State of Nebraska

Automated Clearing House (ACH) Origination Services Technical Proposal

RFP 6304 Z1

August 18, 2020

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COVER LETTER

August 18, 2020

Julie Schiltz / Annette Walton
State Purchasing Bureau
1526 K Street. Suite 130
Lincoln, NE 68508

RE: RFP 6304 Z1 to provide Automated Clearing House (ACH) Origination Services

Dear Ms. Schlitz and Ms. Walton:

I have enjoyed meeting individuals at the State and learning more about your day-to-day processes. We are excited about the opportunity to support the State in its banking service's needs. J.P. Morgan opened its first branch in Nebraska, located a few blocks from the State Capitol building, and are thrilled to open a branch in Omaha by year end.

On behalf of JPMorgan Chase Bank, N.A. (J.P. Morgan), we are pleased to submit our response to the Request for Proposal #6304 Z1 for Automated Clearing Origination Services for the State of Nebraska. Our response includes innovative solutions, industry leading technology and a relationship team that will help you achieve your goals.

- **Innovative Solutions**: To assist the State in their goal to expand electronic payments, at no additional cost, we propose an annual review of your vendor warrant payment file and engagement of our Client Campaign Management team to assist in the conversion of paper-based payments to ACH.
- **Financially Stable, National Bank:** JPMorgan Chase Bank, N.A., is a national banking association with branches in 39 states. The bank is wholly owned by JPMorgan Chase & Co., a financial holding company. The firm is a leader in investment banking, financial services for consumers, small businesses, and commercial banking, financial transaction processing and asset management. J.P. Morgan's Commercial Banking Government segment has maintained an unwavering commitment to empower government clients for over 70 years. Our government banking team is a distinct group of relationship managers, product, technology and service experts who are solely focused on serving the public sector.
- **Dedicated Relationship Team**: The State will be supported by a highly skilled and qualified team led by me, Joanne Meulendyke, Relationship Manager, Treasury Management Officer, Kristen Reece and Client Service Associate, Yolanda Savage. The expertise we offer makes us exceptionally positioned to service the customized and complex requirements of clients like the State. We are committed to working with the State on a collaborative basis to ensure that we understand, and proactively serve, your evolving needs.
- **Cybersecurity**: Cybercrime has shifted away from individual consumers to enterprise opportunities, consequently creating a rising threat to the public sector. J.P. Morgan's technology investment, which includes technology, communication and equipment costs, totals more than $11 billion, with more than $5 billion earmarked for new investments. At J.P. Morgan, we have developed a rigorous program to safeguard our customers' data in our care.

We appreciate the opportunity to respond to this RFP and look forward to the opportunity to meet the evaluation team to further discuss our technical solution. Should you have any questions about the information contained within this response, please do not hesitate to contact me.

Sincerely,

Joanne Meulendyke
Relationship Manager
(312) 732-6988
joanne.meulendyke@jpmorgan.com

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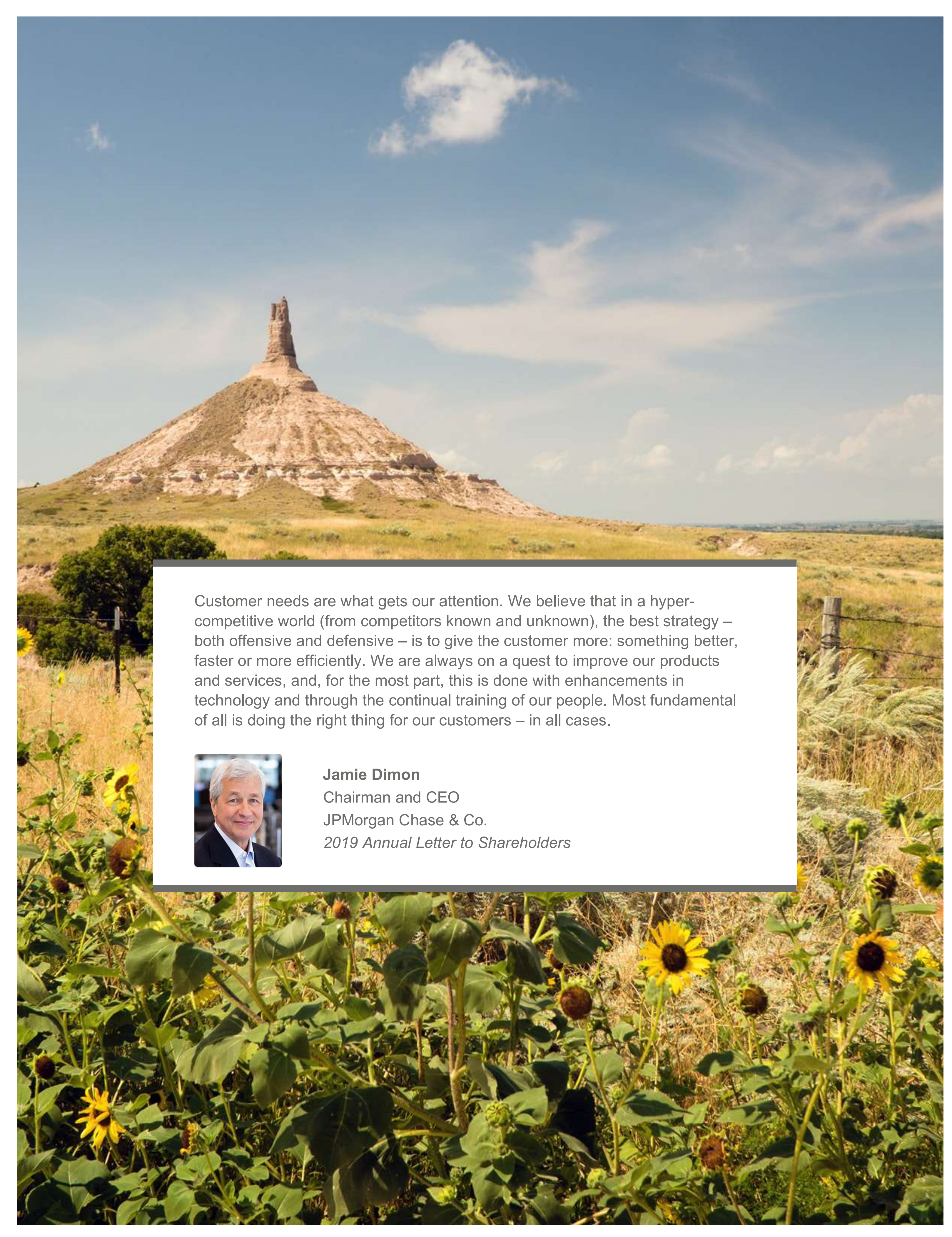


Customer needs are what gets our attention. We believe that in a hyper-competitive world (from competitors known and unknown), the best strategy – both offensive and defensive – is to give the customer more: something better, faster or more efficiently. We are always on a quest to improve our products and services, and, for the most part, this is done with enhancements in technology and through the continual training of our people. Most fundamental of all is doing the right thing for our customers – in all cases.

Jamie Dimon
Chairman and CEO
JPMorgan Chase & Co.
2019 Annual Letter to Shareholders

EXECUTIVE SUMMARY

We understand the State seeks a qualified provider to fulfill your banking needs as entirely, efficiently and timely as possible—a bank that can provide high-quality service and value. Using proven electronic banking solutions can help you control costs, manage resources, and make informed decisions. In addition, the State can increase efficiencies by working with a bank to provide a comprehensive suite of cash management products and tools to the State and its agencies.

With decades of experience working with all levels of government, including entities like the State, our government banking team can guide you in quickly implementing banking services that meet your needs. We will work diligently to provide a solution that exceeds your expectations. We look forward to addressing your key business issues.

Achieving the State's goals

Through a strategic approach we can share insights, perspectives and thoughts to help your staff operate with advanced efficiency and to meet your objectives. We will work with you to outline a plan of proposed initiatives which align with your objectives and we consistently reevaluate this plan to help certify that we stay current with your goals and priorities.

To meet the State's specific needs, we will:

- Draw on our substantial experience with other State governments to offer enhanced practices for automation of complex payment processes
- Bring new ideas and payment industry updates allowing you to take advantage of J.P. Morgan's more than $11 billion technology budget dedicated to continually investing in new solutions that will drive automation
- Commit to continued comprehensive assessment of your operations through whiteboard sessions with key stakeholders with the goal of consistent, system-wide process improvements and specifically tailored agency solutions

Experienced relationship team

Our Government Banking team is a specialized group of relationship managers, product specialists, project managers and client service professionals dedicated to delivering solutions to state and local governments:

- We demonstrate our commitment and experience in the government sector by serving more than 1,850 government clients
- Our commitment to the government sector is founded in a shared belief that efficient and responsive public administration is essential to serving the needs of individuals and communities

We provide ACH services to many state and local governments and our references will provide a testament to our unmatched level of expertise and service.

Reputable financial institution

Our financial stability is demonstrated as of March 31, 2020 results:

- Market capitalization of more than $274.3 billion.
- Total equity of $261.3 billion.
- Deposits of more than $1.8 trillion.
- Loans of more than $1 trillion.
- Tier 1 Capital and Total Capital ratios of 13.3% and 15.5%, respectively. Ratios are calculated under the Basel III Transitional Approach and represent the Collins Floor.

ACH expertise

J.P. Morgan has provided ACH solutions to more than 53,000 clients and has ranked consistently as a top originator of ACH transactions since the founding of the ACH network. Our ACH processing staff has over 12 years of average experience.

J.P. Morgan ranks #1 in U.S. dollar clearing, in 2019 we processed $24 trillion in annual ACH payments.

Additionally, J.P. Morgan ranks as one of the top Receivers of ACH transactions. The bank is a member of Nacha and the Electronic Payments Network (EPN).

Seamless implementation experience

All of our team members, including a dedicated onboarding specialist, will collaborate with you to deliver an exceptional transition and implementation experience. We will develop comprehensive and thoughtful solutions for the State and your agencies and will provide detailed reporting to maximize your visibility throughout the project. We have provided a strategy and detailed plan in our response which illustrates our objectives to:

- Develop a tailored implementation plan that fits the needs of the State and your agencies
- Work with you to understand each operating environment and collaborate with leadership to deploy a cohesive strategy
- In the spirit of continuous improvement, act on your feedback throughout the project to enhance your overall experience

Training

We understand the importance of training in this process and have detailed our approach in our response. We will provide the State with comprehensive training on our industry leading online products during the implementation process and on an ongoing basis, as required by the State. We offer a variety of options, including in-person, online, webinar, video and phone training, as well as extensive online resources for product and service-related content.

Commitment to the State

Our mission is to support people, strengthen communities and advance local economies. As a proud sponsor of the Nebraska Smart Women Smart Money Conference, we are helping maintain the richness and culture that is so important to the State through our deep commitment to local growth and transformation. It has been a privilege to officially be part of the Lincoln community, opening our first Chase branch in the State in Lincoln in late 2019, and we look forward to our second opening in Omaha in the coming months.

EXPANSION

Chase's retail branch expansion amplifies our opportunity to deepen relationships with clients who already are in those markets by giving them access to branches and the additional resources that come with that access. In addition, the expansion opens the opportunity to serve more public sector customers in new U.S. markets through our Government Banking business, deepening community engagement and broadening our work with cities, states, public universities and other municipal cities.

Jamie Dimon, Chairman & CEO – Letter to Shareholders

Building a case for change

The State is faced with an important decision: whether to change your provider or maintain the status quo. As you review our response, we ask you to think about the following:

- Our people and our experience: Implementation and service should be nothing short of outstanding at all times. The financial institution you choose should exceed your expectations in planning, operational accuracy, troubleshooting, communication, sense of urgency, care and kindness.
- Thought-leadership: The bank you select should employ the world class people in the industry that have the experience and expertise to bring you industry updates and market leading practices on a regular basis, so the State can continue to learn about emerging technology and trends.
- New and different technology: When you select an institution, you are choosing a bank and its people for the future. You are committing to a long-term strategic relationship, and you are investing in that institution's technology of the future. It is important to understand their budget and roadmap. You should feel confident they have the resources and vision to stay ahead of the rapidly changing technologies.
- Understanding of culture and vision: The State deserves a highly experienced team of treasury experts that understand your culture, vision for the future and the goals of each of your departments, both individually and as a whole.

In selecting J.P. Morgan as the State's ACH services provider, you are choosing a proven and dependable institution focused on aligning your objectives with solutions to exceed your goals.

J.P. Morgan has been a leading provider of government banking services for the long term and remains committed to this business in the future. We have the experience, the solutions and the people to effectively support the State's goals. We want and value your business.

Experience in the public sector

For over 200 years, J.P. Morgan has been doing business in the public sector and many of our capabilities have been designed and implemented for government clients. Our commitment to the government sector is founded in a shared belief that efficient and responsive public administration is essential to serving the needs of individuals and communities.

J.P. Morgan has developed and maintained strong financial discipline throughout fluctuating market conditions. We follow sound accounting standards, provide transparent public reporting and offer first-rate information management systems. We have the financial stability to provide our clients with a broad and high-quality set of products and services—while leveraging the benefits and efficiency that come with economies of scale. During the economic downturn, government clients sought J.P. Morgan as a safe harbor for funds, as seen by an increase in government deposits during the past five years.

We maintain an unwavering commitment to our government clients. While population and economic shifts present new financial challenges, we remain committed to anticipating and quickly responding to your needs. Major financial and political changes are occurring across all industries, and, as a leading private sector provider, we can share our insights on how industry activities will affect how governments do business. We will consult with you on changes that the State may need to undertake to continue to manage disruptors while serving constituents.

The State can be secure that we will continue to serve your constituents in many ways. We invest in our communities and work with our community-based partners to provide creative solutions that respond to local community development needs. As our mission to servicing relationships is built on a strong value and belief that we should never rest on past performance, we will look for continual process improvement in all that we do for the State today and in the future.

Experience in higher education

We draw on our higher education industry experience to bring you and the University of Nebraska industry leading practices. J.P. Morgan has proudly served as a trusted financial provider to the industry for more than 150 years.

Beyond bringing world class practices and expertise through peer insight, we also leverage our industry experts on our Higher Education Council for thought leadership. This Council is responsible for presenting at industry conferences and producing whitepapers relevant to the trends and challenges facing the industry. Recent NACUBO panels include:

- In Search of Higher Ed's Affordability Grail: New Insights on the Student Loan Burden (2019)
- Strategies for Leaning In: Advancing Women in College and University Leadership Roles 2.0 (2019)
- Becoming the New U: Exploring Purdue's Expansion of the Land Grant Mission (2018)
- Spending strategies for the future (2017)

We will bring this content to you and the University of Nebraska on a regular basis.

Higher Education Expertise	Impact to the University of Nebraska
480+ higher education clients nationally	You will work alongside an established and credible banking provider with connectivity across the country.
250 investment grade public and private schools	Align with a financial provider that can support the complexity required across your scope of services.
260+ professionals delivering industry expertise	Never wonder about the future of your banking or industry team. J.P. Morgan is invested and growing the team that supports this industry. We have no limits on our expansion.

# 1 ranking as Fortune's most admired company (2018)	Based on the quality of the firm's management, its financial soundness, use of assets, long-term investment value and social responsibility.

Dedicated relationship team and consultative approach

We recognize the importance of providing premier client service that differentiates us from other financial providers. We take a consultative and team approach in building relationships with our clients. Your assigned relationship team is responsible for all aspects of your relationship with J.P. Morgan including general information, collateral, depository services, treasury management services, online payments, and research.

Because a one-size-fits-all approach is not an option in today's complex environment, our relationship team takes a client focused approach to provide a specific solution. We understand that operational needs will vary by agency and will require specifically tailored approaches.

We can leverage our J.P. Morgan Treasury Services teams from across sales, product management, market management and client services to assist with the creation of a treasury strategy. This may include working with project teams for re-engineering initiatives and further streamlining of the treasury function. These teams evaluate the States operating needs and technical requirements, then recommend solutions suited to specific needs.

Industry leading technology and cybersecurity

J.P. Morgan invests more than $11 billion annually in technology and cybersecurity to protect clients' information and operations as well as prevent fraud. We have one of the most talented and sophisticated threat intelligence operations in the financial services sector, and we also collaborate with fraud mitigating organizations to share intelligence to develop advanced practices. Our Technology Resiliency Program and Security Operations Center respond to any suspected security breach or incident, provide continuity and mitigation of risks, and recovery of operations of any disruptions associated with cybersecurity threats.

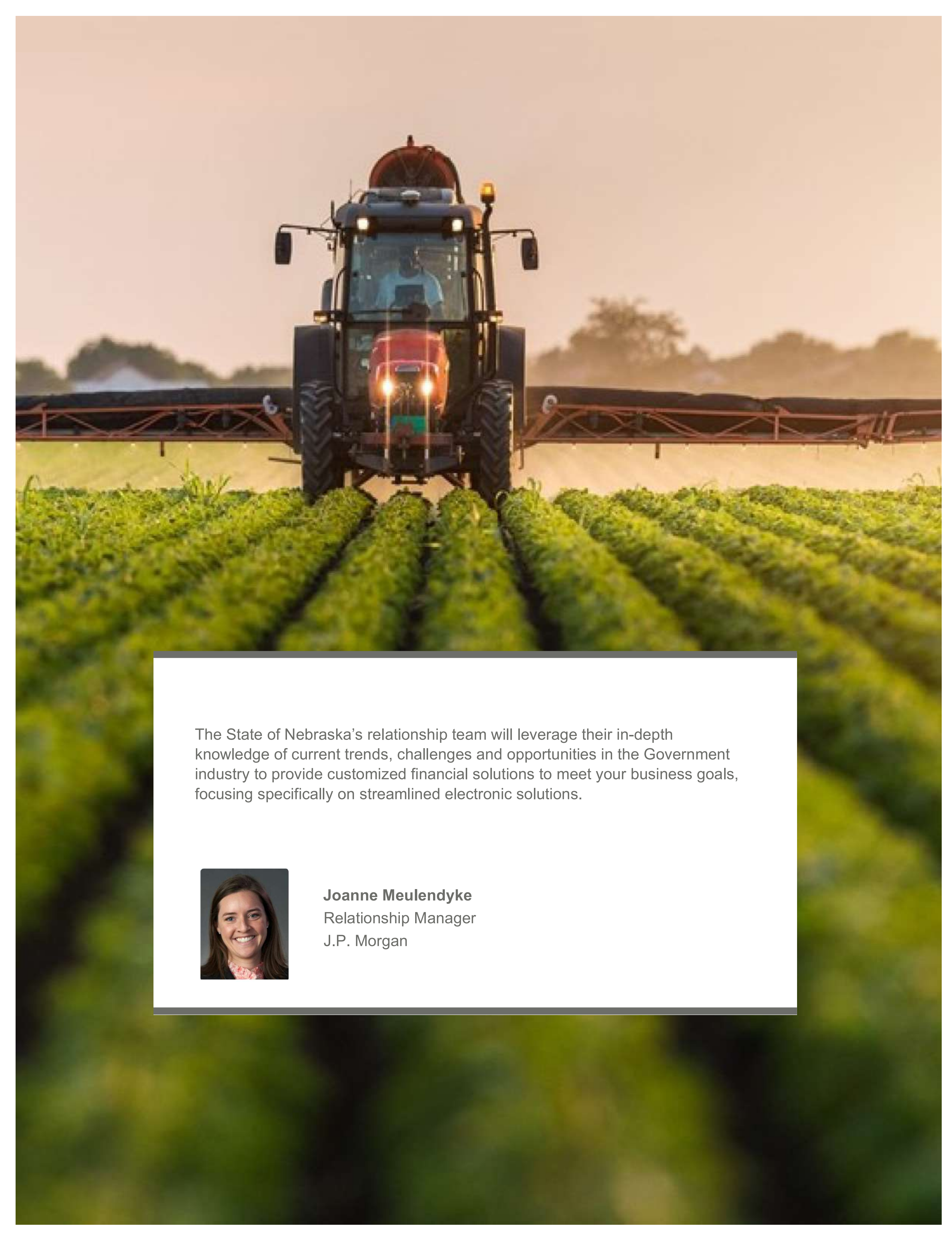
J.P. Morgan has one global platform in which we continue to invest and develop. J.P. Morgan Access® Online is easy to use and customizable. We will work together to explore options that, will enable the State to automate payments, improve reconciliation and reporting, as well as provide full visibility and control to make informed decisions. Per Greenwich Associates, J.P. Morgan Access® Online is ranked as the #1 Cash Management Portal in North America.

Exceptional client service and implementation

We understand the primary importance of account management support and responsiveness to your daily inquiries as well as any new treasury needs. J.P. Morgan recognizes that dedicated, government-focused, responsive and effective service is vital to the State's business goals and objectives. Excellent client service and implementation are fundamental to our core values.

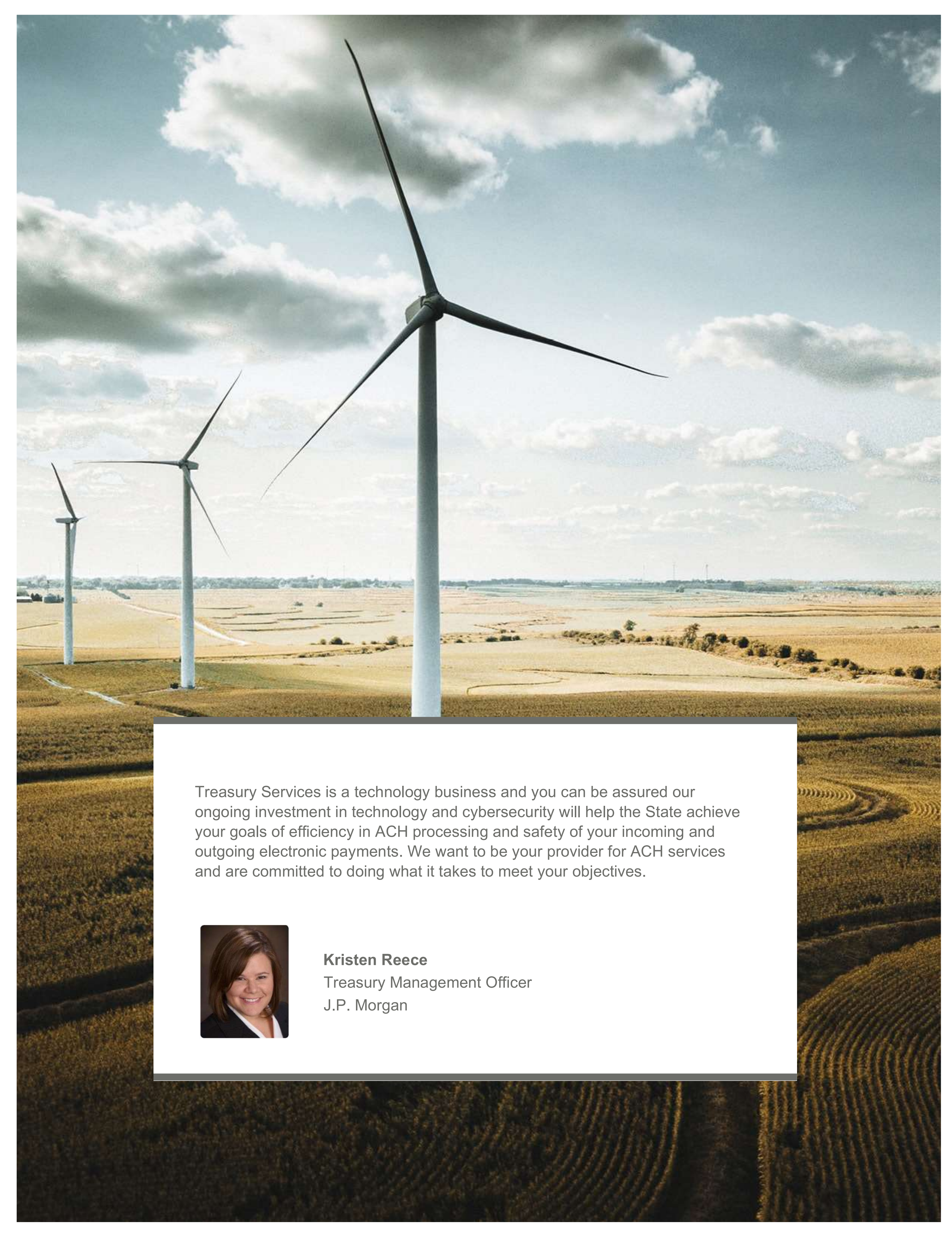
Conclusion

We look forward to earning the opportunity to include the State as one of our government banking clients and continue to build an important strategic relationship. J.P. Morgan is distinctively positioned to help the State as we understand the business and propose customized, competitive solutions to address each of your goals. Our world class treasury platform and fortress balance sheet will continue to support the State's efforts to operate efficiently and securely while supporting the needs of the State and its agencies. We would be honored to be a part of the State's future success.



The State of Nebraska's relationship team will leverage their in-depth knowledge of current trends, challenges and opportunities in the Government industry to provide customized financial solutions to meet your business goals, focusing specifically on streamlined electronic solutions.

Joanne Meulendyke
Relationship Manager
J.P. Morgan



Treasury Services is a technology business and you can be assured our ongoing investment in technology and cybersecurity will help the State achieve your goals of efficiency in ACH processing and safety of your incoming and outgoing electronic payments. We want to be your provider for ACH services and are committed to doing what it takes to meet your objectives.

Kristen Reece
Treasury Management Officer
J.P. Morgan

CORPORATE OVERVIEW

The Corporate Overview section of the Technical Proposal should consist of the following subdivisions:

a. BIDDER IDENTIFICATION AND INFORMATION

The bidder should provide the full company or corporate name, address of the company's headquarters, entity organization (corporation, partnership, proprietorship), state in which the bidder is incorporated or otherwise organized to do business, year in which the bidder first organized to do business and whether the name and form of organization has changed since first organized.

JPMorgan Chase & Co. (JPMorgan Chase) is a financial holding company. Its principal banking subsidiaries are JPMorgan Chase Bank, N.A., a national banking association with branches in 39 states, and Chase Bank USA, N.A., the firm's credit card issuing bank. JPMorgan Chase Bank, N.A. is wholly owned by JPMorgan Chase & Co.

JPMorgan Chase is a leading global financial services firm with assets of more than $3.1 trillion. The firm is a leader in investment banking, financial services for consumers, small businesses, and commercial banking, financial transaction processing and asset management. A component of the Dow Jones industrial average, JPMorgan Chase & Co. has its corporate headquarters in New York. The firm serves millions of consumers in the United States and many of the world's most prominent corporate, institutional and government clients under the J.P. Morgan and Chase brands. Information about the firm is available on the Internet at www.jpmorganchase.com.

With 172 offices in 172 cities globally, Commercial Banking provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management to meet its clients' domestic and international financial needs.

As of March 31, 2020, JPMorgan Chase & Co. has:

- Headcount of approximately 257,000 employees worldwide.
- Market capitalization of $274.3 billion.
- Deposits of $1.8 trillion.
- Loans of $1 trillion.
- Total stockholder equity of $261.3 billion.
- Tier 1 and total risk-based capital ratios 13.3% and 15.5%, respectively. Ratios are calculated under the Basel III Transitional Approach and represent the Collins Floor.

History of our firm

The story of J.P. Morgan Chase and our legacy institutions reaches back more than 200 years with the founding of our earliest predecessor in 1799. Since that time, over 1,200 financial institutions—including such legacy predecessors as J.P. Morgan, Chase Manhattan, Chemical Bank, National Bank of Detroit, Bank One, First National Bank of Chicago and Washington Mutual—have come together to form the largest bank in the United States and one of the premier financial institutions in the world.

Historical Overview

1799
The Manhattan Company is chartered

1848
The Waterbury Bank opens, a predecessor of the Chase Manhattan Bank

1895
J. Pierpont Morgan, Sr. becomes senior partner. The New York firm is renamed J.P. Morgan & Co.

1915
During WWI, J.P. Morgan arranges the biggest foreign loan in Wall Street history – a $500 million dollar Anglo/French loan

1947
Gives $8.5 million to the United Nations to purchase the 17-acre property for the organization's head-quarters in Manhattan

1955
Chase National Bank merges with The Bank of the Manhattan Company to form Chase Manhattan Bank

1996
Jointly leads the first "century" bond for a sovereign borrower – a 100-year, $100 million issue for the People's Republic of China – as well as a $1 billion Eurobond

The Chemical Bank is established
1824

1893
J.P. Morgan is primary financier of U.S. railroads

1906
J.P. Morgan is central to the creation of U.S. Steel, GE and AT&T

1929
Two Ohio banking institutions merge to form City National Bank & Trust, a predecessor of Bank One

1968
Launches Euroclear, a system that provides for the orderly settle-ment of transactions in Eurobonds

1980
Predecessor firm Hambrecht & Quist (H&Q) takes Apple Computer public

2008
Plays an important role in helping manage the credit crisis through the acquisition of Bear Stearns

Figure 1

b. FINANCIAL STATEMENTS

The bidder must provide financial statements applicable to the firm. Bidder should provide financial statements in a separate file. If publicly held, the bidder must provide a copy of the corporation's most recent audited financial reports and statements, and the name, address, and telephone number of the fiscally responsible representative of the bidder's financial or banking organization.

If the bidder is not a publicly held corporation, either the reports and statements required of a publicly held corporation, or a description of the organization, including size, longevity, client base, areas of specialization and expertise, and any other pertinent information, should be submitted in such a manner that proposal evaluators may reasonably formulate a determination about the stability and financial strength of the organization. Additionally, a non-publicly held firm should provide a banking reference.

The bidder must disclose any and all judgments, pending or expected litigation, or other real or potential financial reversals, which might materially affect the viability or stability of the organization, or state that no such condition is known to exist.

The State may elect to use a third party to conduct credit checks as part of the corporate overview evaluation.

For the State's convenience, J.P. Morgan makes our financial statements and other publicly filed documents available through our website: https://www.jpmorganchase.com/corporate/investor-relations/annual-report-proxy.htm. This link provides past and current JPMorgan Chase & Co. Annual Reports, which includes audited financial statements.

c. CHANGE OF OWNERSHIP

If any change in ownership or control of the company is anticipated during the twelve (12) months following the proposal due date, the bidder should describe the circumstances of such change and indicate when the change will likely occur. Any change of ownership to an awarded bidder(s) will require notification to the State.

J.P. Morgan has not had any material mergers or acquisitions (as defined by securities laws) in the last three years. We note that on July 24, 2019, JPMorgan Chase & Co. closed the acquisition of InstaMed Holdings Inc., a leading U.S. healthcare technology company that specializes in healthcare payments. For more information, you may refer to the press release: https://www.jpmorgan.com/country/US/EN/detail/1320574606872

For proprietary and confidentiality reasons, J.P. Morgan is unable to disclose, confirm or deny whether it has plans to merge, reorganize, consolidate, amalgamate, sell or close any part of its business; or engage in any consolidation, amalgamation or merger with or into another person or entity that may affect J.P. Morgan's existing structure or operations. Any plans for acquisitions, expansion or new affiliations are confidential until such time as J.P. Morgan discloses such information to the general public.

d. OFFICE LOCATION

The bidder's office location responsible for performance pursuant to an award of a contract with the State of Nebraska should be identified.

Your relationship manager, Joanne Meulendyke is based in Chicago, Illinois and will be your primary contact throughout the term of the contract.

Primary Contact:	Joanne Meulendyke
Title:	Relationship Manager
Address:	10 S Dearborn St., Chicago, IL 60603-2300

e. RELATIONSHIPS WITH THE STATE

The bidder should describe any dealings with the State over the previous five (5) years. If the organization, its predecessor, or any Party named in the bidder's proposal response has contracted with the State, the bidder should identify the contract number(s) and/or any other information available to identify such contract(s). If no such contracts exist, so declare.

To the knowledge, information and belief of the undersigned after reasonable inquiry, the Bank has the following dealings with the State over the prior five (5) years. Note that due to the firm's internal confidentiality restrictions and information barriers, the following may not include all dealings across the firm.

- J.P. Morgan Securities LLC: S-014-110, S-014-109, S-014-108, S-014-107, S-014-106, S-014-105, S-014-096
- JPMorgan Chase Electronic Financial Services, Contract Number 55677

f. BIDDER'S EMPLOYEE RELATIONS TO STATE

If any Party named in the bidder's proposal response is or was an employee of the State within the past twelve(12) months, identify the individual(s) by name, State agency with whom employed, job title or position held with the State, and separation date. If no such relationship exists or has existed, so declare.

If any employee of any agency of the State of Nebraska is employed by the bidder or is a Subcontractor to the bidder, as of the due date for proposal submission, identify all such persons by name, position held with the bidder, and position held with the State (including job title and agency). Describe the responsibilities of such persons within the proposing organization. If, after review of this information by the State, it is determined that a conflict of interest exists or may exist, the bidder may be disqualified from further consideration in this proposal. If no such relationship exists, so declare.

No individual on the State's proposed relationship team has had such a relationship with the State.

g. CONTRACT PERFORMANCE

If the bidder or any proposed Subcontractor has had a contract terminated for default during the past five (5) years, all such instances must be described as required below. Termination for default is defined as a notice to stop performance delivery due to the bidder's non-performance or poor performance, and the issue was either not litigated due to inaction on the part of the bidder or litigated and such litigation determined the bidder to be in default.

It is mandatory that the bidder submit full details of all termination for default experienced during the past five (5) years, including the other Party's name, address, and telephone number. The response to this section must present the bidder's position on the matter. The State will evaluate the facts and will score the bidder's proposal accordingly. If no such termination for default has been experienced by the bidder in the past five (5) years, so declare.

If at any time during the past five (5) years, the bidder has had a contract terminated for convenience, non-performance, non-allocation of funds, or any other reason, describe fully all circumstances surrounding such termination, including the name and address of the other contracting Party.

The undersigned is not aware of any cancelation or termination of a contract for default in the last five years of the Government Banking division of the Commercial Bank. The undersigned is also not aware of any cancelation or termination of a contract a due in whole or in part to the fault of the Government Banking division of the Commercial Bank which we believe would materially adversely affect our ability to provide the services covered by the RFP. Decisions by a client to not renew or end a contract can vary and due to privacy and confidentiality restrictions we are not able to provide further information about our clients or former clients or their decision making process.

h. SUMMARY OF BIDDER'S CORPORATE EXPERIENCE

The bidder should provide a summary matrix listing the bidder's previous projects similar to this solicitation in size, scope, and complexity. The State will use no more than three (3) narrative project descriptions submitted by the bidder during its evaluation of the proposal.

The bidder should address the following:

1) Provide narrative descriptions to highlight the similarities between the bidder's experience and this solicitation. These descriptions should include:

a) The time period of the project;

b) The scheduled and actual completion dates;

c) The bidder's responsibilities;

d) For reference purposes, a customer name (including the name of a contact person, a current telephone number, a facsimile number, and e-mail address); and

e) Each project description should identify whether the work was performed as the prime bidder or as a Subcontractor. If a bidder performed as the prime bidder, the description should provide the originally scheduled completion date and budget, as well as the actual (or currently planned) completion date and actual (or currently planned) budget.

Commonwealth of Kentucky	
Contact Name, Title	Ryan Barrow, Executive Director, Office of Financial Management
Address	702 Capitol Avenue, Frankfort, KY 40601
Phone	(502) 564-2924
Email	Ryan.barrow@ky.gov
Length of time services provided	52 years
Services provided	Depository services, disbursements, receivables, currency Services, Image Cash Letter and Virtual Remit, wires, ACH, eLockbox, online banking and reporting
Narrative Description	J.P. Morgan is the Commonwealth of Kentucky's primary operating bank. We provide a variety of solutions to the Commonwealth, including ACH origination and receiver services, as well as host online payment portals for multiple payment types and offer streamlined solutions that integrate directly into their ERP platform. Additionally, like all of our clients, the Commonwealth continues to benefit from J.P. Morgan's robust fraud protection services.
Prime bidder/Subcontractor	Primary
Completion date	Ongoing and completed within agreed upon budget

State of Michigan	
Contact Name, Title	Andrew Boettcher, Administrator, Office of Financial Services
Address	430 W Allegan St., Lansing, MI
Phone	(517) 231-9844
Email	boettchera@michigan.gov
Length of time services provided	20+ years
Services provided	ACH, wire transfer, online and phone payment collections, Lockbox, Image Cash Letter, check disbursements, and liquidity solutions.

State of Michigan	
Narrative Description	J.P. Morgan is the State of Michigan's primary operating bank. We provide a variety of complex solutions to the State, including ACH origination and receiver services. We host online payment portals for multiple payment types and offer IVR and CSR channels to the State's payers and provide customized remittance files to the State in order to integrate directly into their ERP platform.
Prime bidder/Subcontractor	Primary
Completion date	Ongoing

State of Florida	
Contact Name, Title	Tanya McCarty, PMP ®, FCCM, Chief, Bureau of Funds Management Division of Treasury, Department of Financial Services
Address	1801 Hermitage Blvd., Tallahassee, FL 32308
Phone	(850) 413-2761
Email	Tanya.McCarty@myfloridacfo.com
Length of time services provided	< 1 year
Services provided	ACH & Controlled Disbursement/Check Print
Narrative Description	State of Florida transitioned their ACH and check disbursements to J.P. Morgan in 2020. Through the implementation, a large focus was placed on driving efficiency through integration with their current ERP system as well planning for an ERP upgrade in 2021
Prime bidder/Subcontractor	Primary
Completion date	Ongoing and completed within agreed upon budget

2) ***Bidder and Subcontractor(s) experience should be listed separately. Narrative descriptions submitted for Subcontractors should be specifically identified as Subcontractor projects.***

J.P. Morgan does not anticipate using subcontractors for any services provided.

3) ***If the work was performed as a Subcontractor, the narrative description should identify the same information as requested for the bidders above. In addition, Subcontractors should identify what share of contract costs, project responsibilities, and time period were performed as a Subcontractor.***

Not applicable.

BIDDER'S PROPOSED PERSONNEL APPROACH

Part of J.P. Morgan's commitment to the State is having the appropriate individuals assigned to your relationship team and providing outstanding client service. J.P. Morgan recognizes the importance of providing premier client service and we are committed to delivering a quality of service that not only meets the State's expectations, but also exceeds industry standards. We take a consultative team approach to building relationships with our clients. We assign a skilled relationship team, which is made up of professionals with a variety of expertise, providing individual answers by taking the time to understand your business, listening carefully and proactively providing targeted ideas to energize your business.

Brief biographies and contact information of your relationship team are provided below.

Joanne Meulendyke

Role	Relationship Manager
Address	10 S Dearborn, Floor 36 Chicago, IL 60603-2300
Phone	(312) 732-6988
Email	joanne.meulendyke@jpmorgan.com

Responsibilities

Joanne will lead the State's banking team with a focus on the quality and delivery of our services. Her experience working with large, complex clients will bring a consultative approach from the implementation of ACH services tailored to each agency to ongoing support of the State's needs.

She will:

- Serve as your primary point of contact for the bank's full capabilities
- Share enhanced practices to maximize electronic payments, as well as maintain awareness of products and services that meet the State's needs and goals
- Oversee delivery of products and services, including the utilization of technology to add efficiency to the processing of electronic payments, reduce manual touchpoints and help protect the State from fraudulent activity
- Address your overall satisfaction with your J.P. Morgan banking relationship

Biography

Joanne Meulendyke joined J.P. Morgan Corporate Investment Bank in 2016, focused on trust and custody services with government clients. In 2018, she brought her government experience to the Commercial Bank where she is a banker on our Midwest Government Banking team. Joanne brings a relationship-focused approach to working with her clients, as well as the depth and breadth of J.P. Morgan.

Joanne received a Bachelor of Business Administration in Marketing from the University of Wisconsin and an MBA from the University of Chicago Booth School of Business.

Resume

2016-2018 **Investor Services, J.P. Morgan Corporate Investment Bank**

- Managed strategic initiatives for existing asset owner clients, including public funds
- Coordinated with J.P. Morgan colleagues across Asset Management, Investment Banker, Commercial Bank and Treasury Services
- Worked with client service teams to confirm meeting client expectations and delivering on scope of services

2012-2016 **Trust and Custody Client Executive, Northern Trust**

- Delivered Trust and Custody services to Foundation, Endowment and Health Care Institutions
- Support client satisfaction by instructing and coordinating service teams to enable timely delivery and issue-resolution, and effectively communicate client needs to partners
- Developed understanding of client's business, objectives, goals and delivered relationship plan tailored to client

2006-2012 **Senior Consultant, J.P. Morgan Chase Bank, N.A. and Aon (Aon acquired J.P. Morgan team in 2010)**

- Managed client relationships for retirement plan regulatory reporting consulting
- Participated in the sales process, including presentation of service and building tailoring project management solutions

References **Alex Shalak, City of Chicago, Office of the City Treasurer**

121 North La Salle Street, Room 106, Chicago, Illinois 60602

Phone: 312-742-2734 Email: Oleksandra.Shalak@cityofchicago.org

Walter Stock, Chicago Public Schools, Treasurer and Deputy Chief Financial Officer

42 W. Madison Street, Chicago, IL 60602

Phone: 773-553-2795, Email: wmstock@cps.edu

Cynthia Evangelisti, Chicago Park District

541 N. Fairbanks, Chicago IL, 6061

Phone: 312-742-4289 Email: cynthia.evangelisti@ChicagoParkDistrict.com

Kristen Reece

Role	Treasury Management Officer
Address	1116 West Long Lake Road, Floor 2 Bloomfield Hills, MI 48302-1963
Phone	(248) 839-0010
Email	kristen.k.reece@jpmorgan.com

Responsibilities

Leading the treasury services team, Kristen will consult with the State on an ongoing basis to maintain the world class treasury management arrangements specifically tailored to meet the State's needs, communicate good practices, new solutions and enhancements to products and services.

She will:

- Assist the State in realizing day-to-day operational efficiencies in alignment with your treasury service goals
- Provide targeted information to you about new products, market developments and industry trends
- Monitor the State's implementation for successful service delivery

Biography

Kristen Reece is a treasury management officer focused on providing complex treasury and cash management services to large government clients in the Midwest. She has over twenty-five years of experience with J.P. Morgan and its predecessor organizations. Her experience includes treasury services sales and relationship management, credit underwriting, client service and operations.

Kristen has a wealth of ACH experience not only from her many years of working within Treasury Services, but also from 5 years within J.P. Morgan's ACH operations.

She uses her industry knowledge and treasury expertise to collaborate with clients, build strong relationships, and recommend innovative solutions that will satisfy current business objectives and position clients for future growth.

Kristen received her Bachelor of Accountancy degree from Walsh College of Business.

Resume

2012-2016 **Commercial Banking Underwriter, J. P. Morgan Chase Bank, N.A.**

- Underwrite commercial banking loans for an assigned portfolio of clients in Middle Market

2007-2012 **Treasury Services Associate, J. P. Morgan Chase Bank, N.A.**

- Provided support to treasury management officers and relationship managers
- Prepared and presented client account plans and relationship reviews
- Coordinated sales of new services by analyzing project requirements, developing customized solutions, and overseeing the implementation process for new and existing clients

2004-2007 **Sr. Client Services Associate, J. P. Morgan Chase Bank, N.A.**

- Managed client relationships within an assigned commercial banking portfolio by providing cash management and commercial lending support
- Served as ACH subject matter expert for Midwest client service team

1999-2004	**Operations, ACH, J. P. Morgan Chase Bank, N.A.** • Managed a team of ACH service associates • Performed complex ACH research requests and exceptions
1994-1999	**Operations, Check processing, J. P. Morgan Chase Bank, N.A.** • Processed and reconciled check deposits
References	**Andrew Boettcher,** State of Michigan 430 W Allegan St., Lansing, MI 48922 Phone: (517) 231-9844, Email: boettcherA@michigan.gov **John Kravitz,** Wayne County 400 Monroe St., STE 550, Detroit, MI 48226 Phone: (313) 224-0489, Email: jkravitz@waynecounty.com **Pat Niland,** Indianapolis Public Schools 120 E Walnut St, Acc Dept Rm B- 5, Indianapolis, IN 46204 Phone: (317) 226-3602, Email: nilandj@myips.org

Yolanda Savage

Role	Senior Client Service Associate
Address	10 S Dearborn St, Floor 37 Chicago, IL 60603-2300
Phone	(312) 732-6916
Email	Yolanda.e.savage@jpmorgan.com

Responsibilities

Yolanda will serve as the primary point of contact and as a proactive resource for the State's banking service needs. With her understanding of all aspects of J.P. Morgan's Treasury Services' product functionality and technology, Yolanda will facilitate the timely resolution of all service issues.

For day-to-day matters, she will:

- Resolve the State's inquires including credit/debit confirmations, cancellations of payments, amendments of payment instructions, funds transfer inquires and other treasury service matters
- Identify and resolve operational issues in a timely manner
- Share her specialized knowledge of fraud prevention tools and provide advice on asset and data protection strategies
- Facilitate the opening of additional accounts

Yolanda works with a team of client service professionals who will provide consistent, reliable, and timely service support.

Biography

Yolanda Savage works with government, not-for-profit and higher education clients in the Illinois market as a dedicated client service associate. Yolanda will be the State's central point of contact and will address your account servicing needs promptly and thoroughly.

A banking veteran of 21 years with J.P. Morgan, Yolanda has been a client service professional since 2010.

Resume

2002-2010 **Operations Specialist II, CPA IPA Services**

- Actively assisted customers with Commercial Paper Settlements exceeding 50 billion daily.
- Reconciled daily financial figures and securities positions.
- Thoroughly managed all debits/credits to each customer account using the SBS system.

Securities Technician II, Capital Markets Inc.

- Provided assistance to traders during the buy/sell process of Government Securities.
- Assisted Treasury Bill Traders with auctions initiated by the Federal Reserve Bank.
- Performed in-depth analysis of the profit and loss issues for approximately ten Trader portfolios.

References	**Alex Shalak, City of Chicago, Office of the City Treasurer** 121 North La Salle Street, Room 106, Chicago, Illinois 60602 Phone: 312-742-2734 Email: Oleksandra.Shalak@cityofchicago.org **Kevin McGowan, Cook County, Office of the County Treasurer** 118 North Clark Street, Room 212, Chicago, Illinois 60602 Phone: 312-603-5619 Email: kmcgowan@cookcountytreasurer.com **Patricia Mocco, Manager of Account Payables, The Art Institute of Chicago** 111 South Michigan Ave., Chicago, Illinois 60603 Phone: 312-499-4055 Email: pmocco@artic.edu

a. SUBCONTRACTORS

J.P. Morgan has not outsourced any cash management services included in this proposal in the past 24 months.

TECHNICAL APPROACH

a. Understanding of the project requirements

Mandatory Project Requirements

Bidder Name: J.P. Morgan Chase Bank, N.A.

Please answer the following seven mandatory questions with a check mark after the appropriate response. Any "No" answer will eliminate the contractor from further evaluations.

Yes ☒ No ☐ Does the contractor agree, without exceptions, to meet State Statute requirements for collateralization of State Deposits?

Yes ☒ No ☐ Does the contractor agree, without exceptions, to provide a statement of collateral every month along with the holding companies pledged securities?

Yes ☒ No ☐ Does the contractor agree, without exceptions, that collateral arrangements must require a signature of a State designated representative before release of collateral or line of credit?

Yes ☒ No ☐ Is the contractor a state or national bank licensed to do business in the State of Nebraska and of approved standing and responsibility pursuant to Neb. Rev. Stat. § 77-2301?

Yes ☒ No ☐ Does the contractor agree to cash Nebraska State Treasury warrants and warrants issued by the NCSPC free of charge and without requiring a fingerprint as required in Neb. Rev. Stat. § 77-2301?

J.P. Morgan agrees to cash Nebraska State Treasury and NCSPC warrants up to $5K for non-accountholders without requiring a fingerprint.

Yes ☒ No ☐ Does the contractor agree to continue the use of the State of Nebraska's UPIC numbers?

b. Proposed development approach

Baseline Functional

Bidder must provide a narrative response describing how the solution will meet each of the following statements.

FR 1 – Technical/Hardware/Software Requirements

a. Describe hardware/software requirements to access a secure online solution.

Response:

Access Online supports the operating systems and Internet browsers provided in the appendix referenced below. Please confirm that the State's systems meet the recommended hardware and software for optimal performance.

Technical Requirements have been included in Appendix 1.

FR 2 – Online Bank Reporting/Internet Functionality

a. Describe how a secure online solution to view bank activity is provided.

Response:

Our electronic banking portal Access Online is a simple, intuitive and multi-functional channel that provides rich information and transaction capabilities with a single sign-on to product applications across the Treasury Services product line.

With a single sign-on, the State's employees have the ability to review and manage data, customize treasury activities, initiate payments, coordinate entitlements and respond to changes. The system is designed to fit the way the State works. The difference is apparent immediately on the home page, which consolidates critical information in one place.

Access Online puts critical cash management information and tools at your fingertips, and the unparalleled experience of J.P. Morgan at your service.

Access Online: A comprehensive cash management system

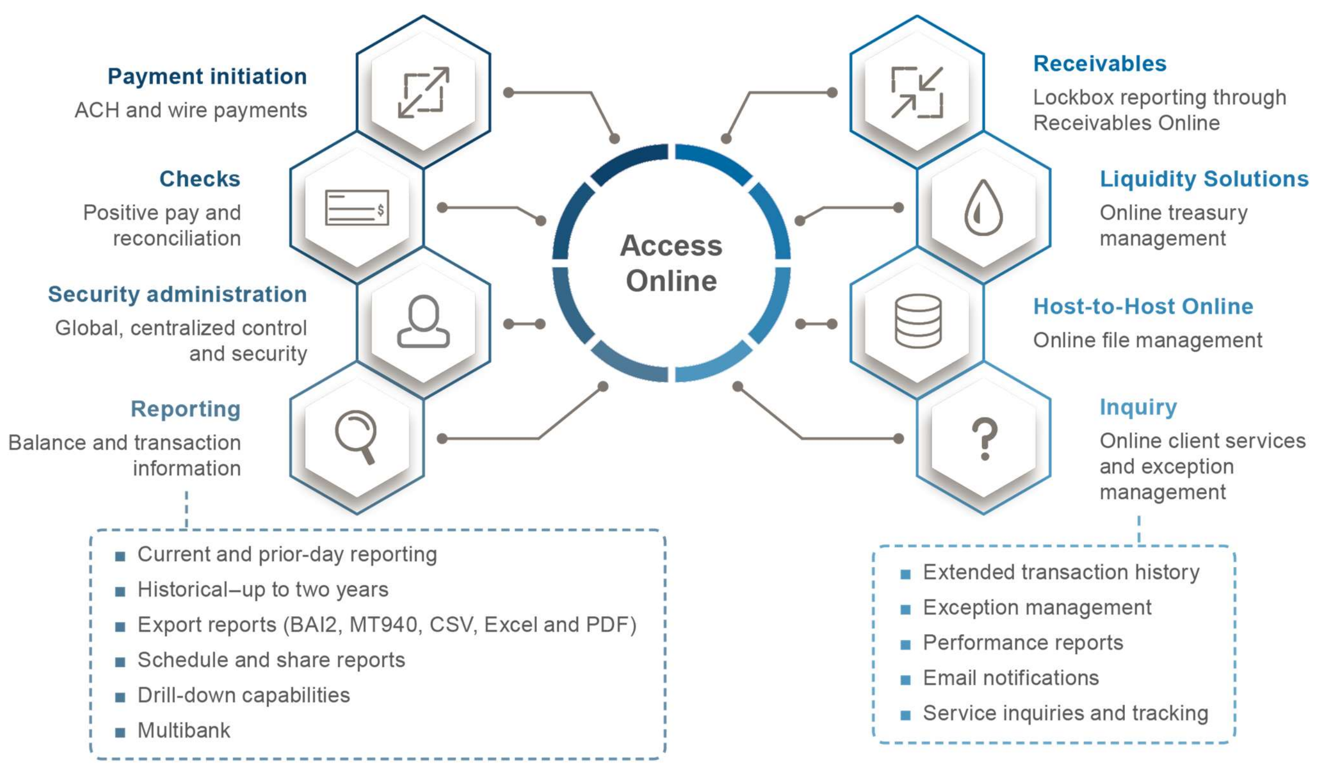


Figure 2

- **Transactions**: Make payments via wires, book transfers, checks, U.S. and global ACH.
- **Checks:** Positive pay services, stop payment services, reconciliation reporting and data download.
- **Reports**: View, print or download reports with balance and transaction information, cash concentration, disbursement, funds transfer and liquidity.
- **Statements**: View, print or download bank, billing and liquidity statements from a central repository.
- **Administration**: Save time with a powerful and innovative entitlement engine that saves time, increases productivity and controls everything users can see and do.
- **More services**: Access a single point of entry to a wide range of additional treasury management services that includes Receivables Online.
- **Access Insight**: Create a customized Microsoft Excel worksheet that can be automatically populated with 45 days of bank account data, or can populate existing spreadsheets so you can initiate payments directly from spreadsheets, set reminders, generate to-do lists, analyze historical trends and more. Access Insight is an Excel add-in that makes working in spreadsheets more efficient, flexible and accurate.
- **Liquidity Solutions**: View reports and make decisions about cash balances and cash investment positions, cash concentration structures and flows, inter-company positions and accruals.

Features and benefits

Access Online benefits	
Secure and efficient	Accessed through the Internet, a sophisticated multi-layer security system protects the privacy and authenticity of users, data and transactions.
Easy to use	A single sign-on provides seamless access to authorized accounts and functionality. Upgrades are accomplished automatically when users sign on.
Saves time	The customizable home page places critical information at your fingertips—with features and capabilities that are just a few clicks away.
One site	Based on advanced technology and standard interface protocols, Access Online is a single point of access to our financial services.
Unparalleled service	Our Client Service and Technical Support teams are available 24 hours a day, Monday through Friday.
Broad suite of services	Comprehensive functionality provides secure, seamless access to products across J.P. Morgan businesses.
Decision support interfaces	These allow you to effectively manage your data using filtering and export technologies.
Virtually effortless administration	Security administrators use simple and intuitive tools to manage and respond to frequent user entitlement changes in real time, and with time-saving features such as Cloning Entitlements and Account and User Groups.
Flexibility	The State can select the services required to support your current business environment and add additional services as your needs evolve.
Self-service training and education	Access Support offers clients a single and consistent location for product and service related content providing support and training material. An intuitive online webinar registration tool allows your staff to participate in training as and when required.

b. Provide a link to demo the online solution website and describe how to use.

Response:

For more information of our Access Online products and services described in this response, visit http://www.jpmorgan.com/treasury/jpm_access/index.html and https://www.jpmorgan.com/access/guides.

c. Describe a web-based system, IVR system and operator-assisted service to collect payment data from taxpayers. Describe any mobile functionality available.

Response:

Our solution enables the State to collect from your payers electronically through multiple channels, including a State-branded online and mobile portal that is securely hosted by J.P. Morgan.

As part of our comprehensive solution, the platform can support additional payment channels, including an interactive voice response (IVR), in-person point-of-sale (POS) and an operator assisted channel. This fully integrated ecosystem enables the State to consolidate and automatically reconcile your collections regardless of what payment type was used.

Our solution enables the State to accept a variety of payment types, including credit card, debit card, Apple Pay and eCheck/ACH. The platform incorporates industry leading practices in payment processing and security with the expertise of one of the world's leading financial institutions. It is the only third-party payment collection system available today that is fully owned by a single provider. This provides the State with a single point of accountability throughout the entire process.

Our solution is designed to be integrated with your collection process and supports a deep amount of configurability, such as:

- The State-branded online portal with your logo, color schemes, labels and banner graphics or optional co-branding with the Chase logo
- Other payment channel support, such as mobile application, IVR, call center and point-of-sale
- The State-branded outbound email notifications such as bill notification, payment reminders and confirmations
- Secure, online invoice image presentment
- English and Spanish language options
- Flexible payment options:
  - One-time payments that can be processed immediately or on a scheduled date
  - Recurring payments that can be installment payments with a fixed amount on a fixed frequency or variable recurring payments where the amount and/or timing of each payment can vary per your billing cycle
- Multiple payer registration options including pre-registration, self-registration or unregistered/guest payments
- Configurable remittance data presentation and collection
- Modularly expandable hierarchical structure to support multiple business units and/or payment types
- Online Administration capabilities enabling entitled users to conduct role-appropriate research, inquiries reporting and payment activities
- Real-time and end-of-day reporting options available, as well as consolidated reporting options with lockbox, remote deposit capture, and other electronic receivables
- Direct settlement to the State's demand deposit account (DDA) held at J.P. Morgan or a daily sweep to your depository bank using our Standing Order Funds Transfer Initiation (SOFTI) process.

These are just some of the configurable options available to the State. You will work closely with an experienced onboarding specialist who will help define, build and test your customized setup, staying closely tied with you through the entire process.

Once launched, you will take advantage of the highly scalable infrastructure that actively supports hundreds of clients just like you, and processes over 38 million transactions valued at approximately $41 billion on an annual basis.

As an industry leader, J.P. Morgan is committed to providing the State with the functionality, expertise and support to effectively achieve an integrated receivables solution now and in the future as your needs evolve.

Solution Overview

Bill presentment

Configurable data element parameters:

- Bill notification email
- Bill data only or with an image
- Single or multiple bills

Payer registration

Three registration options:

- Preregistration (by you)
- Self registration (by payer)
- Unregistered payments

Payment channels

Six payment channels:

- Web
- Mobile
- IVR
- CSR
- Point of sale
- Client interface/API

Payment methods

Payers can select from:

- Credit cards
- Debit cards
- eCheck/ACH
- Apple Pay

Payment frequency

Frequency options include:

- Immediate
- Scheduled
- Recurring
- Installment
- Variable/automatic

Payment information

Remittance data:

- Real-time payment confirmations
- End-of-day remittance file

Administrative site:

- Research and reconcile payments
- Generate reports

Figure 3

d. ***Allow taxpayers to initiate payments via IVR and web until 5:00 PM CT for next-day settlement. Discuss cut-off times and ACH processing schedules. Provide customer service support times for the IVR.***

Response:

Settlement of funds typically occurs one or two business day after the payment is made or scheduled by your payer and is dependent on the payment method used.

Below is the typical settlement timing for ACH transactions based on our standard cutoff times. The State has the flexibility to select earlier cutoff times if required.

Settlement timing

	ACH 8:00 p.m. CT cutoff	Credit/debit card (1) 7:00 p.m. CT cutoff	
Payment made	**Standard settlement**	**Standard settlement**	**Wire settlement (2)**
Monday	Tuesday	Wednesday	Tuesday
Tuesday	Wednesday	Thursday	Wednesday
Wednesday	Thursday	Friday	Thursday
Thursday	Friday	Monday	Friday
Friday	Monday	Tuesday	Monday

Settlement timing			
	ACH **8:00 p.m. CT cutoff**	**Credit/debit card** (1) **7:00 p.m. CT cutoff**	
Payment made	**Standard settlement**	**Standard settlement**	**Wire settlement** (2)
Saturday	Tuesday	Wednesday	Tuesday
Sunday	Tuesday	Wednesday	Tuesday

(1) Based on the State's preference, Discover transactions can be settled by Chase Merchant Services or you can receive payment directly. American Express payments are conveyed and settlement times are managed by the card brand.

(2) Additional fees may apply for card settlement made via wire transfer.

The service team hours are 8:00 a.m. to 8:00 p.m. ET, Monday through Friday, excluding bank holidays. Online support provides both email and phone support during business hours. During business hours you can call the team directly at 888-222-0038.

For critical inquiries and escalations outside of standard hours, the State should call our Support Off-hours number at 866-282-1981 between the hours 8pm-8am ET. This will engage an agent to connect with our Support Specialist, where they will reach back out to you and engage the appropriate resources. This should only be used for emergencies where your solution is down or cannot accept payments

e. ***Describe the security levels that are available in the online solution, including whether security levels can be set by user, account, dollar amount, or type of transaction.***

Response:

Security in Access Online begins with user setup:

- This is initiated by two security administrators.
- One administrator sets up the user and another must approve the setup before it becomes active.

Access Online security is configurable based upon various parameters.

- User IDs, user created Site Phrase, passwords and RSA SecurID® token code govern access to the portal itself.
- Access to individual functionality is enabled through product-specific privileges set at the client, user and product/account levels.

Payment initiation services available through Access Online have separation of duty entitlements, giving the State the option to require payment process approvals. The State security administrators configure security, product access and functionality. Users may be added to the system or be modified by a security administrator in real time. Once these entitlements are submitted and approved by a second security administrator, adds and changes are activated within seconds.

Security administrator options	
Account authority	State account numbers that can be debited may be restricted at the user level.
Transaction amount limit	Maximum dollar amount for each transaction created by a user.
Release amount limit	Maximum dollar amount for each transaction released by the user.
Daily amount limit	Maximum aggregate dollar amount for all transactions created by the user in a single day.
Modification authority	Matrix allowing restriction of modification authority by transaction type.
Deletion authority	Matrix allowing restriction of deletion authority by transaction type.
Approval authority	Matrix allowing restriction of approval authority by transaction type. Preformatted transaction types—created by other users, created by the same users, or both or none—are defined independently from unformatted transaction types.
Release authority	Matrix allowing restriction of approval authority by transaction type. Preformatted transaction types—created by other users, created by the same users, or both or none—are defined independently from unformatted transaction types.

f. Describe the security measures for which Treasury Management System Administrator(s) will be responsible. How many System Administrators can be assigned?

Response:

Access Online allows ample flexibility for the State to designate the rights of each user on the platform, and provides comprehensive and configurable user entitlements, limits and approval workflow to provide optimal control. Available services accommodate a wide range of security options, including dual control among users, daily or transaction limits and transaction approval rules.

Each user can be restricted by dollar amount and function. Dollar amounts may be either single transaction, daily aggregate or both. By separating duties, accounts and approval workflows, the State can help reduce the risk of fraud or compromised data. The State's security administrators are the only individuals able to assign users with transaction initiation privileges.

The State will nominate your own security administrators to establish and approve users for accounts, services and functions using an online entitlement feature. As a standard practice, and to help the State maintain audit controls, a minimum of two security administrators are required for user setup and maintenance.

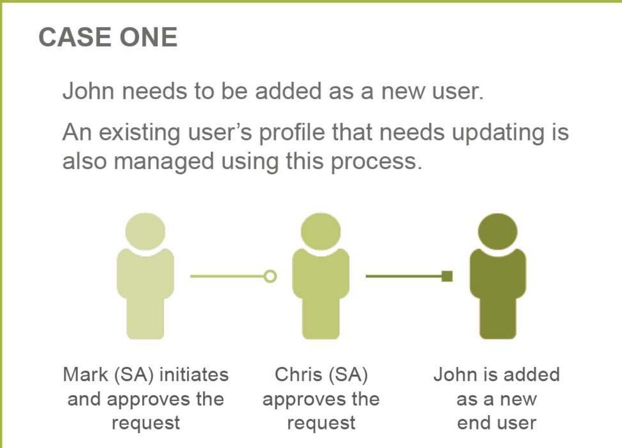
- One security administrator establishes users for accounts, services (e.g., ACH initiation, funds transfer initiation or balance reporting), and functions (e.g., reporting, transaction initiation and transaction approval or release).
- A second security administrator approves the user entitlements granted by the first security administrator.
- For each user created by a State SA, we establish basic authentication user IDs. Digital signature authentication IDs will be established for users authorized for transaction initiation and administrative functions.
- RSA SecurID tokens are assigned by the security administrator to those users who need to perform digital signatures.

- User IDs are sent electronically to one security administrator, along with the RSA SecurID tokens. The other security administrator electronically receives the user passwords. The State's security administrators are responsible for distributing the IDs and passwords (and an RSA SecurID token if required) to each user.
- Users sign on to Access Online to start the new user identification process with the secured information provided by your security administrator. This sign-on procedure, in combination with the acknowledgement and pre-established user entitlements, creates an electronic user profile that will be employed for all Access Online communications with J.P. Morgan. Each user's Access Online desktop will reflect the accounts, services and functions to which that user has been entitled.

Standard security administrator model

STANDARD SECURITY ADMINISTRATOR MODEL

- Two security administrators (SA) are required to change user entitlements
- Security administrators cannot change their own profiles



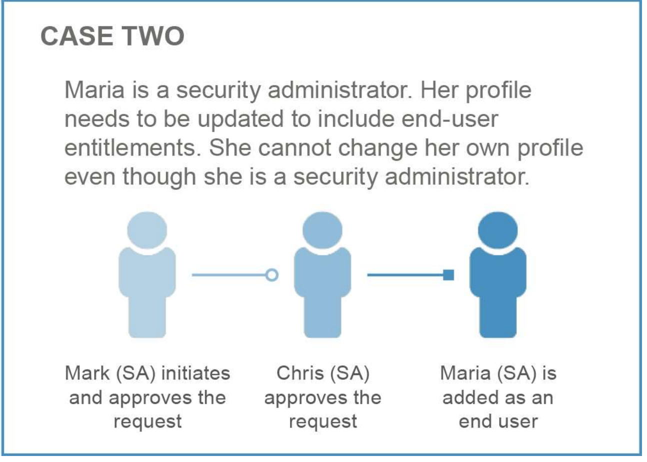


Figure 4

g. Describe the secure online solution and the methods of dual authentication available to initiate ACH files for debit and credit programs.

Response:

Authentication is required for users accessing functions involving value-bearing transactions or security activities, for example wires and ACH.

J.P. Morgan uses a two-factor authentication process: Digital signature authentication is achieved through the firm's patent-pending solution, leveraging RSA SecurID token technology to provide signatures. Access Online's security architecture allows the client' to designate the rights of each user.

It is designed to accommodate a wide range of security options, including requests for multiple transaction approvals, demands for separate 'enter' and 'release' functions for users, dual control

J.P.Morgan

among users and daily transaction limits. This allows for joint digital signatures to be required for all transactions.

Security Administrators for Access Online are established with their own security credentials (user ID, password) and digital signature authority (RSA SecurID®) first. They can then create and approve additional users of accounts, services and functions using the online entitlement-provisioning tool.

h. ***Describe how Treasury Management staff can create users and assign access levels to agency personnel to the online solution.***

Response:

Users can be quickly added or deleted by the State. After initial client setup as described below, security administrators may use the electronic entitlements capability within Administration to add, delete or modify a user within minutes.

Mobile access to your company information is separately enabled by your company's security administrator. Access via a Mobile device may be terminated at any time by the State's security administrator.

Establishing Authorized Users

During implementation of Access Online, the State will provide initial security administrator user information. After signed acknowledgements are processed, security administrators begin establishing entitlements for authorized client users.

The online platform automatically creates initial, temporary user passwords. When a new user first logs in, they are required to change this, entering a password of their choice that meets required parameters. Passwords must be different from user names and contain 6–8 characters, of which there must be at least one numeric and one alphabetical character.

Passwords automatically expire every 90 days. Users may change their passwords at any point prior to expiration and security administrators may reset passwords prior to their expiration date.

Establishing Entitlements

Passwords/IDs govern access to Access Online itself. Product-specific controls are set at the client, account and user levels. The system provides flexible methods to customize user authorities through both individual assignments and entitlement user groups.

There are four setup methods:

- **Express Setup**: This is the simpler and faster way to set up entitlements, using pre-defined roles to assign product and functions entitlements.
- **Clone**: This setup method enables the State to quickly and easily assign products, functions, accounts and group membership to a new user by cloning (replicating) the entitlements granted in Administration from an existing user.
- **Profile Only Setup**: This setup method enables the State to establish user profile information without assigning entitlements.

J.P.Morgan

- **Custom Setup**: This method allows the greatest amount of customization, enabling the State to choose specific entitlements to products, functions, accounts and group membership.

Access Online: Administration Made Easy

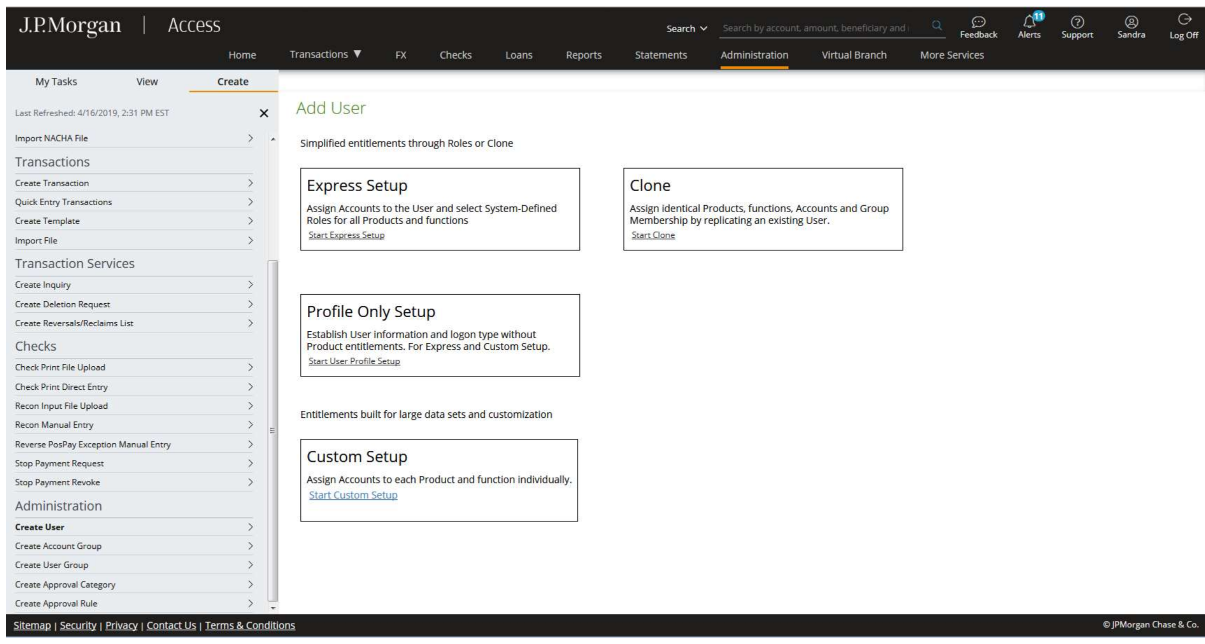


Figure 5

Credential Management

Access Online offers features to simplify and streamline credential management. Rather than requiring security administrators to use a separate security administration app, credential services functionality is integrated into Access Administration. the State can:

- Self-service to order new security tokens and track the status of token requests
- Manage Location Groups integrated into Administration
- Opt to use a software token alternative that will enable users to generate a token code from their mobile device using the RSA SecurID Software Token App

i. ***Describe how users can be set up for access to zba accounts.***

Response:

Access Online allows flexibility for the State to designate the rights of each user on the platform. Each user can be restricted by account and function. Dollar amounts may also be restricted by single transaction, daily aggregate or both.

Users can be quickly added or deleted by the State. After initial client setup, security administrators may use the electronic entitlements capability within Administration to add, delete or modify a user within minutes.

j. ***Describe the formats available to receive ACH addenda online (both translated and raw data).***

Response:

We can support the State with electronic payment remittance information in a number of ways, including:

- Presentation via the Receivables Online image browser (as data or as a static downloadable report).
- An optional Electronic Payment Detail Report is available via Receivables Online as a PDF file.
- Payment notification alerts can be setup on Receivables Online to provide the State notice of important payments.
- Merge onto a data file in BAI2 or EDI X.12 823 format.
- Separate EDI X.12 820 data file (Host-to-Host Reporting).

Our ACH/EDI and wire departments send information to Receivables Online at 10 different intervals throughout the day. Upon receipt of each electronic payment file we will consolidate the electronic payment detail (e.g., payment amount, invoice number, invoice amount) with your daily transmission, converting all information into your specific file format.

The data mapping for electronic payments may vary based on the transaction type and source and is dependent on information the remitter or remitter's bank has provided.

(Note: No images are presented for electronic payments.)

k. ***Describe the firewalls to protect customer information on the bank side.***

Response:

As part of the firm's network security policy, Network Perimeter Security, Firewall Security, Remote Access and User Access Management standards are employed bank-wide.

The firm has deployed a content filtering program designed to prevent data leakage and support the enforcement of policies, standards, laws, and regulations regarding the appropriate usage of the Internet and the protection of personal information.

The firm has also implemented an automated intrusion detection system that actively monitors the network perimeter and critical locations within the network to identify suspicious events. Events detected by both content monitoring and intrusion detection are monitored and actioned appropriately by the firm's global Cybersecurity team.

Internet facing applications are hosted on dedicated networks that are logically separated by use of de-militarized zones (DMZ) from infrastructure that houses business logic and database systems.

l. Describe if additional online authentication can be used beside user ID and password.

Response:

A unique user ID and password give the State's users access to the Access Online platform and product functions that do not involve the initiation of value-bearing transactions.

Authentication is required for users accessing functions involving value-bearing transactions or security activities (e.g., wires and ACH). We use a two-factor authentication process:

- Digital signature authentication is achieved through J.P. Morgan's patent-pending solution leveraging RSA SecurID token technology to provide signatures.
- Users enter their user ID, password and RSA SecurID token code when logging on. They are prompted to re-enter their password and token code before moving funds during their secure session.

m. Describe the number of users that can have access to the contractor's online solution and how many users can be in the solution at one time.

Response:

There is no limit to the number of users that can be assigned to Access Online. Multiple users can access information through Access Online. There is no limit to the number of users that can access the system simultaneously.

n. Describe how online solution upgrades are communicated and implemented. Including if emails are sent or easily viewable on the online solution?

Response:

Access Online is upgraded using planned change management processes; changes are verified before they are introduced to clients. Upgrades become available to clients via their web browser the next time they login to the online platform. The bank makes advance notice available in the Important Messages broadcasts and Alerts feature of the portal, including specific details and benefits.

o. Can the information for current day reporting be available by 8 AM? Describe the time of day (CT) information is retrieved from the ACH network and made available for current day reporting. How often is the bank activity updated and are there set times?

Response:

Current day information, which is the reporting of memo-posted transactions, is available throughout the day as the transactions complete on processing applications such as lockbox, wire, ACH, returns and DDA. Current day information generally is available within five minutes of receipt or completion.

J.P. Morgan provides updates throughout the business day for established accounts. Current-day information is available based on the operating area of the bank for funds transfer, letters of credit, securities and deposit transactions.

Wire transfers are reported in near real-time. Other transaction types are reported as follows (targets).

Current-day information reporting goal	
Report	**Goal**
ACH: U.S.	11:00 a.m. CT, 3:00 a.m. CT, 5:00 a.m. CT, 7:00 a.m. CT
ACH: International	6:00 p.m. CT (7:00 SGT)
Wires: U.S. Domestic (GFP)—Fed	8:00 a.m. to 5:00 p.m. CT
Wires: U.S. Domestic (GFP)—CHIPS	8:00 a.m. to 4:00 p.m. CT
Wires: U.S. Domestic (GFP)—book	8:00 a.m. to 5:00 p.m. CT

p. Describe the process to ensure previous day information will be available by 8:00 AM CT.

Response:

Prior day reporting will be made available by 7:00 a.m. CT.

q. Provide a detailed listing and samples of all reports available online. Describe how these reports can be customized for each user.

Response:

The cash reporting tools built-in to Access Online let the State create, customize and run up-to-the-minute reports on your accounts, all from a single location. With its flexibility and ease of use, Access Online fits the way you work to save you time.

Several master reports form the foundation of Access Online centralized reporting capability. Each format can be customized to create reports tailored to specific needs.

The State can also create and save customized reports through a set of filter criteria (e.g., date range, accounts, reference numbers, check numbers, transaction types, etc.) Users can:

- Run, view and modify all customized reports quickly and easily.
- Customize how to view or download reports, tailored to your specific needs, with a set of interactive features including:
  - Ability to move, show or hide columns within the report.
  - Sort columns on the fly.
  - Use J.P. Morgan's web search tool to filter data.
  - Add and customize graphs or charts (pie, bar, line, etc.) to quickly see trends.
- Share a customized report, where one user can run a copy according to their schedule. A copy of the shared report will appear in the recipient's Reports Inbox, with an icon indicating it has been shared with them. When the original report is modified, the recipient's report will reflect the same modifications.
- Schedule online reports for automatic generation (PDF, XLS).

Output will be delivered to your Reports Inbox and available for 24 hours.

Interactive Reporting

A set of interactive features enables the State to customize how to view or download reports. These intuitive features include the ability to move, show or hide columns within the report, sort columns on the fly, use J.P. Morgan's web search tool to filter data and add graphs or charts to quickly see trends. By letting the State view each change as it is made, the interactive report makes it easier to tailor to your specific needs. Once customized, the State can schedule reports for automatic generation (PDF, XLS).

Benefits include:

- Avoids manual rework when exporting data to upload into treasury workstation/ERP systems
- Facilitates transition from a previous bank by providing the tools to match any report format
- Quickly identify trends with graph or chart views
- Customizes your graphic output by type of graphic (pie, bar, line, etc.)
- Delivers to your Reports Inbox and available for 24 hours

Access Online reports	
Balance and Transactions Report	• Includes top-line balance and transaction summaries, detail transaction records and time-specific data • Available for current-day, prior-day and date-range periods • Choose from many layouts: account, summary and detail, summary only, detail only, or location • Includes check/deposit ticket images, transaction note entry, and Lockbox and deposit float reporting, and also sorting and drilldown capabilities to view additional transaction details • Customize the filters and view as a Location Report that captures deposit information from each of your locations
Checks Paid Report	• Detailed view of check transactions that have cleared through J.P. Morgan accounts • Data is available for current-day, previous-day and date-range periods • Also includes sorting options and drilldown capabilities to view check images and additional transaction details
Returns and Exceptions Report	• Detailed view of return items, including check returns, Automated Clearing House (ACH) returns and ACH notification of changes (NOC) • Run the report using the default date, account and transaction settings or customize it by choosing desired criteria and settings • Includes sorting options and drilldown capabilities to view check return images
Wire Detail Report	• Detailed view of incoming and outgoing wire transactions by account or date for completed CHIPS, book, and Fed payments
Payment and Template Reports	• Provides both summary and detail reporting of payments and templates • Can include payments sent, in-process or future-valued • Template reporting includes summary and detail reports of templates, either active or in-process
EDI Reports (prior-day only)	• Provides detailed remittance and invoice information for electronic receivables or payments for a specific settlement date in Adobe PDF or ANSI X12 820

Access Online reports	
Controlled Disbursement Report (current-day only)	• For U.S. accounts only, these reports show summary and detailed information on your payments and templates • Provides interim and final presentments and funding across all sites, or selected disbursement sites that offer both • Can include, for example, all detail payments sent, in-process or future-valued • Template reporting includes summary and adjustments detail reports of templates active accounts presentment totals by location • Within location, users can see location number, description, amount and number of items per location in-process

For sample reports available via Access Online, please refer to Appendix 2.

r. Describe the ability to view, print, and download daily reports for previous day and current day activity in one (1) or more of the formats listed in Exhibit 1.

Response:

Access Online reporting offers a variety of industry standard file formats including CSV, which may be similar to what the State has referenced in Exhibit 1. We also have an interactive reporting feature that allows for Microsoft Excel based exports to be re-sorted and organized to meet specific export map requirements. The State can view reports online or export them into Adobe PDF ,CSV, BAI2, OFX, ISO camt.052/.053/.054 or SWIFT MT942/MT940.

During implementation, the State's technical requirements will be discussed. Your onboarding specialist will strive to understand the source data for the customized records of incoming debit/credit transactions reflected in Exhibit 1. J.P. Morgan will work with the State on a similar output file to meet the State's daily reconcilement and cash reporting needs.

s. Describe all the information on current day and previous day reports. Example: trace number, effective entry date, payment description, originator's company ID number and amount.

Response:

J.P. Morgan provides the following supporting details on the bank statement, balance and transaction reports and in return-item transmissions:

- Transaction amount
- Company ID number
- Individual ID number
- Company name
- Value date
- J.P. Morgan reference number
- Descriptive text to help reconcile the transactions, including trace number and originator's company ID

t. ***Provide an example where the ACH trace numbers are located and describe how the State will access the ACH trace numbers. Example: on current day, previous day, or ACH received item addenda reports (whether translated or raw data).***

Response:

The Access Online Balance and Transaction report provides batch and detail level information for originated ACH transactions, including the ACH trace numbers.

Balance and Transaction Report

Debits

Tran. Date Value Date	Description	Customer Ref.	Bank Ref.	Debit Amount	Report Time (ET)
03/13/2017 03/13/2017	DEBIT ACH SETTLEMENT	9bbb45678	0725444573TC	1,138.95	02:18 PM

ORIG CO NAME: ABC CORP
ORIG ID : 9bbb45678
DESC DATE : OFFSET
ENTRY DESCR : CORP PAY
ENTRY CLASS : CCD
TRACE NO : 021000025444573
ENTRY DATE : 170313
IND ID NO : 9bbb45678
IND NAME : EFT FILE NAME: AXR6UY
COMPANY DATA: 170313 AXR6UY
REMARK : EFT/ACH CREATED OFFSET FOR ORIGIN#:9bbb45678 CO EFF DATE: 17/03/13
ORIG BANK : JPMorgan Chase Bank, N.A. (NY)

Company Name	Company ID	Entry CLS	Company Description	EFF Entry Date	Batch Number	Batch Amount
ABC CORP	9bbb45678	CCD	CORP PAY	03/13/2017	0000267	1,138.95

DFI Bank	DFI Account	IND ID No	IND Name	Trace Number	Item Amount
123123002	4bbb89123		ENGINEERING CO	021000020000001	1,130.05
123123002	4bbb89123		WESTERGREEN	021000020000002	8.90

Balance and Transaction Report - Summary and Detail

Figure 6

Please see Appendix 2 for detailed examples of Access Online sample reports.

u. ***Describe how fees will be billed monthly on an analysis statement and if the analysis statement will be provided online or via email. Provide an example of the analysis statement and describe how it could be downloaded from the online solution. Describe if the analysis statement could be downloaded in an editable file format.***

Response:

The State receives an account analysis statement each month identifying all services provided, product volumes and the resulting service charge incurred.

BENEFITS OF OUR APPROACH TO

Electronic account analysis statements

GET FASTER DELIVERY

Receive the Adobe PDF version on the sixth business day after close of your billing period

EXPORT YOUR DATA

Export billing statement data using robust encryption technology into Excel or text (CSV) for further analysis

GROUP ACCOUNTS YOUR WAY

Group specific accounts and billing relationships together for online analysis

MANAGE ACCESS

Create user profiles to give access to specific accounts or billing relationships and your security administrators can reset user passwords

Account analysis statements—How it works

Retrieve electronic account analysis statements via Access Online on the sixth business day after the close of the billing period. All sections of your account analysis statement may be viewed, printed and exported through Access Online.

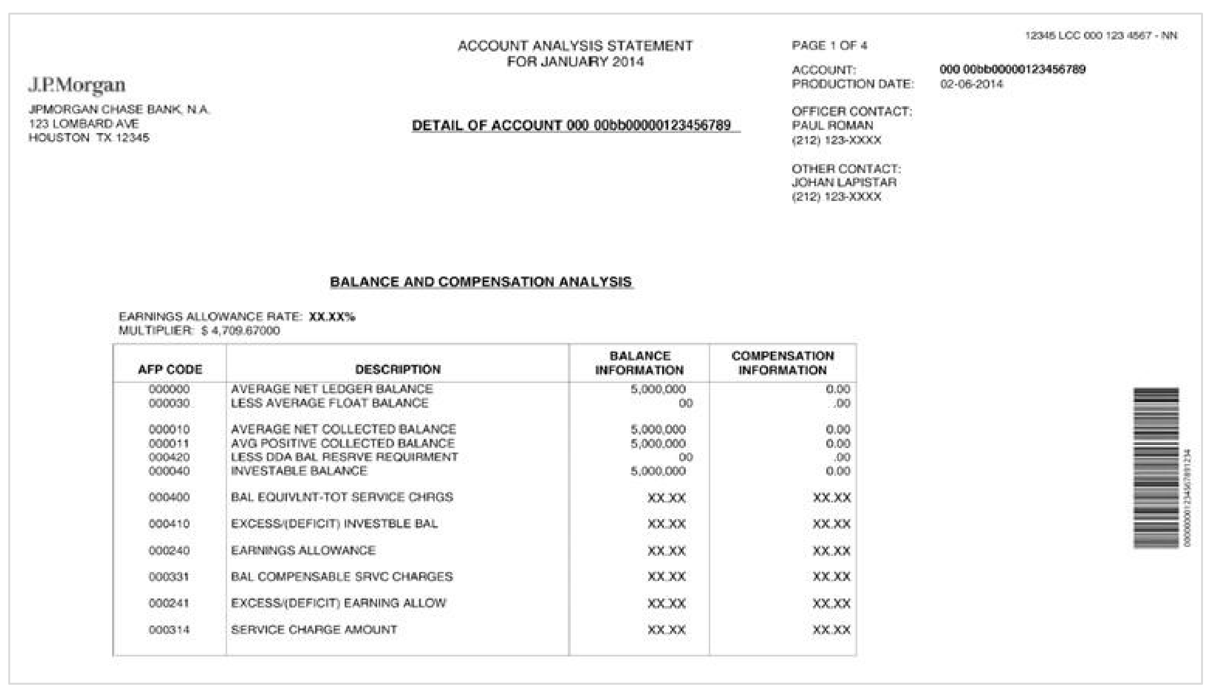
Analysis statements are available in PDF, Excel and CSV formats. In addition, you can download statements in a BAI file via Access Online Reports or via Host-to-Host Direct Transmission.

You can group specific accounts and billing relationships together for online analysis purposes and create user profiles giving access to specific accounts or billing relationships, as required.

Sample Account Analysis in Adobe PDF Format

Account analysis statements in PDF format show each section of billing information in a separate table. Total charges are displayed at the end of each table for clarity.

Balance and Compensation Analysis Section



ACCOUNT ANALYSIS STATEMENT
FOR JANUARY 2014

PAGE 1 OF 4

12345 LCC 000 123 4567 - NN

J.P.Morgan

JPMORGAN CHASE BANK, N.A.
123 LOMBARD AVE
HOUSTON TX 12345

ACCOUNT: 000 00bb00000123456789
PRODUCTION DATE: 02-06-2014

DETAIL OF ACCOUNT 000 00bb00000123456789

OFFICER CONTACT:
PAUL ROMAN
(212) 123-XXXX

OTHER CONTACT:
JOHAN LAPISTAR
(212) 123-XXXX

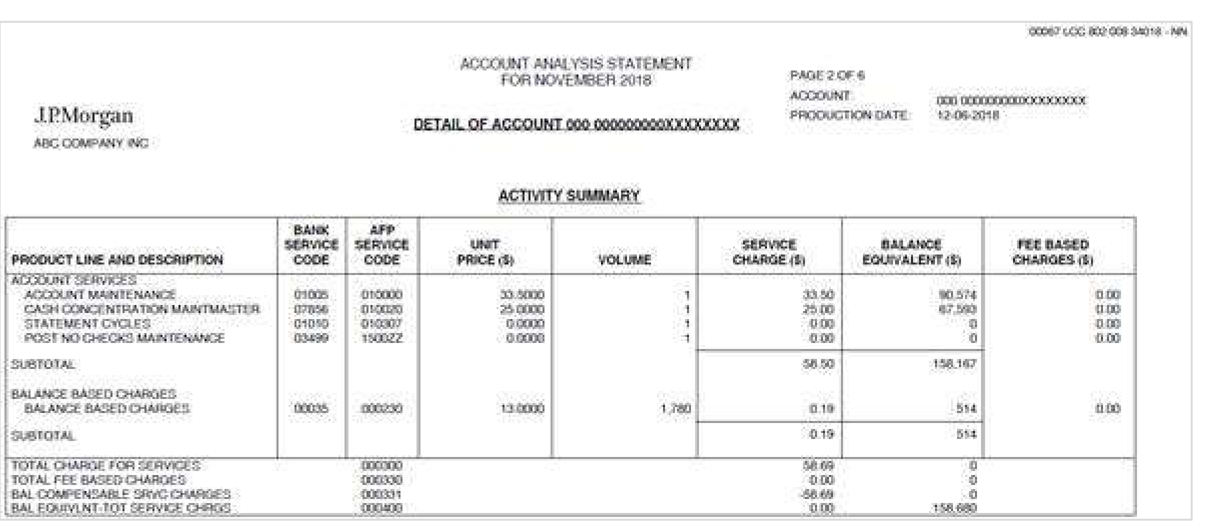
BALANCE AND COMPENSATION ANALYSIS

EARNINGS ALLOWANCE RATE: **XX.XX%**
MULTIPLIER: $ 4,709.67000

AFP CODE	DESCRIPTION	BALANCE INFORMATION	COMPENSATION INFORMATION
000000	AVERAGE NET LEDGER BALANCE	5,000,000	0.00
000030	LESS AVERAGE FLOAT BALANCE	00	.00
000010	AVERAGE NET COLLECTED BALANCE	5,000,000	0.00
000011	AVG POSITIVE COLLECTED BALANCE	5,000,000	0.00
000420	LESS DDA BAL RESRVE REQUIRMENT	00	.00
000040	INVESTABLE BALANCE	5,000,000	0.00
000400	BAL EQUIVLNT-TOT SERVICE CHRGS	XX.XX	XX.XX
000410	EXCESS/(DEFICIT) INVESTBLE BAL	XX.XX	XX.XX
000240	EARNINGS ALLOWANCE	XX.XX	XX.XX
000331	BAL COMPENSABLE SRVC CHARGES	XX.XX	XX.XX
000241	EXCESS/(DEFICIT) EARNING ALLOW	XX.XX	XX.XX
000314	SERVICE CHARGE AMOUNT	XX.XX	XX.XX

Figure 7

Activity Summary Section



00067 LCC 802 008 34018 - NN

ACCOUNT ANALYSIS STATEMENT
FOR NOVEMBER 2018

PAGE 2 OF 6

ACCOUNT 000 000000000XXXXXXXX
PRODUCTION DATE 12-06-2018

J.P.Morgan

ABC COMPANY INC

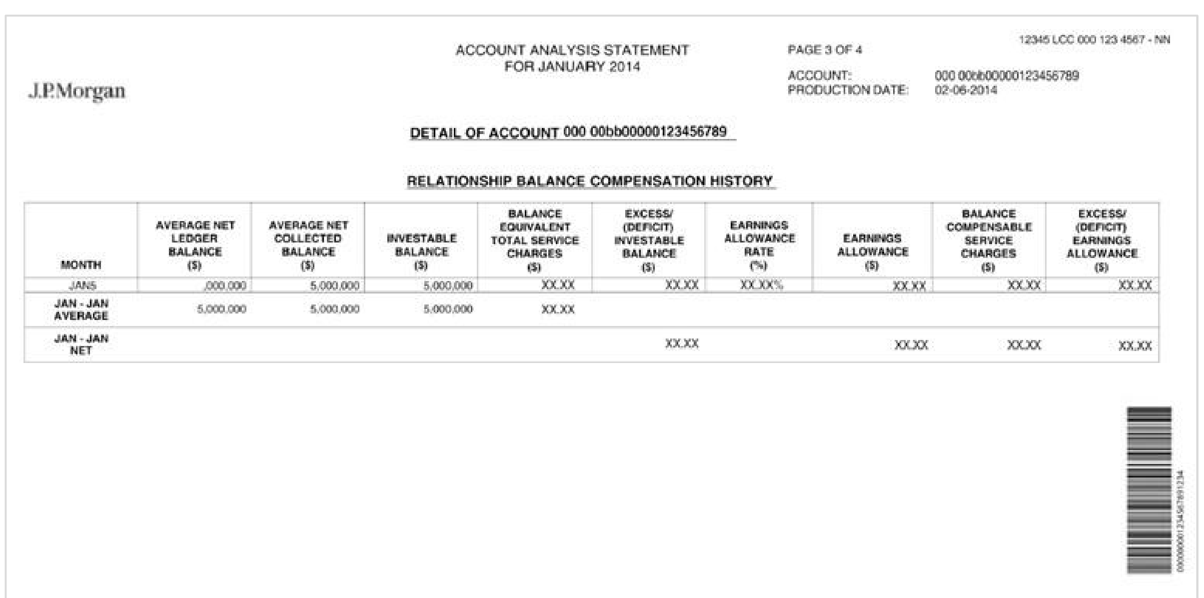
DETAIL OF ACCOUNT 000 000000000XXXXXXXX

ACTIVITY SUMMARY

PRODUCT LINE AND DESCRIPTION	BANK SERVICE CODE	AFP SERVICE CODE	UNIT PRICE ($)	VOLUME	SERVICE CHARGE ($)	BALANCE EQUIVALENT ($)	FEE BASED CHARGES ($)
ACCOUNT SERVICES							
ACCOUNT MAINTENANCE	01005	010000	33.5000	1	33.50	90,574	0.00
CASH CONCENTRATION MAINTMASTER	07856	010020	25.0000	1	25.00	67,593	0.00
STATEMENT CYCLES	01010	010307	0.0000	1	0.00	0	0.00
POST NO CHECKS MAINTENANCE	03499	15002Z	0.0000	1	0.00	0	0.00
SUBTOTAL					58.50	158,167	
BALANCE BASED CHARGES							
BALANCE BASED CHARGES	00035	000230	13.0000	1,780	0.19	514	0.00
SUBTOTAL					0.19	514	
TOTAL CHARGE FOR SERVICES		000300			58.69	0	
TOTAL FEE BASED CHARGES		000330			0.00	0	
BAL COMPENSABLE SRVC CHARGES		000331			-58.69	0	
BAL EQUIVLNT-TOT SERVICE CHRGS		000400			0.00	158,680	

Figure 8

Relationship Balance Compensation History Section



12345 LCC 000 123 4567 - NN

J.P.Morgan

ACCOUNT ANALYSIS STATEMENT
FOR JANUARY 2014

PAGE 3 OF 4

ACCOUNT: 000 00bb00000123456789
PRODUCTION DATE: 02-06-2014

DETAIL OF ACCOUNT 000 00bb00000123456789

RELATIONSHIP BALANCE COMPENSATION HISTORY

MONTH	AVERAGE NET LEDGER BALANCE ($)	AVERAGE NET COLLECTED BALANCE ($)	INVESTABLE BALANCE ($)	BALANCE EQUIVALENT TOTAL SERVICE CHARGES ($)	EXCESS/ (DEFICIT) INVESTABLE BALANCE ($)	EARNINGS ALLOWANCE RATE (%)	EARNINGS ALLOWANCE ($)	BALANCE COMPENSABLE SERVICE CHARGES ($)	EXCESS/ (DEFICIT) EARNINGS ALLOWANCE ($)
JAN5	,000,000	5,000,000	5,000,000	XX.XX	XX.XX	XX.XX%	XX.XX	XX.XX	XX.XX
JAN - JAN AVERAGE	5,000,000	5,000,000	5,000,000	XX.XX					
JAN - JAN NET					XX.XX		XX.XX	XX.XX	XX.XX

Figure 9

v. ***Describe the normal data retention policy and the proposal for the ACH payment scheduling system. Include details such as time period, data storage capabilities and processes, disposal of records, and any other relevant details regarding data retention.***

Response:

Data Retention policy details:

- Our solution for online, IVR and Operator Assisted transactions stores transaction data for two years online and for nine years offline.
- From an ACH origination perspective, ACH items can be future dated. For origination files received via direct transmission, the determined retention time for future-date transactions is 90 days. Transactions are maintained for online inquiry for 180 days after the effective dates.
- ACH payments via Access Online can be warehoused for up to 60 days in advance of the value date.

w. ***Describe any options for extending the time frame on data retention.***

Response:

The maximum retention period for future dated payments is described in question *v.* above.

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x. ***Describe your online solution to initiate and complete wires using reoccurring templates and intrabank transfers with a back-up phone process.***

Response:

We provide wire transfer initiation and provide a summary below. We recommend the State use Access Online and telephonic with a PIN to initiate wire transfers.

Wire transfer initiation via Access Online

Access Online provides you with a broad range of funds transfer services supporting U.S. dollar and multicurrency payments. Our solution supports wires (Fedwire and CHIPS), book transfers, drafts, account transfers and U.S. drawdown transaction initiations using both predefined (repetitive) templates and free-form formats.

The State establishes user entitlements. Your security administrators authorize users to add, modify, delete, approve and/or release wire transactions, as well as add, modify, delete, approve and activate predefined templates. Receive a client confirmation number immediately upon release to the funds transfer processing platform. Confirmation codes are accessible using cash reporting features of Access.

Sample transaction initiation page

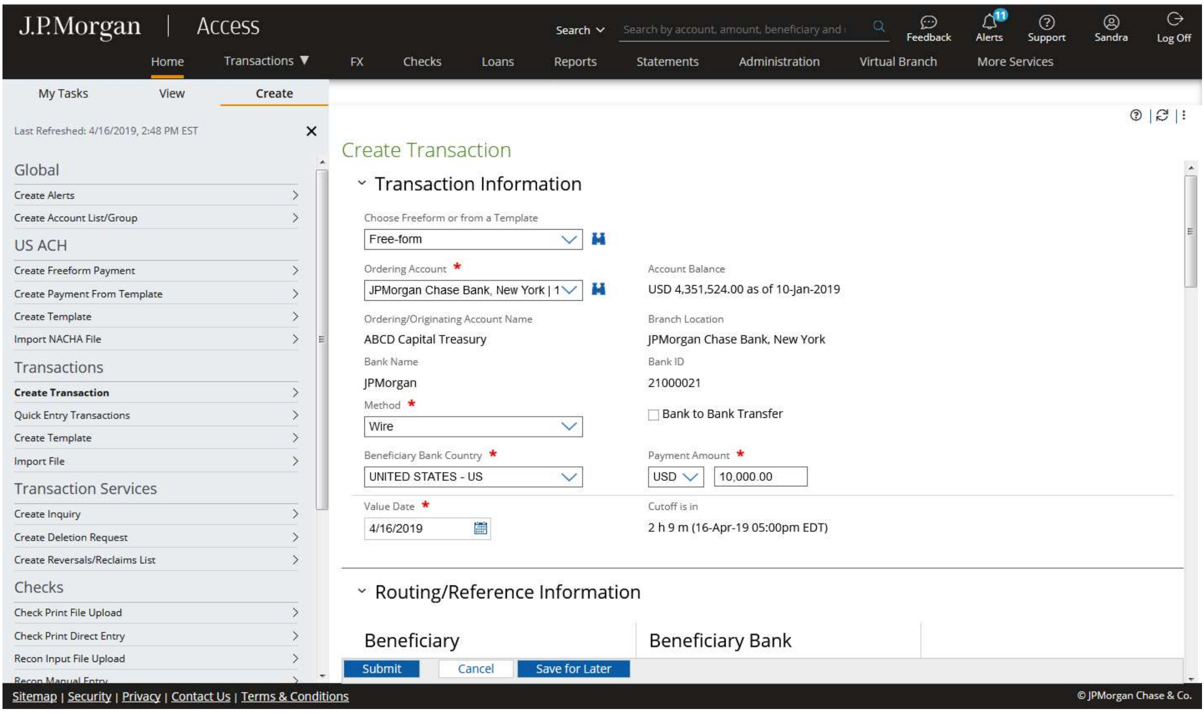

Figure 10

Telephonic wire transfer with a PIN

Telephonic wire transfer with a PIN can be used as a primary and/or back-up method of wire initiation. Like wire initiate on Access Online, we offer repetitive templates and free-form transactions, support multicurrency account payments and provide dual control (initiation/confirmation).

y. Describe how same-day intrabank transfers can be made and at what time the last transfer can be made for same day posting.

Response:

Access Online provides authorized users the ability to enter transfers to and from the State's own U.S. J.P. Morgan accounts in a secure online environment 24/7. The State can use Account Transfer to transfer funds between U.S. (domestic) J.P. Morgan bank accounts. Funds move in real-time between accounts. Account transfers are executed against the available balance.

Cutoff time for same-day transaction posting is 10:00 p.m. CT; any transaction initiated after this time will post on the following business day.

z. Describe how the contractor will deposit funds as directed by DOR.

Response:

J.P. Morgan will deposit funds as directed by DOR. We recommend the following solutions to streamline that process.

Incoming ACH Payments via UPIC:

J.P. Morgan offers Universal Payment Identification Code (UPIC) to the State for use with different ACH credit payments being paid to the State electronically monthly. The State will may use the existing UPIC numbers that are in place and expand the use in the right situation.

UPIC will help protect the State’s sensitive banking information by providing a universally recognized account and routing number that is different than their J.P. Morgan account number for the purposes of receiving ACH credit transactions. Features of UPIC include:

- Masking routing and account numbers while securely facilitating electronic payments
- Receive credit payments only, blocking all debit originations
- Used in conjunction with a universal routing number
- Issued and maintained by banks
- Remains with the State regardless of changes in account numbers or banking relationships

As payments are received, we will post them to your J.P. Morgan account(s).

EDI Reporting

Host-to-Host Reporting delivers consolidated reporting of remittance data for ACH, wire and lockbox receipts posted to the State’s demand deposit accounts (DDA). Data is presented in standard formats

and is sent via a variety of standard communications connections. Host-to-Host Reporting transaction reports include details that may not be supplied through standard bank reporting tools. The information can be consolidated into a single data stream that is transmitted directly to your accounts receivables system.

Online, IVR and Operator Assisted transactions

Our online solution for online, IVR and Operator Assisted transactions requires settlement to a J.P. Morgan demand deposit account (DDA).

Hierarchy Structure

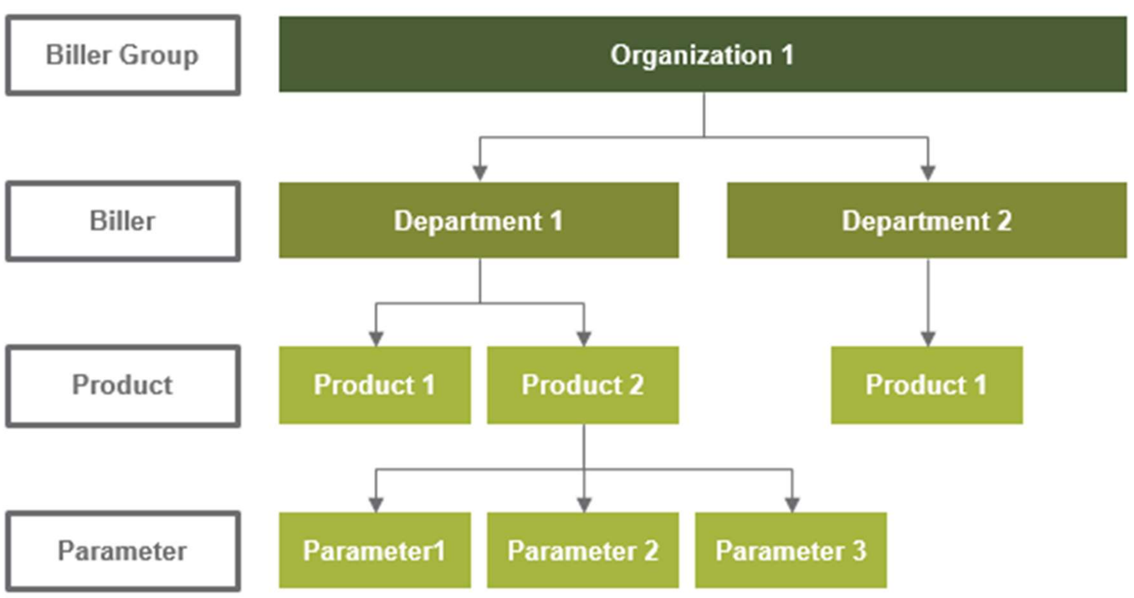

Figure 11

aa. ***Describe the online solution to create templates for repetitive ACH transactions.***

Response:

Access Online uses a common set of intuitive templates for each payment method. For example, the State can easily create beneficiary templates with lockable and editable fields to set up recurring payments.

There are many ways to customize the system. Access Online can be configured with flexible sorting and filtering options to display only the features you use—in the order you prefer.

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Sample template details page

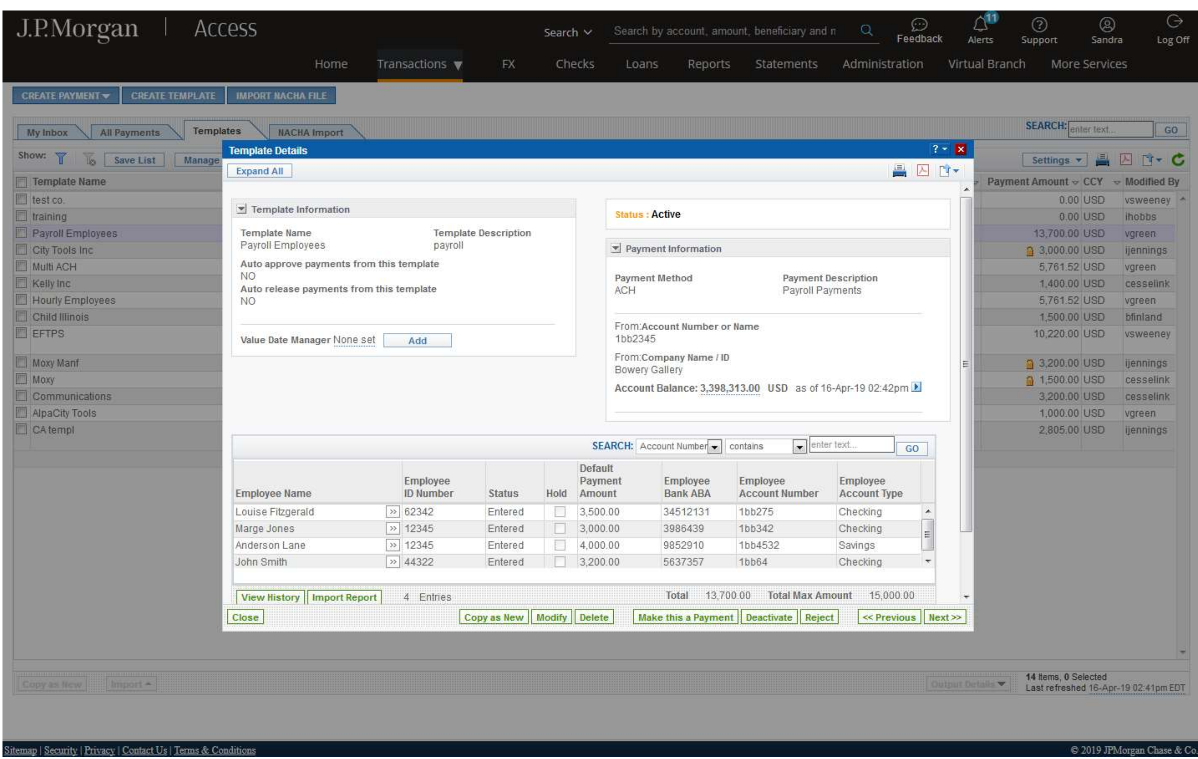


Figure 12

ab. ***Describe the ability to provide DOR with a product description, system capabilities, and a sample application or website, if available, for consideration for their ACH Payment scheduling system. Disclose all potential fees associated with the transaction processing, reporting, or file creation for this type of program if not listed in the cost proposal.***

Response:

As described above, the online and mobile portal is user-friendly and highly configurable to match the look and feel of your organization, enabling your payers to quickly and efficiently make their payments electronically.

The online platform supports robust branding and style customizations on the website and can include J.P. Morgan's logo, colors and themes, and even terminology, providing a consistent look and feel. In addition, J.P. Morgan has the option to co-brand with the Chase logo to provide your payer with additional assurance that their payment experience is secured by the bank.

Our solution's online and mobile portal are integrated experiences, with the mobile portal automatically adjusting the layout when using a mobile device. This technique, known as Responsive Design, provides a unified way for J.P. Morgan to integrate desktop and mobile user experiences into your collection process.

The platform can support a variety of digital workflows that can be configured to the specific use cases you would like to support, including:

- Initiate a one-time or recurring payment, including setting up Auto-Pay
- Manage saved credit card, debit card and bank account information
- View historical payments and remittances
- Edit or cancel a pending payment
- View bill, invoice or statement history including images
- View and edit user profile information

The online and mobile portal supports the ability to display or collect remittance data from your payers as they are completing a payment. Data that is displayed on the portal can be provided by J.P. Morgan's systems in real-time or by batch file.

J.P. Morgan's portal can be integrated with your existing website in a number of ways:

- **Direct Access URL**: A web address that is specific to your portal, and can be distributed to your payers (e.g., https://www.payconnexion.com/pconWeb/public/session/new/xxx/xxx/pay
- **Secure Session Transfer**: Place a session transfer button on your website that can be linked directly to your platform login page using HTML (POST) or securely transfer an authenticated payer directly into system without having to log-in a second time.
- **Embedded iFrame**: Leveraging your existing secure website or portal, you can embed portions of our solution directly into your website using iFrames providing a seamless look and feel.

Our solution's online and mobile portal is designed to provide J.P. Morgan's payers with seamless and efficient self-service capabilities. The portal's near infinite configurability serves clients across a broad spectrum of industries and verticals and is uniquely positioned to help J.P. Morgan achieve your collection goals.

J.P. Morgan would be happy to provide demonstrations, upon request.

Please see the Cost Proposal for all associated fees.

FR 3 – Return/Notification of Change Reporting

a. ***Describe in detail all methods by which agencies could receive ACH notifications of change and returned items. Department of Labor should receive reporting separately.***

Response:

Depending on which services the State selects, notification of change and returned item advices transmit on the day of posting via:

- Transmission
- Access Online
- Encrypted Email

Additionally, Access Online can be used to retrieve return/NOC information post settlement date.

The State's Security Administrators can set up account reporting entitlements for specific department users and then customize, schedule, and assign those users only the reports they need to view. This would allow the State to restrict the information each user receives to the full extent of the report customization tool.

b. ***If the State would need the Returns and Notifications of Changes sorted by company ID's, describe how multiple reports could be produced or obtained.***

Response:

The State can sort returns and notifications by company ID. The State can customize and filter output reports by choosing desired criteria, as well as Excel customizable Interactive Report settings as via Access Online.

c. ***Describe when the Returns and Notifications of Change would be available for viewing. (Example: posting day, or next day after settlement of the ACH notification of change or return and what time CT)***

Response:

Return files are available at the start of business, Monday through Friday.

d. ***Describe how a separate file of returned items can be viewed, printed, and downloaded.***

Response:

Returned items can be viewed the following day via Access Online.

The Returns and Exceptions Report in Access Online provides:

- Detailed view of return items, including Automated Clearing House (ACH) returns and ACH notification of changes (NOC)
- Run the report using the default date, account and transaction settings or customize it by choosing desired criteria and settings
- Includes sorting options and drilldown capabilities

e. ***Describe and provide an example of how the contractor can prepare a NACHA-formatted raw data file of ACH returns and Notifications of Change entries by specified company IDs.***

Response:

J.P. Morgan can provide return items via direct transmission, encrypted email or online via the Return and Exception Report in Access Online. J.P. Morgan offers a NACHA formatted ACH data transmission options to reduce delivery problems and minimize the time between the return and the time to receive notification of return. We have provided a sample file mapping document of our NACHA ACH Return file format in Appendix 3.

Returned credits also are included in the return data file and will be credited to the State's checking account with a separate entry per company ID.

f. ***Describe how the contractor will make an entry for each ACH return. Can the entries be made per return item? Describe how that return can be identified by the State on previous and current day reporting.***

Response:

The bank offers flexibility in how we post ACH return entries. By default, we typically post one return batch entry per ACH company ID, for the total of the return file. Then, detailed reporting is provided on-line via JPMorgan Access Returns and Exceptions report. However, we can easily post those entries

individually against the State's account, if preferred. In addition, all returns can be reported in a single NACHA formatted ACH return file transmission.

ACH returns reporting is available via Access Online, email, or transmission. Return reporting will be available on a current day basis. A sample report is provided below.

Returns and Exceptions Report

Cash Reporting - Returns and Exceptions Report J.P.Morgan

Company Name: UATWAMU
As of: 10/20/2009
Date Type: Post Date

Report Filters

Beneficiary Name:	n/a	**Viewing Option(s):**	n/a
Amount Range:	n/a	**Your Ref:**	n/a
Status:	All Statuses		

For Informational Purposes Only

Bank: JPMORGAN CHASE BANK. N.A.
Account Number: 12345678900 **Currency:** USD
Account Name: Your Account Name

References		Company/Location ID	Amount	Post/Orig.	Status	Return/Reject Reason
Ref/Check #:	000000000001156	1596023083	238.79	10/20/2009 10/17/2009	RETURN	R01 INSUFFICIENT FUNDS CHECKING
Name:	T JONES					
Bank:	322271627					
Account:	2222222222					
Cust. Trace:	082845402001610					
Bank Trace:	021000026695554					
Batch Desc:	PAYMENT					
Orig. Name:	FINE COMPANY					
Ref/Check #:	000000000000118	1596023083	60.20	10/20/2009 10/18/2009	RETURN	R01 INSUFFICIENT FUNDS CHECKING
Name:	W SMITH					
Bank:	111906271					
Account:	3333333333					
Cust. Trace:	082841902009349					
Bank Trace:	021000026695563					
Batch Desc:	PAYMENT					
Orig. Name:	SOME COMPANY					
ID Sub Total:			298.99	Items:2		
ACH Return			298.99	Items:2		
Ref/Check #:	304	1460	45.00	10/20/2009	RCK	01 NSF 1ST PRESENTMENT
Name:	E CLARK					
Bank:	11100002					
Account:	5555555555					
ID Sub Total:			45.00	Items:1		
RCK			45.00	Items:1		
Account Total:			343.99	Items:3		
Grand Total:			343.99	Items:3		

End of Report

Figure 13

g. Describe how returns are listed on the reporting, as single items or multiple returns grouped to make an entry, etc. Currently returned items are not netted from receipts, netting will not be an option. Describe how the State Treasurer's Office would return the payment(s) through the ACH Network.

Response:

J.P. Morgan offers the State the ability to monitor incoming ACH Credit or Debit entries items and initiate electronic return requests within 24 hours of posting, via our ACH Transaction Review service.

J.P.Morgan

J.P. Morgan provides comprehensive and accurate data on each ACH return by using key fields from the returned items to retrieve the original record sent to J.P. Morgan from a historical file. This file contains records for ACH transactions initiated in the past 15 months.

- If search does not locate an exact match, the entries are declined to the Receiving Depository Financial Institution (RDFI) for correction and resubmission.
- If the correct item is found, data from the original record is supplied to the State with the reason for the return.

The bank issues one debit or credit offset per entity or application against the State's account for the total of the return file. This simplifies reconciliation, because all returns are in a single return transmission.

Returned credits also are included in the return data file and will be credited to the State's checking account with a separate entry per company ID. Return entries are not netted against one another or against the new item settlement.

h. Describe in detail the methods which agencies will receive ACH Notification of Change and returned items. Describe how each agency could receive reporting separately.

Response:

As described above, depending on which services the State selects, notification of change and returned item advices transmit on the day of posting via:

- Transmission
- Access Online
- Encrypted Email

Additionally, Access Online Transaction Services can be used to retrieve return/NOC information post settlement date.

The State can count on us to provide notifications of your ACH Notification of Change and returned items. Please refer to the following table for the available notifications, the options to receive, the timing of each of the notifications as well as whether the notifications can be received by multiple State authorized users.

Bank notifications

Type of notification	Transmitted by	Timing	Available to multiple users
ACH Notification of Change (NOC)	Email, Access Online, transmission	Day of posting	Yes

i. ***Describe the ability to provide a NOC management solution and how this would assist the State in preventing reoccurring NOC returns.***

Response:

Through the ACH Artificial Intelligence (AI) suite of the services, J.P. Morgan can provide the State access to the ACH Return Intelligence Database (RIDB). The State will spend less time manually reviewing customer payment instructions by automating the review process. The RIDB service allows the State to use J.P. Morgan's intelligence on ACH Administrative returns to receive returns sooner and possibly reduce your administrative return exposure to the ACH network.

ACH Artificial Intelligence service

J.P. Morgan has developed an Artificial Intelligence (AI) transaction scanning engine that is coupled with a collection of relational databases that together reduce returns by correcting transactions before they are processed through the ACH network.

The Artificial Intelligence service contains two primary data sources:

- Notification of Change Data: Because of our scale, J.P. Morgan receives thousands of Notifications of Change each day. This data is loaded into the AI database where you benefit from the collective experiences of all of our originators.
- Ineligible Check to ACH Data: We determine the eligibility of check items based on our experience with transactions that were previously determined ineligible for conversion from check to ACH. Items determined to be ineligible are removed from ACH job streams for swift processing.

Additionally, J.P. Morgan's Zero Administrative Returns (ZAR) service allows the State to outsource your back-office return item processing to J.P. Morgan. With this service, J.P. Morgan manages the entire exception item process, reducing the manual research and correction of items, as well as automating redeposits and substitute check initiation, allowing the State to reduce expense and redeploy staff to more critical functions.

FR 4 – ACH Reversals/Deletes

a. ***Describe how reversals or deletions are accepted from multiple designated individuals at State agencies.***

Response:

State users can initiate online transaction reversals in a secure manner, using Access Online, or by initiating requests via file transmission. You may delete an entire file by contacting your dedicated client service professional or the ACH Transmission Services Group by phone at (813) 432-3800.

Authentication or encryption - software or hardware may be used, depending on the method of reversal or deletion. Other security procedures involve ID/password combinations with levels of security administered by a security manager, as well as authorized signature verification.

b. ***Describe how reversals/deletions are handled at the bank and what time frame (CT) the State is required to meet. Inform the State how the bank will handle reversed or deleted ACH transactions (i.e., by phone, FAX, or Internet).***

Response:

The State may request deletion, reversal or reclamation of ACH items via Access Online. J.P. Morgan will endeavor to delete a file or item prior to the bank releasing the file or item to the ACH network. According to NACHA rules, reversals must be made within five business days after the settlement of the original ACH entry.

c. ***Explain the procedure the State would use to reverse an ACH payment that was credited to one bank account (zba account), but have the main relationship account debited.***

Response:

State users can initiate online transaction reversals in a secure manner, using Access Transaction Services, or by initiating requests via file transmission. ACH reversals must be re-posted back to the original bank account it was drawn upon. ACH returns and exceptions may be posted back to a different account, if desired.

d. ***Describe the process of reversing or deleting individual transactions, batches, or entire files on behalf of the State in accordance with NACHA regulations.***

Response:

In addition to State users initiating reversals online as described above, you may delete an entire file by contacting your dedicated client service professional or the ACH Transmission Services Group by phone at (813) 432-3800.

J.P. Morgan will endeavor to delete a file or item prior to the bank releasing the file or item to the ACH network. According to NACHA rules, reversals must be made within five business days after the settlement of the original ACH entry.

e. ***Describe how the contractor can be notified if a file can be held if a transaction needs to be deleted from the file.***

Response:

Reversals and deletions of items can be performed through Access Online's Transaction Services feature. Only single items can be deleted or reversed, depending on settlement timing. Using J.P. Morgan's ACH File Warehouse service, the State can make modifications to transactions that have been sent to the bank but not released to the ACH operator. ACH File Warehouse provides the State with enhanced, secure online access to delete and modify transactions—including dollar amount, account and routing numbers. The deadline is 3:00 p.m. CT, the day prior to settlement.

f. ***Describe how the confirmation for deletions and reversals are provided.***

Response:

Confirmation for deletions and reversals initiated via Access Online are reported in the Reversal/Reclaim Report.

g. ***Describe and provide an example how the State can identify reversed or deleted entries the bank would make on previous or current day reporting.***

Response:

ACH reversal credits or reversal debits are reflected on the ACH Returns and Exception Item report. For sample reports, please see Appendix 2.

FR 5 – Settlement/Funding

a. ***Describe the method used to allow funding on a settlement date. Including but not limited to allowing the account to be in a daylight overdraft most mornings.***

Response:

Funding for ACH credits is required by 3:00 p.m. CT on the date of settlement, which is the Federal Reserve deadline for receipt of domestic wires.

b. ***Describe how the contractor is able to process ACH credit and debit files for next day, two day, or more settlement date.***

Response:

The table below provides the methods available for processing ACH credit and debit files and the specified settlement dates.

The State initiation method	Next-day ACH	Same-day ACH
Direct transmission (1,2)	9:00 p.m. CT	11:30 a.m. CT (prefund) and 12:15 p.m. CT
ACH payments via Access Online (1)	9:00 p.m. CT	11:00 p.m. CT (prefund) and 12:00 p.m. CT

(1) ACH PPDs must be received two business days in advance.

(2) If later deadlines are required, this should be discussed with your relationship team.

c. ***Describe the process of when ACH credits would be available and when the money would be available to transfer.***

Response:

For ACH credits, the State will receive availability (memo post) for ACH collections upon opening of the business day on the settlement date. A hard post of the funds will occur at the end of the business day.

d. ***Describe the order that the bank posts transactions. Example: credits post before debits.***

Response:

Deposits are applied to accounts as the highest priority and at presentation. Electronic credits and debits (such as wire transfers and ACH transactions) are applied to the account by transaction time and type. Check transactions are typically the last transaction type to present to the balance, prioritized in the largest to smallest amounts.

e. ***Describe an online solution for electronic submission of NACHA formatted files; including but not limited to multiple SEC formats for debit and credit transactions.***

Response:

Based on the State's operational requirements, J.P. Morgan recommends:

- Access Online for lower volume transaction files. Access Online is a fully integrated, browser-based platform that provides easy-to-use applications for all of your information, compliance and portfolio management needs.
- The secure file transfer protocol (SFTP) transmission method for large batch origination.

ACH Nacha file import

The State can elect to use the automated interface to upload a standard Nacha formatted file, after which you can submit them for payment approval and release. Nacha import is available for CCD, CTX, PPD and WEB Standard Entry Class Code transactions. The import functionality also supports the transaction codes for Checking, Savings, General Ledger and Loans. Optionally, a comma-delimited or fixed width file can be uploaded using the template functionality.

The file import feature offers the State:

- Future-dated warehousing of up to 60 calendar days.
- Ability to create settlement offset at transaction level or batch level.
- Next-day settlement option for transfers to/from J.P. Morgan accounts.
- Option to create addendum record for all payments.

Note: To process a file as same day, you must click the Allow Same Day Value Date checkbox and have the current date in your file. If the checkbox is not enabled, contact your system administrator to request the change. Additional charges will be incurred for non-J.P. Morgan transactions. Same-day cutoff is 12:00 p.m. CT, unless prefunded, then same-day cutoff is 11:00 a.m. CT.

Importing Nacha file

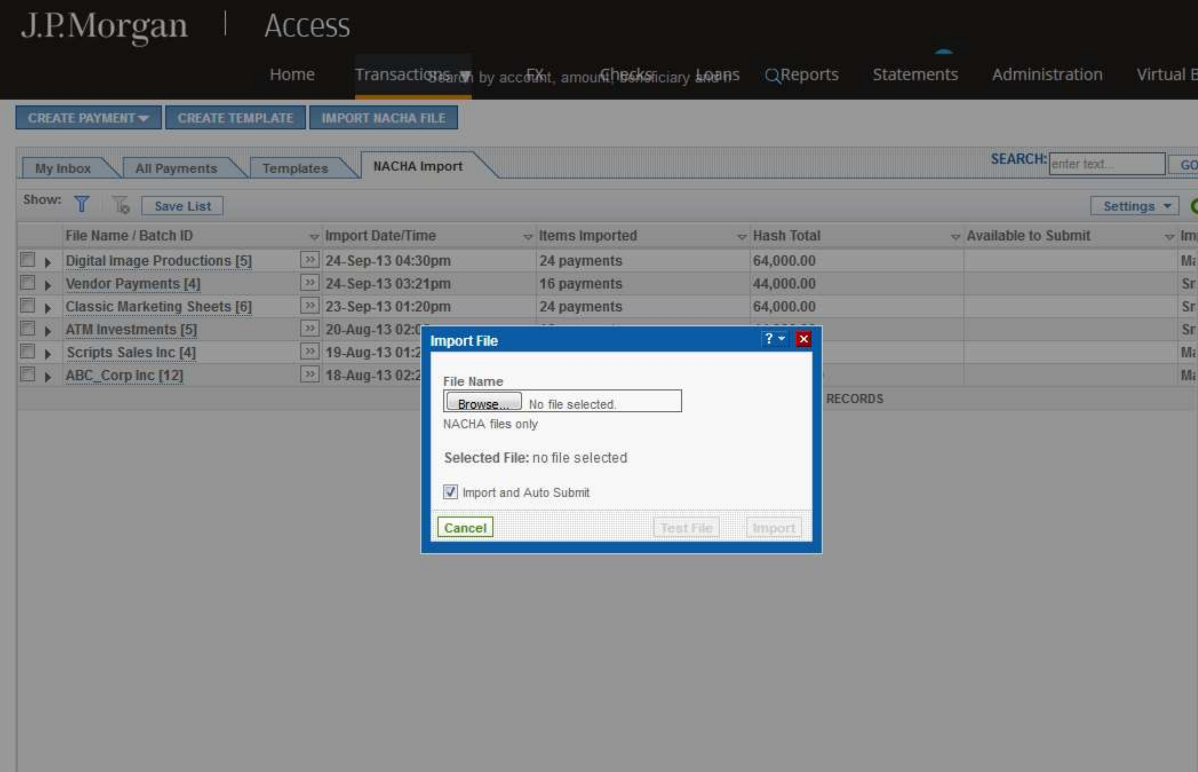


Figure 14

View newly imported Nacha files

Once a file is successfully imported, users can view a list of the batches for a particular file, the batch header information and beneficiaries for that batch, and the items within each batch.

View imported Nacha file details

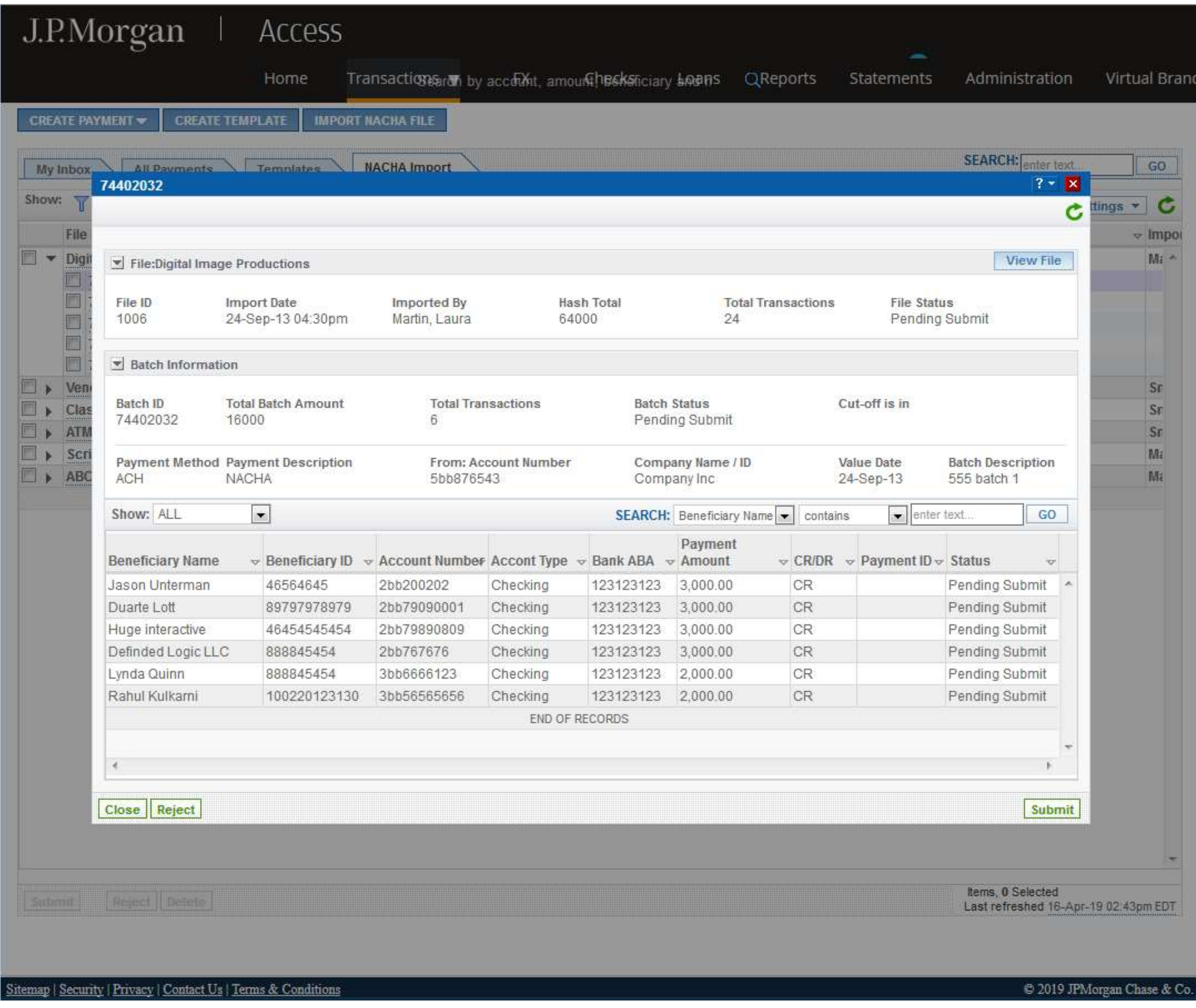


Figure 15

Note: For Nacha CTX transactions, you will only be able to view the first line of addenda in the Imports tab. Once the batch or file is submitted to the payments workflow, you will be able to view and print the multiple lines of addenda.

Submit imported Nacha files to payments

An authorized user must then submit the file or individual batches within the file into the Payment Approval workflow, where another authorized user can then approve/release submitted batches from the imported Nacha files for processing.

Submit imported Nacha files

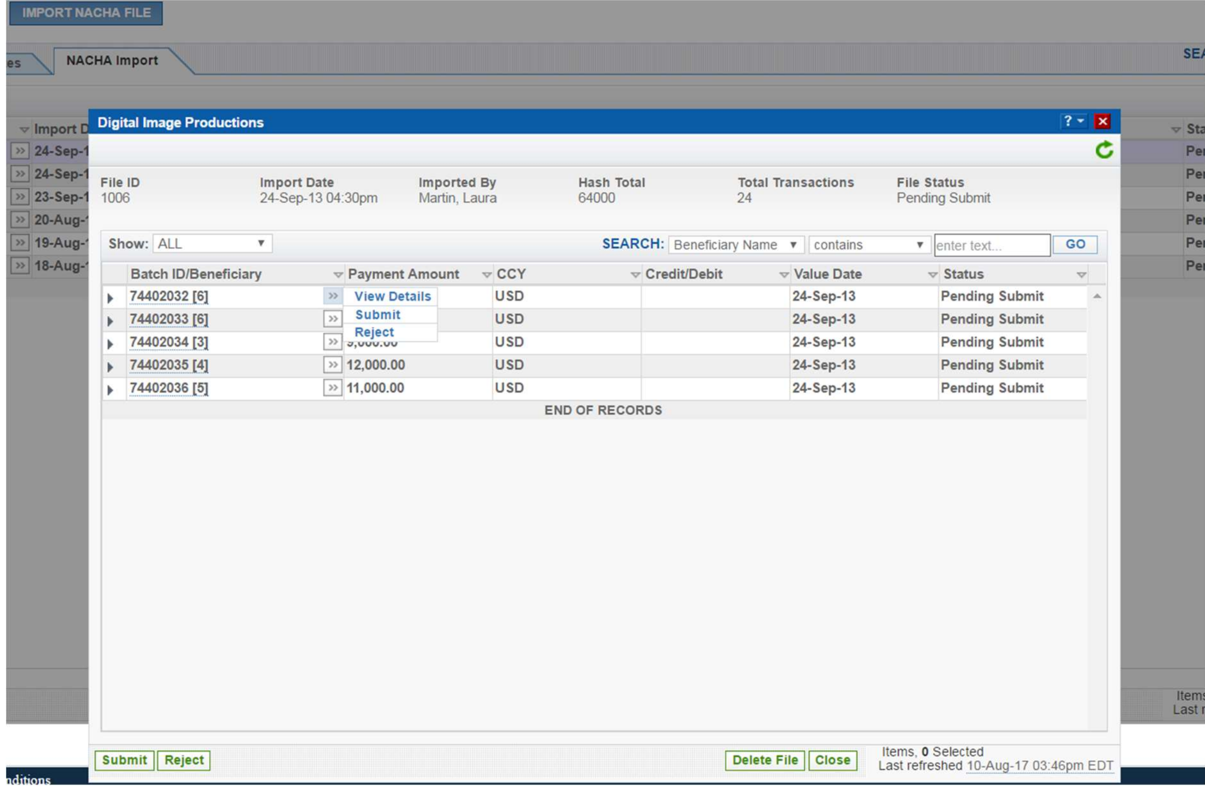


Figure 16

f. Describe the process for file balancing, verification, and confirmation.

Response:

To confirm the receipt of the State's direct transmission files, the State may choose to receive any of the following confirmation files:

- ACH File Receipt Notification Service is available to clients that provide J.P. Morgan with Direct Send ACH files and sends the State an email notification that their submitted ACH file was either successfully received by the ACH back office and validated or rejected for further processing. Email notifications can be sent to a maximum of 10 corporate email addresses (personal email addresses are not supported) and does not include notification of successful ACH processing of client files.
- The ACH Acknowledgement File automatically transmits a copy of the State's original File Header (1) record and File Control (9) record, allowing the State to reconcile back to their original ACH file processing records.
- The ACH Companion (Mirror) File provides a whole copy of the original incoming ACH Nacha detail payment file received by J.P. Morgan. This re-confirms the individual payment instructions that will be processed and is often used as a reconcilement file. Any ACH rejects or returns will be reported back to the State within one to three business days.

- The ACH Transaction Summary Report (Journal), is created post-processing and summarizes the settlement results and totals either for an individual file or for the entire business day. The report is sent to the State's via secure email or direct transmission delivery and is provided within 90 minutes of receipt of the ACH initiation file. Item count and dollar amount are included in the acknowledgement.
- ACH InfoDex offers the State a "hands-on" telephonic method to have authorized users securely verify and release ACH files. This is done by listening to the total dollar amount and number of items and approving that this information conforms to the State's own records.

g. Describe the time windows which same-day transactions are updated.

Response:

The State initiation method	Same-day ACH
Direct transmission (SFTP)	12:15 p.m. CT
ACH payments via Access Online	12:00 p.m. CT
Host-to-Host Payments	10:30 a.m. CT

Incoming same-day ACH transactions originated at other institutions, are posted and available by 4:00 pm CT.

h. Describe cut off times to process files for next day settlement. Describe how the contractor can process files according to the times needed by the agency, such as processing by 12:00 CT.

Response:

The cut off times to process files for next day settlement are listed below by file initiation method.

The State initiation method	Next-day ACH
Direct transmission (1,2)	9:00 p.m. CT
ACH payments via Access Online (1)	9:00 p.m. CT
Host-to-Host Payments (1)	9:00 p.m. CT
ACH concentration service	5:00 p.m. CT

FR 6 – Fraud Prevention – ACH Filters/ACH Blocks

a. Describe in detail the filters or fraud prevention services available.

Response:

We offer the State protection from unauthorized ACH items.

Protect your account from unauthorized ACH transactions with ACH debit block and more specific ACH transaction review services that provide protection from third-party organizations who originate ACH transactions against your accounts.

ACH debit block

ACH debit block enables you to specify which companies are authorized to post ACH debits to your accounts, blocking unauthorized use. The system's "block all" option prevents all ACH debits from posting. You may also set dollar limit ceilings.

With the ACH Debit Block Transaction report, you receive a daily report that provides a listing of all transactions that are blocked. Data is transmitted via Voltage secure email to identify blocked transactions, or optionally, to indicate that no transactions were blocked.

ACH FRAUD IS ON THE RISE

You decide to “block” or “allow”:

- All ACH transactions
- Specific originators
- By dollar amount
- By date

ACH transaction review

In addition to ACH debit block, we offer ACH transaction review service, available through Access Online.

You review and confirm ACH debit and credit transactions that post to your account and return unauthorized transactions on a case-by-case basis.

A self-service option allows you to choose either a “pay” or “return” decision default on your ACH Filter Profiles. ACH Transaction Review applies to both credit and debit profiles.

This feature is beneficial if you have bank accounts that serve multiple purposes or add diligence and reporting for higher-volume ACH received.

ACH transaction blocking self-service tool

ACH transaction blocking is a self-service tool that allows clients to add ACH debit and/or ACH credit block setups at the account level, with optional dollar amount thresholds using our robust Access Online portal. The ACH block can be setup through Access Online via the Checks module.

Early Warning—fraud mitigation for ACH origination

Begin to streamline your experience, while identifying and addressing risk from digital payments with our Early Warning solution.

With our Early Warning Integrated Solution, you submit inquiries to determine account status and ownership and receive a simplified response to aid in determining an actionable decision on a transaction. The solution may be used solely for bank account verification purposes or integrated within the digital payment process.

BENEFITS OF OUR APPROACH TO
Early Warning

LOWER RISK
Lower the risk of digital payments fraud as technology advancements increase

REDUCE TAKEOVER
Reduce occurence of account takeover and re-direction of funds to fraudsters

REDUCE COSTS
Cut down operational, collection and recovery costs associated with payment fraud

PROTECT YOURSELF
Minimize reputational risk, which can be just as damaging as financial losses

b. ***Describe the ability to block all ACH debits on accounts, including consumer and corporate.***

Response:

All ACH debits are prevented from posting to your account when you use the "block all" option with our ACH debit block service.

c. ***Describe if the State is allowed to designate certain companies to debit the State's bank account and block all other companies.***

Response:

The State is allowed to designate certain companies to debit the State's bank account and block all other companies. You provide a list of allowable company ID numbers. Only ACH debits that contain company ID numbers on your list post to your account. You can add criteria for accepting only ACH debits up to a dollar limit and during specified time periods.

d. ***Describe how the State would notify the bank of an unauthorized debit on the State's bank account. Describe how the State would pull the report and how the debit would show on the bank report.***

Response:

If the State elects to use our ACH transaction review service. You would notify the bank of unauthorized debits via Access Online. If there are exception items to view, your authorized user logs into Access Online to review the list. Once logged in, authorized users make a return decision or allow the ACH transaction(s) to remain posted. The following criteria are used to define the ACH transactions you wish to view:

- Debits and credits
- Company IDs
- Dollar amount and/or dollar amount range

- Transaction type (i.e., TEL, WEB, ARC, CCD, POP, PPD)

You have until 4:00 p.m. local bank time (determined by account location) to submit decisions. If a Pay or Return decision is not submitted by the client, the default Pay or Return decision, as established in the related profile, is applied.

If the State elects to use ACH debit block, the State will specify which companies are authorized to post ACH debits to its accounts, blocking unauthorized use. The system's "block all" option prevents all ACH debits from posting. the State may also set dollar limit ceilings.

With the ACH Debit Block Transaction report, the State receives a daily report that provides a listing of all transactions that are blocked. Data is transmitted via Voltage secure email to identify blocked transactions or optionally to indicate that no transactions were blocked.

FR 7 – Online Solution for RCK Entries

a. Describe an online solution to initiate RCK entries through the ACH network in an attempt to collect on insufficient funds checks.

Response:

Using Access Online, the State will have the ability to create an eCheck or RCK for checks returned due to insufficient funds or uncollected funds.

b. Describe how to enter the information to collect on a returned item.

Response:

RCK files may be created by the State (ACH Origination) using Access Online.

During your account implementation process, we will help set up the return item solutions to meet the State's needs in managing returned checks.

ACH Returns via our online payment presentment platform will be credited or debited to the State's J.P. Morgan demand deposit account according to standard ACH processing rules. Once the returns are presented to our solution, they will be included in the next remittance file, labeled as returns. The original transaction will be updated in our solution to reflect the return and an email notification sent to the payer.

Additional features available to help reduce returns include:

- **Automatic ACH Option Removal**: The State's applications can be configured to automatically turn off ACH as a payment option if a payer has received a client-defined number of prior ACH returns. The ACH payment option can be turned back on using either the Administrative site or file update process.
- **Invalid Bank Account Identification**: Our solution maintains a history of invalid bank accounts for each registered payer, based on returned payments received through the ACH network. The account is tagged as invalid when the system receives a return for any of the following reasons:
  - Account Closed (R02)
  - Unable to Locate Account (R03)
  - Invalid Account Number (R04)

- Account Frozen (R16)

Our solution will automatically cancel all recurring and future scheduled payments associated with the invalid bank account. If the account was erroneously deemed to be invalid, or subsequently becomes valid again, the account may be re-enabled using the Administrative site.

c. Describe what security measures are put in place to initiate and authorize RCK entries.

Response:

If a check is returned, it is evaluated for ACH conversion eligibility by determining the following:

- Is the check less than $2,500 in value?
- Has the check been returned as NSF or uncollected funds?
- Did a consumer write the check and will funds be drawn from a consumer bank account?
- Is the check not drawn on a Federal Reserve Bank or Federal Home Bank?
- Does the check contain a preprinted serial number?
- Was the check written within the last 180 days?

The check will be converted to ACH debit and re-presented up to two additional times. A credit will be posted to your account on the effective date of the initial RCK transaction—normally the business day after processing.

Security Measures

Access Online allows ample flexibility for the State to designate the rights of each user on the platform, and provides comprehensive and configurable user entitlements, limits and approval workflow to provide optimal control. Available services accommodate a wide range of security options, including dual control among users, daily or transaction limits and transaction approval rules.

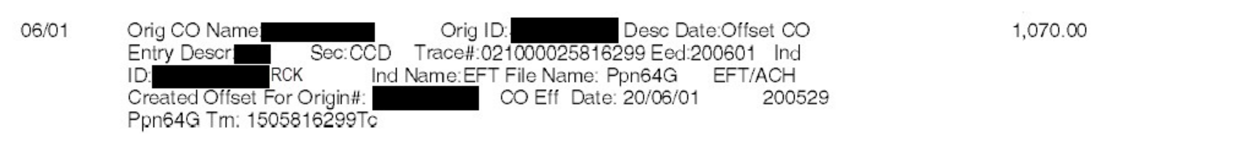
Each user can be restricted by dollar amount and function. Dollar amounts may be either single transaction, daily aggregate or both. By separating duties, accounts and approval workflows, the State can help reduce the risk of fraud or compromised data. The State's security administrators are the only individuals able to assign users with transaction initiation privileges.

d. Describe how the RCK entry would show on the bank statement and provide an example.

Response:

RCK entries would post as a consolidated ACH settlement item on the bank statement.

ACH Settlement Item



06/01 Orig CO Name: [redacted] Orig ID: [redacted] Desc Date:Offset CO 1,070.00
Entry Descr: [redacted] Sec:CCD Trace#:021000025816299 Eed:200601 Ind
ID: [redacted] RCK Ind Name:EFT File Name: Ppn64G EFT/ACH
Created Offset For Origin#: [redacted] CO Eff Date: 20/06/01 200529
Ppn64G Trn: 1505816299Tc

Figure 17

FR 8 – Other

a. ***Describe what training options are available to new users. Including if the training is in person, by phone and any charge associated for this service.***

Response:

We offer the State a variety of methods for training without any cost to you, such as webinars, phone and short step-by-step prerecorded videos.

The following resources are available:

- **Phone Training**: Customized one-on-one training conducted over the phone is offered to meet the State's unique needs for all Access Online products and services. To schedule a one-on-one session, you may contact Client Access Training at **866-619-3055**, Monday through Friday, 6:30 a.m. until 6:00 p.m. CT.
- **Webinar Training**: Instructor-led sessions are available on many of our products including Receivables Online and Remote Deposit Capture. For Access Online, we have webinars for each of our products in the Access Online family. Each webinar lasts between 15-90 minutes. Webinar registration is available via Access Online's Support/Education page.
- **Online Resources**:
  - Access Online: Available on Access Online's Support via the Education tab. Resources include online help articles, FAQs, guides and a range of live and pre-recorded webinar offerings on how the State can use the Access Online products and services. Short how-to videos are also available from certain Access Online screens.
- **In-person Training:** Your relationship team and onboarding specialist will coordinate in-person training for the State and State staff as part of the onboarding process.

b. ***Describe the hours of customer service and what information customer service would be able to assist with.***

Response:

Yolanda Savage, your client service professional, is a member of the Client Service team, which is organized by industry or segment. As an advocate for your business, Yolanda works with you to handle complex issues and provides resolution on service-related inquiries. Yolanda is available from 8:00 a.m. to 5:00 p.m. CT.

In addition to your primary and back-up client service professionals, we staff the Commercial Banking Service Center with client service professionals who help with routine requests from 7:00 a.m. to 7:00 p.m. CT Monday through Friday.

c. ***The bidder must provide a listing by month of the prior 12 months Earnings Credit Rate (ECR) used for bank account analysis as well as the current rate. The December 2019 ECR for the Nebraska State Treasurer's account was 1.55%. Describe how earning credits are calculated.***

Response:

The earnings credit rate is a bank managed rate which is reviewed and updated periodically by J.P. Morgan after considering a range of factors, including the market rate environment. Using a managed rate helps to maintain pricing flexibility while helping to protect you from the short-term rate volatility that could result from using an indexed rate.

The earnings credit allowance is calculated based on the average daily positive collected balances in the non-interest bearing accounts less the reserve requirement (currently 0%) using the following calculation:

Monthly earnings credit allowance calculation
(Average monthly investable balance x ECR x actual number of days in month) Actual number of days in year

Please see current and historical monthly earnings credit rates provide below. Please note, this table is not necessarily reflective of the rate that would have been offered to the State of Nebraska. We would have provided an exception-approved earnings credit rate.

Earnings credit rate history					
Feb-19	1.35%	Aug-19	1.07%	Feb-20	0.85%
Mar-19	1.35%	Sep-19	1.07%	Mar-20	0.28%
Apr-19	1.35%	Oct-19	1.00%	Apr-20	0.28%
May-19	1.35%	Nov-19	0.85%	May-20	0.28%
Jun-19	1.35%	Dec-19	0.85%	Jun-20	0.28%
Jul-19	1.35%	Jan-20	0.85%	Jul-20 / Current	0.28%

d. ***Describe if the bank charges for use of uncollected funds. If so, describe how the charge is calculated. Would the contractor allow these charges to be offset by earnings credit allowance?***

Response:

J.P. Morgan charges for the use of end of day (EOD) uncollected funds by applying a daily variable overdraft (OD) rate to individual DDAs for each day an overdraft occurs. Interest and overdraft fees can be offset by an earnings credit allowance and may be assessed on a per-occurrence basis.

The formula for Negative Collected Balance Fee is as follows:

Negative collected balance fee calculation

$$\frac{\text{(Negative collected balance x overdraft rate x number of days overdrawn)}}{\text{360 days}}$$

There is also a per occurrence fee for each individual overdraft when paid or returned.

e. ***Describe if the bank will assist the State to receive monthly holding reports for collateral? Describe how collateral will be pledged, Letter of credit or securities.***

Response:

Please see Process and Procedures herein.

NCMG Process and Procedures

JPMorgan Chase Bank, N.A. (the “Bank”), through its National Collateral Management Group (“NCMG”), employs a Bank developed Corporate Collateral Management System (“Coast”), which provides daily monitoring of deposit balances and security value for collateralization purposes.

Coast is reviewed each Federal Reserve banking day by dedicated Collateral Managers for compliance with customer collateral requirements. Collateral requirements are based upon the end-of-day ledger balances (except for Louisiana clients, where collected balances are used) in deposit accounts (demand and time deposits) (plus accrued interest if any), less applicable FDIC coverage, plus applicable margin (gross-up), if any. The end-of-day deposit balances are uploaded into Coast the following Federal Reserve banking day morning from the Bank's deposit system. NCMG monitors the market value of collateral pledged to our customers and compares the market value to the collateral requirements. In the event a market value reduction or increase in deposit level creates an under-collateralized position, additional collateral will be pledged promptly.

Federal Reserve Bank Third-Party Joint-Custody Security Accounts

The Bank currently uses the Federal Reserve Bank (“FRB”) as the primary custodian for joint-custody security accounts (“Collateral Account”). The Administrative Reserve Bank (“ARB”) that holds the securities for the Bank is the FRB of New York (determined by Federal Reserve rules). The FRB of Boston is the Federal Reserve System’s national collateral account administrator. Pledged securities will be held in an FRB collateral account in the name of the Public Entity.

In order to establish a Collateral Account, FRB requires a copy of the completed FRB “Pledgee Agreement Form” (“PA”) and “Fed Mail Form” from the Public Entity (the Public Entity must agree to the custodial agreement terms set forth in the FRB’s Operating Circular 7, Appendix C, as amended from time to time). The FRB will not review or complete any tri-party custodial agreements that Public Entities or banks present for collateral accounts.

The FRB will assign a unique, alphanumeric collateral account number to the Public Entity upon the receipt, review and verification of the completed PA and Fed-mail forms. The Public Entity may retain the original forms for their records.

If a Public Entity has (or had) a FRB collateral account, the Public Entity can provide NCMG the FRB alphanumeric collateral account number, a listing of authorized signer(s) and verification requirements listed on the existing PA or provide a copy of an existing PA, such that NCMG can pledge into their collateral account. If the Public Entity has a PA greater than two (2) years old, it is recommended that the Public Entity submit a new PA.

Until NCMG receives the FRB documents (or information regarding the existing account), NCMG will pledge collateral into a Bank controlled account at the FRB in the name of the Public Entity on Coast.

The FRB provides two (2) types of reporting; Joint Custody Daily Activity Statements (“AS”) and Monthly Securities Holdings Report (“MSHR”). The AS reports account activity when conducted within the collateral account. The MSHR reports all securities held in the Public Entity’s collateral account at month end. Both reports are sent within 24 hours either by email or facsimile. The FRB reports list the original par value of the securities pledged and does not report market value of securities pledged. The FRB does not provide online access to collateral account nor hold any irrevocable letter of credit issued by a Federal Home Loan Bank.

Collateral Increases

NCMG recommends that customers contact NCMG directly when additional deposits will exceed current collateral levels so that additional collateral can be pledged and put in place at the time the deposits are made.

Customers can contact NCMG before 1PM (Eastern) for a collateral increase to be effective the same day, otherwise NCMG will endeavor to make the collateral increase effective the same day if contacted after such time. Also, the Bank requires a one (1) business day notification of a collateral increase request greater than $50 million.

In the event that NCMG has not received timely prior notification of an increase in deposits from a customer, which results in a need of additional collateral, additional collateral will be promptly pledged, unless otherwise advised by the customer.

Collateral Releases

The release of any securities pledged as collateral in the clients’ FRB collateral account requires written authorization and verbal confirmation based upon the current FRB standards. NCMG will submit collateral release letter(s) to the client authorized individual(s) for authorization of any collateral reductions.

Collateral Limits

The Bank will collateralize all public deposits collateral requirements as necessary currently and has no established maximum collateral limit. As noted above, the Bank does require a one (1) business day notification of a collateral increase request greater than $50 million.

Security Valuation

The Bank uses an independent, third-party pricing agent for collateral valuation. Dependent upon the types of securities pledged, the Bank will update security prices (marked to market) daily, weekly and monthly, as provided from the pricing agent.

Types of Collateral Pledged

State law will govern acceptable collateral for public fund deposits, if applicable. Clients may provide further direction as to types of acceptable collateral. The types of collateral pledged are subject to change.

Subject to applicable state law and anticipated deposit levels, the Bank may pledge an irrevocable letter of credit issued by a Federal Home Loan Bank and securities in the form of U.S. Treasury (e.g., bills, notes, bonds and TIPS) and agency (e.g., Fannie Mae, Freddie Mac) securities as collateral to secure public fund deposits. In circumstances where the amount of deposits exceeds the size of the letter of credit the Bank will provide the required collateral using other forms of eligible collateral. Your relationship team or NCMG will be pleased to discuss our approach and provide additional information.

Reporting

In addition to FRB reporting (see “Federal Reserve Bank Third-Party Joint-Custody Security Accounts” above), NCMG provides a monthly collateral report which lists the pledged securities (description, maturity and rate), original par, current par and market value and, if applicable, will list any irrevocable letter of credit issued by a Federal Home Loan Bank. NCMG emails the report by the 5th business day of the following month. Customers may contact NCMG during normal business hours to request a collateral report for any specific business day.

Board Resolution

The Board of Directors of the Bank has passed a resolution which delegates authority from the Board to certain Bank personnel to, among other things, enter into agreements with governmental entities to serve as a depository and to pledge collateral to secure that entities’ public funds deposits. This resolution can be delivered upon request.

Contact Information

NCMG can be reached by:

Phone - 1-888-333-8340, option 1 (Monday – Friday 7AM – 4PM CT)
Email - ncmg@jpmorgan.com
U.S. Mail:
JPMorgan Chase Bank, N.A.
Attn: NCMG OH1-0138
1111 Polaris Parkway
Columbus, Ohio 43240-0138

_f._ **_Describe the process when the contractor receives the EFT batch from International Game Technology PLC (IGT), including confirmation of file accuracy and verification from bank of completed processing (including totals)._**

Response:

When a third party ACH processor is chosen by the State, the primary communication and confirmation process is between J.P. Morgan and the third party. The State may be added to the email confirmation distribution list for ACH file receipt notification service. All other post processing ACH confirmations and daily reports are provided back to the third party only, who can then pass them along to the State.

_g._ **_Describe the interface options with Salesforce to accept electronic invoices for Charitable Gaming._**

Response:

The online platform supports a variety of batch and real-time interface options for exchanging inbound and outbound data with the State's systems. The system interfaces use IT-industry standard protocols and supports a variety of formats. Depending on the depth of integration required, the State will have varying levels of technical effort and preference.

The State to J.P. Morgan (Inbound) Integration: Used for providing payer profiles, bill/invoice data and bill/invoices images (if required), as well as for payment initiation:

- **Transmission:**
  - **Inbound File:** This file provides profile and payment data into our solution prior to payers accessing the relevant payment channel (e.g., online, IVR or point-of-sale).
  - **Statement Image Archive File:** If using statement presentment, PDF statement images corresponding to the billing information provided in the Pre-Registration File may be delivered in batch as a *.zip, *.tar and *.tar.gz files.
- **API:**
  - Enables real-time communication between the State and our solution using industry standards and mutual authentication through the exchange of SSL certificates. The API is also used to facilitate secure session transfer of payers into and out of the online portal.
- **HTTPS POST:**
  - Select data elements can be passed into our solution using an HTTPS POST session transfer that then will be associated with each corresponding payment. This data is also reflected in the real-time payment confirmation and remittance batch file.

J.P. Morgan to the State (Outbound) Integration: Used to provide completed payment and remittance information back to your systems:

- **Transmission:**
  - **Transmission Reporting File:** Consolidate your online, IVR and operator assisted initiated collected items with both paper and electronic collections received by J.P. Morgan. File is transmitted during designated times in an ANSI X-12 EDI 823 format.
  - **Remittance File:** This file provides detail remittance of all executed and returned transactions on our solution, providing you with a daily means (excluding bank observed holidays) to reconcile funds settlement.

    - **Recurring Payment Enrollment File:** This file provides recurring enrollment activity that occurred within our solution on the previous day including all new, edited, stopped, expired, and active recurring enrollments. This file is transmitted daily (seven days a week, including bank observed holidays).
- **API:**
    - **Real-Time Payment Confirmation (RTPC):** Enables the State to receive a notification each time a payment is initiated, edited, canceled, or refunded, allowing you to update your systems in real-time and make time-sensitive decisions.

h. Describe the ability to process transactions in real time.

Response:

Transactions processed via our online billing and payments presentment platform settle based on the payment type selected by the user.

Settlement is as follows:

- All ACH payments are settled on the designated payment effective date, typically the next business day.
- All Apple Pay payments are settled separately from card payments but will be settled at the same time as the card payments.
- All credit and debit card payments are authorized in real-time and settled one to two business days after the payment effective date.

i. Describe the ability to update same day transactions. If there are daily specific time, please list the times update occur.

Response:

J.P. Morgan is highly engaged with Nacha and the ACH industry. Together with The Clearing House and other key Nacha members, J.P. Morgan worked to design, develop and champion the same-day ACH rule change.

The same day ACH rule changes now include the following:

- All receiving financial institutions are now required to provide same-day settlement of ACH transactions for their consumer and corporate clients.
- ACH credit transactions of $100,000 and under are eligible for same-day processing. This allows for payroll, bill payments, person-to-person payments and other types of credit transactions to be processed faster.
- The processing of ACH debit payments, affecting consumer bill payments for items like mortgages and credit card payments. ACH debit transactions of $100,000 and under are eligible for same-day processing.
- The final phase mandated that RDFIs make funds available from Same Day ACH credits to their depositors by 5:00 p.m. at the RDFI’s local time.

J.P. Morgan’s ACH originators will automatically be enabled to initiate same-day transactions by using the Effective Entry Date within the batch header record on the ACH File; an opt-out process is available

for clients who do not want same-day processing. ACH clients wishing to initiate same-day ACH debit entries must contact their relationship team to enable same-day debit processing.

Additional fees are charged for off-us same-day ACH origination. Cutoff times are as follows:

The State initiation method	Cutoff times
Direct transmission	11:30 a.m. CT (prefund) and 12:15 p.m. CT
ACH payments via Access Online	11:00 a.m. CT (prefund) and 12:00 p.m. CT
Host-to-Host Payments	10:00 a.m. CT (prefund) and 10:30 a.m. CT

Note: Transactions above $100,000 and IAT (cross-border ACH) transactions are not eligible for same-day ACH. The $100,000 per transaction limit that is in effect will continue to be reexamined separately by Nacha to determine the need for additional limit increases and what that limit will be.

j. Describe options available for licensees (taxpayers) to file and pay taxes and fees through an EFT process.

Response:

Our solution enables the State to accept a variety of payment types, including credit card, debit card, Apple Pay and eCheck/ACH. The following summarizes the general online payment life cycle, which may vary depending on the capabilities used by the State.

- **Step 1**: The State has the option to provide payers and payment data online, including:
  - Pre-registered end-user profiles, including payment enrollment or account data
  - Bill/invoice data, images or additional remittance information
- **Step 2**: Payers are able to access any of the online channels, including:
  - **Online & Mobile**: A the State-branded online and mobile website that enables your payers to view bills/invoices and pay them using their credit card, debit card, Apple Pay* or ACH
  - **Interactive Voice Response (IVR)**: A the State-branded solution that enables your payers to pay you using their credit card, debit card or ACH over the phone
  - **In-person Point-of-Sale (POS)**: Accept credit card and debit card from payers at in-person locations
  - **Administration Portal**: The State's authorized personnel can make payments on behalf of payers in support of your call center or administrative processes

  Payments initiated through any channel are processed on the designated effective date, either immediate or a future date.
- **Step 3:** Remittance data is sent to the State through a real-time API or through a file transmission to facilitate fully automated "straight through" posting of payments. File transmissions can be combined with other payment types including checks received via a J.P. Morgan managed lockbox or wire.
- **Step 4:** The State may use the Administration portal to view payment activity, generate reports, support reconciliation, execute refunds and perform inquiries.
- **Step 5:** Settlement of funds depends on the payment type selected by the user:

- All credit and debit card payments are authorized in real-time and settled one to two business days after the payment effective date.
- All ACH payments are settled on the designated payment effective date, typically the next business day.
- All Apple Pay payments are settled separately from card payments but will be settled at the same time as the card payments.

*Apple Pay is only available on Apple products. The payments cannot be saved and will only be available for one-time use.

k. Describe the options available to confirm bank file totals electronically.

Response:

The ACH Transaction Summary Report (Journal) is created post-processing, and summarizes the settlement results and totals for either an individual file or for the entire business day. The bank sends the report to the State via secure email or direct transmission delivery within 90 minutes of receipt of the ACH initiation file. The acknowledgement includes item count and dollar amount.

l. Describe and provide an example of how credit transactions will post and all options to download this information.

Response:

J.P. Morgan provides several options for reporting incoming and outgoing ACH transactions.

- **Access Transaction Services**: Access Online gives J.P. Morgan access to ACH transaction information, help initiate investigations, receives responses, and generates analytical reports. Access Online stores 15 months of history and enables J.P. Morgan to obtain either summary or complete payment details on originated transactions. It also enables J.P. Morgan to send reversals and/or reclaims securely and can also be used to retrieve ACH returns and obtain a Reversal/Reclaim report. J.P. Morgan can submit a notification of change (NOC) to correct future transactions.
- **Enhanced Receiver Services and Host-to-Host Reporting**: Acts as a pipeline, carrying information in standard formatted files or printed reports to client sites. Enhanced Receiver Services report on a variety of transactions, including ACH, carrying extended remittance data. Data can be formatted into EDI or BAI2 data files for the transmission service.
- **ACH Reconcilement Service**: ACH reconcilement services facilitate automatic reconcilement of U.S. domestic ACH payments initiated through various J.P. Morgan channels against corresponding transactions posted to client DDAs. Replacing single, generic offsets, this solution delivers BAI2-formatted information about originated batches or items directly to treasury software systems. This information is also available on Access Online.
- **EDI Reporting** - Host-to-Host Reporting delivers consolidated reporting of remittance data for ACH, wire and lockbox receipts posted to the State's demand deposit accounts (DDA). Data is presented in standard formats and is sent via a variety of standard communications connections. Host-to-Host Reporting transaction reports include details that may not be supplied through standard bank reporting tools. The information can be consolidated into a single data stream that is transmitted directly to your accounts receivables system.

m. Describe the ability to originate ACH debits from files provided to the contractor from multiple sources.

Response:

J.P. Morgan is able to accept an ACH file from multiple sources. We will assign a dedicated ACH implementation specialist that will work side-by-side with the State's personnel on setup. The specialist will verify that there is an understanding of your overall needs prior to implementation.

n. Describe the ability to provide RDFI services, including depositing received funds into specified bank accounts and what options are available to DOR with files containing offsetting credits.

Response:

J.P. Morgan offers the ability to process ACH balanced files, where the State will populate the offsetting ACH batch settlement credit entry within the file, to direct the incoming funds to the correct J.P. Morgan account.

o. Describe options available to combine electronic posting or a Trap file of all ACH credit files received daily and all ACH debit originations from various application sources into one file and provide this file in NACHA standard CCD+ and PPD+ formats. Describe what options are available for FTP via SSL and what time the day following the effective settlement date the file would be available.

Response:

J.P. Morgan can provide the State with a single file of all ACH items received. Firm policy requires all files be sent via secure protocol (SFTP, FTPS, AS, HTTPS).

Incoming ACH receipts

For incoming ACH receipts and attached remittance data records collected by the State, J.P. Morgan can provide a NACHA formatted Trap file or an EDI 820 file. The State has the option to choose to receive the remittance data through a variety of formats and transmission interfaces. This may be a fully automated transmission from J.P. Morgan or a web-based exportable download file, to facilitate reconciliation into your ERP systems.

ACH debit origination

For ACH debit origination files, J.P. Morgan can provide a mirror file which provides a whole copy of the original incoming ACH Nacha detail payment file received by J.P. Morgan. This re-confirms the individual payment instructions that will be processed and is often used as a reconcilement file.

Consolidated data file

J.P. Morgan may be able to consolidate incoming ACH Receipts and ACH Debit Origination into a single file. We would appreciate the opportunity to discuss this process further with you.

J.P. Morgan Host-to-Host

The firm recognizes how critically important secure Internet transmission capabilities are to your business. J.P. Morgan Host-to-Host offers a suite of comprehensive data communication tools, to be used over the Internet or through Private Networks, that align to industry accepted standards and protocols.

J.P. Morgan Host-to-Host leverages advanced security features to provide authentication, confidentiality, non-repudiation and data integrity when transmitting files to, or receiving files from, the firm.

Transmission is executed through J.P. Morgan's Transmission Services Platforms - Managed Internet Services and Managed Private Network (e.g., SwiftNet FileAct and 3rd Party vendors). Firm policy requires all files be sent via secure protocol (SFTP, FTPS, AS, HTTPS) and must adhere to the minimum security standards described below:

All SSL certificates and PGP keys must expire in two years

- All credentials must have a key bit length of 2048 or above
- All SSH2 keys must use the RSA algorithm
- All inbound files containing transactions must be digitally signed

J.P. Morgan Host-to-Host Transmission Services employs public key infrastructure (PKI) security in accordance with approved ANSI standards for all Internet connections to/from the bank.

Internet transmission solutions are used by more than 90% of J.P. Morgan Host-to-Host Payment clients.

ACH Transaction Summary Report (Journal)

The ACH Transaction Summary Report (Journal), is created post-processing and summarizes the settlement results and totals either for an individual file or for the entire business day. The report is sent to the State via secure email or direct transmission delivery and is provided within 90 minutes of receipt of the ACH initiation file. Item count and dollar amount are included in the acknowledgement.

p. ***Describe the process to work with agencies and their vendors to test debit and credit electronic funds transfers through the ACH network and test all components of auxiliary systems as requested by the DOR.***

Response:

The process for testing debit and credit electronic funds transfers through the ACH network will occur during implementation and on an ongoing basis as needed. One or more technical implementation specialists will work with the State to coordinate setup and testing activities for your data file transmissions. The technical implementation specialists will assemble a team of production and systems experts to work closely with you throughout the process.

The J.P. Morgan technical implementation specialist develops the test plan, including test scenarios, test scripts and test cases. The process involves managing and coordinating the following key activities during the setup process:

- Nacha file specifications

- Return/Notification of Change reporting options
- Processing options (i.e., redeposit, returns, media determination, etc.)
- Transmission options and setup
- Manage file testing
- Review file security
- Update implementation documents
- Provide status updates
- Confirm that reports and elements of file testing and processing are examined
- Confirm that test results are reported to appropriate individuals
- Provide training or other assistance (as needed)

One successful end-to-end test with the State is required before your go-live date.

q. Describe what standard entry class codes are supported. Describe how the contractor will support implementation of additional standard entry class codes.

Response:

As an industry leader, J.P. Morgan supports all ACH standard entry class codes for electronic processing and settlement. The State can elect to use either a web-based offering or fully automated data transmission. Nacha import is available for CCD, CTX, PPD and WEB Standard Entry Class Code transactions. The web based import functionality also supports the transaction codes for checking, savings, general ledger and loans. Optionally, a comma-delimited or fixed width file can be uploaded using the template functionality.

The file import feature offers the State:

- Future-dated warehousing of up to 60 calendar days.
- Ability to create settlement offset at transaction level or batch level.
- Next-day settlement option for transfers to/from J.P. Morgan accounts.
- Option to create addendum record for all payments.

r. Describe how the contractor will meet the requirements of the ACH payment scheduling system.

Response:

Our solution supports registered payer profiles including remembering their bank accounts, payment history, bills/invoices, recurring enrollments and pending payments.

Registered profiles are established using two different methods:

- **Pre-Registration**: The State can provide profile information using a real-time API or batch input file transmission.
  - Pre-registration enables use of advanced features, including tokenized payments, bill/invoice presentment, installment and variable recurring auto payments and single sign-on (secure session transfer).

- **Self-**Registration: The State's payers will be given the opportunity to self-register upon entering the online and mobile portal.
  - The payer will be prompted to enter their personal information (e.g., name, email address, identifying account information), and to create a user name and password for future verification.
  - Each time a payer makes a subsequent visit, the system recognizes their name and password.

payers can schedule payments on the date of their choosing. The State can limit the payment date range, from 30 days up to 365 days.

One-time and recurring payments

Online can support both one-time and recurring payments. The State can specify which payment options you would like to make available to your payers, including specific frequency options such as:

Frequency options	
One-time payments	• *Immediate*: Payment is made on the first available effective date based on the payment method selected and time the payment is completed • *Scheduled* (future-dated): The payment is made on the specified date
Recurring payments	Each installment payment is for a fixed amount and executed on a fixed frequency. • *Frequency options*: Weekly, every other week, twice per month, monthly, or quarterly • *Duration options*: Until cancelled, until a specified date, or for a fixed number of payments
Variable, recurring automatic payments	Available for pre-registered payers only, the amount and/or timing of each payment varies based on billing data provided by the State. • *Duration options*: Until cancelled, until a specified date, or for a number of payments • *Maximum payment amount*: Enables the payer to set a "not to exceed" limit on the amount of any given payment instance

All payment instances including one-time and each recurring payment instance are reported to the State via a real-time API or through an end-of-day file transmission.

Variable recurring auto-payments

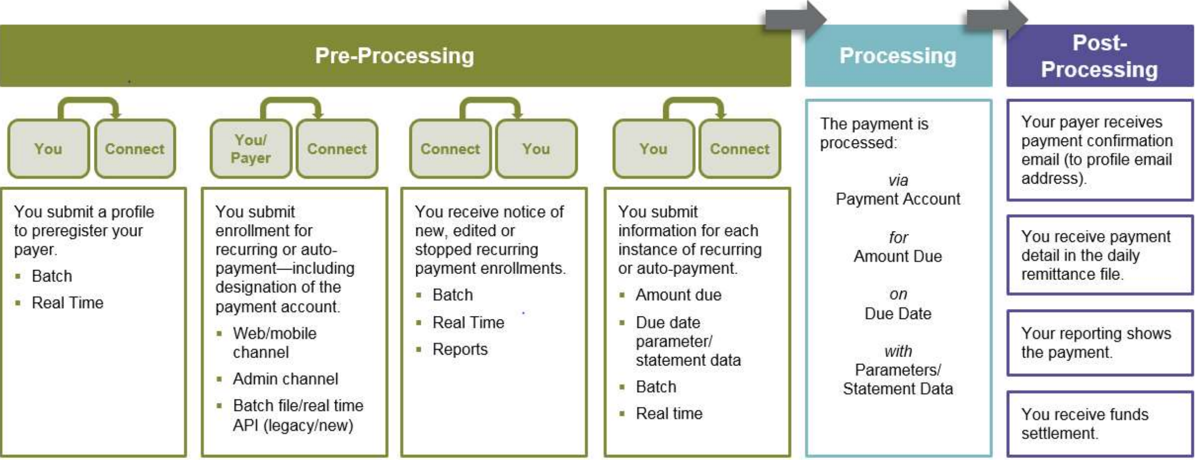


Figure 18

Notifications

The portal can create and send email notifications as various events occur within the platform including payment confirmation, recurring payment enrollment, new bill/invoices available, card expiration warning, returned items and profile changes. The emails include relevant details about the event, are the State branded and can be sent in English or Spanish depending on the Payer's language preference.

Our solution sends an email to your payer when an email address is provided. Email addresses may optionally be required for all payers during registration, except at the point-of-sale. The State may choose to send emails directly from your own internal application, in which case emails can be disabled.

Possible email notifications that can be sent are:

Email notifications	
Profile/account management	
Registration	• Registration confirmation
Payer Account	• Payer account updated • Payer account removed
Password	• Forgot password • Reset password
Credit/debit cards	• Credit card expiration warning
Bill/Statement notification	• New bill/statement is available for viewing

J.P.Morgan

Email notifications	
Payments	
Single payment	• Payment initiated on the online portal or Administration site • Payment edited on the online portal or Administration site • ACH payment was processed • ACH payment was returned • Warehoused ACH payment was cancelled • Warehoused credit/debit card payment was processed • Warehoused credit/debit card payment was declined
Recurring payment enrollments	• Recurring enrollment was created • Recurring enrollment was edited • Recurring enrollment was stopped • Recurring enrollment is about to end
Recurring payment instance	• Recurring payment was processed • Payment information was updated • Due date occurs after the card expiration date • Amount due is greater than maximum payment amount
Refunds	• Payment was refunded
Cancellations	• Payment was cancelled

s. ***Describe how the contractor can combine ACH credit and ACH debit files from various application sources into one file. If the contractor can combine files, could the file be available by 5:00 AM CT? If not available by 5:00 AM CT, what time could it be available?***

Response:

J.P. Morgan may be able to consolidate incoming ACH Receipts and ACH Debit Origination into a single file. We would appreciate the opportunity to discuss this process further with you.

t. ***Describe the timeline from award to implementation.***

Response:

Please see Appendix 4 for sample implementation project plan including timeline.

u. ***Provide the State Treasurer's Office, through a mutually agreed electronic transmission method, the amount of receipted funds credited to those accounts designated by the State by open of business Central Time on the effective settlement date. The money must be available for withdrawal by 8:30 AM CT. Describe the time which money would be available for transfer.***

Response:

For ACH credits, the State will receive availability (memo post) for ACH collections upon opening of the business day on the settlement date. A hard post of the funds will occur at the end of the business day.

v. ***Describe ability to assist the State with Office of Foreign Assets Control (OFAC) compliance in relation to the NACHA Operating Rules.***

Response:

Please refer to the attached letter included in Appendix 5 for information about JPMorgan Chase & Co.'s global sanctions compliance program. In addition, an audit is performed annually on Global Sanctions Compliance.

c. Technical considerations

Please see Appendix 1 for Access Technical Requirements.

d. Detailed project work plan

An onboarding specialist will be assigned to serve as the State's primary point of contact throughout the process. Your onboarding specialist, who has end-to-end ownership and accountability of the implementation, is responsible for communicating regularly with you and coordinates activities across the bank. Regular, often weekly, meetings occur to share information and measure progress.

Your onboarding specialist works with you to validate the solutions you have requested, establish timelines for implementation and then coordinates with the necessary teams across your organization and J.P. Morgan to complete the setup.

We view the implementation process as a pivotal phase in our relationship and an opportunity to demonstrate the value of our expertise and consultative capabilities. Our project management methodology is designed to build a strong understanding of your objectives.

The onboarding specialist is responsible for:

- Forwarding new account and product documentation, file specifications, start-up packet(s) and procedure manuals to the State.
- Contacting your designated representative(s) to complete all required documentation and determine specific product instructions.
- Reviewing and completing product questionnaires with you, as appropriate.
- Opening required accounts.
- Ordering depository supplies.
- Coordinating with our operations group to make sure products are set up to your specifications.
- Coordinating file and transmission testing with the technical implementation specialist for both teams, which includes:

- Transmission options review and setup
- File testing
- File security
- Providing test and reports to the State
- Examining all reports and elements of file testing and processing
- Updating all parties on progress

- Confirming delivery of PINS and instruction guides.
- Providing required training or other assistance, as needed.
- Monitoring initial depository activity and confirming depository products are working as expected.
- Organizing a post-implementation meeting to review your account analysis statement.
- Coordinating the hand-off to your Yolanda Savage, your designated client service professional, for ongoing servicing.

An established project flow and framework is followed when executing the setup of products and services.

Implementation process flow

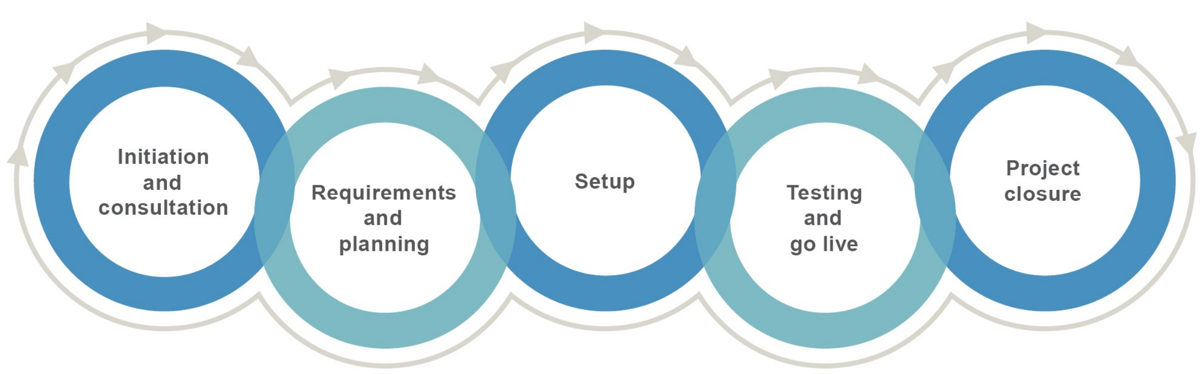


Figure 19

A sample implementation plan is included in Appendix 4.

The basic implementation process follows:

- Relationship team confirms terms of proposal with the State.

You accept the proposal.

- Terms of proposal are shared with our implementations group.
- Your sales and implementation teams discuss the proposal, exceptions, your goals and special conditions.
- Your implementation team schedules a kick-off call, reviews the project plan, identifies needed documentation and establishes a meeting schedule.

- You return the required core Demand Deposit Account (DDA) documents and product-specific documents to Implementation.
- Our implementation team works to complete your request and verifies our systems reflect correct the State information.
- Your Client Service Professional, Yolanda Savage is notified of product setup completions.
- Training requirements are coordinated and scheduled with your designated contact(s).
- Training, including product manuals and sample completed order forms, is provided to you at no cost.
- Your account is monitored for a period of time (to be determined) to verify proper setup, availability, exceptions, etc.
- Your onboarding specialist confirms with you that products are working properly and sets up a meeting to review your first analysis statement.
- Your account is officially handed to your designated Client Service Professional, Yolanda Savage for ongoing servicing.

e. Deliverables and due dates

Please see Appendix 4 for a sample implementation project plan including timeline.

TERMS AND CONDITIONS

Bidders should complete Sections II through VI as part of proposal. Bidder is expected to read the Terms and Conditions and should initial either accept, reject, or reject and provide alternative language for each clause. The bidder should also provide an explanation of why the bidder rejected the clause or rejected the clause and provided alternate language. By signing the solicitation, bidder is agreeing to be legally bound by all the accepted terms and conditions, and any proposed alternative terms and conditions submitted with the proposal. The State reserves the right to negotiate rejected or proposed alternative language. If the State and bidder fail to agree on the final Terms and Conditions, the State reserves the right to reject the proposal. The State of Nebraska is soliciting proposals in response to this solicitation. The State of Nebraska reserves the right to reject proposals that attempt to substitute the bidder's commercial contracts and/or documents for this solicitation.

The bidders should submit with their proposal any license, user agreement, service level agreement, or similar documents that the bidder wants incorporated in the Contract. The State will not consider incorporation of any document not submitted with the bidder's proposal as the document will not have been included in the evaluation process. These documents shall be subject to negotiation and will be incorporated as addendums if agreed to by the Parties.

If a conflict or ambiguity arises after the Addendum to Contract Award have been negotiated and agreed to, the Addendum to Contract Award shall be interpreted as follows:

1. ***If only one Party has a particular clause then that clause shall control;***

2. ***If both Parties have a similar clause, but the clauses do not conflict, the clauses shall be read together;***

3. ***If both Parties have a similar clause, but the clauses conflict, the State's clause shall control.***

Please keep in mind that J.P. Morgan also requires execution of all applicable account opening documents, as well as all relevant product and service agreements. As part of our efforts to manage our environmental footprint in an efficient and sustainable manner, sample documents are provided through the links below. Please note that these documents may be modified by the bank from time to time.

- **Sample Account Opening Documents:**

  https://www.chase.com/content/dam/chasecom/en/commercial-bank/documents/11-21-us-account-opening-package.pdf

- **Sample Product and Service Terms and Agreements:**

  https://www.chase.com/content/dam/chasecom/en/commercial-bank/documents/11-21-consolidated-service-terms-commercial-bank.pdf

The sample documents cover the comprehensive set of products and services that may be offered to our Commercial Banking clients in general, and many of those in the standard package may not apply to the services currently proposed to the State. At the time of your implementation, and based on the specific services you elect to use, you will receive the applicable agreements to be executed from your implementation project manager.

Know Your Customer

J.P. Morgan is required to know its customer and to adhere to policies and procedures intended to meet those regulatory requirements that apply to safety and soundness and to fight against the funding of terrorism, money laundering and sanction related activities including performing certain transaction screenings. This means J.P. Morgan will request information about the State and its management and those having authority to transact business with J.P. Morgan in order for J.P. Morgan to comply with its policies and procedures. This is an ongoing requirement and the provision of services pursuant to this proposal and any additional products or services that may be requested is subject to and conditioned upon the ongoing satisfaction of those policies and procedures and compliance by the State with applicable law with respect to the services provided and J.P. Morgan's policies of which the State is informed.

Proposed Deviations

J.P. Morgan has identified below the terms or conditions that we respectfully request be modified in accordance with our recommended revisions. We are willing to discuss mutually agreeable modifications to the contract terms. The proposed changes are indicated by additions *in italic, underlined, text* and deletions by ~~strikethrough, red text~~.

A. GENERAL

Accept (Initial)	Reject (Initial)	***Reject & Provide Alternative within Solicitation Response (Initial)***	***NOTES/COMMENTS:***
JM			For clarity, the applicable Bank account and service documentation will also be part of the Contract between the parties. Sample documentation is provided in our Proposal. Based on the specific services you elect to use; the applicable agreements will be provided at Contract negotiation or implementation.

The contract resulting from this solicitation shall incorporate the following documents:

1. Request for Proposal and Addenda;

2. Amendments to the solicitation;

3. Questions and Answers;

4. Bidder's proposal (Solicitation and properly submitted documents);

5. Addendum One to Contract, if applicable; and,

6. Amendments/Addendums to the Contract.

These documents constitute the entirety of the contract.

Unless otherwise specifically stated in a future contract amendment, in case of any conflict between the incorporated documents, the documents shall govern in the following order of preference with number one (1) receiving preference over all other documents and with each lower numbered document having preference over any higher numbered document: 1) Amendments and Addendums to the executed Contract with the most recent dated amendment or addendum having the highest priority, 2) Addendum One to Contract 3) Amendments to solicitation and any Questions and Answers, 4) the original solicitation document and any Addenda, and 5) the Bidder's submitted Proposal.

Any ambiguity or conflict in the contract discovered after its execution, not otherwise addressed herein, shall be resolved in accordance with the rules of contract interpretation as established in the State of Nebraska.

B. NOTIFICATION

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Bidder and State shall identify the contract manager who shall serve as the point of contact for the executed contract.

Communications regarding the executed contract shall be in writing and shall be deemed to have been given if delivered personally or mailed, by U.S. Mail, postage prepaid, return receipt requested, to the parties at their respective addresses set forth below, or at such other addresses as may be specified in writing by either of the parties. All notices, requests, or communications shall be deemed effective upon personal delivery or five (5) calendar days following deposit in the mail.

Either party may change its address for notification purposes by giving notice of the change, and setting forth the new address and an effective date.

C. NOTICE (Buyer Representative)

The State reserves the right to appoint a Buyer's Representative to manage [or assist the Buyer in managing] the contract on behalf of the State. The Buyer's Representative will be appointed in writing, and the appointment document will specify the extent of the Buyer's Representative authority and responsibilities. If a Buyer's Representative is appointed, the Contractor will be provided a copy of the appointment document, and is expected to cooperate accordingly with the Buyer's Representative. The Buyer's Representative has no authority to bind the State to a contract, amendment, addendum, or other change or addition to the contract.

D. GOVERNING LAW (Statutory)

Notwithstanding any other provision of this contract, or any amendment or addendum(s) entered into contemporaneously or at a later time, the parties understand and agree that, (1) the State of Nebraska is a sovereign state and its authority to contract is therefore subject to limitation by the State's Constitution, statutes, common law, and regulation; (2) this contract will be interpreted and enforced under the laws of the State of Nebraska; (3) any action to enforce the provisions of this agreement must be brought in the State of Nebraska per state law; (4) the person signing this contract on behalf of the State of Nebraska does not have the authority to waive the State's sovereign immunity, statutes, common law, or regulations; (5) the indemnity, limitation of liability, remedy, and other similar provisions of the final contract, if any, are entered into subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity; and, (6) all terms and conditions of the final contract, including but not limited to the clauses concerning third party use, licenses, warranties, limitations of liability, governing law and venue, usage verification, indemnity, liability, remedy or other similar provisions of the final contract are entered into specifically subject to the State's Constitution, statutes, common law, regulations, and sovereign immunity.

The Parties must comply with all applicable local, state and federal laws, ordinances, rules, orders, and regulations.

E. BEGINNING OF WORK

The bidder shall not commence any billable work until a valid contract has been fully executed by the State and the awarded bidder. The Bidder will be notified in writing when work may begin.

F. AMENDMENT

This Contract may be amended in writing, within scope, upon the agreement of both parties.

G. CHANGE ORDERS OR SUBSTITUTIONS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The State and the Contractor, upon the written agreement, may make changes to the contract within the general scope of the solicitation. Changes may involve specifications, the quantity of work, or such other items as the State may find necessary or desirable. Corrections of any deliverable, service, or work required pursuant to the contract shall not be deemed a change. The Contractor may not claim forfeiture of the contract by reasons of such changes.

The Contractor shall prepare a written description of the work required due to the change and an itemized cost sheet for the change. Changes in work and the amount of compensation to be paid to the Contractor shall be determined in accordance with applicable unit prices if any, a pro-rated value, or through negotiations. The State shall not incur a price increase for changes that should have been included in the Contractor's proposal, were foreseeable, or result from difficulties with or failure of the Contractor's proposal or performance.

No change shall be implemented by the Contractor until approved by the State, and the Contract is amended to reflect the change and associated costs, if any. If there is a dispute regarding the cost, but both parties agree that immediate implementation is necessary, the change may be implemented, and cost negotiations may continue with both Parties retaining all remedies under the contract and law.

In the event any product is discontinued or replaced upon mutual consent during the contract period or prior to delivery, the State reserves the right to amend the contract or purchase order to include the alternate product at the same price.

******Contractor will not substitute any item that has been awarded without prior written approval of SPB******

H. VENDOR PERFORMANCE REPORT(S)

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The State may document any instance(s) of products or services delivered or performed which exceed or fail to meet the terms of the purchase order, contract, and/or solicitation specifications. The State Purchasing Bureau may contact the Vendor regarding any such report. Vendor performance report(s) will become a part of the permanent record of the Vendor.

I. NOTICE OF POTENTIAL CONTRACTOR BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
		JM	We agree with this provision in principal. We agree to give notice of a breach of contract promptly and without undue delay. Depending on the facts and circumstances, immediate notice may not be possible, however we will act in good faith to provide notice in the manner described.

If Contractor breaches the contract or anticipates breaching the contract, the Contractor shall immediately give written notice to the State. The notice shall explain the breach or potential breach, a proposed cure, and may include a request for a waiver of the breach if so desired. The State may, in its discretion, temporarily or permanently waive the breach. By granting a waiver, the State does not forfeit any rights or remedies to which the State is entitled by law or equity, or pursuant to the provisions of the contract. Failure to give immediate notice, however, may be grounds for denial of any request for a waiver of a breach.

J. BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			We propose to also have those certain termination rights as described in our account and service documentation.

Either Party may terminate the contract, in whole or in part, if the other Party breaches its duty to perform its obligations under the contract in a timely and proper manner. Termination requires written notice of default and a thirty (30) calendar day (or longer at the non-breaching Party's discretion considering the gravity and nature of the default) cure period. Said notice shall be delivered by Certified Mail, Return Receipt Requested, or in person with proof of delivery. Allowing time to cure a failure or breach of contract does not waive the right to immediately terminate the contract for the same or different contract breach which may occur at a different time. In case of default of the Contractor, the State may contract the service from other sources and hold the Contractor responsible for any excess cost occasioned thereby.

The State's failure to make payment shall not be a breach, and the Contractor shall retain all available statutory remedies and protections.

K. NON-WAIVER OF BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The acceptance of late performance with or without objection or reservation by a Party shall not waive any rights of the Party nor constitute a waiver of the requirement of timely performance of any obligations remaining to be performed.

L. SEVERABILITY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

If any term or condition of the contract is declared by a court of competent jurisdiction to be illegal or in conflict with any law, the validity of the remaining terms and conditions shall not be affected, and the rights and obligations of the parties shall be construed and enforced as if the contract did not contain the provision held to be invalid or illegal.

M. INDEMNIFICATION

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

1. **GENERAL**

The Contractor agrees to defend, indemnify, and hold harmless the State and its employees, volunteers, agents, and its elected and appointed officials ("the indemnified parties") from and against any and all third party claims, liens, demands, damages, liability, actions, causes of action, losses, judgments, costs, and expenses of every nature, including investigation costs and expenses, settlement costs, and attorney fees and expenses ("the claims"), sustained or asserted against the State for personal injury, death, or property loss or damage, arising out of, resulting from, or attributable to the willful misconduct, negligence, error, or omission of the Contractor, its employees, Subcontractors, consultants, representatives, and agents, resulting from this contract, except to the extent such Contractor liability is attenuated by any action of the State which directly and proximately contributed to the claims.

2. ***INTELLECTUAL PROPERTY (Optional)***

The Contractor agrees it will, at its sole cost and expense, defend, indemnify, and hold harmless the indemnified parties from and against any and all claims, to the extent such claims arise out of, result from, or are attributable to, the actual or alleged infringement or misappropriation of any patent, copyright, trade secret, trademark, or confidential information of any third party by the Contractor or its employees, Subcontractors, consultants, representatives, and agents; provided, however, the State gives the Contractor prompt notice in writing of the claim. The Contractor may not settle any infringement claim that will affect the State's use of the Licensed Software without the State's prior written consent, which consent may be withheld for any reason.

If a judgment or settlement is obtained or reasonably anticipated against the State's use of any intellectual property for which the Contractor has indemnified the State, the Contractor shall, at the Contractor's sole cost and expense, promptly modify the item or items which were determined to be infringing, acquire a license or licenses on the State's behalf to provide the necessary rights to the State to eliminate the infringement, or provide the State with a non-infringing substitute that provides the State the same functionality. At the State's election, the actual or anticipated judgment may be treated as a breach of warranty by the Contractor, and the State may receive the remedies provided under this solicitation.

3. ***PERSONNEL***

The Contractor shall, at its expense, indemnify and hold harmless the indemnified parties from and against any claim with respect to withholding taxes, worker's compensation, employee benefits, or any other claim, demand, liability, damage, or loss of any nature relating to any of the personnel, including subcontractor's and their employees, provided by the Contractor.

4. ***SELF-INSURANCE***

The State of Nebraska is self-insured for any loss and purchases excess insurance coverage pursuant to Neb. Rev. Stat. § 81-8,239.01 (Reissue 2008). If there is a presumed loss under the provisions of this agreement, Contractor may file a claim with the Office of Risk Management pursuant to Neb. Rev. Stat. §§ 81-8,829 – 81¬8,306 for review by the State Claims Board. The State retains all rights and immunities under the State Miscellaneous (Section 81-8,294), Tort (Section 81-8,209), and Contract Claim Acts (Section 81-8,302), as outlined in Neb. Rev. Stat. § 81-8,209 et seq. and under any other provisions of law and accepts liability under this agreement to the extent provided by law.

5. ***The Parties acknowledge that Attorney General for the State of Nebraska is required by statute to represent the legal interests of the State, and that any provision of this indemnity clause is subject to the statutory authority of the Attorney General.***

N. ATTORNEY'S FEES

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

In the event of any litigation, appeal, or other legal action to enforce any provision of the contract, the Parties agree to pay all expenses of such action, as permitted by law and if ordered by the court, including attorney's fees and costs, if the other Party prevails.

O. PERFORMANCE BOND

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			A performance bond requirement for a banking services RFP is typically waived or deemed not applicable by the government issuer. A performance bond is not needed in this context as the State's public deposits are secured by pledged collateral. We respectfully request further discussion.

The Contractor will be required to supply a bond executed by a corporation authorized to contract surety in the State of Nebraska, payable to the State of Nebraska, which shall be valid for the life of the contract to include any renewal and/or extension periods. The amount of the bond must be $500,000The bond will guarantee that the Contractor will faithfully perform all requirements, terms and conditions of the contract. Failure to comply shall be grounds for forfeiture of the bond as liquidated damages. Amount of forfeiture will be determined by the agency based on loss to the State. The bond will be returned when the contract has been satisfactorily completed as solely determined by the State, after termination or expiration of the contract.

P. LIQUIDATED DAMAGES

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
		JM	We agree to this section in principal but do respectfully request the following modifications be made. We are open to further discussion on this point, and agree to negotiate in good faith. We request that "per 24 hours" damages time frame calculation be revised to "per business day," as damages should not accrue over weekends or non-banking days. In addition, we request that total liquidated damages paid shall not exceed the six (6) month average of fees paid to the Bank under the agreement.

The State and the contractor agree that actual damages from a failure to perform certain requirements as set forth below and requirements as may be agreed to in any contract(s) executed pursuant to this RFP are difficult to accurately estimate, that there has been a reasonable effort by parties to fix the amount of compensation that is due under the contracts, and that it is possible to identify an amount of liquidated damages for the failure to perform those requirements that is proportionate to the actual damages that the State would anticipate as a result of the failure.

In lieu of actual damages, the State and the contractor(s) shall agree to a schedule of damages for failure to perform certain requirements as set forth below and other requirements that are agreed to by contractor and the State in any contract(s) executed pursuant to this RFP.

The following is the required schedule of liquidated damages for failure to perform certain requirements set forth below and any other requirements the contractor and the State may agree to.

The damages are categorized as follows:

Standard $ 3,000.00 per 24 hours

High $ 7,500.00 per 24 hours

Critical $15,000.00 per 24 hours

Liquidated damages may be charged by the State for each day the Contractor fail to perform or comply with certain requirements as set forth below or requirements agreed to by the State and the contractor in the contract(s), other than failures directly caused by the State or circumstances beyond the control of the contractor or their agents (natural disasters, etc.). Such liquidated damages shall be prorated on an hourly basis. Within sixty (60) calendar days after each instance that causes liquidated damages to be due, the State will send a notice to the Contractor that liquidated damages are due. The Contractor shall pay the State any damages due within ten (10) business days of receiving such notice.

All notices as set forth in Section II.P. shall be delivered to the contractor by email(s) designated by the contractor, unless otherwise agreed to by the State and contractor. Notices shall be deemed received by the contractor when they are sent by the State.

1. ACCEPTANCE OF ACH FILES

Within three (3) hours of contractor being notified by State that contractor was not available to accept ACH Credit/Debit Origination files (by any method used by State agencies to transmit files not limited to: direct transmission, PC encryption transmission, Internet upload), contractor will either resolve the situation within three (3) hours of receiving such notice so the ACH Credit/Debit Origination files can be received from the State or pay liquidated damages until such situation is resolved to the satisfaction of the State.

Category: Critical

2. ABILITY TO ACCESS DAILY BANK REPORTING INFORMATION

Upon being notified by the State that daily bank information reports prior day balance reports, current day balance reports, ACH return and Notice of Change reports, ACH current day and prior day addenda reports, or CSV exports are unavailable, contractor will either resolve the situation within four (4) hours of receiving such notice and make all required reports available to State staff or pay liquidated damages until such situation is resolved to the satisfaction of the State.

Category: Critical

3. TRAP FILES AVAILABILITY

Upon being notified by the State that daily trap files for the Nebraska Department of Revenue are not available to State staff for download, contractor will either resolve the situation within four (4) hours of receiving such notice by having the trap files available for download by State staff or pay liquidated damages until such situation is resolved to the satisfaction of the State.

Category: Critical

4. SENDING/RECEIVING OF WIRES

Upon being notified by the State that contractor is unable to send or receive wires, contractor will either resolve the situation within four (4) hours of receiving such notice or pay liquidated damages until such situation is resolved to the satisfaction of the State.

Category: Critical

5. RAW DATA RETURN AND NOTICE OF CHANGE FILE/TRANSMISSION AVAILABILITY

Upon being notified by the State that daily raw data return and notice of change file/transmission is unavailable, contractor will either resolve the situation within eight (8) hours of receiving such notice by making the file/transmission available to State staff or pay liquidated damages until such situation is resolved to the satisfaction of the State.

Category: Standard

6. ACH RETURNS, ACH REVERSALS, AND ACH DELETES PROCESSING

The contractor will be responsible to process batch, file, and individual item ACH Returns, Reversals, and Deletes the same day the State has notified the bank. Failure to handle ACH returns, Reversals and Deletes according to NACHA Operating Rules will require a payment of liquidated damages to the State for each instance not handled in accordance with the NACHA Operating Rules.

Category: Standard

7. ACH CREDIT/DEBIT ON-US TRANSACTION POSTING

Contractor will post ACH transactions accurately within the NACHA Operating Rules. Contractor will correct each error made to customers account/State clients due to posting error(s) within eight (8) hours after State notifies contractor of error or pay liquidated damages for each uncorrected error until the situation is resolved to the satisfaction of the State.

Category: High

8. CUSTOMER SERVICE

Contractor will provide adequate customer service support, as determined by the State, to the State and State clients/vendors. When contacted by State staff or State vendors/clients for information, customer service will provide a response back to each inquiry within four (4) hours of receiving such inquiry.

Specific service levels requested:

Request for trace number/or additional information of ACH transaction with an effective date within the last sixty (60) days. Expected response time frame: Contractor will provide within twenty-four (24) hours. Category: Standard State Vendor/Receiving Bank request for addenda information on an ACH transaction with an effective date within the last sixty (60) days. Expected response time frame: Contractor will provide within eight (8) hours of contact from State Vendor or Receiving Bank.

Category: Standard

Request for trace number/or additional information of ACH transaction with an effective date within the more than sixty (60) days old. Expected response time frame: Contractor will provide within forty-eight (48) hours.

Category: Standard

9. RFP REQUIRED REPORTING

Within three (3) business days of contractor being notified by the State, reports not provided by contractor will be made available to the State or contractor will pay liquidated damages until the situation is resolved to the satisfaction of the State.

Category: Standard

Q. ASSIGNMENT, SALE, OR MERGER

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Either Party may assign the contract upon mutual written agreement of the other Party. Such agreement shall not be unreasonably withheld.

The Contractor retains the right to enter into a sale, merger, acquisition, internal reorganization, or similar transaction involving Contractor's business. Contractor agrees to cooperate with the State in executing amendments to the contract to allow for the transaction. If a third party or entity is involved in the transaction, the Contractor will remain responsible for performance of the contract until such time as the person or entity involved in the transaction agrees in writing to be contractually bound by this contract and perform all obligations of the contract.

R. CONTRACTING WITH OTHER NEBRASKA POLITICAL SUB-DIVISIONS OF THE STATE OR ANOTHER STATE

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The Contractor may, but shall not be required to, allow agencies, as defined in Neb. Rev. Stat. §81-145, to use this contract. The terms and conditions, including price, of the contract may not be amended. The State shall not be contractually obligated or liable for any contract entered into pursuant to this clause. A listing of Nebraska political subdivisions may be found at the website of the Nebraska Auditor of Public Accounts.

The Contractor may, but shall not be required to, allow other states, agencies or divisions of other states, or political subdivisions of other states to use this contract. The terms and conditions, including price, of this contract shall apply to any such contract, but may be amended upon mutual consent of the Parties. The State of Nebraska shall not be contractually or otherwise obligated or liable under any contract entered into pursuant to this clause. The State shall be notified if a contract is executed based upon this contract.

Currently, Nebraska Public Power District and Lancaster County are using this contract. It will be the responsibility of the selected contractor to contact the cities, counties, and other governmental subdivisions regarding the potential to participate under the contract. Each municipality, county, or other governmental subdivision will establish a relationship with the selected contractor and negotiate business and technical requirements according to the specific needs of each within the constraints of the contract.

S. FORCE MAJEURE

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Neither Party shall be liable for any costs or damages, or for default resulting from its inability to perform any of its obligations under the contract due to a natural or manmade event outside the control and not the fault of the affected Party ("Force Majeure Event"). The Party so affected shall immediately make a written request for relief to the other Party, and shall have the burden of proof to justify the request. The other Party may grant the relief requested; relief may not be unreasonably withheld. Labor disputes with the impacted Party's own employees will not be considered a Force Majeure Event.

T. CONFIDENTIALITY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

All materials and information provided by the Parties or acquired by a Party on behalf of the other Party shall be regarded as confidential information. All materials and information provided or acquired shall be handled in accordance with federal and state law, and ethical standards. Should said confidentiality be breached by a Party, the Party shall notify the other Party immediately of said breach and take immediate corrective action.

It is incumbent upon the Parties to inform their officers and employees of the penalties for improper disclosure imposed by the Privacy Act of 1974, 5 U.S.C. 552a. Specifically, 5 U.S.C. 552a (i)(1), which is made applicable by 5 U.S.C. 552a (m)(1), provides that any officer or employee, who by virtue of his/her employment or official position has possession of or access to agency records which contain individually identifiable information, the disclosure of which is prohibited by the Privacy Act or regulations established thereunder, and who knowing that disclosure of the specific material is prohibited, willfully discloses the material in any manner to any person or agency not entitled to receive it, shall be guilty of a misdemeanor and fined not more than $5,000.

U. EARLY TERMINATION

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			We acknowledge the State has the right to terminate for convenience as described in this section, however the State will not exercise such termination right for the period of time which corresponds to the fee waiver proposed in our Bid. In the alternative, if the State does terminate for convenience during such time period, the State will be responsible and shall pay the accumulated waived fees to the Bank.

The contract may be terminated as follows:

1. The State and the Contractor, by mutual written agreement, may terminate the contract at any time.

2. The State, in its sole discretion, may terminate the contract for any reason upon thirty (30) calendar day's written notice to the Contractor. Such termination shall not relieve the Contractor of warranty or other service obligations incurred under the terms of the contract. In the event of termination the Contractor shall be entitled to payment, determined on a pro rata basis, for products or services satisfactorily performed or provided.

3. The State may terminate the contract immediately for the following reasons:

a. if directed to do so by statute;

b. ***Contractor has made an assignment for the benefit of creditors, has admitted in writing its inability to pay debts as they mature, or has ceased operating in the normal course of business;***

c. ***a trustee or receiver of the Contractor or of any substantial part of the Contractor's assets has been appointed by a court;***

d. ***fraud, misappropriation, embezzlement, malfeasance, misfeasance, or illegal conduct pertaining to performance under the contract by its Contractor, its employees, officers, directors, or shareholders;***

e. ***an involuntary proceeding has been commenced by any Party against the Contractor under any one of the chapters of Title 11 of the United States Code and (i) the proceeding has been pending for at least sixty (60) calendar days; or (ii) the Contractor has consented, either expressly or by operation of law, to the entry of an order for relief; or (iii) the Contractor has been decreed or adjudged a debtor;***

f. ***a voluntary petition has been filed by the Contractor under any of the chapters of Title 11 of the United States Code;***

g. ***Contractor intentionally discloses confidential information;***

h. ***Contractor has or announces it will discontinue support of the deliverable; and,***

i. ***In the event funding is no longer available.***

V. ***CONTRACT CLOSEOUT***

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			For the avoidance of doubt, we do request removing clause 2. Each party retains rights to its respective intellectual property.

Upon contract closeout for any reason the Contractor shall within 30 days, unless stated otherwise herein:

1. ***Transfer all completed or partially completed deliverables to the State;***

2. ***Transfer ownership and title to all completed or partially completed deliverables to the State;***

3. ***Return to the State all information and data, unless the Contractor is permitted to keep the information or data by contract or rule of law. Contractor may retain one copy of any information or data as required to comply with applicable work product documentation standards or as are automatically retained in the course of Contractor's routine back up procedures;***

4. ***Cooperate with any successor Contactor, person or entity in the assumption of any or all of the obligations of this contract;***

5. ***Cooperate with any successor Contactor, person or entity with the transfer of information or data related to this contract;***

6. Return or vacate any state owned real or personal property; and,

7. Return all data in a mutually acceptable format and manner.

Nothing in this Section should be construed to require the Contractor to surrender intellectual property, real or personal property, or information or data owned by the Contractor for which the State has no legal claim.

CONTRACTOR DUTIES

A. INDEPENDENT CONTRACTOR / OBLIGATIONS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

It is agreed that the Contractor is an independent contractor and that nothing contained herein is intended or should be construed as creating or establishing a relationship of employment, agency, or a partnership.

The Contractor is solely responsible for fulfilling the contract. The Contractor or the Contractor's representative shall be the sole point of contact regarding all contractual matters.

The Contractor shall secure, at its own expense, all personnel required to perform the services under the contract. The personnel the Contractor uses to fulfill the contract shall have no contractual or other legal relationship with the State; they shall not be considered employees of the State and shall not be entitled to any compensation, rights or benefits from the State, including but not limited to, tenure rights, medical and hospital care, sick and vacation leave, severance pay, or retirement benefits.

By-name personnel commitments made in the Contractor's proposal shall not be changed without the prior written approval of the State. Replacement of these personnel, if approved by the State, shall be with personnel of equal or greater ability and qualifications.

All personnel assigned by the Contractor to the contract shall be employees of the Contractor or a subcontractor, and shall be fully qualified to perform the work required herein. Personnel employed by the Contractor or a subcontractor to fulfill the terms of the contract shall remain under the sole direction and control of the Contractor or the subcontractor respectively.

With respect to its employees, the Contractor agrees to be solely responsible for the following:

1. ***Any and all pay, benefits, and employment taxes and/or other payroll withholding;***

2. ***Any and all vehicles used by the Contractor's employees, including all insurance required by state law;***

3. ***Damages incurred by Contractor's employees within the scope of their duties under the contract;***

4. ***Maintaining Workers' Compensation and health insurance that complies with state and federal law and submitting any reports on such insurance to the extent required by governing law;***

5. ***Determining the hours to be worked and the duties to be performed by the Contractor's employees; and,***

6. ***All claims on behalf of any person arising out of employment or alleged employment (including without limit claims of discrimination alleged against the Contractor, its officers, agents, or subcontractors or subcontractor's employees)***

If the Contractor intends to utilize any subcontractor, the subcontractor's level of effort, tasks, and time allocation should be clearly defined in the contractor's proposal. The Contractor shall agree that it will not utilize any subcontractors not specifically included in its proposal in the performance of the contract without the prior written authorization of the State.

The State reserves the right to require the Contractor to reassign or remove from the project any Contractor or subcontractor employee.

Contractor shall insure that the terms and conditions contained in any contract with a subcontractor does not conflict with the terms and conditions of this contract.

The Contractor shall include a similar provision, for the protection of the State, in the contract with any Subcontractor engaged to perform work on this contract.

B. EMPLOYEE WORK ELIGIBILITY STATUS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			JPMC is enrolled in E-Verify.

The Contractor is required and hereby agrees to use a federal immigration verification system to determine the work eligibility status of employees physically performing services within the State of Nebraska. A federal immigration verification system means the electronic verification of the work authorization program authorized by the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, 8 U.S.C. 1324a, known as the E-Verify Program, or an equivalent federal program designated by the United States Department of Homeland Security or other federal agency authorized to verify the work eligibility status of an employee.

If the Contractor is an individual or sole proprietorship, the following applies:

1. The Contractor must complete the United States Citizenship Attestation Form, available on the Department of Administrative Services website at http://das.nebraska.gov/materiel/purchasing.html

2. The completed United States Attestation Form should be submitted with the solicitation response.

3. If the Contractor indicates on such attestation form that he or she is a qualified alien, the Contractor agrees to provide the US Citizenship and Immigration Services documentation required to verify the Contractor's lawful presence in the United States using the Systematic Alien Verification for Entitlements (SAVE) Program.

4. The Contractor understands and agrees that lawful presence in the United States is required and the Contractor may be disqualified or the c

C. COMPLIANCE WITH CIVIL RIGHTS LAWS AND EQUAL OPPORTUNITY EMPLOYMENT / NONDISCRIMINATION (Statutory)

The Contractor shall comply with all applicable local, state, and federal statutes and regulations regarding civil rights laws and equal opportunity employment. The Nebraska Fair Employment Practice Act prohibits Contractors of the State of Nebraska, and their Subcontractors, from discriminating against any employee or applicant for employment, with respect to hire, tenure, terms, conditions, compensation, or privileges of employment because of race, color, religion, sex, disability, marital status, or national origin (Neb. Rev. Stat. §48-1101 to 48-1125). The Contractor guarantees compliance with the Nebraska Fair Employment Practice Act, and breach of this provision shall be regarded as a material breach of contract. The Contractor shall insert a similar provision in all Subcontracts for goods and services to be covered by any contract resulting from this solicitation.

D. COOPERATION WITH OTHER CONTRACTORS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Contractor may be required to work with or in close proximity to other contractors or individuals that may be working on same or different projects. The Contractor shall agree to cooperate with such other contractors or individuals, and shall not commit or permit any act which may interfere with the performance of work by any other contractor or individual. Contractor is not required to compromise Contractor's intellectual property or proprietary information unless expressly required to do so by this contract.

E. DISCOUNTS

Prices quoted shall be inclusive of ALL trade discounts. Cash discount terms of less than thirty (30) days will not be considered as part of the proposal. Cash discount periods will be computed from the date of receipt of a properly executed claim voucher or the date of completion of delivery of all items in a satisfactory condition, whichever is later.

F. PRICES

Prices quoted shall be net, including transportation and delivery charges fully prepaid by the contractor, F.O.B. destination named in the solicitation. No additional charges will be allowed for packing, packages, or partial delivery costs. When an arithmetic error has been made in the extended total, the unit price will govern.

All prices, costs, and terms and conditions submitted in the proposal shall remain fixed and valid commencing on the opening date of the proposal until the contract terminates or expires.

The State reserves the right to deny any requested price increase. No price increases are to be billed to any State Agencies prior to written amendment of the contract by the parties.

The State will be given full proportionate benefit of any decreases for the term of the contract.

G. PERMITS, REGULATIONS, LAWS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The contract price shall include the cost of all royalties, licenses, permits, and approvals, whether arising from patents, trademarks, copyrights or otherwise, that are in any way involved in the contract. The Contractor shall obtain and pay for all royalties, licenses, and permits, and approvals necessary for the execution of the contract. The Contractor must guarantee that it has the full legal right to the materials, supplies, equipment, software, and other items used to execute this contract.

H. OWNERSHIP OF INFORMATION AND DATA / DELIVERABLES

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
	JM		This provision is not applicable for a banking services agreement, as banking services described in this RFP are not "works for hire" nor do they constitute unique intellectual property developed specifically for the State. Each party retains rights to its respective intellectual property

The State shall have the unlimited right to publish, duplicate, use, and disclose all information and data developed or obtained by the Contractor on behalf of the State pursuant to this contract.

The State shall own and hold exclusive title to any deliverable developed as a result of this contract. Contractor shall have no ownership interest or title, and shall not patent, license, or copyright, duplicate, transfer, sell, or exchange, the design, specifications, concept, or deliverable.

I. INSURANCE REQUIREMENTS

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The Contractor shall throughout the term of the contract maintain insurance as specified herein and provide the State a current Certificate of Insurance/Acord Form (COI) verifying the coverage. The Contractor shall not commence work on the contract until the insurance is in place. If Contractor subcontracts any portion of the Contract the Contractor must, throughout the term of the contract, either:

1. Provide equivalent insurance for each subcontractor and provide a COI verifying the coverage for the subcontractor;

2. Require each subcontractor to have equivalent insurance and provide written notice to the State that the Contractor has verified that each subcontractor has the required coverage; or,

3. Provide the State with copies of each subcontractor's Certificate of Insurance evidencing the required coverage.

The Contractor shall not allow any Subcontractor to commence work until the Subcontractor has equivalent insurance. The failure of the State to require a COI, or the failure of the Contractor to provide a COI or require subcontractor insurance shall not limit, relieve, or decrease the liability of the Contractor hereunder.

In the event that any policy written on a claims-made basis terminates or is canceled during the term of the contract or within ninety (90) days of termination or expiration of the contract, the contractor shall obtain an extended discovery or reporting period, or a new insurance policy, providing coverage required by this contract for the term of the contract and ninety (90) days following termination or expiration of the contract.

If by the terms of any insurance a mandatory deductible is required, or if the Contractor elects to increase the mandatory deductible amount, the Contractor shall be responsible for payment of the amount of the deductible in the event of a paid claim.

Notwithstanding any other clause in this Contract, the State may recover up to the liability limits of the insurance policies required herein.

1. WORKERS' COMPENSATION INSURANCE

The Contractor shall take out and maintain during the life of this contract the statutory Workers' Compensation and Employer's Liability Insurance for all of the contactors' employees to be engaged in work on the project under this contract and, in case any such work is sublet, the Contractor shall require the Subcontractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all of the Subcontractor's employees to be engaged in such work. This policy shall be written to meet the statutory requirements for the state in which the work is to be performed, including Occupational Disease. The policy shall include a waiver of subrogation in favor of the State. The COI shall contain the mandatory COI subrogation waiver language found hereinafter. The amounts of such insurance shall not be less than the limits stated hereinafter. For employees working in the State of Nebraska, the policy must be written by an entity authorized by the State of Nebraska Department of Insurance to write Workers' Compensation and Employer's Liability Insurance for Nebraska employees.

2. COMMERCIAL GENERAL LIABILITY INSURANCE AND ~~COMMERCIAL~~ BUSINESS AUTOMOBILE LIABILITY INSURANCE

The Contractor shall take out and maintain during the life of this contract such Commercial General Liability Insurance and ~~Commercial~~ Business Automobile Liability Insurance as shall protect Contractor and any Subcontractor performing work covered by this contract from claims for damages for bodily injury, including death, as well as from claims for property damage, which may arise from operations under this contract, whether such operation be by the Contractor or by any Subcontractor or by anyone directly or indirectly employed by either of them, and the amounts of such insurance shall not be less than limits stated hereinafter.

The Commercial General Liability Insurance shall be written on an occurrence basis, and provide Premises/Operations, Products/Completed Operations, Independent Contractors, Personal Injury, and Contractual Liability coverage. The policy shall include the State, and others as required by the contract documents, as Additional Insured(s). This policy shall be primary, and any insurance or self-insurance carried by the State shall be considered secondary and non-contributory. The COI shall contain the mandatory COI liability waiver language found hereinafter. The ~~Commercial~~ Business Automobile Liability Insurance shall be written to cover all Owned, Non-owned, and Hired vehicles.

REQUIRED INSURANCE COVERAGE	
COMMERCIAL GENERAL LIABILITY	
General Aggregate	$2,000,000
Products/Completed Operations Aggregate	$2,000,000
Personal/Advertising Injury	$1,000,000 per occurrence
Bodily Injury/Property Damage	$1,000,000 per occurrence
Damage to Rented Premises (Fire)	$300,000 each occurrence
Contractual	Included
XCU Liability (Explosion, Collapse and Underground Damage)	Included
Independent Contractors	Included
If higher limits are required, the Umbrella/Excess Liability limits are allowed to satisfy the higher limit.	
WORKER'S COMPENSATION	
Employers Liability Limits	$500K/$500K/$500K
Statutory Limits – All States	Statutory – State of Nebraska
Voluntary Compensation	Statutory
COMMERCIAL AUTOMOBILE LIABILITY	
Bodily Injury/Property Damage	$1,000,000 combined single limits
Included All Owned, Hired & Non-Owned Automobile liability	Included
UMBRELLA/EXCESS LIABILITY	
Over Primary Insurance	$5,000,000 per occurrence
Bankers **PROFESSIONAL LIABILITY**	
All Other Professional Liability (Errors & Omissions)	$1,000,000 Per Claim / Aggregate
Bankers Blanket Bond ~~COMMERCIAL CRIME~~	
Crime/Employee Dishonesty Including 3rd Party Fidelity	$1,000,000
CYBER LIABILITY	
Breach of Privacy, Security Breach Denial of Service, Remediation, Fines and Penalties	$10,000,000

MANDATORY COI SUBROGATION WAIVER LANGUAGE
"Workers' Compensation policy shall include a waiver of subrogation in favor of the State of Nebraska."
MANDATORY COI LIABILITY WAIVER LANGUAGE
"Commercial General Liability & ~~Commercial~~ *Business* Automobile Liability policies shall name the State of Nebraska as an Additional Insured and the policies shall be primary and any insurance or self-insurance carried by the State shall be considered secondary and non-contributory as additionally insured."

3. EVIDENCE OF COVERAGE

The Contractor shall furnish the Contract Manager, with a certificate of insurance coverage complying with the above requirements prior to beginning work at:

State Purchasing Bureau

1526 K Street Ste. 130

Lincoln, NE 68508

These certificates or the cover sheet shall reference the RFP number, and the certificates shall include the name of the company, policy numbers, effective dates, dates of expiration, and amounts and types of coverage afforded. If the State is damaged by the failure of the Contractor to maintain such insurance, then the Contractor shall be responsible for all reasonable costs properly attributable thereto.

Reasonable notice of cancellation of any required insurance policy must be submitted to the contract manager as listed above when issued ~~and a new coverage binder shall be submitted immediately~~ to ensure no break in coverage.

4. DEVIATIONS

The insurance requirements are subject to limited negotiation. Negotiation typically includes, but is not necessarily limited to, the correct type of coverage, necessity for Workers' Compensation, and the type of automobile coverage carried by the Contractor.

J. NOTICE OF POTENTIAL CONTRACTOR BREACH

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
		JM	We agree with this provision in principal. We agree to give notice of a breach of contract promptly and without undue delay. Depending on the facts and circumstances, immediate notice may not be possible, however we will act in good faith to provide notice in the manner described.

If Contractor breaches the contract or anticipates breaching the contract the Contractor shall immediately give written notice to the State. The notice shall explain the breach or potential breach, and may include a request for a waiver of the breach if so desired. The State may, at its discretion, temporarily or permanently waive the breach. By granting a temporary waiver, the State does not forfeit any rights or remedies to which the State is entitled by law or equity, or pursuant to the provisions of the contract. Failure to give immediate notice, however, may be grounds for denial of any request for a waiver of a breach.

K. ANTITRUST

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The Contractor hereby assigns to the State any and all claims for overcharges as to goods and/or services provided in connection with this contract resulting from antitrust violations which arise under antitrust laws of the United States and the antitrust laws of the State.

L. CONFLICT OF INTEREST

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			To the knowledge, information and belief of the undersigned after reasonable inquiry, there is no known conflict of interest. J.P. Morgan and its affiliates have banking and other business relationships in the normal course of business with various persons or entities, which may include employees, officers, directors, etc. of the State. Such relationships are governed by our usual and customary terms and conditions. The J.P. Morgan Code of Conduct prohibits any employee in general from acting on behalf of the bank in any transaction or business relationship involving such employee, members of his/her family, or other persons or organizations with which such employee or his/her family have any significant personal connection or financial interest.

By submitting a proposal, bidder certifies that no relationship exists between the bidder and any person or entity which either is, or gives the appearance of, a conflict of interest related to this Request for Proposal or project.

Bidder further certifies that bidder will not employ any individual known by bidder to have a conflict of interest nor shall bidder take any action or acquire any interest, either directly or indirectly, which will conflict in any manner or degree with the performance of its contractual obligations hereunder or which creates an actual or appearance of conflict of interest.

If there is an actual or perceived conflict of interest, bidder shall provide with its proposal a full disclosure of the facts describing such actual or perceived conflict of interest and a proposed mitigation plan for consideration. The State will then consider such disclosure and proposed mitigation plan and either approve or reject as part of the overall bid evaluation.

M. ADVERTISING

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

The Contractor agrees not to refer to the contract award in advertising in such a manner as to state or imply that the company or its goods or services are endorsed or preferred by the State. Any publicity releases pertaining to the project shall not be issued without prior written approval from the State.

N. NEBRASKA TECHNOLOGY ACCESS STANDARDS (Statutory)

Contractor shall review the Nebraska Technology Access Standards, found at http://nitc.nebraska.gov/standards/2-201.html and ensure that products and/or services provided under the contract are in compliance or will comply with the applicable standards to the greatest degree possible. In the event such standards change during the Contractor's performance, the State may create an amendment to the contract to request the contract comply with the changed standard at a cost mutually acceptable to the parties.

We are committed to meeting the banking and financial service needs of all of or our customers, and will work to provide customers equal access to and the opportunity for equal enjoyment of our products, services, and facilities. We continue to improve accessibility to our online services and will address concerns from a customer with disabilities who reports difficulties accessing information or documents related to the services provided under this agreement. Further information regarding our commitment to accessibility can be found at https://www.chase.com/digital/resources/accessibility.

O. DISASTER RECOVERY/BACK UP PLAN

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			We are committed to meeting the banking and financial service needs of all of or our customers, and will work to provide customers equal access to and the opportunity for equal enjoyment of our products, services, and facilities. We continue to improve accessibility to our online services and will address concerns from a customer with disabilities who reports difficulties accessing information or documents related to the services provided under this agreement. Further information regarding our commitment to accessibility can be found at https://www.chase.com/digital/resources/accessibility.

The Contractor shall have a disaster recovery and back-up plan, of which a copy should be provided upon request to the State, which includes, but is not limited to equipment, personnel, facilities, and transportation, in order to continue delivery of goods and services as specified under the specifications in the contract in the event of a disaster.

P. DRUG POLICY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Contractor certifies it maintains a drug free work place environment to ensure worker safety and workplace integrity. Contractor agrees to provide a copy of its drug free workplace policy at any time upon request by the State.

Q. WARRANTY

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			We agree to this language in principal but for the avoidance of doubt, we shall reimburse the State fees paid for the unsatisfactory services from the period of time beginning with when we acknowledge receipt of written notice from the State of such unsatisfactory services, and for the thirty (30) days prior to receipt of the written notice.

Despite any clause to the contrary, the Contractor represents and warrants that its services hereunder shall be performed by competent personnel and shall be of professional quality consistent with generally accepted industry standards for the performance of such services and shall comply in all respects with the requirements of this Agreement. For any breach of this warranty, the Contractor shall, for a period of ninety (90) days from performance of the service, perform the services again, at no cost to Customer, or if Contractor is unable to perform the services as warranted, Contractor shall reimburse Customer the fees paid to Contractor for the unsatisfactory services. The rights and remedies of the parties under this warranty are in addition to any other rights and remedies of the parties provided by law or equity, including, without limitation actual damages, and, as applicable and awarded under the law, to a prevailing party, reasonable attorneys' fees and costs.

PAYMENT

A. PROHIBITION AGAINST ADVANCE PAYMENT (Statutory)

Neb. Rev. Stat. §§81-2403 states, "[n]o goods or services shall be deemed to be received by an agency until all such goods or services are completely delivered and finally accepted by the agency."

B. TAXES (Statutory)

The State is not required to pay taxes and assumes no such liability as a result of this solicitation. The Contractor may request a copy of the Nebraska Department of Revenue, Nebraska Resale or Exempt Sale Certificate for Sales Tax Exemption, Form 13 for their records. Any property tax payable on the Contractor's equipment which may be installed in a state-owned facility is the responsibility of the Contractor

C. INVOICES

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Fees charged by the contractor will be submitted to the State through an analysis statement, allowing the State to determine how fees should be split by agencies. The State will pay the contractor by the end of the following month by an ACH transaction. The terms and conditions included in the Contractor's invoice shall be deemed to be solely for the convenience of the parties. No terms or conditions of any such invoice shall be binding upon the State, and no action by the State, including without limitation the payment of any such invoice in whole or in part, shall be construed as binding or estopping the State with respect to any such term or condition, unless the invoice term or condition has been previously agreed to by the State as an amendment to the contract.

D. PAYMENT (Statutory)

Accept (Initial)	Reject (Initial)	Reject & Provide Alternative within Solicitation Response (Initial)	NOTES/COMMENTS:
JM			

Payment will be made by the responsible agency in compliance with the State of Nebraska Prompt Payment Act (See Neb. Rev. Stat. §81-2403). The State may require the Contractor to accept payment by electronic means such as ACH deposit. In no event shall the State be responsible or liable to pay for any goods and services provided by the Contractor prior to the Effective Date of the contract, and the Contractor hereby waives any claim or cause of action for any such services.

E. LATE PAYMENT (Statutory)

The Contractor may charge the responsible agency interest for late payment in compliance with the State of Nebraska Prompt Payment Act (See Neb. Rev. Stat. §81-2401 through 81-2408).

F. SUBJECT TO FUNDING / FUNDING OUT CLAUSE FOR LOSS OF APPROPRIATIONS (Statutory)

The State's obligation to pay amounts due on the Contract for a fiscal years following the current fiscal year is contingent upon legislative appropriation of funds. Should said funds not be appropriated, the State may terminate the contract with respect to those payments for the fiscal year(s) for which such funds are not appropriated. The State will give the Contractor written notice thirty (30) calendar days prior to the effective date of termination. All obligations of the State to make payments after the termination date will cease. The Contractor shall be entitled to receive just and equitable compensation for any authorized work which has been satisfactorily completed as of the termination date. In no event shall the Contractor be paid for a loss of anticipated profit.

G. RIGHT TO AUDIT (Statutory)

The State shall have the right to audit the Contractor's performance of this contract upon a thirty (30) days' written notice. Contractor shall utilize generally accepted accounting principles, and shall maintain the accounting records, and other records and information relevant to the contract (Information) to enable the State to audit the contract. (Neb. Rev. Stat. §84-304 et seq.) The State may audit and the Contractor shall maintain, the Information during the term of the contract and for a period of five (5) years after the completion of this contract or until all issues or litigation are resolved, whichever is later. The Contractor shall make the Information available to the State at Contractor's place of business or a location acceptable to both Parties during normal business hours. If this is not practical or the Contractor so elects, the Contractor may provide electronic or paper copies of the Information. The State reserves the right to examine, make copies of, and take notes on any Information relevant to this contract, regardless of the form or the Information, how it is stored, or who possesses the Information. Under no circumstance will the Contractor be required to create or maintain documents not kept in the ordinary course of contractor's business operations, nor will contractor be required to disclose any information, including but not limited to product cost data, which is confidential or proprietary to contractor.

The Bank acknowledges the State's audit rights; with any such activity to be mutually agreed upon as to time and scope and subject to the Bank's record retention policy. The Bank does not permit general inspections or general third party audits due to the confidentiality and security obligations related to financial and customer data required of financial institutions, however, the Bank can make the State records that related to this Contract available.

PROJECT DESCRIPTION AND SCOPE OF WORK

The contractor should provide the following information in response to this solicitation.

A. PROJECT OVERVIEW

Automated Clearing House (ACH) is an electronic network for financial transactions. ACH processes large volumes of credit and debit transactions in batches. ACH credit transfers include direct deposit payroll and vendor payments. ACH direct debit transfers include consumer payments on insurance premiums, revenue tax obligations, child support payment, and other kinds of payments. Rules and regulations that govern the ACH network are established by National Automated Clearing House Association (NACHA) and the Federal Reserve.

The State Treasurer's Office will be the point of contact for all daily banking functions and implementation of the banking services on behalf of State agencies. The State will continue to expand the use of electronic payments for State vendors, payroll, and government benefits payments to consumers and vendors. The State is seeking a state or national bank contractor that will work with State agencies to develop additional electronic solutions to receive payments via ACH, thus enabling the State to continue reducing check processing charges and to allow all agencies to continue to exercise the specific requirements of each agency's process of ACH credits and debits. All payments to vendors in excess of $25,000 or vendors receiving multiple payments per year are required to be sent electronically. The State will continue to reduce the number of warrants written by encouraging the use of Direct Deposit of government benefit payments (Department of Health and Human Services (DHHS) child care and child support payments have been mandated by the Nebraska State Legislature, Neb. Rev. Stat. §43-3342) and vendor payments. The State allows employees to receive payments by warrant, Direct Deposit to a savings/checking account, or loaded to a stored-value Visa branded debit card. The increased use of ACH payments across State programs will also decrease fees by the banks for clearing and processing State warrants, forgery, and expired warrant claims. The State will continue to work on expanding programs that will increase the dollar amount of receipts being paid and originated electronically by both ACH credit and ACH debit programs.

A historical count of ACH transactions, ACH returns, and return checks processed by the State and governmental entities under the State's current contract. These figures are not a guarantee of future transaction counts. Figures are provided for the benefit of bidders in the development of proposals.

Following is the number of Credit and Debit ACH transactions originated by all State agencies (except the Nebraska Child Support Payment Center (NCSPC) which is listed in Exhibit 2) for Fiscal Year 2018-19 and the first half of Fiscal Year 2019-2020 by month.

Fiscal Year	ACH Transactions	Dollar Amount
2018-2019	2,619,552	$12,110,525,243

Month	ACH Transactions	Dollar Amount
July 2019	180,095	$ 948,851,615
August 2019	191,728	$1,042,998,632
September 2019	168,105	$1,070,286,612
October 2019	180,794	$1,059,908,177
November 2019	177,009	$1,049,525,332
December 2019	202,155	$1,009,979,357
January 2020	178,182	$1,201,315,739
February 2020	417,329	$1,254,599,273
March 2020	329,433	$1,314,178,645

J.P. Morgan understands and can provide the services as described above.

B. PROJECT ENVIROMENT

While multiple State agencies will use the services, the Nebraska State Treasurer's Office will be the point of contact for all daily banking functions and implementation of the banking services.

Acknowledged.

ACH ORIGINATION SERVICES

Outlined below is a current list of entities authorized to send or transmit files on the State's behalf. Multiple agencies are also receiving NACHA-formatted files from the State's current ACH processor. Administrative Services processes all ACH vendor and payroll payments on behalf of State agencies excluding those listed below. The Nebraska Department of Revenue's (DOR) accounts will be set up as a subsidiary zero balance account (ZBA) with funds being moved to a main account.

1. SENDING AND RECEIVING ACH FILES

State Accounting (credit files only)…………………....Direct Transmission Administrative

State Accounting *IRS payments ……..Website Transmission

Nebraska Lottery – (credit and debit files)……….……………..….Website Transmission

State Treasurer's Office – (credit and debit files)……………………...Website Transmission

State Treasurer's Office – NCSPC – (credit and debit files)…….. Website Transmission

Department of Labor – (credit and debit files) …..……………………...Direct Transmission

Department of Revenue – (credit and debit files) ………………….…...Direct Transmission

University of Nebraska – (credit and debit files) ……………………......Direct Transmission

J.P. Morgan understands and can provide the services as described above.

2. RECEIVING ACH TRAP FILES

Department of Revenue – (credit and reversal transactions)………..Direct Transmission

As discussed in the Technical Proposal, J.P. Morgan can provide reporting for both incoming ACH credits and ACH originated debits. We may be able to consolidate incoming ACH Receipts and ACH Debit Origination into a single file. We would appreciate the opportunity to discuss this process further with you.

3. PROVIDE BANK ACCOUNT

A bank account will be established with the contractor where ACH files will be credited and debited. ACH debit files will be funded on settlement date, which could mean that the account will be in a daylight overdraft every morning. Treasury Management will wire money into the account daily so that an approximate balance of $4 million could be maintained. However, debits and credits flowing in and out of this account in one day could be as high as $425 million. A secure online solution is required so wires can be received and initiated by Treasury Management staff.

The Nebraska Department of Revenue (DOR) requires accounts set up as subsidiary zero balance accounts (ZBA) with funds being moved to the State's bank account every business day.

The following information provides a description of the project and additional State agency-specific requirements. The figures listed represent recent transaction counts and are not a guarantee of future volumes. The below narratives were based on the use of current services and are being provided to assist bidders in preparing a quality response.

J.P. Morgan understands and can provide the services as described above.

4. NEBRASKA LOTTERY (LOTTERY)

a. ACH ORIGINATION

Current Process:

Lottery originates CCD+ credit and debit transactions to lottery retailers. This is a mandatory Electronic Funds Transfer (EFT) program. The file is sent to the bank on Monday for settlement on Wednesday.

Lottery receives the EFT batch file from their vendor, International Game Technology PLC (IGT). The file, which contains both debit and credit transactions, is uploaded using a Web-based application on the bank website by logging in using a unique ID and password. The staff fills out the batch data fields, which identify the file as being from Lottery, and uploads the file. After the file is uploaded, staff checks the directory listing within the Web application to make sure the file was processed correctly and there were no format errors.

Within 5-10 minutes, State staff calls a designated line at the bank and enters a four-digit PIN. The total number and dollar amount of credits and debits are entered for the bank to verify the file was correct. When finished, the bank then sends an email to designated staff when the batch file is processed correctly. See chart in Exhibit 2 for historical volumes.

J.P. Morgan understands and can provide the services as described above.

b. CHARITABLE GAMING

See chart in Exhibit 2 for historical volumes.

Charitable Gaming is a division of the Nebraska Department of Revenue; it administers and collects taxes for the bingo, keno, lottery/raffle and pickle card games. The licensees (taxpayers) can file and pay taxes and fees through an EFT process.

<u>Current Process:</u>

After the licensee files the return information and indicates they want to pay the tax due electronically, an invoice of how much tax is due is created by SaleForce Inc. A licensee will log into the Nebraska Department of Revenue/Gaming Website (NEGAM), where a payment gateway is connected, process the charitable gaming tax return, and request to make an electronic payment for the charitable gaming tax. The application uses the URL to redirect to the banking site.

An invoice is generated by Salesforce and the invoice page sends HTML form data to the current Contractor. This including the total amount due, since the bank does not accept partial/overpayments nor allow payments of less than all invoices simultaneously. In addition, the session transfer message can accommodate data for up to five (5) invoices. If there are less than five (5) invoices on a record, some of these additional fields will be blank.

The bank processes payment and provides an itemized payment receipt to licensee.

J.P. Morgan understands and can provide the services as described above.

5. NEBRASKA DEPARTMENT OF REVENUE (DOR)

See chart in Exhibit 2 for historical volumes.

a. ACH DEBIT ORIGINATION SERVICES

<u>Current Process:</u>

DOR receives ACH transactions for a variety of tax programs. ACH files are provided to the bank for debit origination. DOR originates its own ACH debit transactions through its Payment Plan and Electronic Funds Withdrawal (EFW) programs. Transactions are also generated by DOR vendors. All ACH files provided will be balanced files containing an offset credit for each debit.

The State Treasurer's Office has set aside bank accounts for DOR use to segregate funds for accounting purposes. DOR requires the bidder to provide this same level of service. Currently, DOR uses nine (9) bank accounts and reserves the right to add, eliminate, or combine accounts as needed. These accounts are for Individual Estimated Tax, Sales and Use Tax, Sales Tax, Business Consumer Use Tax, Withholding Tax, Individual Income Tax, Corporate Tax, Motor Fuels Tax, and E Payment.

J.P. Morgan understands and can provide the services as described above.

b. ACH CREDIT PROCESSING SERVICES

<u>Current Process:</u>

The DOR supports receipt of credits to designated State-owned demand deposit accounts for tax payments. DOR uses Universal Payment Identification Codes (UPIC) for these designated State-owned demand deposit accounts. The DOR provides taxpayers with file format requirements and the appropriate UPIC for the type of tax being paid. The contractor must provide DOR with a daily file containing the offset credits from these ACH Credit files.

J.P. Morgan understands and can provide the services as described above.

c. PAYMENT SCHEDULING SYSTEM.

Current Process:

DOR currently uses an Internet and IVR based application to initiate ACH debit entries in various tax filing and tax payment applications.

DOR utilizes a payment scheduling system to allow taxpayers to schedule ACH payments via the Web, an IVR interface, and operator-assisted entry. The Web and IVR interface allows the taxpayer to enter basic payment related information such as Nebraska taxpayer ID, type of tax being paid, tax period end date, amount, and RDFI information needed to complete the ACH transaction. The operator-assisted service allows the ACH payment scheduling system vendor to enter this same required information reported by the taxpayer by a toll-free telephone call.

This ACH payment scheduling system allows the taxpayer to log in via a secure application to initiate payments for all types of EFT tax payments supported by DOR. The IVR component of this service must provide toll-free access using a state specified telephone number. The application accepts Nebraska taxpayer ID number or social security number (SSN), and accommodate single entry and recurring payments. The application provides reports online, allow the taxpayer to easily review payment history and pending payments, and allows the taxpayer to set up bank account information for multiple bank accounts.

Requirements:

The ACH payment scheduling system must provide a public facing Web-based system, IVR system, and operator-assisted service used to collect payment data from taxpayers. If the payment system allows for mobile functionality, describe the interface. Functionality to include; Schedule a tax payment – taxpayer should be able to enter:

a. Payment amount in dollars and cents.

Our solution can support this requirement.

1) Scheduled Payment Date. This can be a future date. The system must allow payments to be warehoused for a period of up to one (1) year beyond the current date.

Our solution can support this requirement.

2) Tax Period End Date (MMDDYYYY). This can be for past dates, but should not be for future dates or before 01011968 (January 1, 1968).

Our solution can support "Tax Period End Date" as a State-defined reference field value that is a valid date field in MMDDYYYY format passed in from the State. It is expected that the State will only pass in valid values.

3) ***Nebraska ID Number. The system must verify that the entered Nebraska ID Number is a valid licensed DOR taxpayer – be present on the DOR business master file.***

Our solution can support "Nebraska ID number" as a State-defined User ID field value that passed in from the State that conforms to the User ID field specification. It is expected that the State will only pass in valid values.

4) ***Tax Type. The system must allow the taxpayer to select a tax type from a list of tax types that taxpayer is licensed to pay.***

Our solution support authorized tax types, enabling the taxpayer to only make tax payment from a list of tax types for which the taxpayer is eligible to pay. It is expected that the State will indicate via file, API or the admin site, which taxpayers are authorized to pay for which tax types.

Upon completion of scheduling a payment, the ACH payment scheduling system must issue a confirmation number to the taxpayer. The taxpayer must be given the opportunity to review and confirm the details of the payment and have the opportunity to cancel the transaction. A confirmation number must be issued each time a transaction is completed. This is a unique number assigned to a one-time payment when it is initiated, edited, or cancelled.

The system should provide taxpayer inquiry and payment history. The ACH payment scheduling system should

1) ***Allow the taxpayer to view pending payments and edit or delete, if necessary***

2) ***Allow the taxpayer to view payment history***

Taxpayers are given the opportunity to verify/edit/cancel payment details prior to confirming the payment initiation. Unique payment confirmation numbers are generated for each transaction when it is initiated, which is available for reference when payments are to be edited, refunded, or cancelled.

Registered taxpayers will have the ability to view, edit, or delete payments. For unregistered payers, the State will have the ability to cancel pending payments within our admin portal.

d. ***Register taxpayer banking information in the system. The ACH payment scheduling system should allow registrations to be made in real-time. Both registered and unregistered taxpayers should be able to originate payments. Payments originated by unregistered taxpayers should require fewer pages to navigate. Registered taxpayer should be allowed to create a profile that can be accessed through the application and have access to additional features, including the ability to store bank accounts for future use. Stored banking information would include***

1) ***Bank routing number – system checks to ensure this is a valid entry***

2) ***Bank account number***

3) ***Re-enter bank account number for verification***

4) ***Bank Account Type – checking or savings***

5) ***Business Account – yes or no***

6) ***Option to save account for future use by giving it a name.***

Our solution supports registered profiles including the above required fields.

Registered profiles are established using two different methods:

- Pre-Registration: the State can provide profile information using a real-time API or batch input file transmission.
  - Pre-registration enables use of our solution's advanced features, including tokenized payments, bill/invoice presentment, installment and variable recurring auto payments and single sign-on (secure session transfer).
- Self-Registration: taxpayers will be given the opportunity to self-register upon entering the online and mobile portal.
  - The taxpayer will be prompted to enter their personal information (e.g., name, email address, identifying account information), and to create a user name and password for future verification.
  - Each time a taxpayer makes a subsequent visit, our solution recognizes their name and password.

We can also accept single, one-time payments without requiring registration.

e. Validate registration or payment information entered by the taxpayer.

1) Show payment detail

2) Show bank account detail

3) Allow taxpayer to enter email address and phone number for payment confirmation

4) Terms and conditions -- Taxpayer must read and accept the terms of the authorization and the confirmation number to complete the transaction

5) Payment confirmation with confirmation number assigned and detailed information on transaction

Our solution can support the above requirements. Please note that sensitive data is masked throughout the entire application, including the online, mobile and Administration channels. Sensitive data would include bank account numbers (e.g., "XXXXXXXXXXXX1234).

f. Manage taxpayer bank account information

1) Allows the taxpayer to add, edit or delete banking information saved in the system.

2) Multiple bank accounts may be listed for a single Nebraska taxpayer ID number or SSN.

Our solution can support the above requirements.

g. Provide taxpayer authentication. Authentication functionality should include at a minimum the same functionality supported in the current ACH payment scheduling system.

1) ***Currently a taxpayer is authenticated using their Nebraska taxpayer ID number or SSN and system-specific password.***

a. ***First time taxpayers use their Nebraska taxpayer ID numbers as their password and are required to change their passwords the first time into the system.***

Our solution can support this requirement.

b. ***Nebraska taxpayer ID numbers and associated tax program data are provided to the contractor via a computer file as agreed upon by DOR and the selected bidder. Updates to this file are provided daily by DOR.***

Our solution can support this requirement.

c. ***For taxpayers making individual income tax payments, DOR does not provide preregistration data to the contractor; instead taxpayers must self-register by entering their SSNs through the ACH Payment Scheduling system.***

Our solution can support this requirement.

d. ***Bidders must provide descriptions of their solutions for taxpayer authentication.***

Our solution supports registered profiles including remembering their bank accounts, payment history, bills/invoices, recurring enrollments and pending payments.

Registered profiles are established using two different methods:

- Pre-Registration: the State can provide profile information using a real-time API or batch input file transmission.
  - Pre-registration enables use of our solution's advanced features, including tokenized payments, bill/invoice presentment, installment and variable recurring auto payments and single sign-on (secure session transfer).
- Self-Registration: taxpayers will be given the opportunity to self-register upon entering the online and mobile portal.
  - The taxpayer will be prompted to enter their personal information (e.g., name, email address, identifying account information), and to create a user name and password for future verification.
  - Each time a taxpayer makes a subsequent visit, our solution recognizes their name and password.

We can also accept single, one-time payments without requiring registration.

1. ***Provide the taxpayer with the ability to change his or her password.***

Our solution supports password changes and resets.

h. ***The ACH payment scheduling system must provide an internal Web-based administrative site for DOR taxpayers. This system will be used by DOR to perform a variety of functions:***

1) ***Schedule payments at taxpayer request***

2) ***Cancel payments at taxpayer request***

3) ***Update payments at taxpayer request***

4) ***Inquire on pending and past payments***

5) ***Reset passwords at taxpayer request***

The Administration portal enables authorized State personnel to generate a wide range of reports, make payments, execute refunds and perform other administrative functions. The following functions are available for use by the State where applicable to your configuration:

Administrative capabilities

Function	Capability
Single payment	Make taxpayer payment Refund payment Cancel pending payment Edit pending payment Enable/disable payment methods View payment details View payment history View pending payments
Recurring enrollment	Edit recurring enrollment Make taxpayer recurring enrollment Stop recurring enrollment View recurring enrollment View recurring enrollment details
Bill/Invoice presentment	View bill/invoice history
Registered payers	Self-register taxpayer View taxpayer profile Add/delete authorized products Edit taxpayer profile Reset password
Payment accounts	Delete payment account Enable invalid account View payment account (with masked account number)

i. ***The ACH payment scheduling system must be able to support all tax categories allowing EFT supported by DOR and allow for the addition of new tax programs at the request of the DOR throughout the life of this contract.***

Agreed.

j. ***The ACH payment scheduling system must have the ability for taxpayers to schedule estimated payments for both individual and business taxes. These recurring payments must be able to be scheduled for dates as specified by the DOR. The current due dates for individual income estimated tax payments are April 15, June 15, September 15, and January 15. For corporation income tax, the current due dates are April 15, June 15, September 15, and December 15.***

Taxpayers can schedule payments on the date of their choosing. The State can limit the payment date range, from 30 days up to 365 days.

Our solution can support recurring payments that can be installment payments with a fixed amount on a fixed frequency or variable recurring payments where the amount and/or timing of each payment can vary per your billing cycle.

k. ***DOR receives and transmits files with the ACH payment scheduling system vendor via secure FTP. Exhibit 3 provides specifications for each file. These files include but not limited to:***

Our solution supports a variety of batch and real-time interface options for exchanging inbound and outbound data with the State's systems. The system interfaces use IT-industry standard protocols and supports a variety of formats. Depending on the depth of integration required, the State will have varying levels of technical effort and preference.

Nebraska DOR to J.P. Morgan (Inbound) Integration: Used for providing taxpayer profiles, and payment initiation:

- **Transmission:**
  - **Inbound File:** This file provides profile and payment data into our solution prior to taxpayers accessing the relevant payment channel (e.g., web or IVR).
- **API:**
  - Enables real-time communication between the State and J.P. Morgan using industry standards and mutual authentication through the exchange of SSL certificates. The API is also used to facilitate secure session transfer of taxpayers into and out of the online portal.
- **HTTPS POST:**
  - Select data elements can be passed into our solution using an HTTPS POST session transfer that then will be associated with each corresponding payment. This data is also reflected in the real-time payment confirmation and remittance batch file.

J.P. Morgan to Nebraska DOR (Outbound) Integration: Used to provide completed payment and remittance information back to your systems:

- **Transmission:**
  - **Remittance File:** This file provides detail remittance of all executed and returned transactions, providing you with a daily means (excluding bank observed holidays) to reconcile funds settlement.
  - **Recurring Payment Enrollment File:** This file provides recurring enrollment activity that occurred within our solution on the previous day including all new, edited, stopped, expired, and active recurring enrollments. This file is transmitted daily (seven days a week, including bank observed holidays).
- API:

- **Real-Time Payment Confirmation (RTPC):** Enables the State to receive a notification each time a payment is initiated, edited, canceled, or refunded, allowing you to update your systems in real-time and make time-sensitive decisions.

l. Daily Remittance report containing payment information about debit transactions originated by the ACH payment scheduling system.

Our solution can support this process.

m. Pre-Registration Response File. This file serves as an acknowledgment from the ACH payment scheduling system that the DOR Pre-registration file has been received.

Our solution can support this process.

n. Revenue Pre-registration File. This is a copy of the DOR Business Master File used by the ACH payment scheduling system to authenticate taxpayers. Once this file is initially provided, only daily adds, changes, and deletes are sent.

Our solution can support this process.

6. UNIVERSITY OF NEBRASKA

a. ACH ORIGINATION SERVICES

Current Process:

SAP is a business software vendor used for the UN business enterprise solution. The UN and NSCS use SAP Payroll for processing monthly and biweekly net pay results. Employees may deposit into more than one bank account the transaction count reflects each deposit. Each pay cycle the University makes ACH deposits to vendors (such as retirement plan contributions or health insurance premiums) for the payroll deductions taken from the employees' pay. The vendor payments are included in the same file as net pay, as a separate batch. Once a month, the University processes a debit file to collect health insurance premiums from retirees that are participating in the University's group health insurance plan. The retiree health premium requires mandatory EFT participation. The University sends payroll files two days in advance. Retiree debit files are transmitted to the bank approximately 10 days in advance. A University staff member calls in file totals via an IVR. See chart in Exhibit 2 for historical volumes.

The University will use some or all of the requirements. There are no agency-specific requirements that need a response.

J.P. Morgan understands and can provide the services as described above.

7. NEBRASKA CHILD SUPPORT PAYMENT CENTER

a. ACH ORIGINATION SERVICES

Current Process:

NCSPC transmits one file a day with multiple batches via a website. NCSPC makes payments to the Custodial Parent by an ACH transaction to a checking or savings account or to a VISA branded stored value card. The NCSPC also debits Non-Custodial parents checking and savings accounts via an ACH transaction for child support payments. The State Treasurer's Office will maintain a separate demand deposit account for NCSPC. All NCSPC analysis activity must be billed monthly to NSCPC. See chart in Exhibit 2 for historical volumes.

The bank account ledger balance must be collateralized at the level required by State statute individually of other State bank accounts. Currently $10 million is pledged.

NCSPC staff will need access to NCSPC bank account via an Internet-based information reporting application.

NCSPC will use some or all of the requirements listed. There are no agency-specific requirements that need a response.

J.P. Morgan understands and can provide the services as described above.

8. NEBRASKA DEPARTMENT OF LABOR - UNEMPLOYMENT INSURANCE

a. ACH ORIGINATION SERVICES

Current Process:

The Department of Labor has three (3) daily files, which are both debit and credit files. The batch information is verified by a secure email, it includes the number of transactions and the file amounts, and whether they are debits or credits. After information is received and verified a confirmation is made electronically. Tax payments are accepted via UIConnect, their online data and payment system, which can push or pull payment from employer accounts. Batches of unemployment benefit payments are produced by GeoSolutions. See chart in Exhibit 2 for historical volumes.

J.P. Morgan understands and can provide the services as described above.

9. TREASURY MANAGEMENT

a. ACH ORIGINATION SERVICES

Current Process:

The Treasury Management Division of the State Treasurer's Office (TM) submits ACH files for daily processing. Files often contain multiple batches and are transmitted via a secure website with dual authentication credentials. Criteria for selecting an originating bank will include the ability to provide a secure online solution with at least the minimum industry authentication standards. ACH files are initiated from both TM, as well as Administrative Services' Accounting Division. The State Treasurer's Office works with many State agencies to offer debit programs, this option continues to grow. See chart in Exhibit 2 for historical volumes.

Treasury Management handles the ACH returns for State Agencies other than NCSPC and the Department of Labor. Daily Return Settlement report is printed and staff identifies which agency the money should be returned to. An entry for the return is made in the accounting system and a copy of the entry is sent to the proper agency. Returns should be listed on the previous and current day reports separately and not netted from receipts.

Treasury Management requires the contractor to provide an online application to initiate a re-presented check entry (RCK) through the ACH network in attempt to collect the debt on insufficient fund checks. This is a service that TM provides to any agencies that want to use it.

J.P. Morgan can support the State's current ACH and RCK processes.

10. STATE ACCOUNTING

a. ACH ORIGINATION

<u>Current Process:</u>

State Accounting coordinates all payments flowing out of the State's accounting system to the bank except those listed individually. Two NACHA ACH formatted files with multiple batches per file are created daily and sent to the bank via direct transmission. Most of the batches in the files are sent with an effective date two or more days in advance, but there is generally at least one batch of limited transactions in the file which is for one-day settlement. Employees may direct their payroll deposits into more than one bank account, so transaction count includes multiples. The contractor will be required to provide a PC or Internet-based batch database solution for use by State Accounting to transmit IRS tax payments and occasional payroll PPD credits. See chart in Exhibit 2 for historical volumes.

State Accounting will use some or all of the requirements. There are no agency-specific requirements that need a response.

J.P. Morgan understands and can provide the services as described above

11. Universal Payment Identification Code (UPIC)

The State requires the contractor to use UPIC account numbers. The State has been using UPICs with different ACH credit payments being paid to the State electronically monthly. The State will continue to expand the use of the UPICs when the opportunity. The State will use the existing UPIC numbers that are in place and expand the use in the right situation. UPIC offers the State fraud protection, the ability to block incoming wires, and ACH debits. It also reduces State expenses by allowing the portability of the UPIC to future selected vendors under the State origination agreement without having to do mass postal mailings to thousands of entities/consumers paying the State by ACH credit.

In the calendar year 2018, UPIC numbers were used 948,104 times with a dollar volume of $4,686,459,281. UPIC numbers were used 1,406,765 times with a dollar volume of $5,130,838,567 in the calendar year 2019.

These figures represent a historical count of prior activity by the State and are not a guarantee of future transaction accounts.

The State is not willing to change the account numbers that are already in place using UPIC.

J.P. Morgan understands and can provide the services as described above. No changes to UPIC account numbers will be needed.

12. Daily Export

The State requires the contractor to provide a daily Comma Separated Value (CSV) export of designated bank accounts' prior day activity by 10 a.m. CT. Four format options are available. This file will be imported into the State ERP system as a part of an automated daily reconciliation process unique to the State. The State requires this information to be exported from a Web-based information reporting application. See Exhibit 1 for descriptions of the formats available.

Access Online reporting offers a variety of industry standard file formats including CSV, which may be similar to what the State has referenced in Exhibit 1. We also have an interactive reporting feature that allows for Microsoft Excel based exports to be re-sorted and organized to meet specific export map requirements. The State can view reports online or export them into Adobe PDF ,CSV, BAI2, OFX, ISO camt.052/.053/.054 or SWIFT MT942/MT940.

During implementation, the State's technical requirements will be discussed. Your onboarding specialist will strive to understand the source data for the customized records of incoming debit/credit transactions reflected in Exhibit 1. J.P. Morgan will work with the State on a similar output file to meet the State's daily reconcilement and cash reporting needs.

C. BUSINESS REQUIREMENTS

1. The Contractor is responsible to research Nebraska Revised Statutes for legal responsibilities when doing business with the State. State statutes and the Nebraska Constitution include but are not limited to:

Neb. Rev. Stat. § 48-1122—Prohibition of Discrimination

Neb. Rev. Stat § 73-205(3)—Technology Access Standards

Neb. Rev. Stat § 73-506(1)—The State cannot pay for deliverables not received

Neb. Rev. Stat § 73-506(2)—Service contracts with unspecified or unlimited duration

Neb. Rev. Stat § 77-2301—The bank must be a state or national bank licensed to do business in the

State and will cash State warrants free of charge

Neb. Rev. Stat § 77-2387 to 77-2398—Collateral Requirements

Neb. Rev. Stat § 81-2401 to 81-2408—Prompt Payment Act

Neb. Rev. Stat § 81-118.01-Electronic Payment; acceptance; conditions

Nebraska State Constitution, Article XIII, § 3—Prohibits indemnification and limitations of liability

J.P. Morgan has reviewed and acknowledges the Nebraska Revised Statutes for legal responsibilities when doing business with the State.

2. `COLLATERAL REQUIREMENTS

The contractor shall be responsible to meet State statute requirements for collateralization of State deposits. References to collateralization requirements are found in Neb. Rev. Stat. Section §77-2395, §77-2389, §77¬2398, and §77-2387. Collateral requirements are applicable to all State agency accounts serviced under this contract and the contractor is required to pledge 102 percent of the bank account ledger balance. The State requires a statement of collateral be provided on a calendar month basis by the bank and the holding company emailed to NST.TMStaff@nebraska.gov. The agreement for collateral arrangements must require the signature of a State designated representative before collateral for the State is released. The contractor must provide statutorily required collateral, currently estimated to be up to $50 million, without exceptions or be excluded from further award consideration.

Collateral requirement are required for the maximum daily ledger balance, below is the monthly average from July 2019 to December 2019:

January 2019 $4,404,271

February 2019 $3,725,272

March 2019 $3,938,049

April 2019 $4,117,922

May 2019 $3,405,645

June 2019 $3,184,488

July 2019 $3,409,620

August 2019 $2,466,095

September 2019 $2,588,483

October 2019 $2,979,269

November 2019 $3,143,192

December 2019 $3,577,684

J.P. Morgan can comply with the collateral requirements above.

3. ACH ORIGINATION BUSINESS REQUIREMENTS

The contractor must comply with the following items:

a. The contractor must allow all State bank accounts except Nebraska Unemployment and NCSPC be grouped for the purposes of compensating balance. All charges for services must be charged on a calendar month account analysis. The account analysis must be made available online or mailed to the State entity no later than the 15th of each month.

J.P. Morgan understands and can comply with the requirements above.

b. Per Neb. Rev. Stat. 77-2301, the contractor will be required to cash State Treasury warrants and warrants issued by the NCSPC free of charge and without requiring a fingerprint at any branch of the contractor.

<u>Cleared State Warrants</u>

January 2019	***21,773***	***$33,072,059***
February 2019	***30,873***	***$30,963,022***
March 2019	***43,882***	***$32,390,474***
April 2019	***56,428***	***$36,366,996***
May 2019	***39,073***	***$36,338,948***
June 2019	***28,125***	***$26,136,292***
July 2019	***24,827***	***$27,725,441***
August 2019	***21,608***	***$26,931,084***
September 2019	***22,462***	***$30,898,863***
October 2019	***23,087***	***$30,049,204***
November 2019	***20,403***	***$27,508,178***
December 2019	***19,707***	***$34,351,366***

<u>Cleared NCSPC Warrants</u>

January 2019	***1961***	***$423,061.30***
February 2019	***1889***	***$362,595.44***
March 2019	***2738***	***$674,004.14***
April 2019	***2825***	***$695,547.85***
May 2019	***2433***	***$515,931.39***
June 2019	***1839***	***$365,405.52***
July 2019	***2131***	***$396,399***

August 2019	***1878***	***$345,155***
September 2019	***1845***	***$385,074***
October 2019	***1981***	***$393,227***
November 2019	***1939***	***$411,445***
December 2019	***1906***	***$413,202***

J.P. Morgan agrees to cash Nebraska State Treasury and NCSPC warrants up to $5K for non-accountholders without requiring a fingerprint.

c. The contractor must follow all applicable Nebraska DHHS rules and regulations, and may view them at: www.sos.ne.gov/rules-and-regs/regsearch/index.html. NCSPC staff will work with the contractor to resolve questions or issues regarding compliance of these rules and regulations.

J.P. Morgan acknowledges this requirement.

d. The contractor will be required to provide an annual report for the period July 1 to June 30 to the State Treasurer's Office for all transaction counts processed. The report will be due August 1 of each year. The report would give transaction counts by Standard Entry Class code and dollars processed per entity using the contract.

J.P. Morgan understands and can support this reporting requirement.

J.P. Morgan will advise you of any updates that may arise related to Nacha rule changes and their implications during regularly scheduled client reviews.

The State is encouraged to become familiarized with Nacha rules and any subsequent rule changes. Updates to rules are posted on the J.P. Morgan website, and are periodically communicated to our clients through customized mailings. The complete set of rules is available for free to all clients at www.achrulesonline.org by selecting the Basic User option during registration.

J.P. Morgan also offers web-based ACH training to the State on a quarterly basis. Open to all clients, classes are free of charge, and clients who attend will earn up to 2.4 Accredited ACH Professional (AAP) credits per course for continuing education. The classes currently consist of four webinars. Clients can choose to attend one, two, three or all four in the series:

- ACH Originator Responsibilities
- ACH Risk Management
- Payments and Innovation
- Principles of International Payments

e. The contractor must keep the State educated on all changes to the rules and regulations by providing training or materials.

J.P. Morgan will advise you of any updates that may arise related to Nacha rule changes and their implications during regularly scheduled client reviews.

The State is encouraged to become familiarized with Nacha rules and any subsequent rule changes. Updates to rules are posted on the J.P. Morgan website, and are periodically communicated to our

clients through customized mailings. The complete set of rules is available for free to all clients at www.achrulesonline.org by selecting the Basic User option during registration.

J.P. Morgan also offers web-based ACH training to the State on a quarterly basis. Open to all clients, classes are free of charge, and clients who attend will earn up to 2.4 Accredited ACH Professional (AAP) credits per course for continuing education. The classes currently consist of four webinars. Clients can choose to attend one, two, three or all four in the series:

- ACH Originator Responsibilities
- ACH Risk Management
- Payments and Innovation
- Principles of International Payments

f. The contractor will detail the process the State will use to export using a CSV format the daily bank activity from an online/internet based information reporting application, and in which format the contractor will allow the State to use. (Examples are listed in Exhibit 1 and the contractor must use one of the four formats

Access Online reporting offers a variety of industry standard file formats including CSV, which may be similar to what the State has referenced in Exhibit 1. We also have an interactive reporting feature that allows for Microsoft Excel based exports to be re-sorted and organized to meet specific export map requirements. The State can view reports online or export them into Adobe PDF ,CSV, BAI2, OFX, ISO camt.052/.053/.054 or SWIFT MT942/MT940.

During implementation, the State's technical requirements will be discussed. Your onboarding specialist will strive to understand the source data for the customized records of incoming debit/credit transactions reflected in Exhibit 1. J.P. Morgan will work with the State on a similar output file to meet the State's daily reconcilement and cash reporting needs.

We will also provide training to ensure that the State understands how to retrieve these reports.

g. The contractor must provide credit limit for the day on State accounts of $400 million to allow a wire to be posted to cover the debits for the day.

J.P. Morgan understands and can comply with this requirement.

h. The contractor must provide debit limit for the day on State accounts of $400 million. Largest to date was $373,933,963 for one (1) day.

J.P. Morgan understands and can comply with this requirement.

i. Provide the State Treasurer's Office, through a mutually agreed electronic transmission method, the amount of receipted funds credited to those accounts designated by the State by open of business Central Time on the effective settlement date. The money must be available for withdrawal by 8:30 AM CT.

J.P. Morgan understands and can comply with this requirement.

j. Retain existing UPIC numbers with the option to add or delete numbers.

J.P. Morgan understands and can comply with this requirement.

FORM A BIDDER PROPOSAL POINT OF CONTACT

Please see *Form A. Bidder Proposal Point of Contact* provided on the following page.

Form A
Bidder Proposal Point of Contact
Request for Proposal Number 6304 Z1

Form A should be completed and submitted with each response to this solicitation. This is intended to provide the State with information on the bidder's name and address, and the specific person(s) who are responsible for preparation of the bidder's response.

Preparation of Response Contact Information	
Bidder Name:	JPMorgan Chase Bank, N.A.
Bidder Address:	10 S. Dearborn St., Floor 36, Chicago, Illinois 60603-2300
Contact Person & Title:	Joanne Meulendyke, Authorized Officer
E-mail Address:	joanne.meulendyke@jpmorgan.com
Telephone Number (Office):	(312) 732-6988
Telephone Number (Cellular):	(414) 828-1905
Fax Number:	n/a

Each bidder should also designate a specific contact person who will be responsible for responding to the State if any clarifications of the bidder's response should become necessary. This will also be the person who the State contacts to set up a presentation/demonstration, if required.

Communication with the State Contact Information	
Bidder Name:	JPMorgan Chase Bank, N.A.
Bidder Address:	10 S. Dearborn St., Floor 36, Chicago, Illinois 60603-2300
Contact Person & Title:	Joanne Meulendyke, Authorized Officer
E-mail Address:	joanne.meulendyke@jpmorgan.com
Telephone Number (Office):	(312) 732-6988
Telephone Number (Cellular):	(414) 828-1905
Fax Number:	n/a

REQUEST FOR PROPOSAL FOR CONTRACTUAL SERVICES FORM

Please see *Request for Proposal for Contractual Services Form* provide on the following page.

REQUEST FOR PROPOSAL FOR CONTRACTUAL SERVICES FORM

By signing this Request for Proposal for Contractual Services form, the Bidder guarantees compliance with

BIDDER MUST COMPLETE THE FOLLOWING

the procedures stated in this Solicitation, and agrees to the terms and conditions unless otherwise indicated in writing and certifies that bidder maintains a drug free work place.

Per Nebraska's Transparency in Government Procurement Act, Neb. Rev Stat § 73-603 DAS is required to collect statistical information regarding the number of contracts awarded to Nebraska Contractors. This information is for statistical purposes only and will not be considered for contract award purposes.

JM____ NEBRASKA CONTRACTOR AFFIDAVIT: Bidder hereby attests that bidder is a Nebraska Contractor. "Nebraska Contractor" shall mean any bidder who has maintained a bona fide place of business and at least one employee within this state for at least the six (6) months immediately preceding the posting date of this Solicitation.

_____ I hereby certify that I am a Resident disabled veteran or business located in a designated enterprise zone in accordance with Neb. Rev. Stat. § 73-107 and wish to have preference, if applicable, considered in the award of this contract.

_____ I hereby certify that I am a blind person licensed by the Commission for the Blind & Visually Impaired in accordance with Neb. Rev. Stat. §71-8611 and wish to have preference considered in the award of this contract.

FORM MUST BE SIGNED USING AN INDELIBLE METHOD (NOT ELECTRONICALLY)

FIRM:	JPMorgan Chase Bank, N.A.
COMPLETE ADDRESS:	10 S. Dearborn St., Floor 36, Chicago, Illinois 60603-2300
TELEPHONE NUMBER:	(312) 732-6988
FAX NUMBER:	n/a
DATE:	8-18-2020
SIGNATURE:	Joanne Meulendyke
TYPED NAME & TITLE OF SIGNER:	Joanne Meulendyke, Authorized Officer

Cost Proposal

Pricing is provided in the separate *Cost Proposal*. Please see *Cost Proposal Appendix 1* for additional pricing details and comments.

Appendices

Appendix 1. Access Online Technical Requirements

Appendix 2. Access Online Sample Reports

Appendix 3. ACH Origination and ACH Returns NACHA Record Format

Appendix 4. Sample Implementation Project Plan

Appendix 5. Global Sanctions Compliance Program

Appendix 6. Addendum Acknowledgement

J.P.Morgan

Automated Clearing House (ACH) Origination Services Financial Statements

RFP 6304 Z1

August 18, 2020

Prepared by:

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(312) 732-6988
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J.P.Morgan

DISCLOSURE STATEMENT

This document was prepared exclusively for the benefit and internal use of the party to whom it is directly addressed and delivered (the "Organization") in order to assist the Organization in evaluating certain products or services that may be provided by J.P. Morgan.

Chase, J.P. Morgan, and JPMorgan Chase and InstaMed are marketing names for certain businesses of JPMorgan Chase & Co. and its affiliates and subsidiaries worldwide (if and as used herein may include as applicable employees or officers of any or all of such entities irrespective of the marketing name used). Products and services may be provided by commercial bank affiliates, securities affiliates or other J.P. Morgan affiliates or entities. In particular, securities brokerage services other than those which can be provided by commercial bank affiliates under applicable law will be provided by registered broker/dealer affiliates such as J.P. Morgan Securities LLC, J.P. Morgan Institutional Investments Inc. or by such other affiliates as may be appropriate to provide such services under applicable law. Such securities are not deposits or other obligations of any such commercial bank, are not guaranteed by any such commercial bank and are not insured by the Federal Deposit Insurance Corporation. We are not responsible for the performance of our partners, their continued service levels, or their ability to provide services.

The information herein does not purport to set forth all applicable issues and is not intended to constitute advice on legal, tax, investment, accounting, regulatory or any other matters. J.P. Morgan makes no representations as to such matters or any other effects of any transaction and shall have no responsibility or liability to you with respect thereto. You should consult with your own advisors regarding such matters and the suitability, permissibility and effect of any transaction. In no event shall J.P. Morgan nor any of its directors, officers, employees or agents be liable for any use of, for any decision made or action taken in reliance upon, or for any inaccuracies or errors in, or omissions from, the information herein. The information herein is not intended as nor shall it be deemed to constitute advice or a recommendation regarding the issuance of municipal securities or the use of any municipal financial products. J.P. Morgan is not providing any such advice or acting as the Organization's agent, fiduciary or advisor, including, without limitation, as a Municipal Advisor under Section 15B of the Securities and Exchange Act of 1934, as amended.

This proposal is subject to and conditioned upon a mutually agreeable contract between the Organization and J.P. Morgan. J.P. Morgan also requires execution of all applicable product and service agreements. Implementation of products and services is subject to and conditioned upon the condition of satisfactory completion of J.P. Morgan's "Know Your Customer" due diligence and meeting product requirements. These steps are included in J.P. Morgan's client onboarding process.

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To help the United States government fight the funding of terrorism and money laundering activities, U.S. law (Section 326 of the USA PATRIOT Act) requires banks and certain other financial institutions to obtain, verify, and record information that identifies each client that opens an account. What this means for our clients: Before opening a new account, we will require you to provide name, address, taxpayer identification number, and other information and/or documentation that will allow us to identify the account owner(s), as required by law.

Please note that we do not issue cards and prohibit use of our cards in any country against which the United States has imposed sanctions. A current list of such sanctioned countries, as well as information about sanctions, is available on the U.S. Department of the Treasury website: treas.gov/offices/enforcement/ofac.

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This document does not constitute a commitment by any J.P. Morgan entity to extend or arrange credit.

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J.P. Morgan supports sustainable business practices and adheres to the principles of environmental sustainability wherever possible.

Contents

Financial Statements 3

J.P.Morgan

Financial Statements

The bidder must provide financial statements applicable to the firm. Bidder should provide financial statements in a separate file. If publicly held, the bidder must provide a copy of the corporation's most recent audited financial reports and statements, and the name, address, and telephone number of the fiscally responsible representative of the bidder's financial or banking organization.

If the bidder is not a publicly held corporation, either the reports and statements required of a publicly held corporation, or a description of the organization, including size, longevity, client base, areas of specialization and expertise, and any other pertinent information, should be submitted in such a manner that proposal evaluators may reasonably formulate a determination about the stability and financial strength of the organization. Additionally, a non-publicly held firm should provide a banking reference.

Please see our 2019 Annual Report provided on the following pages.

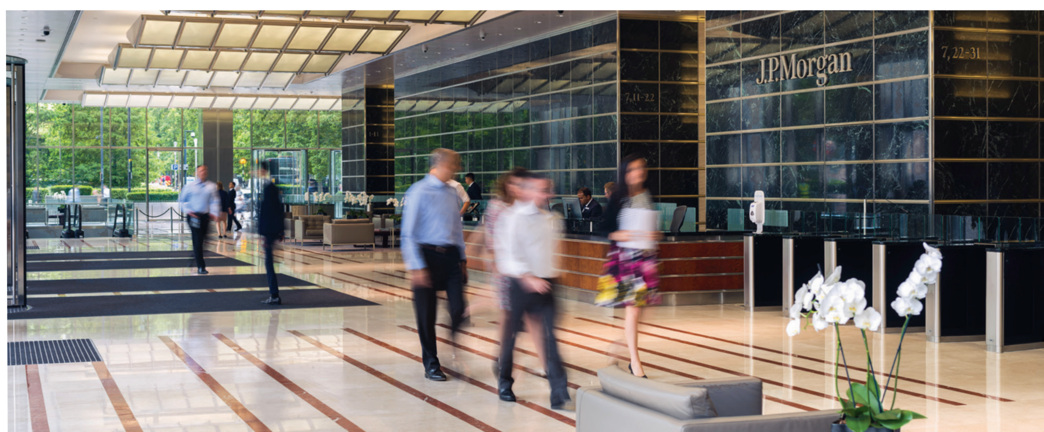
For the State's convenience, J.P. Morgan makes our financial statements and other publicly filed documents available through our website: https://www.jpmorganchase.com/corporate/investor-relations/annual-report-proxy.htm. This link provides past and current JPMorgan Chase & Co. Annual Reports, which includes audited financial statements

The bidder must disclose any and all judgments, pending or expected litigation, or other real or potential financial reversals, which might materially affect the viability or stability of the organization, or state that no such condition is known to exist.

The State may elect to use a third party to conduct credit checks as part of the corporate overview evaluation.

JPMorgan Chase & Co. and/or its subsidiaries (collectively, the "Firm") are defendants or putative defendants in numerous legal proceedings, including private civil litigations and regulatory/government investigations. The litigations range from individual actions involving a single plaintiff to class action lawsuits with potentially millions of class members. Investigations involve both formal and informal proceedings, by both governmental agencies and self-regulatory organizations. These legal proceedings are at varying stages of adjudication, arbitration or investigation, and involve each of the Firm's lines of business and geographies and a wide variety of claims (including common law tort and contract claims and statutory antitrust, securities and consumer protection claims), some of which present novel legal theories. Based on current knowledge, the Firm believes it has asserted meritorious defenses to the claims asserted against it in its currently outstanding legal proceedings, intends to defend itself vigorously in all such matters and does not believe that any pending legal proceeding would have a material effect on the Firm's performance of the services contemplated by the RFP. For further discussion, please refer to JPMorgan Chase & Co.'s publicly-filed disclosures, including its most recent Annual Report on Form 10-K and Quarterly Reports on Form 10-Q filed with the U.S. Securities and Exchange Commission (available at: http://investor.shareholder.com/jpmorganchase/sec.cfm).

2019 ANNUAL REPORT



JPMORGAN CHASE & CO.

Financial Highlights

As of or for the year ended December 31, (in millions, except per share, ratio data and headcount)	2019	2018	2017
Selected income statement data			
Total net revenue	**$ 115,627**	$ 109,029	$ 100,705
Total noninterest expense	**65,497**	63,394	59,515
Pre-provision profit	**50,130**	45,635	41,190
Provision for credit losses	**5,585**	4,871	5,290
Net income	**$ 36,431**	$ 32,474	$ 24,441
Per common share data			
Net income per share:			
Basic	**$ 10.75**	$ 9.04	$ 6.35
Diluted	**10.72**	9.00	6.31
Book value	**75.98**	70.35	67.04
Tangible book value (TBVPS)[(a)]	**60.98**	56.33	53.56
Cash dividends declared	**3.40**	2.72	2.12
Selected ratios			
Return on common equity	**15%**	13%	10%
Return on tangible common equity (ROTCE)[(a)]	**19**	17	12
Liquidity coverage ratio (average)[(b)]	**116**	113	119
Common equity Tier 1 capital ratio[(c)]	**12.4**	12.0	12.1
Tier 1 capital ratio[(c)]	**14.1**	13.7	13.8
Total capital ratio[(c)]	**16.0**	15.5	15.7
Selected balance sheet data (period-end)			
Loans	**$ 959,769**	$ 984,554	$ 930,697
Total assets	**2,687,379**	2,622,532	2,533,600
Deposits	**1,562,431**	1,470,666	1,443,982
Common stockholders' equity	**234,337**	230,447	229,625
Total stockholders' equity	**261,330**	256,515	255,693
Market data			
Closing share price	**$ 139.40**	$ 97.62	$ 106.94
Market capitalization	**429,913**	319,780	366,301
Common shares at period-end	**3,084.0**	3,275.8	3,425.3
Headcount	**256,981**	256,105	252,539

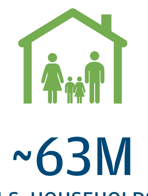
(a) TBVPS and ROTCE are each non-GAAP financial measures. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Financial Performance Measures on pages 57–59 for additional information on these measures.
(b) Refer to Liquidity Risk Management on pages 93-98 for additional information on this measure.
(c) The ratios presented are calculated under the Basel III Fully Phased-In Approach. Refer to Capital Risk Management on pages 85-92 for additional information on these measures.

JPMorgan Chase & Co. (NYSE: JPM) is a leading global financial services firm with assets of $2.7 trillion and operations worldwide. The firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. A component of the Dow Jones Industrial Average, JPMorgan Chase & Co. serves millions of customers in the United States and many of the world's most prominent corporate, institutional and government clients under its J.P. Morgan and Chase brands.

Information about J.P. Morgan's capabilities can be found at jpmorgan.com and about Chase's capabilities at chase.com. Information about JPMorgan Chase & Co. is available at jpmorganchase.com.

$2B
AFFORDABLE HOUSING

$2 billion in financing for affordable housing projects in 2019



~63M
U.S. HOUSEHOLDS

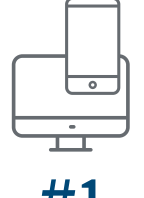
Serving nearly 63 million U.S. households, including 4 million small businesses

BUSINESS LEADERSHIP

Named to *Fortune* magazine's Most Admired Companies and Change the World lists

~$50B
CLEAN FINANCING

Facilitated nearly $50 billion in clean financing in 2019



#1
CONSUMER BANK

#1 primary bank in our Consumer Bank footprint

#1
TRADITIONAL MIDDLE MARKET LENDER

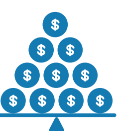
1 traditional Middle Market Bookrunner in the U.S.

#1
INVESTMENT BANK

#1 globally in both investment banking fees and Markets revenue

#1
CREDIT CARD

#1 in total U.S. credit card sales volume and outstandings



88%
RANKED IN TOP TWO QUARTILES

88% of long-term mutual fund assets under management ranked in the top two quartiles over 10 years

#1
MULTIFAMILY LENDER

#1 U.S. multifamily lender

#1
PRIVATE BANK

#1 U.S. Private Bank

90%
YOU INVEST

90% of You Invest customers are first-time investors with Chase

Dear Fellow Shareholders,

Jamie Dimon,
Chairman and
Chief Executive Officer

As we prepare this year's annual letter to shareholders, the world is confronting one of the greatest health threats of a generation, one that profoundly impacts the global economy and all of its citizens. Our thoughts remain with the communities and individuals, including healthcare workers and first responders, most deeply hit by the COVID-19 crisis.

Throughout our history, JPMorgan Chase has built its reputation on being there for clients, customers and communities in the most critical times. This unprecedented environment is no different. Our actions during this global crisis are essential to keeping the global economy going and will be remembered for years to come.

In these annual letters, I usually cover a range of topics, including a review of JPMorgan Chase's principles, priorities and performance, as well as the broader geopolitical issues facing our company and the most critical public policy issues

affecting our country. When the time is right and the future is clearer, I will provide a more complete and current view on how this crisis might change our strategies around how we run the company, work with our clients and governments, and develop public policy solutions. However, right now, as we deal with the spiraling effects of this pandemic, I want to focus on what we as a bank can do to remain strong, resilient and well-positioned to support our colleagues, clients, customers and communities across the globe.

Looking back on the last two decades — starting from my time as CEO of Bank One in 2000 — the firm has weathered some unprecedented challenges, as we will with this current pandemic, but they did not stop us from accomplishing some extraordinary things. Once again, you should know how grateful and proud I am of our more than 200,000 employees around the world. I also want to thank Daniel Pinto, Gordon Smith, our Operating Committee, our Board of Directors and our senior leaders for the exceptional leadership they have shown under the most difficult of circumstances.

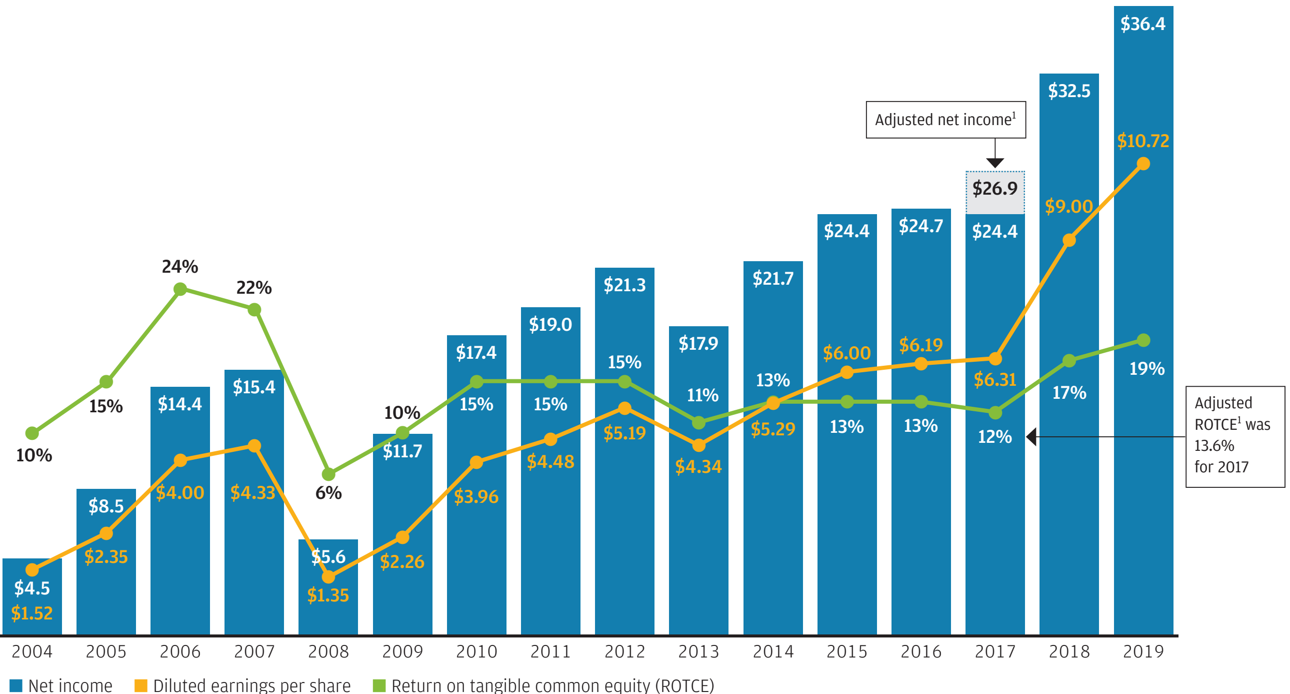
We entered this crisis in a position of strength. 2019 was another strong year for JPMorgan Chase, with the firm generating record revenue and net income, as well as setting numerous other records across our lines of business. We earned $36.4 billion in net income on revenue[1] of $118.7 billion, reflecting strong underlying performance across our businesses. We now have delivered record results in nine of the last 10 years[2] and are confident we will continue to do so in the future, though it should be expected that our earnings will be down meaningfully in 2020. Our largest businesses grew revenue and net income for the year, while the firm continued to make significant investments in products, people and technology. We grew core loans by 2%, increased deposits overall by 5% and generally broadened market share across our businesses, all while maintaining credit discipline and a fortress balance sheet. In total, we extended credit and raised capital of $2.3 trillion for businesses, institutional clients and U.S. customers.

[1] Represents managed revenue.

[2] Adjusted net income, a non-GAAP financial measure, excludes $2.4 billion from net income in 2017 as a result of the enactment of the Tax Cuts and Jobs Act.

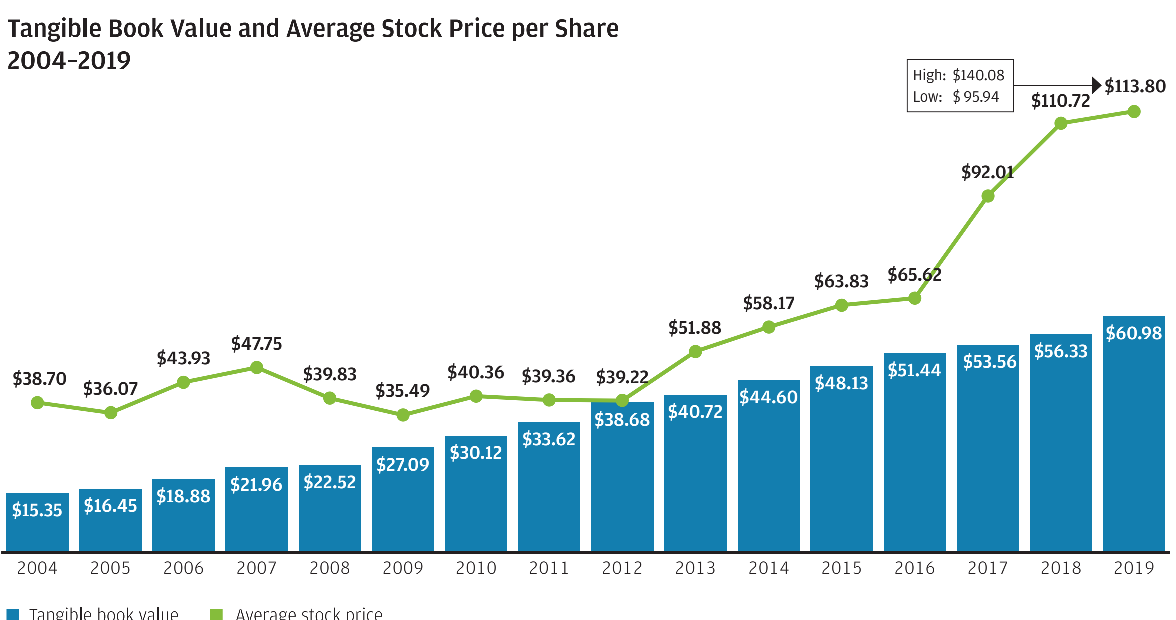
Earnings, Diluted Earnings per Share and Return on Tangible Common Equity 2004–2019

($ in billions, except per share and ratio data)



[1] Adjusted net income, a non-GAAP financial measure, excludes $2.4 billion from net income in 2017 as a result of the enactment of the Tax Cuts and Jobs Act.

Tangible Book Value and Average Stock Price per Share 2004–2019



JPMorgan Chase stock is owned by large institutions, pension plans, mutual funds and directly by individual investors. However, it is important to remember that in almost all cases, the ultimate beneficiaries are individuals in our communities. Approximately 100 million people in the United States own stock, and a large percentage of these individuals, in one way or another, own JPMorgan Chase stock. Many of these people are veterans, teachers, police officers, firefighters, retirees, or those saving for a home, school or retirement. Your management team goes to work every day recognizing the enormous responsibility that we have to perform for our shareholders.

While we don't run the company worrying about the stock price in the short run, in the **long run** our stock price is a measure of the progress we have made over the years. This progress is a function of *continual* investments, in good and bad times, to build our capabilities — our people, systems and products. These important investments drive the future prospects of our company and position it to grow and prosper for decades. Whether looking back over five years, 10 years or since the JPMorgan Chase and Bank One merger (15 years ago), our stock has significantly outperformed the Standard & Poor's 500 Index and the Standard & Poor's Financials Index.

Bank One/JPMorgan Chase & Co. tangible book value per share performance vs. S&P 500 Index

	Bank One (A)	S&P 500 Index (B)	Relative Results (A) – (B)
Performance since becoming CEO of Bank One (3/27/2000–12/31/2019)[1]			
Compounded annual gain	11.5%	5.9%	5.6%
Overall gain	688.3%	210.8%	477.5%

	JPMorgan Chase & Co. (A)	S&P 500 Index (B)	Relative Results (A) – (B)
Performance since the Bank One and JPMorgan Chase & Co. merger (7/1/2004–12/31/2019)			
Compounded annual gain	12.2%	9.2%	3.0%
Overall gain	499.2%	290.2%	209.0%

Tangible book value over time captures the company's use of capital, balance sheet and profitability. In this chart, we are looking at heritage Bank One shareholders and JPMorgan Chase & Co. shareholders. The chart shows the increase in tangible book value per share; it is an after-tax number that assumes all dividends were retained vs. the Standard & Poor's 500 Index (S&P 500 Index), which is a pretax number that includes reinvested dividends.

[1] On March 27, 2000, Jamie Dimon was hired as CEO of Bank One.

Stock total return analysis

	Bank One	S&P 500 Index	S&P Financials Index
Performance since becoming CEO of Bank One (3/27/2000–12/31/2019)[1]			
Compounded annual gain	12.8%	5.9%	4.4%
Overall gain	988.2%	210.8%	132.9%

	JPMorgan Chase & Co.	S&P 500 Index	S&P Financials Index
Performance since the Bank One and JPMorgan Chase & Co. merger (7/1/2004–12/31/2019)			
Compounded annual gain	11.5%	9.2%	4.1%
Overall gain	441.9%	290.2%	85.6%
Performance for the period ended December 31, 2019			
Compounded annual gain			
One year	47.3%	31.5%	32.1%
Five years	20.5%	11.7%	11.1%
Ten years	15.6%	13.6%	12.2%

These charts show actual returns of the stock, with dividends reinvested, for heritage shareholders of Bank One and JPMorgan Chase & Co. vs. the Standard & Poor's 500 Index (S&P 500 Index) and the Standard & Poor's Financials Index (S&P Financials Index).

[1] On March 27, 2000, Jamie Dimon was hired as CEO of Bank One.

The results shown above use our stock price as of December 31, 2019. If you compare that with our stock price as of March 31, 2020, you would see a dramatic change. For example, the overall stock price gain from the date of the JPMorgan Chase and Bank One merger was 442% at the end of last year, but it dropped to 252% three months later. While that's still far better than many companies' performance, it illustrates the volatility of returns.

Unlike past letters, the placement of charts about the performance of our lines of business and our fortress balance sheet is different — they can be found in an appendix following this letter to peruse at your leisure. Instead, I am going to focus my comments in the rest of this letter on issues that relate to our current crisis. And while I enjoy sharing my opinion on many other matters, I will avoid doing so this year.

Within this letter, I discuss the following:

Dealing With an Extraordinary Crisis

1. We go to extraordinary lengths to help our customers — consumers, small businesses, midsize companies, large corporations, and state and local governments.
2. We take excellent care of our employees.
3. We make extraordinary efforts to lift up our communities, especially in challenging times.
4. We are transparent with our shareholders: What they should expect regarding our financial and operating performance in 2020.
5. We are working closely with all levels of government during this crisis — and while we will participate in government programs to address the severe economic challenges, we will not request any regulatory relief for ourselves.
6. We need a plan to get safely back to work.
7. We need to come together: My fervent hope for America.

DEALING WITH AN EXTRAORDINARY CRISIS

A corporation – essentially any institution – is a living, breathing organism made up of people, technology, institutional knowledge and relationships and is generally organized around mission and purpose. Entering into a crisis is not the time to figure out what you want to be. You must already be a well-functioning organization prepared to rapidly mobilize your resources, take your losses and survive another day for the good of all your stakeholders.

No matter the challenge, we manage our company consistently with principles that have stood the test of time. I have written about these inviolable principles often – the need for extremely talented and motivated employees; a fortress balance sheet that allows us to invest in good times and in bad times; clear, comprehensive and accurate financial, risk and operating reporting to let us make quick and accurate decisions; a devotion to our customers and communities; and continuous investing in technology to better serve both our employees and our customers. (These principles also underlie an organization's preparedness for tough competition – I was going to write this year that the ***competition is back*** in all of its facets. There'll be more to come on that next year.)

We are there for our customers, employees and communities in good and bad times – we are a port in the storm. It is in the toughest of times that we need to use our capital and liquidity to help clients – large and small. COVID-19 is one of those extraordinary times. Below are some of the things we are doing to help our company and our customers during this global crisis.

1. We go to extraordinary lengths to help our customers — consumers, small businesses, midsize companies, large corporations, and state and local governments.

First and foremost, we have to be prepared to operate under extremely adverse circumstances.

The significant economic fallout from this crisis reinforces the critical need to keep the global financial system fully functioning – and we recognize that our firm is an important part of the global economy. Therefore, we incorporate plans for resilience in everything we do – resilience for hurricanes, data center failures, cyber attacks and other issues. And while we had not envisioned the effects of a pandemic like this one, all of this preparation has paid off – and we have been able to accomplish far more and far more quickly than we originally thought possible. It is absolutely essential that we be up and functioning for all of our customers ***each and every day***.

How else would we process $6 trillion in payments or buy and sell approximately $2 trillion in securities and foreign exchange transactions for our clients on a daily basis? And how else would we raise more than $2 trillion of credit and capital for our clients each year? Our branches, collectively, have 1 million customer visits each day, and our combined credit card and debit card transaction volume totals $1.1 trillion a year.

During this crisis, we have been utilizing our disaster recovery sites and implementing alternative work arrangements globally. We now have more than 180,000 employees working from home (and quite effectively), including traders, bankers, portfolio managers,

and operations and call center teams across the globe. We are ensuring they continue to operate at the highest standards with the proper technological tools and access so they can serve their clients safely and seamlessly. Over the past few weeks, we have had nearly 150,000 concurrent virtual sessions – nearly five times our pre-pandemic average – and we have capacity in reserve to support significantly more demand if necessary.

We're taking significant steps to help our consumer customers.

After Superstorm Sandy, Hurricane Harvey and other devastating natural disasters around the globe, after wildfires ravaged California towns and after a number of other tragic events, we stepped up for our customers. Today, we are doing the same ***across the country*** as we work individually with customers facing COVID-19-related hardships.

We have been helping our customers, who tell us about their financial struggles as a result of the crisis, and are offering relief measures such as:

- Providing a 90-day grace period for mortgage and auto loan/lease payments and waiving any associated late fees.
- Removing minimum payment requirements on credit cards and waiving associated late fees.
- Not reporting payment deferrals such as late payments to credit bureaus for up-to-date clients.
- Continuing to responsibly lend to qualified consumers.
- Waiving or refunding some fees, including early withdrawal fees on certificates of deposit.

You can learn more about our customer response at: **www.chase.com/stayconnected**.

Of our approximately 5,000 Chase branches, we have managed to keep three-quarters of them open – and safe – for our customers who need our services. In every one of our markets, almost all of our 2,300 branches with drive-up windows have remained open for business, allowing people to maintain a safe distance. Our 17,000 bankers have continued to take appointments and proactively reach out to customers – helping them manage their finances and use our digital tools – often letting customers stay home. In addition, the vast majority of our 16,850 ATMs are well-stocked and still functioning to provide needed cash to our customers. Our call centers have not fared as well; many of them have been effectively shut down by local restrictions. As the volume of calls has increased from customers seeking assistance, hold times have also increased. We have mobilized quickly to address this issue, reminding customers that our digital self-service capabilities are always available for them to check balances, deposit checks or make payments. Additionally, we have built new tools – digital and electronic – to allow customers to request relief without waiting for a specialist. And we are making it possible for our displaced phone specialists to work from home.

We are also taking significant action to support businesses — small, midsize and large — and state and local governments.

Clearly, some clients may be much more vulnerable than others – for example, transportation companies, hospitality enterprises, hospitals, utilities and, in particular, small businesses that do not have enough capital to withstand sudden and sustained downturns in income. JPMorgan Chase Institute research reveals that 50% of small businesses have less than 15 cash buffer days, reinforcing why small businesses are being heavily disrupted by the current crisis and

will feel the effects for a significant period of time – even as more capital from the recent federal stimulus program reaches them.

To support businesses during this current crisis, we are doing the following:

- Prudently extending credit to businesses of all sizes for working capital and general corporate purposes. For example, in the past 60 days alone, we have extended $950 million in new loans to small businesses.
- Waiving and refunding fees for those businesses in need and finding ways to help more small businesses through resources available at the Small Business Administration.
- Servicing clients with additional credit through revolving facilities, when appropriate, and stepping in to try to help with credit when others can't or won't.
- Continuing in the ordinary course of business to sustain consumers, businesses and communities with about $500 billion of credit and capital raised ***every quarter.***
- Continuing to maintain undrawn revolving commitments in our wholesale businesses, which totaled approximately $295 billion as of the close of business on March 31, 2020. Companies have ***already drawn down more than $50 billion*** of their revolvers to prepare themselves for the crisis (this already dramatically exceeds what happened in the global financial crisis). Many others have requested additional credit, which we have been offering judiciously – ***more than $25 billion of new credit extensions*** were approved in the month of March alone.
- Continuing the issuance of bonds for highly rated companies ($85 billion) – it may surprise you that the first quarter of 2020 will be ***our largest quarter for investment grade issuance,*** led by J.P. Morgan.
- Continuing to support vital institutions to keep our communities strong: Increased funding in March included, for example, $1.9 billion for hospitals and healthcare companies, $270 million for educational institutions, $360 million for nonprofits, and $240 million for state and local governments.
- Continuing to fund construction projects essential to our communities (affordable housing, food banks and grocery stores) through our $5 billion commitment.

Recognizing the extraordinary extension of new credit, mentioned above, and knowing there will be a major recession mean that we are exposing ourselves to billions of dollars of additional credit losses as we help both consumer and business customers through these difficult times. (We will provide more detail on these actions later in this letter.) Of course, we are in continual contact with our regulators about our actions and efforts.

We stand ready to assist the government in implementing stimulus package benefits to support the economy.

We applaud the speed with which the federal government and the Federal Reserve (the Fed), as well as other central banks around the world, put together a stimulus package and other funding benefits to help individuals, businesses, and state and local entities across the United States and beyond. Much remains to be done to assure these resources can be quickly and effectively rolled out. We hope to be at the forefront of using this assistance ***to help our customers*** get through what is certain to be a difficult next few months. We will not use this relief funding for ourselves.

2. We take excellent care of our employees.

Times like these reinforce that our employees are our most important asset – they are fundamental to the vibrancy and success of our company. Excellence in everything we do – from operations and technology to service and reputation – depends upon the abilities and character of our employees. Our vast and diverse team of people serves our customers and communities, builds the technology, makes the strategic decisions, manages the risks, determines our investments and drives innovation. Setting aside differing views of our complex world and the risks and opportunities ahead, it is inarguable that having such an extraordinary team – people with guts, brains and enormous capabilities who can navigate whatever circumstances bring – is what ensures our future prosperity.

In last year's letter, I wrote about the many ways we take excellent care of our employees: competitive wages and compensation, 401(k) retirement benefits, health benefits and wellness programs, extensive training programs, volunteer and employee engagement opportunities, generous parental leave policies and much more.

During this pandemic, we have also taken extensive steps to protect and support our employees and their families. For example:

- We continue to pay employees who are at home because they have had potential exposure to the virus or whose health is higher risk. Additionally, we provide paid medical leave to employees who are unwell.
- We have clinical staff internally to support our employees through this difficult time, whether it is fielding general inquiries related to COVID-19 or locating testing or other medical facilities.
- All employees are receiving five additional paid days off to help manage personal needs, which may include dependent care, child care or other issues.
- A special payment of up to $1,000 has been granted to full- and part-time employees whose job requires them to continue working on-site and generally whose annual cash compensation is less than $60,000.
- All branch employees are being paid for their regularly scheduled hours even if those hours are reduced or their branch is temporarily closed.
- For those who must go to work on-site, we are reinforcing both basic and enhanced personal and office hygiene measures to keep them, their colleagues and their clients safe. We have modified business operations, staggered shifts, changed seating arrangements, closed buildings to nonessential visitors and provided additional equipment where possible. We have also intensified nightly and daily cleaning of all offices and branches worldwide that remain open.

It's amazing how quickly we have mobilized and implemented work-from-home and other resiliency measures – in weeks instead of months or years. There are great lessons to be learned from this experience.

While conditions may sometimes be unusual and difficult, we are functioning smoothly. In fact, over the last month in certain parts of our company, we've had the highest volume and transaction totals we have ever seen.

Needless to say, this success would be impossible without our exceptional employees, and we recognize our responsibility to support both their professional and personal lives now more than ever.

A DIVERSE AND INCLUSIVE COMPANY IS A STRONGER COMPANY

While the health crisis we are facing supersedes all other topics in this year's letter, the subject of diversity and inclusion is such an important one that I feel compelled to include it. As a firm, we have an unwavering commitment to integrity, fairness and responsibility. That's why any instances of racist behavior and discrimination are so deeply unsettling.

Recently, Daniel Pinto and Gordon Smith, our Co-Presidents and Chief Operating Officers, sent a note to employees about steps we're taking to ensure our values reach all corners of our company.

Dear colleagues,

We are managing through uncertain times right now and recognize many of you are focusing much of your day on responding to the ongoing spread of the COVID-19 coronavirus. While this is a top priority for all of us, we want to make sure you know we haven't lost sight of our commitment to keeping you informed about our ongoing efforts to strengthen our culture. Now, more than ever, we need the best of everyone because only together will we get through these unprecedented times.

As you know, after the media reported on alleged discrimination in our firm last year, Jamie asked Gordon to lead an internal team to take a hard look at how we do business so that we could gain a deeper understanding of what more we can do to root out racism and discrimination anywhere it exists.

Challenging our people to be clear-eyed and open to change, we tasked many of our senior leaders from across the firm, from multiple lines of business and control functions, to evaluate our policies, procedures and programs firmwide, to ensure they are fair for all employees and customers. To be clear, we are looking across the whole firm and at everything we do.

As a result, we've identified a number of areas that, with enhanced, scaled or new programming or processes, would serve to improve our culture in important ways. For example, we focused on employee and customer complaints – examining common themes, where they originated and where opportunity exists to improve.

We also looked at how employee discretion may affect product accessibility across lines of business. We found opportunities to increase awareness about the firm's Diversity & Inclusion strategy, and we identified a need to expand our diversity recruitment efforts to help us hire more diverse talent, and to implement mandatory firmwide training.

While this work is ongoing, here are five initial areas where work is now underway, including:

Enhancing our employee feedback process

We are looking hard at how we treat an employee complaint when it comes in. We are already working to simplify escalation channels so employees are clear on where to submit complaints, in addition to further building out our capabilities across complaints to better understand the full scope of the individual's experience. Feedback suggests that employees are not always clear on where to submit complaints, so we are working to identify where improvements are needed.

Employees are encouraged to use existing channels to report inappropriate conduct or discrimination. We will continue to strengthen these "listening posts" and reporting channels in an effort to make sure every one of us feels safe and confident identifying and reporting inappropriate behavior.

Making it easier for customers to access products and services

We regularly review the products and services we offer to customers, and we are looking for ways to boost customer connectivity across our full spectrum of consumer products. To start, we are focusing on:

- Enhancing ease of navigating and guiding customers through our full range of products and services available across our entire branch network; and
- Re-evaluating the qualification requirements for new product features and benefits.

We will improve product parameters and strengthen monitoring tools to ensure the exercise of discretion works as intended.

Bolstering our hiring systems to build a more robust pipeline of diverse talent

Attracting the best talent can only be achieved through a dedicated focus on inclusive recruiting, so we are recommitting ourselves to this effort. We have made progress in this area, with programs such as Advancing Black Leaders, a program

focused specifically on increased hiring, retention and development of talent from within the black community. Over the past four years, we have increased the number of black professionals in our most senior ranks, with the number of black managing directors and executive directors up by more than 50 percent.

In addition, we are expanding our specialized team dedicated to conducting more targeted outreach to recruit diverse talent. We will expand on our program to hold hiring managers and recruiters at the highest levels of the company accountable for hiring a diverse group of professionals.

Instituting required firmwide Diversity & Inclusion Training

In order to drive more diverse and inclusive behaviors amongst our leaders, managers, employees and customers, we are requiring diversity and inclusion training for all employees at various points throughout an employee lifecycle, including at the time of hire, and periodically thereafter. We expect all employees to fulfill these requirements.

Because the role of the manager is arguably the most critical role in promoting our culture deep into the organization, we will make additional manager training mandatory at the time of promotion to a people-manager role, and at the time of promotion to a senior leader role, in addition to other developmental moments for managers. We already have training in many parts of the organization, including programs like "Journey to Inclusive Teams" and the required unconscious bias training for branch managers. We will continue to enhance and embed this required training throughout the manager's career.

We know that it is essential for managers to be inclusive leaders and we will focus on helping them recognize ways they can be intentional about inclusion as they recruit, hire, retain and develop diverse talent.

Increasing the diversity of the businesses we partner with firmwide

We are fully committed to a fair, equitable and inclusive company for our customers, our employees, our partners and our suppliers. This is part of every manager's job, and they will be held accountable.

The diversity of the businesses we partner with across the firm is just as important as our employee diversity – from the small businesses to which we provide access to capital, to our asset managers, to our suppliers and to the companies we assist in bringing public.

We intend to increase diverse representation through structural process improvements in how we select partners and build our pipeline.

The firm will also continue to use data and research to further inform the development of products, services, employee programs and community investments that help address racial disparities in wealth building.

This all goes to say our work described above is representative of our deep commitment and is ongoing. It is not a "one and done" event. We will remain steadfast, continue to work now and in the future, and remain ever-vigilant in our effort to maintain a culture where racism cannot live or thrive. Over the next 30 days, each business will review their current strategies and contribute a plan to bring this to life and each business will be held accountable.

Let us say again, we are all the keepers of our culture and we are committed to ensuring that ours is one where all employees and customers are treated equally and fairly, and where all of us receive the opportunity and mutual respect we deserve.

Gordon Jamie

I can assure ***you***, it did not take one particular story to make us realize that a diverse and inclusive culture is important.

We know that too many people are being left behind – particularly in the black community. ***The Civil War ended more than 150 years ago, and we still have not come even close to parity.*** We need to do more as a nation, and we have more to do as a firm.

3. We make extraordinary efforts to lift up our communities, especially in challenging times.

I believe that our shareholders know we make extraordinary efforts to lift up our communities, both at a local level – supporting schools and work skills training, for example – and at the national level, helping to formulate policies that are good for countries. These policies affect healthcare, infrastructure, education and employment, including initiatives such as those that help people with a criminal background get a second chance.

We know that crises like COVID-19 create further inequities in society so it is even more important that we be present for those communities hit hard by the pandemic. JPMorgan Chase made a $50 million commitment to help address the immediate humanitarian crisis, as well as the long-term economic challenges people face. Funding will be deployed over time with particular focus on the most vulnerable people and communities, including:

- Immediate healthcare, food and other humanitarian relief globally;
- Help for existing nonprofit partners around the world that are responding to the crisis in their communities;
- Assistance to small businesses vulnerable to significant economic hardships in the United States, China and Europe.

There is a tremendous amount we do day to day – in addition to traditional banking – to help the communities in which we operate, including the following, some of which you might be surprised to know:

- We finance more than $5.5 billion in affordable housing each year (including residential and commercial lending and mortgages in low- and moderate-income communities).
- We provide small business loans in low- and moderate-income neighborhoods.
- We design products and services to promote the financial health of lower-income individuals.
- We support a number of employee- and community-based initiatives and philanthropic activities, including:
  - ***Office of Military and Veterans Affairs***, which sponsors mentorship, development and recognition programs to support the military and veterans working at the firm;
  - ***Women on the Move***, our global firmwide effort that empowers female employees, clients and consumers;
  - ***The Service Corps***, which mobilizes employee volunteers to help nonprofit organizations around the world;
  - ***Advancing Black Pathways***, a comprehensive program focused on providing more opportunities for black people and black-owned businesses because we know that opportunity is not always created equally;
  - ***Entrepreneurs of Color Fund***, which is expanding and provides minority entrepreneurs with access to capital, education and other resources.
- We expect to finance more than $100 billion in transactions aimed at supporting development in emerging market countries – in infrastructure, education, healthcare, agribusiness and industry, among other investments – to promote the United Nations' Sustainable Development Goals.

- We are huge supporters of regional and community banks, which are critical to many cities and small towns around the country. We bank approximately 500 of America's 5,000 regional and community banks. In 2019, we lent or raised a total of $2.6 billion in capital for them. In addition, we provide payment-processing services for them, we finance some of their mortgage activities, we advise on acquisitions, and we buy and sell securities for these banks. We also supply interest rate swaps and foreign exchange both for themselves – to help them hedge some of their exposures – and for their clients. For example, while many community banks were seeking more liquidity to serve their local communities amidst COVID-19 fears, we were able to help approximately 100 community banks secure $775 million in increased cash availability over a three-week period in March, delivering $1.9 billion of cash to support their branches and ATMs. This is not only a win for our clients but also for the communities in which they operate.

4. We are transparent with our shareholders: What they should expect regarding our financial and operating performance in 2020.

Of course, we do not know how this crisis will ultimately end, including how long it will last, how much economic damage it will do, or how fast or slow the recovery will be. We have always been serious about stress testing and run an enormous number of tests per week so that we are prepared for most crises. But as is often the case, this "actual new crisis" – while it shares attributes with what is being stress tested – is dramatically different from the expected.

We stopped buying back our stock: We have always held the position that the highest and best use of our equity is to reinvest it in our own business and, of course, to be able to withstand tough times. Halting buybacks was simply a very prudent action – we don't know exactly what the future will hold – but at a minimum, we assume that it will include a bad recession combined with some kind of financial stress similar to the global financial crisis of 2008. Our bank ***cannot be immune*** to the effects of this kind of stress.

We will share in detail our latest thinking on the impact this crisis will have on our financials in our first quarter earnings release in mid-April; however, to put it in context, here is how our shareholders can think broadly about a reasonable range of outcomes.

Our 2019 pretax earnings were $48 billion[1] – a huge and powerful earnings stream that enables us to absorb the loss of revenues and the higher credit costs that inevitably follow a crisis. For comparison, the Comprehensive Capital Analysis and Review (CCAR) results for 2020 that we submitted to the Federal Reserve in 2019 (which assumed outcomes like U.S. unemployment peaking at 10% and the stock market falling 50%) showed a decline in revenue of almost 20% and credit costs of approximately $20 billion more than what we experienced in 2019. We believe we would perform better than this if the Fed's scenario were to actually occur. But even in the Fed's scenario, we would be profitable in every quarter.[2] These stress test results also show that following such a meaningful reduction in our revenue (and assuming we continue to pay dividends), our common equity Tier 1 (CET1) ratio would likely hold at a very strong 10%, and we would have in excess of $500 billion of liquid assets.

Additionally, we have run an ***extremely adverse scenario*** that assumes an even deeper contraction of gross domestic product, down as much as 35% in the second quarter and lasting through the end

[1] Represents managed pretax income.

[2] We are adjusting these CCAR results for the global market shock trading losses and operational losses – and there have been none in this crisis.

of the year, and with U.S. unemployment continuing to increase, peaking at 14% in the fourth quarter. Even under this scenario, the company would still end the year with strong liquidity and a CET1 ratio of approximately 9.5% (common equity Tier 1 capital would still total $170 billion). This scenario is quite severe and, we hope, unlikely. If it were to play out, the Board would likely consider suspending the dividend even though it is a rather small claim on our equity capital base. If the Board suspended the dividend, it would be out of extreme prudence and based upon continued uncertainty over what the next few years will bring.

It is also important to be aware that in both our central case scenario for 2020 results and in our extremely adverse scenario, we are lending – currently or plan to do so – an additional $150 billion for our clients' needs. Despite this, our capital resources and liquidity are very strong in both models. We have over $500 billion in total liquid assets and an incremental $300+ billion borrowing capacity at the Federal Reserve and Federal Home Loan Banks, if needed, to support these loans, as well as meet our liquidity requirements (these numbers do not include the potential use of some of the Fed's newly created facilities). We could, of course, make our capital and liquidity buffer better by restricting our activities, but we do not intend to do that – our clients need us.

I would like to point out that, as we get closer to the extremely adverse scenario, current regulatory constraints will limit additional actions we can take to help clients – in spite of the extraordinary amount of capital and liquidity we could deploy.

5. We are working closely with all levels of government during this crisis — and while we will participate in government programs to address the severe economic challenges, we will not request any regulatory relief for ourselves.

We are just beginning to analyze and work with the government on all of their various programs. For the most part, these initiatives will need the deep involvement of the private sector to be properly executed. We intend to do everything we can – and as soon as possible – to ensure that government support is reaching the people who need it most.

We applaud and support the recent actions the U.S. Department of the Treasury and the Federal Reserve have taken to try to mitigate the economic impact of the COVID-19 turmoil. The Fed's overwhelming actions have already dramatically reduced the financial stress in the system, and there is still more they could do if they need to. For example, balance sheet expansion, additional lending facilities, and changes to capital and liquidity requirements are steps designed to ensure that more capital will flow through the system, which will ultimately allow us to help more families and small businesses. These actions would bolster the U.S. economy with no impact on safety, soundness or regulatory oversight. We are working with the government to make sure such crisis-relief measures are structured to work effectively – there are a significant number of details that need to be resolved, which I will not go into here.

While we will aggressively help our customers take advantage of these new programs (though we must take action to protect ourselves from ongoing – and, more important, future – litigation risk), we want our shareholders to know that we have not requested any regulatory relief for ourselves. Saying that we will not ask for regulatory relief does not mean the government shouldn't change some rules and regulations, however. For example, some rules can improperly prevent healthy, well-capitalized banks from lending freely in times of stress. This can hurt customers as the crisis deepens. Leaving high-quality, available liquidity undeployed in times of need is an opportunity forever lost.

I have written in detail in past letters that the regulatory system is in need of both reform and recalibration – not because we want it to happen but because it would be good for a deepening and widening of the financial system – something that would benefit all Americans. While a lot of the rules were constructive and made the financial system stronger, we are now seeing the impact of poorly coordinated, poorly calibrated and poorly organized rulemaking.

After the crisis subsides (and it will), our country should thoroughly review all aspects of our preparedness and response. And we should use the opportunity to closely review the economic response and determine whether any additional regulatory changes are warranted to improve our financial and economic system. There will be a time and place for that – but not now.

6. We need a plan to get safely back to work.

It is hoped that the number of new COVID-19 cases will decrease soon and – coupled with greatly enhanced medical capabilities (more beds, proper equipment where it is needed, adequate testing) – the healthcare system is equipped to take care of all Americans, both minimizing their suffering and maximizing their chance of living. Once this occurs, people can carefully start going back to work, of course with proper social distancing, vigilant hygiene, proper testing and other precautions. There are many jobs that can be safely done; however, employees in certain companies should return to business as usual only if the Centers for Disease Control and Prevention (CDC) and other government entities deem it safe to do so.

In addition, this "return to work" process could be accelerated if federal, state and local governments make tests widely available that allow people to certify that they have contracted and recovered from the disease, have the necessary antibodies to prevent them from getting sick again and are not infectious to anyone. Initially, we need a buffer period of days or weeks for people to be tested, and then for those who test negative for the virus, we need to discover whether virus antibodies appear through serology testing. Both the CDC and private companies are scrambling to produce such tests: The U.K. has ordered 3.5 million of them, Germany will use them to issue immunity certificates to COVID-19 survivors, and China and Singapore already are using tests to determine how extensively the virus spread in large populations in order to measure the true infection rate. In the United States, the Food and Drug Administration is allowing doctors to use these serology tests to identify recovered patients whose antibodies could treat emergency cases of the disease.

The country was not adequately prepared for this pandemic – however, we can and should be more prepared for what comes next. Done right, a disciplined transition would maximize the health of Americans and minimize the time, extent and suffering caused by the economic downturn.

7. We need to come together: My fervent hope for America.

Sometimes extraordinary events in history can cause a change in the body politic. As a nation, we were clearly not equipped for this global pandemic, and the consequences have been devastating. But it is forcing us to work together, and it is improving civility and reminding us that we all live on one planet. *E Pluribus Unum.*

I am hoping that civility, humanity, empathy and the goal of improving America will break through.

We have the resources to emerge from this crisis as a stronger country. America is still the most prosperous nation the world has ever seen. We are blessed with the natural gifts of land; all the food, water and energy we need; the Atlantic and Pacific oceans as natural borders; and wonderful neighbors in Canada and Mexico. And we are blessed with the extraordinary gifts from our Founding Fathers, which are still unequaled: freedom of speech, freedom of religion, freedom of enterprise, and the promise of equality and opportunity. These gifts have led to the most dynamic economy the world has ever seen – one that nurtures vibrant businesses large and small, exceptional universities, and a welcoming environment for innovation, science and technology. America was an idea borne on principles, not based upon historical relationships and tribal politics. It has and will continue to be a beacon of hope for the world and a magnet for the world's best and brightest.

Of course, America has always had its flaws. The current pandemic is only one example of the bad planning and management that have hurt our country: Our inner city schools don't graduate half of their students and don't give our children an education that leads to a livelihood; our healthcare system is increasingly costly with many of our citizens lacking any access; and nutrition and personal health aren't even being taught at many schools. Obesity has become a national scourge. We have a litigation and regulatory system that cripples small businesses with red tape and bureaucracy; ineffective infrastructure planning and investment; and huge waste and inefficiency at both the state and federal levels. We have failed to put proper immigration policies in place; our social safety nets are poorly designed; and the share of wages for the bottom 30% of Americans has effectively been going down. We need to ***acknowledge*** these problems and the damage they have done if we are ever going to fix them.

There should have been a pandemic playbook. Likewise, every problem I noted above should have detailed and nonpartisan solutions. As we have seen in past crises of this magnitude, there will come a time when we will look back and it will be clear how we – at all levels of society, government, business, healthcare systems, and civic and humanitarian organizations – could have been and will be better prepared to face emergencies of this scale. While the inclination of some will be to finger-point and look for blame, I hope we can avoid that. I also hope we can avoid people using times of crisis to argue for what they already believe. We need to demand more of ourselves and our leaders if we want to prevent or mitigate these disasters. This can be a moment when we all come together and recognize our shared responsibility, acting in a way that reflects the best of all of us. As President Kennedy historically said, "Ask not what your country can do for you – ask what you can do for your country."

My fervent hope is that America rolls up its sleeves and starts to attack these problems. Fixing them would better prepare us for future catastrophes, create better economic outcomes for everyone (with policies that aim to maximize economic growth, driving the best potential outcomes), improve income inequality, protect the most vulnerable and foster economic growth that is more resilient, which would also strengthen America's role in the world. We must never

forget that America's economic prosperity is a necessary foundation for our military capability, which keeps us free and strong and is essential to world peace. These issues could all be tackled while preserving the freedoms ascribed by our Founding Fathers: life, liberty and the pursuit of happiness, freedom of speech, freedom of religion and freedom of enterprise, which means the free movement of capital and labor (meaning you can work where you want and for whom you want). At the end of the day, the pursuit of happiness, our freedoms and free enterprise are inseparable.

If we acknowledge our problems and work together, we can lift up those who need help and society as a whole. Business and government collaborating together can conquer our biggest challenges.

IN CLOSING

While I have a deep and abiding faith in the United States of America and its extraordinary resiliency and capabilities, we do not have a divine right to success. Our challenges are significant, and we should not assume they will take care of themselves. Let us all do what we can to strengthen our exceptional union.

I would like to express my deep gratitude and appreciation for the employees of JPMorgan Chase, and I'd also like to thank all of you who shared your good wishes with me while I was recuperating from my recent heart surgery. From this letter, I hope shareholders and all readers gain an appreciation for the tremendous character and capabilities of our people and how they have helped communities around the world. They have faced these times of adversity with grace and fortitude. I hope you are as proud of them as I am. Finally, the countries and citizens of the global community will get through this unprecedented situation, undoubtedly stronger for it. Together, we will rise to the challenge.

Jamie Dimon
Chairman and Chief Executive Officer

April 6, 2020

APPENDIX

Client Franchises Built Over the Long Term

		2006	2018	2019
Consumer & Community Banking	Deposits market share[1]	3.6%	9.3%	9.3%
	# of top 50 Chase markets where we are #1 (top 3)	11 (25)	14 (40)	13 (40)
	Average deposits growth rate	8%	5%	3%
	Active mobile customers growth rate	NM	11%	12%
	Credit card sales market share[2]	16%	22%	23%
	Merchant processing volume[3] ($B)	$661	$1,366	$1,512
	# of branches	3,079	5,036	4,976
	Client investment assets ($B)	~$80	$282	$358
	Business Banking primary market share[4]	5.1%	8.8%	9.4%
Corporate & Investment Bank	Global investment banking fees[13]	#2	#1	#1
	Market share[13]	8.7%	8.6%	9.0%
	Total Markets revenue[14]	#8	#1	#1
	Market share[14]	6.3%	11.5%	12.0%
	FICC[14]	#7	#1	#1
	Market share[14]	7.0%	11.8%	12.3%
	Equities[14]	#8	co-#1	co-#1
	Market share[14]	5.0%	11.0%	11.3%
	Assets under custody ($T)	$13.9	$23.2	$26.8
Commercial Banking	# of top 50 MSAs with dedicated teams	26	50	50
	Bankers	1,203	1,922	2,101
	New relationships (gross)	NA	1,232	1,706
	Average loans ($B)	$53.6	$205.5	$207.9
	Average deposits ($B)	$73.6	$170.9	$172.7
	Gross investment banking revenue ($B)[18]	$0.7	$2.5	$2.7
	Multifamily lending[19]	#28	#1	#1
Asset & Wealth Management	Ranking of 5-year cumulative net client asset flows[21]	NA	#2	#2
	U.S. Private Bank *(Euromoney)*	#1	#1	#1
	Client assets ($T)	$1.3	$2.7	$3.2
	Active AUM market share[22]	1.8%	2.4%	2.5%
	North America Private Bank client assets market share[23]	3%	4%	4%
	Average loans ($B)	$26.5	$138.6	$149.7
	# of Wealth Management client advisors	1,506	2,865	2,890

Consumer & Community Banking

- Serve ~63 million U.S. households, including 4.3 million small businesses[5]
- 52 million active digital customers[6], including 37 million active mobile customers[7]
- #1 primary bank within Chase footprint[8]
- #1 U.S. credit card issuer based on sales and outstandings[9]
- #2 mortgage servicer[10]
- #3 bank auto lender[11]
- All-time high Net Promoter Score[12]

Corporate & Investment Bank

- >80% of Fortune 500 companies do business with us
- Presence in over 100 markets globally
- #1 in 16 businesses – compared with 8 in 2014[15]
- #1 in global investment banking fees for the 11th consecutive year[13]
- Consistently ranked #1 in Markets revenue since 2012[14]
- #1 in USD payments volume[16]
- #2 custodian globally[17]

Commercial Banking

- 142 locations across the U.S. and 30 international locations
- Credit, banking, and treasury services to ~18K Commercial & Industrial clients and ~34K real estate owners and investors
- 17 specialized industry coverage teams
- #1 traditional Middle Market Bookrunner in the U.S.[20]
- 26,000 affordable housing units financed in 2019

Asset & Wealth Management

- Serve clients across the entire wealth spectrum
- Clients include 59% of the world's largest pension funds, sovereign wealth funds and central banks
- Serves as a fiduciary across all asset classes
- 88% of Asset Management's 10-year long-term mutual fund AUM performed above peer median[25]
- Revenue and long-term AUM grew more than 90% since 2006

Refer to the 2020 Investor Day presentations for footnoted information, which is available on JPMorgan Chase & Co.'s website under the heading Investor Relations, Events & Presentations, JPMorgan Chase 2020 Investor Day (www.jpmorganchase.com/corporate/investor-relations/event-calendar.htm), and on Form 8-K as furnished to the U.S. Securities and Exchange Commission (SEC) on February 25, 2020, which is available on the SEC's website (www.sec.gov), as follows: Refer to Firm Overview slide 3 for footnotes 1, 5, 9, 16, 17, 18, 22 and 25; refer to Consumer & Community Banking slides 22, 3, 3, 2, 9, 9 and 7 for footnotes 2, 6, 7, 8, 10, 11 and 12, respectively; refer to Corporate & Investment Bank slides 5 and 4 for footnotes 13 and 15, respectively; and refer to Asset & Wealth Management slide 3 for footnote 22.

Note: 2018 deposits market share and # of top 50 Chase markets where we are #1 (top 3) have been revised to conform with the 2019 methodology.

[3] 2006 reflects First Data joint venture.

[4] Barlow Research Associates, Primary Bank Market Share Database as of 4Q19. Rolling 8-quarter average of small businesses with revenues of $100,000 - <$25 million.

[14] Coalition, preliminary 2019 rank and market share analysis reflects JPMorgan Chase's share of the global industry revenue pool and is based on JPMorgan Chase's business structure. 2006 rank analysis is based on JPMorgan Chase analysis.

[19] S&P Global Market Intelligence as of December 31, 2019.

[20] Refinitiv LPC, 2019.

[21] Source: Company filings and JPMorgan Chase estimates. Rankings reflect financial information publically reported by the following peers: Allianz Group, Bank of America Corporation, Bank of New York Mellon Corporation, BlackRock, Inc., Credit Suisse Group AG, DWS Group, Franklin Resources, Inc., The Goldman Sachs Group, Inc., Invesco Ltd., Morgan Stanley, State Street Corporation, T. Rowe Price Group, Inc. and UBS Group AG. JPMorgan Chase's ranking reflects AWM client assets, Chase Wealth Management investments and new-to-the-firm Chase Private Client deposits.

[23] Source: Capgemini World Wealth Report 2019. Market share estimated based on 2018 data (latest available).

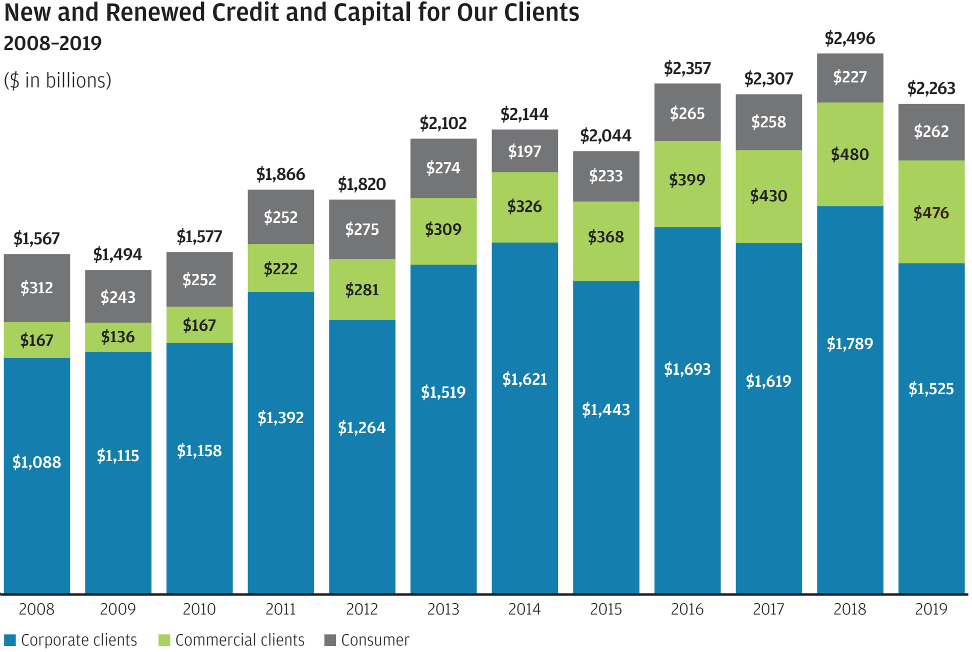
NM = Not meaningful
NA = Not available
FICC = Fixed Income, Currencies and Commodities
MSAs = Metropolitan statistical areas
AUM = Assets under management
USD = U.S. dollar

B = Billions
T = Trillions
K = Thousands

New and Renewed Credit and Capital for Our Clients

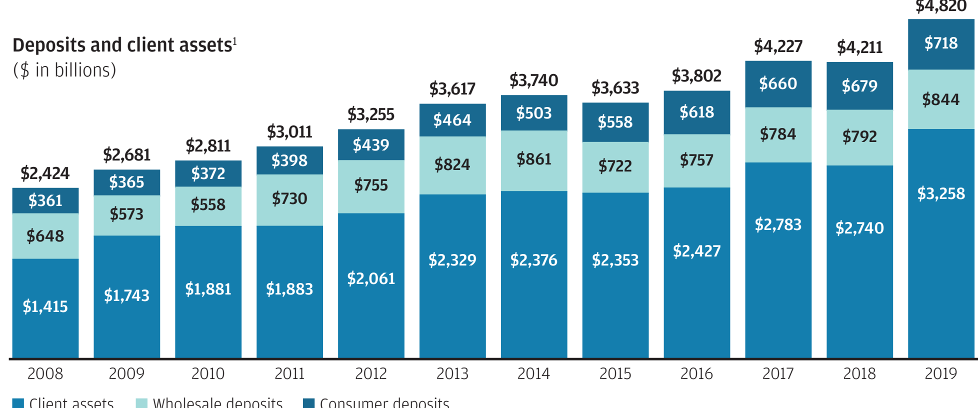
2008–2019

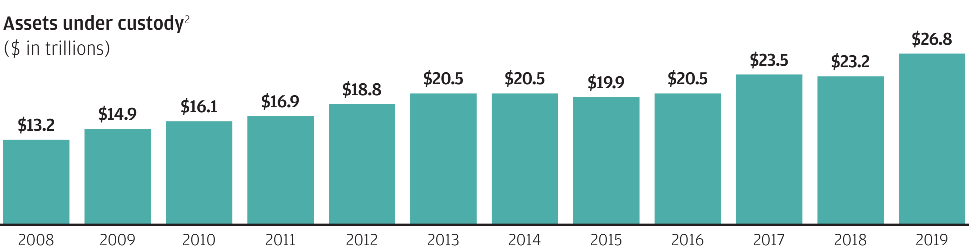
($ in billions)



Assets Entrusted to Us by Our Clients

at December 31,





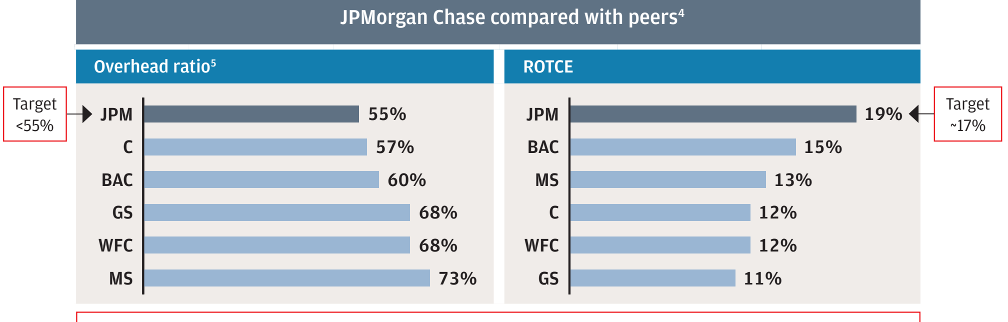
[1] Represents assets under management, as well as custody, brokerage, administration and deposit accounts.

[2] Represents activities associated with the safekeeping and servicing of assets.

While we never expect to be best in class every year in every business, we normally compare well with our best-in-class peers. The chart below shows our performance generally, by business, versus our competitors in terms of efficiency and returns.

JPMorgan Chase Is in Line with Best-in-Class Peers in Both Efficiency and Returns

	Efficiency			Returns		
	JPM 2019 overhead ratio	Best-in-class peer overhead ratio[1]	JPM medium-term target overhead ratio	JPM 2019 ROTCE	Best-in-class peer ROTCE[2, 3]	JPM medium-term target ROTCE
Consumer & Community Banking	52%	46% BAC-CB	50%+/-	31%	35% BAC-CB	25%+
Corporate & Investment Bank	56%	54% BAC-GB & GM	54%+/-	14%	15% BAC-GB & GM	~16%
Commercial Banking	39%	43% USB-C & CB	40%+/-	17%	17% FITB	~18%
Asset & Wealth Management	73%	56% CS-PB & GS-AM	<75%	26%	37% MS-WM & MS-IM	25%+



Achievement of medium-term targets may take time and require more normalized GDP, unemployment and interest rates.

[1] Best-in-class peer overhead ratio represents the comparable business segments of JPMorgan Chase (JPM) peers: Bank of America Consumer Banking (BAC-CB), Bank of America Global Banking and Global Markets (BAC-GB & GM), US Bancorp Corporate and Commercial Banking (USB-C & CB), Credit Suisse Private Banking (CS-PB) and Goldman Sachs Asset Management (GS-AM).

[2] Best-in-class peer ROTCE represents implied net income minus preferred stock dividends of the comparable business segments of JPM peers when available or of JPM peers on a firmwide basis when there is no comparable business segment: BAC-CB, BAC-GB & GM, Fifth Third Bancorp (FITB), Morgan Stanley Wealth Management (MS-WM) and Morgan Stanley Investment Management (MS-IM).

[3] Comparisons are at the applicable business segment level, when available; the allocation methodologies of peers may not be consistent with JPM's.

[4] Bank of America Corporation (BAC), Citigroup Inc. (C), The Goldman Sachs Group, Inc. (GS), Morgan Stanley (MS), Wells Fargo & Company (WFC).

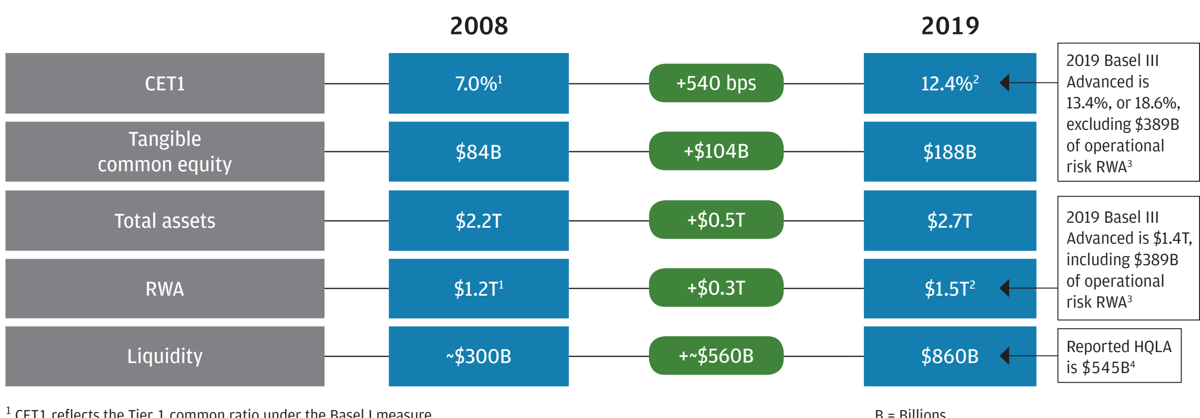
[5] Managed overhead ratio = total noninterest expense/managed revenue; revenue for GS and MS is reflected on a reported basis.

ROTCE = Return on tangible common equity

GDP = Gross domestic product

Our Fortress Balance Sheet

at December 31,



[1] CET1 reflects the Tier 1 common ratio under the Basel I measure.

[2] Reflects the Basel III Standardized measure, which is the firm's current binding constraint.

[3] Operational risk RWA is a component of RWA under the Basel III Advanced measure.

[4] Represents quarterly average HQLA included in the liquidity coverage ratio. Refer to Liquidity Coverage Ratio on page 94 for additional information.

B = Billions
T = Trillions
bps = basis points

CET1 = Common equity Tier 1 ratio. Refer to Regulatory capital on pages 86-90 for additional information
RWA = Risk-weighted assets
Liquidity = HQLA plus unencumbered marketable securities, which includes excess liquidity at JPMorgan Chase Bank, N.A.
HQLA = High quality liquid assets include cash on deposit at central banks and highly liquid securities (predominantly U.S. Treasuries, U.S. government-sponsored enterprises and U.S. government agency mortgage-backed securities, and sovereign bonds)
LCR = Liquidity coverage ratio

Consumer & Community Banking

We continue to make real progress in Consumer & Community Banking, and I am proud of what our great team has accomplished. We have built multiple market-leading businesses while de-risking and simplifying them, and we worked with regulators to close gaps and make tough decisions. We do the hard work each and every day to put our customers first and do the right thing.

Our performance in 2019 is the result of that discipline and effort. We are the #1 U.S. credit card issuer based on sales and outstanding balances. We are the #1 primary bank in our footprint. We are the #1 business bank based on primary relationships. We are the #2 mortgage servicer and the #3 bank auto lender.

We take nothing for granted and remain humble and motivated as we compete to be, or stay, best in class.

2019 financial results

In 2019, Consumer & Community Banking delivered a 31% return on equity on record net income of $16.6 billion. Our $55.9 billion in revenue was up 7% year-over-year. We reduced our overhead ratio to 51.7% and self-funded significant investments. We grew our customer base to nearly 63 million U.S. households, including over 4 million small businesses. This performance is a direct result of the growth in our business drivers and our sustained focus on investing for the medium and long term.

Our average deposits of $694 billion were up 3% over 2018, and client investment assets reached $358 billion, up 27%. We ended the year with $464 billion in average loans, reflecting $43 billion in loan sales over the last two years. Our customer base of active mobile users is the largest and, on an absolute basis, the fastest growing among U.S. banks: 37 million, up 12% year-over-year.

There was no way to predict that credit performance would remain as strong as it has over these last few years, and that has positively contributed to the performance we delivered in 2019.

We achieved our 2019 results with continued focus on six strategic priorities that have remained consistent and have proved to be effective. We bring in new customers, drive engagement across multiple channels and always focus on improving their experience with us. We closely manage expenses and simplify our business, and we seek efficiency and greater productivity. We're intensely focused on the regulatory and risk and control environment. We work to hire the best, diverse talent in the industry that also reflects the diverse communities we serve.

Here are some highlights of what we accomplished in 2019 in each of these areas:

Acquire, deepen and retain customer relationships by offering compelling value propositions

We're bringing in new customers and earning more of their valuable business. In 2019, we grew the total number of households we serve and increased the number of households that have a relationship with more than one Chase line of business even faster than households overall. Among our consumer households, 25% have a relationship with two or more Chase lines of business.

Our lending businesses – Credit Card, Home Lending and Auto – are a significant acquisition funnel for our deepest customer relationships,

#1

#1 in total U.S. credit card sales volume and outstandings

#1

#1 primary bank within our footprint

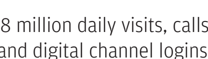
~63M

Nearly 63 million U.S. households served

#1

#1 most visited banking portal in the U.S.

28M



28 million daily visits, calls and digital channel logins

$1.1T

More than $1 trillion in credit and debit card sales volume

NEW TOOLS FOR CUSTOMERS

We've started to bring together our digital experiences to engage customers at an earlier stage in their financial journey. Doing so can help them reach their goals faster. Our already-established digital tools give customers a clear view and understanding of their finances.

Today, customers can better understand and manage some of their most important financial assets; for example, their home. In 2019, we rolled out a digital mortgage offering, Chase MyHome, allowing customers to apply for a loan and initiate a mortgage origination digitally.

Customers can use features such as Credit Journey to receive a detailed view of their finances and borrowing ability; Autosave allows them to set a down payment savings goal. And with Chase MyHome, they can review the value of their current home and explore their neighborhood before applying for a new loan.

These are just a few examples of how we continue to do more to help our customers with their everyday finances. We plan to create more of these experiences for customers with similar opportunities, such as buying a car, saving for a vacation and staying on top of everyday purchases.

Credit Journey

Customers visit Credit Journey to understand their borrowing ability.

Approximately 22 million customers enrolled in Credit Journey as of December 2019.

Autosave

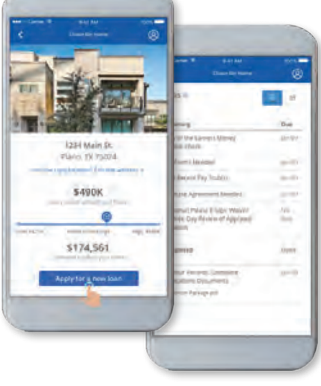
Customers can set goals to save for major purchases.

Autosave helped our customers save more than $1.5 billion in 2019.

Chase MyHome

Users can get home value information on Chase MyHome and track progress through a simplified mortgage experience.

More than 1 million customers have visited Chase MyHome since April 2019, and about 80%[1] of customers used Chase MyHome in 4Q19.



[1] Reflects percentage of consumer originations that used Chase MyHome for loan fulfillment in the fourth quarter of 2019.

bringing in more than half of all new-to-Chase households. Our lending customers respond to Consumer Banking marketing at three times the rate of pure prospects; in branch expansion markets, the response rate is even better. Customers with these deeper relationships are more satisfied and less likely to leave Chase. We continually improve and simplify the customer experience and offer new, customer-centered digital capabilities using our data to benefit and protect our customers.

In Consumer & Business Banking, our focus is to be our customers' primary bank. Customers consider a wide range of factors when choosing their primary bank. Over 75% of our checking households are primary relationships, and we are the #1 business bank based on primary bank relationships. The deposits these customers bring to us are the outcome of that relationship.

Drive engagement through omnichannel, customer-centered experiences

The scale of our distribution gives us a competitive advantage. When we bring new products and services to the marketplace, we bring them to nearly 63 million households that engage with us on a regular basis. On any given day in 2019, 28 million customers visited us, called us or logged in to our digital channels. Two-thirds of our Consumer Banking customers used more than one channel to interact with us during the year. We are still committed to our omnichannel strategy because our customers are. And all of our channels have evolved based upon our customers' preferences and expectations. For example, we're able to build branches in new markets farther apart than branches in our legacy markets because of our new tools and capabilities: our digital account opening functionality and data about our existing customers in those markets.

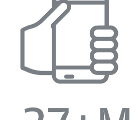
In these newer markets, customers can choose whether to open an account in a branch or digitally. Until 2018, our checking and savings accounts could only be opened

↑10+ PERCENTAGE POINTS

10+ percentage point increase in share of self-service Consumer Banking transactions since 2014

52+M

More than 52 million active digital customers



37+M ACTIVE MOBILE CUSTOMERS

More than 37 million active mobile customers

Secure Banking checking account launched

16 NEW MARKETS ENTERED

16 new markets entered and 90+ branches added since 2018

$1.5+B AUTOSAVE

$1.5+ billion saved by customers using Autosave

in a branch. In addition, we were able to use the information we have about where our customers live, work and shop to determine the optimal locations to place our new branches and ATMs. This has allowed us to enter markets with the smartest possible footprint and helps explain why the early-stage performance of these branches has exceeded our expectations.

In our digital channels, we are providing new features for our customers based on their relationship with Chase. In Chase Mobile, our Snapshot feature offers personalized insights to help customers make the most of their money. One insight that educates customers on how to begin saving automatically – Autosave – enabled our customers to set aside more than $1.5 billion in 2019.

Improve productivity, agility and customer experience through data, analytics and technology

We're using data, analytics and technology to improve the customer experience and drive productivity. Over the last five years, our operational staff has become 20% more productive, serving a larger customer base with a smaller team. The cost to serve each household has declined 14% over the same time period, as the share of transactions completed through self-service channels has grown more than 10 percentage points.

We are adopting more agile ways of working, including a product- and platform-based architecture. Product and platform owners have end-to-end ownership, which puts decision making closer to the customer, helping us move faster than we could in an annual planning cycle.

These efforts have made us better at providing the capabilities and features that improve the customer experience. As an example, we began extending already-approved offers to existing customers for whom we had enough information to make an approval decision. Being able to show customers products they are qualified for is a superior client experience. Previously, these same customers had been required to reapply for products using the same application as a new-to-Chase customer. For certain customers – 10 million to date – that wasn't necessary; we wanted to save their time and make it easier to do more business with us. Customers value the transparency and certainty of these already-approved offers and the simple one-click experience to accept them. Personalized offers such as these convert at rates up to 20% higher than our traditional marketing offers.

Manage expenses and simplify our business while continuing to invest for the future

We closely manage expenses, continuously simplifying and investing for the medium and long term – driving down our overhead ratio in the process. Our 2019 overhead ratio of 51.7% was 170 basis points better than in 2018 and 6 percentage points better than five years ago. In areas where we have become more efficient, we have been able to self-fund some of our investments in our businesses.

Many of the investments we made have allowed us to reduce annual expenses via automation and enabled the improved productivity described earlier. In Consumer Banking, our investments in digital self-service capabilities have reduced

everyday branch transactions per customer by 49% since 2014 – eliminating transactions that are simple and easy for customers to manage anywhere and at their convenience, such as depositing checks.

Our investments for the long term have also led to revenue growth. Examples include the 400 branches we are in the process of opening in new markets to extend our reach. Our new branches in existing markets break even seven months faster than they did five years ago, and the branches in our newer markets are trending even better than that.

Operate a disciplined risk and control environment, protect the firm's systems, and safeguard customer and employee privacy

As always, we are focused on managing risk appropriately and using well-designed controls. This work is never done. Investing in these efforts remains our highest priority, and we have done so consistently over time. We are vigilant and never complacent in this space.

Over the last five years, for example, we've used technology and machine learning to reduce fraud losses in the credit card business by 50%.

We have made great strides to protect customer data, as well as our own systems, when sharing data. Previously, to share information with approved third parties, customers provided their Chase login credentials, giving access to their entire Chase profile. This enabled third parties to obtain information beyond the scope of the customer's intention. That wasn't safe for the customer or for us. Now we require these third parties to abide by our data-sharing rules, and we securely send data that customers choose for us to provide on their behalf. This reduces risk for all parties while giving transparency and control to our customers.

Attract, develop and retain the best talent for today and the future, harnessing the power of diversity

Our talent sets us apart, and we work to attract and retain the best, diverse talent for today and tomorrow. Our team must represent and reflect the diverse customers we serve every day. We are proud that more than 57% of our employees in Consumer & Community Banking are female and more than half of our U.S. employees identify as a minority. The roles with the highest minority representation are disproportionately our customer-facing, front-line roles rather than executive management. We are mindful of this imbalance and are working tirelessly to correct it.

Representation is only part of the equation when it comes to attracting and retaining world-class talent. We are focused on driving inclusiveness and reinforcing the fact that we all are responsible for keeping a culture where everyone is respected and valued for who they are and what they contribute.

Conclusion

We have built tremendous businesses that deliver repeatable revenue. Each year, we work hard to bring in new customers, retain existing ones and generate earnings throughout economic cycles. We are experiencing turbulent times across the country – and the world – as we get set to publish this letter. We are here for our customers in good times and tough times, and that is true now more than ever.

Over the last few weeks, we have been offering relief to our customers and small business clients who are struggling financially. We have provided payment relief for credit cards, auto loans and home loans. We also continue to lend money.

And as we forge ahead through this challenging time and get through it, we still see opportunities to help and support more people. Two opportunities that stand out are: helping a broader range of Americans manage their financial lives and earning the chance to manage investments for the many millions of households that work with Chase as their primary bank.

Our Chase franchise is powerful and differentiated from our peers. We will continue to support our customers, small business clients, communities and employees now and in the future.

Gordon Smith
Co-President and Chief Operating Officer,
JPMorgan Chase & Co., and
CEO, Consumer & Community Banking

Corporate & Investment Bank

In 2019, the Corporate & Investment Bank (CIB) generated earnings of $11.9 billion on revenue of $38.3 billion – a record year for our business.

This standout performance is the culmination of a journey that began during the 2008 financial crisis when clients turned to J.P. Morgan for capital, liquidity and a safe haven.

In 2009, 10 years ago, client business drove earnings in our investment bank to a record $6.9 billion. By 2019, the CIB's earnings had topped the entire firm's net income from 2009. As we close out the decade, it is worth reflecting on the strategy that brought us to this point, helping us to generate record revenue and profits and a consistently strong return on equity (ROE) while adding $42 billion to the CIB's capital base and investing substantially in the business.

Global, complete and at scale

The success of our business over the last decade has hinged chiefly on our steadfast pursuit of three strategic goals: being global, complete and at scale. The benefits of these qualities may seem obvious today but weren't quite so clear a decade ago.

New regulations that followed the financial crisis helped make the banking system safer overall but also made investment banking more expensive. Banks had to hold a lot more capital, which reduced leverage and ROE. At the same time, major investments were needed in technology and compliance.

This created a predicament for banks emerging from the crisis, and they chose several different paths. Some decided to cut back on businesses that were less profitable or carried too much capital. Others retreated from traditional investment banking businesses altogether.

At J.P. Morgan, we believed that clients would always need an array of global banking products even though margins on these products varied. We looked at our client relationships holistically and prioritized long-term value for them over short-term profitability for us. That decision – to continue to provide a full suite of products and services for clients across the globe – has proved to be mutually beneficial.

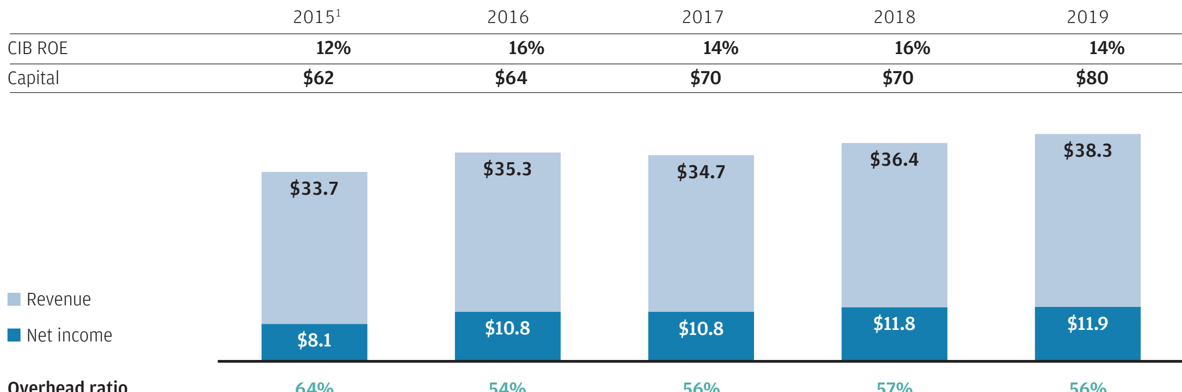
Having scale has been equally critical to our success. Following the financial crisis, we believed that clients would gravitate to the best ideas and offerings, particularly if they could be accessed anywhere and at any time.

Over the years, that scale has become a springboard for growth. In 2010, we began to expand our international corporate banking effort to include multinational clients around the globe, with 100 bankers dedicated to serving 2,200 clients. Today, our 400 corporate bankers cover 3,300 companies and their subsidiaries worldwide. In addition, we are partnering with Commercial Banking to extend our services to middle market clients internationally.

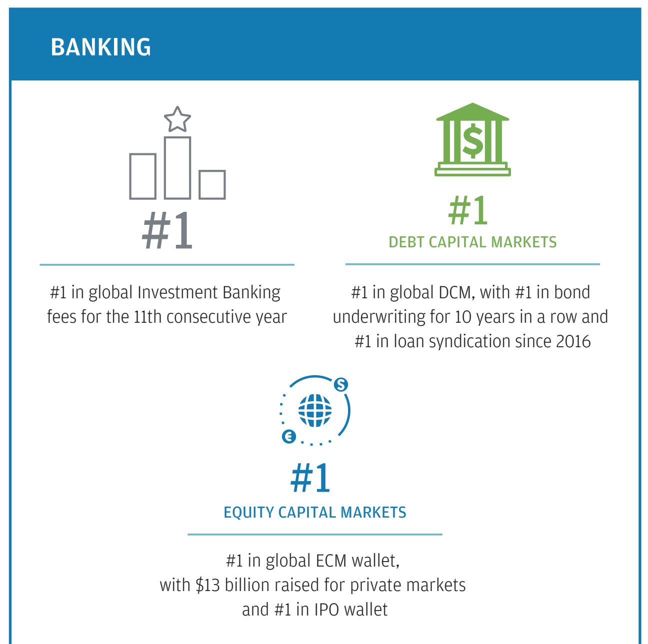
Commitment and consistency

Supporting clients during periods of crisis has always been a hallmark of our business. A decade ago, when investors were worried about bank exposures in struggling economies such as Ireland, Greece, Portugal, Spain and Italy, we did not retrench. On the contrary: In 2009 and 2010, we stood by those countries, raising

Strong Returns on Higher Capital
($ in billions)



[1] Reported results for 2015 have been revised to reflect the adoption in 2018 of the new revenue recognition guidance.



€7.5 billion and €11 billion for Greece and Italy, respectively. That support continues to this day. Last year, we opened a state-of-the-art office in Dublin, which is now a thriving center of technology and commerce.

That commitment and consistency are now spurring the firm's expansion in the world's fastest-growing economies. Ten years ago, regulatory constraints on foreign banks severely restricted what we could offer clients in China. Today, we have approvals from Chinese authorities to open a majority-owned securities joint venture with a path to 100% ownership. Bringing our full suite of banking capabilities to China will enable its companies to grow beyond the country's borders and allow more investors to access its market. This sets us up for tremendous growth in one of the world's largest economies while retaining a prudent approach to expansion.

Stable returns and continuity

The diversity of our CIB businesses has served us well, especially during times of market stress, and we have delivered consistent returns through the entire economic and market cycle. Our traditional investment banking businesses of Markets and Banking have delivered a combined ROE ranging from 14% to 18% over the past five years. Meanwhile, Securities Services and Treasury Services, the traditional transaction banking businesses, have delivered between 10% and 20% during the same period. This means that for the past five years, the combined CIB has achieved an average ROE of 15%.

Equally critical to our long-term success is attracting and, more important, retaining top talent to ensure our clients receive best-in-class execution and consistency in their experience. This is a particular priority in the Investment Banking business, where clients choose us to lead deals because of trust earned over many years.

Our financial stability and continuity of personnel enable us to build effectively on our progress and invest year after year. That investment includes a firmwide technology budget of about $12 billion, much of it directed toward CIB systems. Not only is technology the structural underpinning of our business, but it is also a power that we have learned to scale and selectively share with clients who seek the same cutting-edge analytical and risk mitigation tools that our professionals use in-house.

And while we are more efficient than we were five years ago, there is still more output to be won per dollar of investment. As we modernize our infrastructure and scale our technology capabilities, we will continue to make key investments required to "change the bank" while deploying resources needed to "run the bank" efficiently.

2019 performance

The CIB's record 2019 earnings of $11.9 billion on record revenue of $38.3 billion allowed us to maintain our position as the world's top investment banking franchise for the 11th consecutive year. In addition, we earned $7.6 billion in global investment banking fees, narrowly beating our all-time record of $7.5 billion in 2018.

In the context of generally flat industry revenue, the CIB has won more business and gained greater wallet share than any other competitor over the last five years, according to Dealogic. We ended 2019 with a global wallet share of 9.0%, the highest attained in a decade.

By line of business, we ranked #1 in wallet share for both Equity and Debt Capital Markets during 2019,

raising more than $530 billion for clients around the world. J.P. Morgan was bookrunner on more equity deals than any other bank, a feat we achieved in eight of the last 10 years. And our 9.4% share of the global wallet was the highest of any bank during the last decade.

J.P. Morgan brought 79 companies public in 2019, including several highly anticipated "unicorns," finishing the year as the #1 underwriter of initial public offerings (IPO) by wallet share. At the same time, our Private Capital Markets group raised more than $13 billion for clients, making it a fast-growing part of our business last year.

In a year characterized by cross-border deals, our Debt Capital Markets business acted as the world's leading bookrunner and retained its #1 position with 8.7% of global wallet share. The business showed its strength across product lines, ranking #1 for wallet share in high-grade, high-yield and investment-grade issuance, as well as in leveraged loans.

In our Mergers and Acquisitions (M&A) business, J.P. Morgan ranked #2 globally in announced dollar volume and wallet share, as clients continued to turn to us for complex and transformative deals. Although the global M&A wallet decreased 10% year-over-year, J.P. Morgan gained share across regions, earning global advisory fees of $2.4 billion, 5% shy of our 2018 record.

In our Markets business, which serves more than 6,500 clients, revenue totaled nearly $21 billion in 2019, up 7% from the prior year. The business achieved an overall ROE of 13% despite the additional capital we invested in our trading businesses in recent years.

Approximately $46 billion of stocks cross our Equities Markets trading desks each day. The business generated $6.5 billion in revenue in 2019, making J.P. Morgan the top bank by wallet share, with 11.3%, up from 8.4% in 2015. Our Cash Equities business continued to grow revenue and share, and our balances in Prime Finance finished the year at all-time highs.

It was an exceptional year for our Fixed Income Markets business. Revenue rose 13% to $14.4 billion, with a particularly good performance in securitized products and a recovery in the credit and rates markets from the previous year.

Wholesale Payments celebrated its first year as a combined business that brought together the services we offer to corporate treasurers with those for global merchants. The business performed well during a year in which the Federal Reserve cut interest rates multiple times and margins on deposits tightened.

Wholesale Payments supports clients across the bank; within the CIB alone, Treasury Services revenue was up 39% since 2015. Cash management and clearing were among the strong revenue generators in 2019. In addition, the acquisition of Philadelphia-based InstaMed, an innovative healthcare payments company, was the firm's largest since the financial crisis.

Ongoing investments in the business, which processed $43 million in payments per second last year across more than 120 currencies, helped drive organic growth and a healthy pipeline. In basic terms, Wholesale Payments enables clients to make, manage and accept payments securely anytime, anywhere and by any method. Our opportunity here is tremendous, particularly as business gravitates to larger banks with global scale.

Securities Services, which provides post-trade services such as custody and fund administration, generated $4.2 billion in revenue during 2019, down slightly from the previous year but up 16% since 2015. Although deposit margins narrowed due to lower interest rates, we continued to invest in products, systems and services. The business has generated record growth over the last five years, with assets under custody[1] up 41% and assets under administration[2] up 55%.

Embedding sustainability

At J.P. Morgan, a readiness to adapt has always characterized the way we do business, and our approach to environmental, social and governance issues is no different. The issue of environmental sustainability is gaining urgency by the day and is among the growing risks being evaluated by our business and policymakers.

We understand the pressing nature of climate change and believe that companies like ours can add tremendous value by helping global companies – and the global economy – transition to cleaner energy.

Currently, around 80% of the world's energy is sourced from fossil fuels, which remain the primary source for heating homes and powering cars. We are working to reduce this dependency by committing billions of dollars to sustainable projects in 2020 alone, including green technologies. Furthermore, we are embedding sustainability into many of our daily business practices, from assessing risk to designing products to advising clients.

We have also tightened restrictions on certain activities, such as financing for coal mining and Arctic drilling, and are on track to meet our own commitment from three years ago to source renewable energy for our entire 2020 global power needs. These initiatives are enthusiastically supported by our employees, as well as by the next generation of recruits, who want J.P. Morgan to lead in this space.

That said, business alone cannot ensure the transition to a lower-carbon economy. Government policy is crucial. Recently, we joined the Climate Leadership Council, a group promoting a bipartisan road map for a revenue-neutral, carbon tax-and-dividend framework for the U.S.

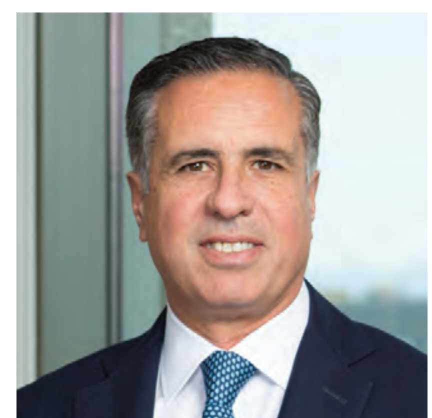
Conclusion

Our impressive 2019 performance was not easily won, as competition and geopolitical uncertainty intensified. The year 2020, however, has already presented all of us with our most challenging problem yet: a pandemic of proportions not seen for 100 years.

Across the firm, taking care of our employees and standing by our clients during events like the coronavirus are critical priorities. With so many companies, institutions and governments relying on J.P. Morgan for their own operations and economic well-being, it's essential that we do the right things day to day, staying focused on risk, costs and making sure our clients have access to the capital they need. We must also think about optimizing the business for the near future, continuously making adjustments to ensure that we are as efficient and effective as possible while closing addressable gaps.

Finally, we must think creatively about next-generation transformation and ways that our businesses will change over the next five to 10 years. To that end, we are evaluating emerging technologies and reshaping our approach to data to bring the power of artificial intelligence and machine learning to all our businesses. We're also building out our infrastructure to reduce friction, improve client service and offer access to sophisticated analytics.

We have the most solid underpinnings for the enduring success of a world-class business: the capital, the brainpower and the hard-earned experience to get things right. Although we will be tested by any number and variety of uncertainties in the years to come, these qualities make me confident and optimistic about our shared future.



Daniel E. Pinto
Co-President and Chief Operating Officer,
JPMorgan Chase & Co., and
CEO, Corporate & Investment Bank

[1] **Assets under custody:** Represents assets held directly or indirectly on behalf of clients under safekeeping, custody and servicing arrangements.
[2] **Assets under administration:** Represents the market value of client assets for which administrative and other related services are performed.

Commercial Banking

Across JPMorgan Chase, we measure our success not just by our financial results, but by our ability to make a positive difference for our clients, employees, communities and shareholders. Over the last several years in Commercial Banking (CB), we've been executing a consistent, long-term strategy focused on doing just that.

Our shareholders: Investing for long-term value

Strong 2019 financial performance

To create value in CB, we work hard every day to add great clients and deepen those relationships over time. We've been making sustained investments in our people and capabilities to drive results across our business. In the last two years, we've hired more than 300 bankers and expanded our presence to 24 high-potential locations. These investments have led to more client activity than ever before, and in 2019, we added over 1,700 new client relationships, a 60% increase since 2017.

Our intense client focus and disciplined execution have resulted in consistent strong financial performance across our business. In 2019, CB generated $9.0 billion in revenue, $3.9 billion in net income and a return on equity of 17%. While our overall results were affected by lower interest rates, the fundamentals of our business remained outstanding, with record Treasury Services fee revenue of $1.5 billion and steady loan and deposit growth. We continued to benefit from our strong partnership with the Corporate & Investment Bank, delivering record investment banking revenue of $2.7 billion, up 10% from 2018.

Our credit discipline has served us well, and by maintaining our strict underwriting standards, our net charge-off rate in 2019 was 8 basis points. This marked the eighth straight year in which net charge-offs were less than 10 basis points.

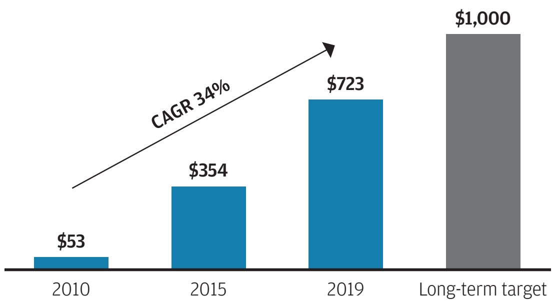
Enormous growth potential

The overall potential to expand our business is tremendous, and as we enter into a new decade, we remain focused on our multifaceted long-term growth strategy. Our Middle Market expansion effort is a terrific example of identifying a market opportunity and executing with purpose. Since 2008, we've nearly doubled our footprint across the country, moving into 47 metropolitan statistical areas (MSAs), adding locations in over 20 states and hiring almost 500 bankers. We've been able to compete and succeed in these new markets because of the quality of our team, the strength of our brand and JPMorgan Chase's unmatched capabilities, delivered at a very local level. To date, we've selectively added almost 3,300 clients, over $15 billion of loans and over $13 billion of deposits.

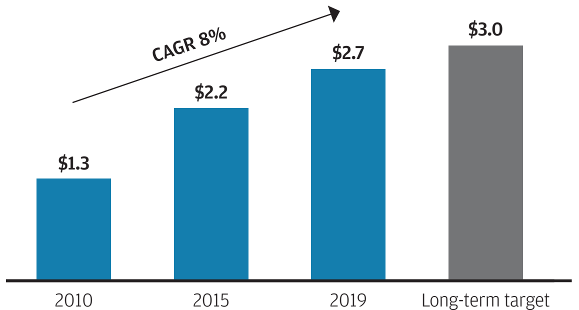
We're equally excited about expanding our business internationally. In 2019, we hired nearly 80 bankers to serve non-U.S.-headquartered, multi-

MAINTAINING STRONG PERFORMANCE

Middle Market Expansion Revenue
($ in millions)



Commercial Banking Gross Investment Banking Revenue[1]
($ in billions)



[1] Represents total JPMorgan Chase revenue from investment banking products provided to CB clients.
CARG = Compound annual growth rate

MAKING A POSITIVE DIFFERENCE IN OUR COMMUNITIES

We take great pride in the work we do to support our communities. We ended 2019 with over $54 billion in financing to local companies, states and municipalities, schools, nonprofits and healthcare providers. We also originated over $2 billion in loans for the construction of affordable housing for low-income individuals. In addition, our teams are very active civically and volunteered more than 25,000 hours with local organizations.

national companies across 18 countries. We have a significant opportunity to support these clients not only in the U.S. but also in other key geographies around the world. As CB continues to build internationally, we benefit greatly from the firm's existing local knowledge and well-established risk, compliance and control infrastructure. Similar to our strategy in the U.S., we are taking a long-term view, focused on selecting only the best clients, and will continue to execute with patience and discipline.

Our clients: Relentlessly focused on delivering solutions and capital to drive their success

Clients are at the absolute center of everything we do, and every day, we strive to deliver differentiated advice, tailored solutions and meaningful capital to help them succeed. The breadth and quality of our capabilities, along with our outstanding team, allow us to build deep, valuable relationships over time. By being part of JPMorgan Chase, we have the ability to serve clients throughout the life cycle of their businesses – from opening their first operating accounts and expanding overseas to funding an important acquisition or taking their company public. In 2019, across our business, we made more than 290,000 client calls and grew loans by $2.4 billion, ending the year with $208 billion in average loan balances. Our long-term view, unmatched solutions and enduring commitment to our clients set us apart in the industry.

As our clients' expectations continue to evolve, we have dedicated teams designing new functionality that will deliver even greater value to our clients and enhance their experience. This design-led approach has informed our investments in technology, data, digital and payments. To date, our work has resulted in tangible benefits, such as faster credit delivery, reduced account opening time and new integrated solutions.

We can uniquely bring our clients an entire suite of wholly owned, global treasury capabilities, including merchant acquiring, commercial cards and cross-border payments. These integrated solutions allow clients to accept any method of payment, in any currency, around the world. Moreover, clients can connect with us however they want, from a global exchange to application programming interfaces. As a result of the investments we are making in our comprehensive payments platform, we can deliver valuable analytics and insights to clients across all of their treasury activities to optimize their businesses.

Our communities: Serving as a positive force where we live and work

In CB, we embrace our obligation to be a positive force in our communities. We ended 2019 with over $54 billion in financing to local companies, states and municipalities, schools, nonprofits and healthcare providers. We have dedicated teams across the country, working hard to support these vital institutions so they can continue to keep our communities strong.

Our Commercial Real Estate (CRE) businesses are also at the forefront of this important work. As the #1 multifamily lender in the U.S.[1], Commercial Term Lending (CTL) provides capital to apartment building and workforce housing owners. In 2019, more than 40% of the loans originated in CTL funded properties in low- to moderate-income neighbor-

[1] S&P Global Market Intelligence as of December 31, 2019.

GROWING OUR CLIENT FRANCHISE

170+
NEW BANKERS

290K+
CLIENT CALLS

1700+
NEW CLIENT RELATIONSHIPS

50
PRESENCE IN TOP 50 MSAs

172
OFFICES IN 172 CITIES GLOBALLY

hoods. Our Community Development Banking team had a record year, originating over $2 billion in loans for the construction of affordable housing and extending nearly $200 million in financing to critical community development institutions. In total, our CRE business financed more than 25,000 housing units for low-income individuals in 2019.

Across CB, our people best demonstrate the positive impact we create in our communities. Many of our employees are active civically and serve on philanthropic boards. Last year, our team volunteered more than 25,000 hours with local organizations. We take great pride in the work we do to support our communities and the firm's commitment to make a difference.

Our employees: Empowering and enabling our teams

Our success wouldn't be possible without our incredible team. As such, we're focused on having the best, diverse talent with the right skills to lead our business forward. We're making significant investments in our training and development programs to enhance our team's expertise in emerging technologies, data and digital solutions. We have created dedicated training centers that host intensive credit and treasury services programs to build upon critical knowledge and enable our teams to provide even more value to our clients. Overall, in 2019, CB employees completed more than 350,000 hours of training.

We're also investing to empower our teams with the best digital tools and data resources to ensure their success. Last year, we launched a new client management system that harnesses the power of cloud technology and our firmwide data assets to better support our bankers. This platform provides live dashboards with real-time client information – alerting our team on service needs, product usage and the overall health of their client portfolio. So far, we've received tremendous feedback, as the tool meaningfully increases efficiency and allows more time to be spent with our clients.

Looking forward: Continuing to execute with patience and discipline

Focused on our strategic priorities

Looking ahead, our attention remains focused on executing our long-term strategic priorities. We will continue to invest and drive innovation across our businesses, build deep client relationships, maintain fortress principles, and attract and retain the best talent. Doing all of this with patience and discipline will allow us to deliver value for our clients, employees, communities and shareholders throughout the cycle.

Managing the market challenges emerging in 2020

We have a long history of supporting our clients and being a market leader through challenging times. Our approach to the current global crisis is no different. As we navigate this complex situation, I have never been more proud of the entire CB team and am so grateful for their hard work, compassion and tenacity. It's inspiring to see everyone come together to support one another, and I am confident the work we are doing for our clients and our communities right now will be remembered forever.

Douglas B. Petno
CEO, Commercial Banking

Asset & Wealth Management

2019 marked my 10th year as CEO of Asset & Wealth Management. During this past decade, we have successfully helped millions of individuals and institutions around the world invest for their futures. Our clients come to us for advice, ideas and solutions for some of their most important life events, and for help in navigating through turbulent times. We cherish our clients' trust and never take it for granted.

Strong investment performance for clients

Our success begins with a focus on investment performance, which requires the unwavering, long-term prioritization and retention of our 1,000+ investment professionals. This has led to 88% of 10-year long-term mutual fund assets under management above peer median and 196 mutual funds 4- or 5-star rated[1]. It's worth noting that our performance is not concentrated in any asset class or region. It represents leading performance across all asset classes globally.

We strive to be the best, not the biggest. If you relentlessly work to be the best, you will have years like 2019, in which we received $194 billion in net new client asset flows[2]. In fact, since 2015, we received half a trillion dollars in net new client asset flows[2]. Similar to our investment performance, our flows are not concentrated in any one asset class, region or client segment, but come from a well-diversified set of businesses.

Strong financial performance for shareholders

I am proud of our results for our clients, while, at the same time, we continue to deliver strong financial performance for our shareholders. In 2019, Asset & Wealth Management achieved record total client assets of $3.2 trillion, record revenue of $14.3 billion, record pretax income of $3.7 billion and return on equity of 26%. Our reliable and consistent growth has been powered by success across our diversified Asset Management (AM) and Wealth Management (WM) franchises. Given our long-term approach, we are even prouder of our sustained performance over the past 10 years.

$3.2T
Record client assets of $3.2 trillion

$14.3B
Record revenue of $14.3 billion

$3.7B
Record pretax income of $3.7 billion

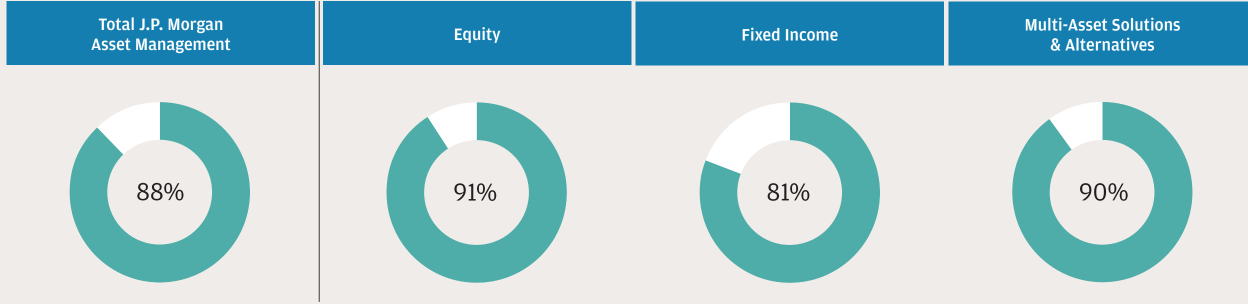
$161B
Record end-of-period loan balances of $161 billion

$100B
Record long-term AUM flows of $100 billion

88%
88% of 10-year AM long-term mutual fund AUM above peer median

Retention rate of over 95% of top talent[3] and 39% of AM AUM managed by female portfolio managers

2019 % of 10-year J.P. Morgan Asset Management Long-Term Mutual Fund AUM Above Peer Median[4]
(net of fees)



For footnoted information, refer to slides noted below in the 2020 Asset & Wealth Management Investor Day presentation, which is available at jpmorganchase.com/corporate/investor-relations/event-calendar.htm.
[1] See slide 18; [2] See slide 25; [3] See slide 17; [4] See slide 20.
AUM = Assets under management

JPMorgan Chase Total Client Asset Flows: 2015-2019[1]

				2015	2016	2017	2018	2019
ASSET CLASS/PRODUCT	Assets= AUM+AUS	AUM	Fixed Income	<$0	≥$0	≥$0	<$0	≥$0
			Equity	≥$0	<$0	<$0	≥$0	<$0
			Multi-Asset	≥$0	≥$0	≥$0	≥$0	≥$0
			Alternatives	≥$0	≥$0	≥$0	≥$0	≥$0
			Liquidity	≥$0	≥$0	≥$0	≥$0	≥$0
		AUS	Brokerage	≥$0	≥$0	≥$0	≥$0	≥$0
			Custody	≥$0	≥$0	≥$0	≥$0	≥$0
			Deposits	<$0	≥$0	<$0	<$0	≥$0
CHANNEL	Assets		Wealth Management	≥$0	≥$0	≥$0	≥$0	≥$0
			Retail	≥$0	≥$0	≥$0	≥$0	≥$0
			Institutional	<$0	≥$0	≥$0	<$0	≥$0
REGION	Assets		U.S.	≥$0	≥$0	≥$0	≥$0	≥$0
			LatAm	≥$0	<$0	≥$0	≥$0	≥$0
			EMEA	<$0	≥$0	≥$0	≥$0	≥$0
			Asia	≥$0	≥$0	≥$0	≥$0	≥$0

● ≥$0 ● <$0

For footnoted information, refer to slides noted below in the 2020 Asset & Wealth Management Investor Day presentation, which is available at jpmorganchase.com/corporate/investor-relations/event-calendar.htm.

[1] See slide 25; [2] See slide 18; [3] See slide 19; [4] See slide 20.

AUS = Assets under supervision

Asset Management

Since 2009, AM grew revenue[2] by 1.5x to $7.3 billion and pretax income by 1.4x to $1.9 billion. That success has been driven by a broad, diversified platform. On long-term AUM, we achieved record levels across asset classes (Equity, Fixed Income, Multi-Asset), segments (Retail and Institutional) and geographies (U.S. and International). We also achieved success in key growth areas of the market, with Multi-Asset AUM growing by 6.4x to $267 billion and, in particular, Target Date AUS growing by 25x to $125 billion.

Wealth Management

Growth since 2009 is an equally powerful story in WM, where revenue grew by 1.8x to a record $7.1 billion and pretax income by 1.7x to $1.9 billion. We continue to differentiate ourselves by providing the advice, solutions and client experience that our clients need. As an example of their commitment, we've nearly tripled the number of clients with over $100 million of total positions to a record level. In addition, we've grown the number of managed accounts by 7.6x to a record 730,000.

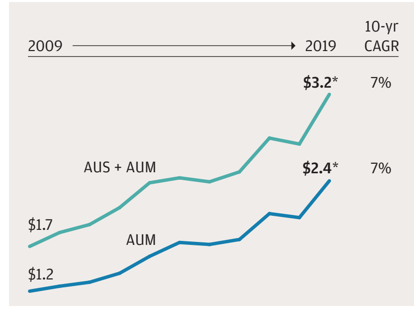
x = times

Growth priorities for the next decade

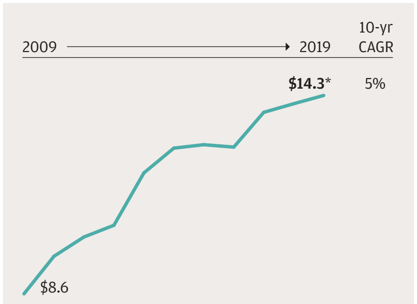
Looking ahead to the next decade, we are highlighting five major drivers to continue our momentum:

- ***Focusing* on U.S. Wealth Management:** This is one of the firm's biggest opportunities with the U.S. representing approximately $50 trillion in market size[3]. For example, Chase banks half of the 22 million households within the $1 million to $10 million net worth segment[3], but only 5% have investments with us. We have a tremendous opportunity to capture new clients and deepen current relationships.
- ***Expanding* the Global Private Bank:** Over the last five years, we've hired approximately 1,300 advisors, successfully converted hundreds of referrals from around the firm, attracted over 11,000 net new clients and captured around $200 billion in client asset flows. We still have a significant expansion opportunity, particularly internationally, where we have less than 2% market share[3]. We plan to capture share by continuing to be the go-to bank, delivering solutions across the balance sheet.
- ***Scaling* Asset Management:** To scale, we need strong, diversified long-term investment performance, which we have with 91% of Equity, 81% of Fixed Income and 90% of Multi-Asset Solutions & Alternatives 10-year mutual fund AUM above peer median. This performance has driven our above-industry growth over the last 10 years[4] and will continue to be our foundation to scale over the next 10 years. And with around 2% market share across asset classes[4], we have significant opportunity to capture share.
- ***Building* Alternatives:** We are celebrating our 50th anniversary of managing what is now nearly a quarter of a trillion dollars in Alternative assets. I am excited about the opportunities to continue building our franchise, from expanding our leading core real estate capabilities to building out our newly consolidated private credit capabilities.

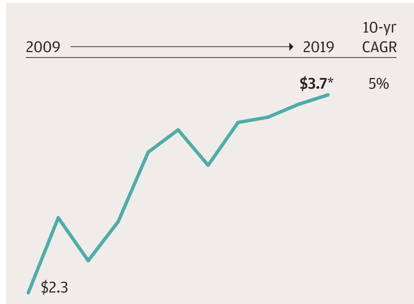
Client Assets (EOP, $ in trillions)



Revenue ($ in billions)[1]



Pretax Income ($ in billions)



* Record

[1] For footnoted information, refer to slide 17 in the 2020 Asset & Wealth Management Investor Day presentation, which is available at jpmorganchase.com/corporate/investor-relations/event-calendar.htm.

- ***Considering* M&A:** While we always prefer organic growth, there are times when the industry changes drastically, and we need to be on top of it, which is what we are doing now. We are very selective, evaluating every M&A opportunity for an adjacent capability. But most important, we always prioritize our clients' needs and increasing shareholder value.

Continuing to invest in the business

Our long-term commitment means that we will continue to serve our clients and invest in making our business better for the future:

- **Front office:** We will continue to hire top front office talent. Additionally, we will continue to invest in our investment capabilities, spending around $320 million on AM research and making thousands of company visits annually.
- **Technology:** We are creating and leveraging tools, such as You Invest and machine learning, to help our clients and employees focus on higher-value activities and make better decisions. We always look to simplify our production processes so that 50+% of our technology spend is dedicated to new and exciting capabilities that deliver stronger client outcomes.
- **Environmental, Social & Governance (ESG):** With the help of industry experts we have hired, we are doing more than ever before, focusing on our clients' needs and delivering across AM and WM. In AM, we are working toward 100% of AUM being ESG-integrated while we launch new ESG-focused WM strategies.
- **China:** We've been in China since the 1970s, and we are set to become the first foreign asset manager to fully own a Chinese fund manager with China International Fund Management. Our increased stake will further solidify our position in China and better address our clients' needs.

As I write this letter, we are at an unprecedented moment in time. The global COVID-19 pandemic has caused many people to suffer, created historic volatility and changed how we work and live. However, we can take comfort in knowing that people around the world are coming together to respond to these challenges in powerful and inspiring ways.

As a fiduciary, we view events that completely disrupt an industry, country or way of living as the times when active security selection (and deselection) is of the utmost importance. With all three of these areas being impacted concurrently in 2020, now is the *most important* time to have portfolios actively managed.

In times like these, I'm also reminded of how fortunate I am to be part of JPMorgan Chase. For more than 200 years, we have been at our best in the most difficult of times. I am proud of, and inspired by, how our colleagues and partners have responded to this crisis, and I remain incredibly optimistic about the firm's future.

Mary Callahan Erdoes
CEO, Asset & Wealth Management

Corporate Responsibility

As the world faces the health and economic consequences of COVID-19, the challenges ahead are a stark reminder that too many people already struggle with economic insecurity every day. This struggle will likely escalate as this public health crisis continues to disrupt the global economy.

Now more than ever, business must step up and collaborate with local, civic and government leaders to lend our expertise toward solutions that support our customers, communities and employees in need. Business Roundtable's recent Statement on the Purpose of a Corporation made clear that America's largest companies must operate for the benefit of *all* stakeholders, and we must be there for them in both good and challenging times.

For JPMorgan Chase, this means bringing the full force of our business to lift up those we serve around the world, focused on where we can deliver the greatest impact and reinvigorate the global economy to benefit more people.

In response to COVID-19 and in addition to efforts across the firm to support our customers and employees in need, we made an initial $50 million philanthropic commitment to help those most affected by humanitarian challenges, as well as sustainable and innovative solutions to help small businesses and underserved communities recover when the crisis subsides. We will continue to focus on areas where we can leverage our core business, philanthropy and policy expertise to help the most vulnerable in the short and long term. In addition to supporting small businesses, this approach has effectively informed and scaled solutions across pillars that will remain critical to helping those most vulnerable as they face financial hardship and uncertain work opportunities, including neighborhood development, financial health, and jobs and skills.

Our ongoing efforts to help prepare workers for the future of work exemplify this strategy in practice. As technology alters nearly every facet of work, the education and skills that people need are rapidly changing. We have combined our resources and reach to give people the education and skills they need to succeed. We have committed $350 million globally to support and scale the most effective local initiatives to equip people with in-demand skills. This investment will be even more critical given the recent unforeseen disruption in the global economy and the longer-term need to rebuild the labor market. From Delhi to Detroit, efforts focused on opportunity and inclusivity, like career and technical education in high schools to apprenticeships in growing industries, are preparing more people to launch successful careers. Additionally, in partnership with our Human Resources team, we're redefining how we train and develop our employees by identifying future-critical skills.

Scaling the most effective programs and creating greater economic opportunity for the most vulnerable will require thoughtful and effective public policy. Last year, we launched the JPMorgan Chase *Policy*Center to advance policies at the federal, state and local levels that strengthen communities and change lives. Business leadership in developing policy solutions is critical as we work to address the longer-term impact of this crisis. We have a track record of supporting policies that provide economic opportunity to more people, including by giving those who have a criminal history a second chance. We are advocating at the state and federal levels for reforms including "banning the box," establishing automatic record expungement for certain offenses and promoting fair-chance hiring in the financial services sector. In 2019, our firm gave second chances to 3,000 people in the U.S. with criminal backgrounds.

As the world responds to this health and economic crisis, we will need to be nimble and lean into our strengths to best support those who have been most vulnerable to economic disruption. We will continue to apply what we learn to scale solutions, deepen our impact and support our customers, communities and colleagues. Make no mistake: An inclusive economy is a stronger economy, and we all have an interest in that.

Peter L. Scher
Head of Corporate Responsibility and Chairman of the Mid-Atlantic Region

Creating an economy that works for more people

Companies like ours have a responsibility to step up and help solve pressing challenges. When communities do well, our firm does well. This conviction is reflected in how JPMorgan Chase does business every day. We're investing in our customers, employees and communities around the world to break down barriers to opportunity and create an economy that works for more people.

We are combining our business and policy expertise, sustainable business practices, data, capital and global presence to advance solutions worldwide. Our efforts focus on five key areas where we believe we can make the greatest impact: jobs and skills, neighborhood development, small business expansion, financial health and sustainability.

Advancing policy solutions

Public policy is a critical tool to scale the most innovative and impactful approaches that bring about lasting change. In 2019, we launched the JPMorgan Chase *Policy*Center to develop and advance sustainable, evidence-based policy solutions that drive inclusive economic growth in the U.S. and around the world.

Through the *Policy*Center, we are advancing policy changes to remove barriers to employment for people with a criminal background and advocating for policy solutions that will enable more young people — particularly those who lack opportunity — to access high-quality career-readiness programs that pave the way to well-paying jobs. In 2020, the *Policy*Center will expand its focus to tackle additional issue areas.

Harnessing the power of data

Sound public policy is informed by timely, granular data. The JPMorgan Chase Institute is dedicated to delivering data-rich analyses and expert insights for the public good. Leveraging the firm's unique assets and proprietary data, the Institute helps policymakers, businesses and nonprofit leaders use timely data and thoughtful analyses to address critical issues and advance global prosperity.

Our data allow us to better understand and answer important questions about the financial health and resilience of U.S. consumers, businesses and communities, as well as study labor and financial markets. In 2019, the Institute shared valuable insights across a range of areas, including how student loan payments affect the financial lives of 4.6 million families; how Miami's small businesses turn a profit yet have limited cash buffers; and how families are weathering financial volatility on a monthly basis.

Preparing workers for the future of work

Technological change continues to transform the world of work. By 2030, more than 30% of American workers and 375 million workers globally will need to change jobs or upgrade their skills significantly in order to advance within the workforce. We are investing $350 million over the next five years to equip young people and adults with the skills they need to be successful in a rapidly changing economy. We are working to create greater economic mobility and career pathways for workers both inside our firm and in our communities. Our firm is investing in our employees through long-term training and reskilling efforts. We are also making long-term commitments to boost career readiness. We invested $7 million in Denver, Colorado's youth apprenticeship system to develop strong connections between high schools and higher education, focused on well-paying careers in the region's growing industries.

Boosting small business growth

Through our long-term investments around the world, we have seen firsthand how underserved, minority entrepreneurs have the power to lift up entire communities. Yet these populations often face unique barriers that inhibit their success. This is why our efforts focus on unleashing their power as drivers of opportunity. We have taken many insights learned from innovative models, such as the Entrepreneurs of Color Fund (EOCF), and are applying them to more communities. For example, in Paris, we're working with nonprofit partners to help local and diverse entrepreneurs in Seine-Saint-Denis grow their businesses. In London, we're giving a boost to female entrepreneurs by providing technical support and hands-on mentorship.

Cultivating thriving neighborhoods

Housing that individuals and families can afford, in proximity to economic opportunity and basic services, is the cornerstone of vibrant and resilient neighborhoods. Producing, preserving and protecting affordable housing is essential to our strategy for creating thriving neighborhoods. For example, we're investing $22 million to develop and preserve affordable housing in San Francisco and Oakland. This investment, which combines long-term, low-cost loans and philanthropic capital, will provide more affordable housing and protect local residents from being displaced.

Advancing financial health

Sound financial health is the foundation on which strong and resilient households, communities and economies are built. We're using our data, expertise and capital to improve the financial health of customers, employees and communities. In 2019, JPMorgan Chase made a $25 million commitment to the Financial Solutions Lab, which supports technology-based innovations that improve financial health. This investment builds on our five-year collaboration with the Financial Solutions Lab, which has supported nearly 40 innovative financial technology companies (fintechs) that have raised over $500 million in capital since joining the program, saving U.S. residents more than $1 billion.

Transitioning to a low-carbon economy

JPMorgan Chase is committed to creating a more sustainable future for our employees, customers and communities. Our firm has committed to facilitate $200 billion in financing in 2020 to support the objectives of the United Nations' Sustainable Development Goals, with a focus on addressing climate change and advancing social and economic development.

We are also promoting bipartisan, market-based policy solutions — such as a carbon tax-and-dividend framework for the U.S. — to reduce carbon emissions and protect consumers. And we've expanded restrictions on financing for coal mining and coal-fired power and prohibited financing for new oil and gas development in the Arctic. Finally, we're on track to source renewable energy for 100% of our own global power needs by the end of 2020.

2019 HIGHLIGHTS AND ACCOMPLISHMENTS

Awards and recognition

- Ranked Top 10 on *Fortune* magazine's World's Most Admired Companies list
- Named to *Fortune* magazine's Change the World list – third consecutive year
- Named to the *Military Times'* Best for Vets Employers list
- Earned 100% on the Human Rights Campaign's Corporate Equality Index – 17th consecutive year
- Inducted into the Billion Dollar Roundtable for attaining at least $1 billion in diverse supplier spend

Accomplishments

- *Advancing*Cities: Bolstering the long-term vitality of the world's cities through low-cost, long-term loans and philanthropic investments:
  - Detroit: Six years into our $200 million commitment:

    14,728 people participated in workforce training programs; 2,002 units of affordable housing were created or preserved; 17,255 people received services to improve their financial health; 3,855 jobs were created or retained; and 7,718 small businesses received capital or technical assistance

  - Chicago's South and West sides: Two years into our $40 million commitment:

    6,362 people participated in workforce training programs; 48 units of affordable housing were created or preserved; 49,314 people received services to improve their financial health; 2,323 jobs were created or retained; and 3,305 small businesses received capital or technical assistance
  - Greater Paris: First year of our $30 million commitment:

    4,000 people participated in career-readiness programs; 12 small businesses received capital or technical assistance
  - Greater Washington region: Two years into our $25 million commitment:

    224 people participated in workforce training programs; 955 units of affordable housing were created or preserved; 1,120 jobs were created or retained; and 2,092 small businesses received capital or technical assistance

  - Bay Area: New $75 million, five-year commitment to help address housing affordability and displacement challenges in San Francisco and Oakland.
  - The inaugural *Advancing*Cities competition – which sources innovative and sustainable solutions that address pressing challenges facing communities – awarded a total of $15 million to winning cities: Chicago, Louisville, Miami, San Diego and Syracuse.
- Jobs and skills: Over the past six years, we have helped more than 150,000 people across 37 countries develop in-demand skills for jobs in growing industries.
- Financial health: In India, the Financial Inclusion Lab has supported 18 fintechs, which have expanded their services to reach more than 900,000 people in underserved communities in the country. Additionally, we committed $15 million to the Catalyst Fund, in partnership with UK Aid, to advance financial inclusion in emerging markets.
- Neighborhood development: To date, we've hosted six Partnerships for Raising Opportunity in Neighborhoods (PRO Neighborhoods) competitions, awarding more than $131 million to over 95 Community Development Financial Institutions across the U.S. As of 2019, the winners raised more than $870 million in outside capital and made over 35,000 loans worth in excess of $475 million dedicated to low- and moderate-income communities.
- Small business expansion: We expanded EOCF to five metros – Detroit, Chicago, the South Bronx, the Bay Area and the Greater Washington region – providing minority entrepreneurs with access to capital, education and other resources. Through 2019, we committed over $17 million through EOCF, resulting in more than 475 loans, totaling $17 million in deployed loan capital that created or retained over 3,000 jobs.
- Sustainable finance: In 2019, we provided over $3 billion for wind and solar projects. Since 2003, JPMorgan Chase has committed or arranged $24 billion in financing for wind, solar and geothermal projects.
- Employees serving our communities:
  - Nearly 73,000 employees volunteered 467,000 hours in 2019. This includes 325 employee volunteers from 14 countries who contributed nearly 20,000 hours working with about 70 nonprofits through the JPMorgan Chase Service Corps.

  - More than 400 employees contributed to the Board Match program, which doubles the impact of eligible employees' donations to nonprofits on whose boards they serve, resulting in the firm matching more than $1.6 million to those organizations.
  - In 2019, our firm and employees donated more than $2.8 million to disaster relief efforts around the globe.

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FIVE-YEAR SUMMARY OF CONSOLIDATED FINANCIAL HIGHLIGHTS (unaudited)

As of or for the year ended December 31, (in millions, except per share, ratio, headcount data and where otherwise noted)	2019	2018	2017	2016	2015
Selected income statement data					
Total net revenue	**$ 115,627**	$ 109,029	$ 100,705	$ 96,569	$ 94,440
Total noninterest expense	**65,497**	63,394	59,515	56,672	59,911
Pre-provision profit	**50,130**	45,635	41,190	39,897	34,529
Provision for credit losses	**5,585**	4,871	5,290	5,361	3,827
Income before income tax expense	**44,545**	40,764	35,900	34,536	30,702
Income tax expense	**8,114**	8,290	11,459	9,803	6,260
Net income	**$ 36,431**	$ 32,474	$ 24,441 [(f)]	$ 24,733	$ 24,442
Earnings per share data					
Net income: Basic	**$ 10.75**	$ 9.04	$ 6.35	$ 6.24	$ 6.05
Diluted	**10.72**	9.00	6.31	6.19	6.00
Average shares: Basic	**3,221.5**	3,396.4	3,551.6	3,658.8	3,741.2
Diluted	**3,230.4**	3,414.0	3,576.8	3,690.0	3,773.6
Market and per common share data					
Market capitalization	**$ 429,913**	$ 319,780	$ 366,301	$ 307,295	$ 241,899
Common shares at period-end	**3,084.0**	3,275.8	3,425.3	3,561.2	3,663.5
Book value per share	**75.98**	70.35	67.04	64.06	60.46
Tangible book value per share ("TBVPS")[(a)]	**60.98**	56.33	53.56	51.44	48.13
Cash dividends declared per share	**3.40**	2.72	2.12	1.88	1.72
Selected ratios and metrics					
Return on common equity ("ROE")	**15%**	13%	10%	10%	11%
Return on tangible common equity ("ROTCE")[(a)]	**19**	17	12	13	13
Return on assets ("ROA")	**1.33**	1.24	0.96	1.00	0.99
Overhead ratio	**57**	58	59	59	63
Loans-to-deposits ratio	**61**	67	64	65	65
Liquidity coverage ratio ("LCR") (average)[(b)]	**116**	113	119	N/A	N/A
Common equity tier 1 ("CET1") capital ratio[(c)]	**12.4**	12.0	12.2	12.3	11.8
Tier 1 capital ratio[(c)]	**14.1**	13.7	13.9	14.0	13.5
Total capital ratio[(c)]	**16.0**	15.5	15.9	15.5	15.1
Tier 1 leverage ratio[(c)]	**7.9**	8.1	8.3	8.4	8.5
Supplementary leverage ratio ("SLR")[(d)]	**6.3%**	6.4%	6.5%	6.5%	6.5%
Selected balance sheet data (period-end)					
Trading assets	**$ 411,103**	$ 413,714	$ 381,844	$ 372,130	$ 343,839
Investment securities	**398,239**	261,828	249,958	289,059	290,827
Loans	**959,769**	984,554	930,697	894,765	837,299
Core Loans	**916,144**	931,856	863,683	806,152	732,093
Average core loans	**906,606**	885,221	829,558	769,385	670,757
Total assets	**2,687,379**	2,622,532	2,533,600	2,490,972	2,351,698
Deposits	**1,562,431**	1,470,666	1,443,982	1,375,179	1,279,715
Long-term debt	**291,498**	282,031	284,080	295,245	288,651
Common stockholders' equity	**234,337**	230,447	229,625	228,122	221,505
Total stockholders' equity	**261,330**	256,515	255,693	254,190	247,573
Headcount	**256,981**	256,105	252,539	243,355	234,598
Credit quality metrics					
Allowance for credit losses	**$ 14,314**	$ 14,500	$ 14,672	$ 14,854	$ 14,341
Allowance for loan losses to total retained loans	**1.39%**	1.39%	1.47%	1.55%	1.63%
Allowance for loan losses to retained loans excluding purchased credit-impaired loans[(e)]	**1.31**	1.23	1.27	1.34	1.37
Nonperforming assets	**$ 4,497**	$ 5,190	$ 6,426	$ 7,535	$ 7,034
Net charge-offs	**5,629**	4,856	5,387	4,692	4,086
Net charge-off rate	**0.60%**	0.52%	0.60% [(g)]	0.54%	0.52%

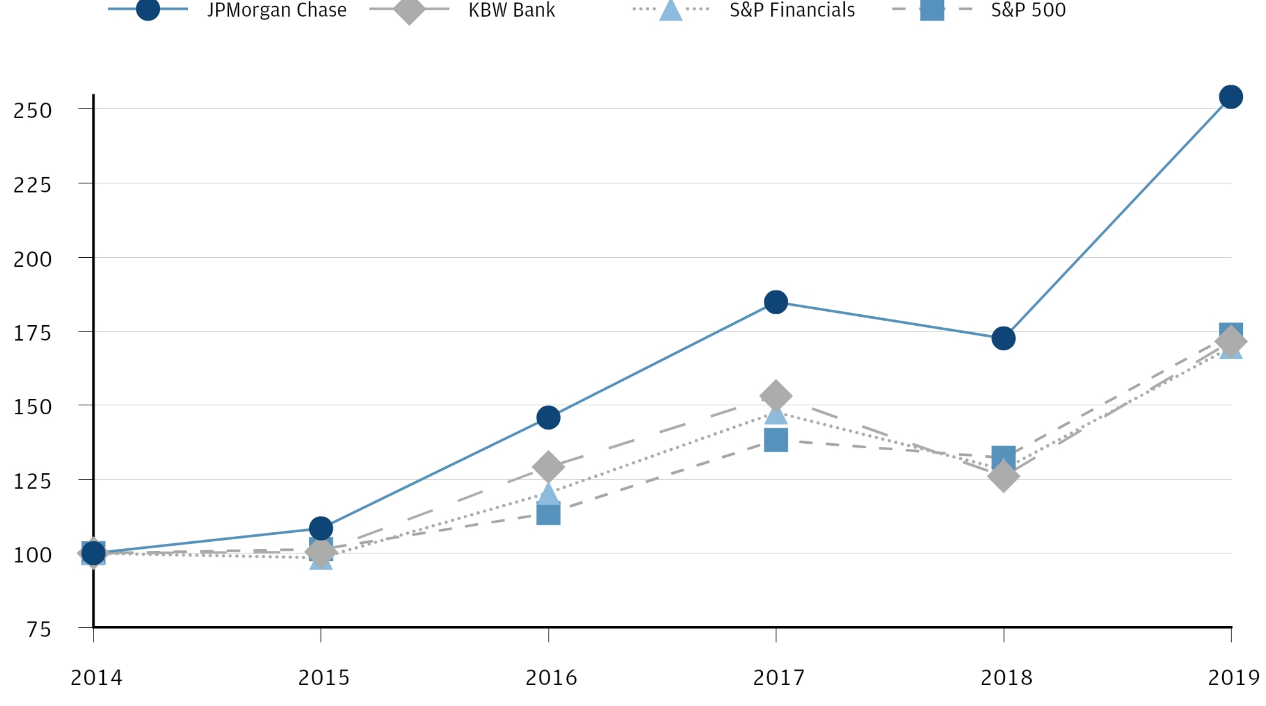
(a) TBVPS and ROTCE are each non-GAAP financial measures. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59 for a further discussion of these measures.
(b) For the years ended December 31, 2019, 2018 and 2017, the percentage represents the Firm's reported average LCR for the three months ended December 31, 2019, 2018 and 2017, which became effective April 1, 2017. Refer to Liquidity Risk Management on pages 93–98 for additional information on the Firm's LCR.
(c) The Basel III capital rules became fully phased-in effective January 1, 2019. Prior to this date, the required capital measures were subject to the transitional rules which, as of December 31, 2018, were the same on a fully phased-in and transitional basis. Refer to Capital Risk Management on pages 85–92 for additional information on these measures.
(d) The Basel III rule for the SLR became fully phased-in effective January 1, 2018. Prior to this date, the SLR was calculated under the transitional rules. Refer to Capital Risk Management on pages 85–92 for additional information on these measures.
(e) This ratio is a non-GAAP financial measure as it excludes the impact of residential real estate purchased credit-impaired ("PCI") loans. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59, and the Allowance for credit losses on pages 116–117 for further discussion of this measure.
(f) In December 2017, the Tax Cuts and Jobs Act ("TCJA") was signed into law. The Firm's results for the year ended December 31, 2017 included a $2.4 billion decrease to net income as a result of the enactment of the TCJA. Refer to Note 25 for additional information related to the impact of the TCJA.
(g) Excluding net charge-offs of $467 million related to the student loan portfolio sale, the net charge-off rate for the year ended December 31, 2017 would have been 0.55%.

FIVE-YEAR STOCK PERFORMANCE

The following table and graph compare the five-year cumulative total return for JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm") common stock with the cumulative return of the S&P 500 Index, the KBW Bank Index and the S&P Financials Index. The S&P 500 Index is a commonly referenced equity benchmark in the United States of America ("U.S."), consisting of leading companies from different economic sectors. The KBW Bank Index seeks to reflect the performance of banks and thrifts that are publicly traded in the U.S. and is composed of leading national money center and regional banks and thrifts. The S&P Financials Index is an index of financial companies, all of which are components of the S&P 500. The Firm is a component of all three industry indices.

The following table and graph assume simultaneous investments of $100 on December 31, 2014, in JPMorgan Chase common stock and in each of the above indices. The comparison assumes that all dividends were reinvested.

December 31, (in dollars)	2014	2015	2016	2017	2018	**2019**
JPMorgan Chase	$ 100.00	$ 108.37	$ 145.82	$ 184.81	$ 172.52	**$ 254.07**
KBW Bank Index	100.00	100.48	129.13	153.14	126.02	**171.54**
S&P Financials Index	100.00	98.44	120.38	147.58	128.33	**169.52**
S&P 500 Index	100.00	101.37	113.49	138.26	132.19	**173.80**



The following is Management's discussion and analysis of the financial condition and results of operations ("MD&A") of JPMorgan Chase for the year ended December 31, 2019. The MD&A is included in both JPMorgan Chase's Annual Report for the year ended December 31, 2019 ("Annual Report") and its Annual Report on Form 10-K for the year ended December 31, 2019 ("2019 Form 10-K") filed with the Securities and Exchange Commission ("SEC"). Refer to the Glossary of terms and acronyms on pages 293–299 for definitions of terms and acronyms used throughout the Annual Report and the 2019 Form 10-K.

The MD&A contains statements that are forward-looking within the meaning of the Private Securities Litigation Reform Act of 1995. These statements are based on the current beliefs and expectations of JPMorgan Chase's management and are subject to significant risks and uncertainties. Refer to Forward-looking Statements on page 141) and Part 1, Item 1A: Risk factors in the 2019 Form 10-K on pages 6–28 for a discussion of certain of those risks and uncertainties and the factors that could cause JPMorgan Chase's actual results to differ materially because of those risks and uncertainties.

INTRODUCTION

JPMorgan Chase & Co. (NYSE: JPM), a financial holding company incorporated under Delaware law in 1968, is a leading global financial services firm and one of the largest banking institutions in the United States of America ("U.S."), with operations worldwide; JPMorgan Chase had $2.7 trillion in assets and $261.3 billion in stockholders' equity as of December 31, 2019. The Firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. Under the J.P. Morgan and Chase brands, the Firm serves millions of customers in the U.S. and globally many of the world's most prominent corporate, institutional and government clients.

JPMorgan Chase's principal bank subsidiary is JPMorgan Chase Bank, National Association ("JPMorgan Chase Bank, N.A."), a national banking association with U.S. branches in 38 states and Washington, D.C. as of December 31, 2019. JPMorgan Chase's principal nonbank subsidiary is J.P. Morgan Securities LLC ("J.P. Morgan Securities"), a U.S. broker-dealer. The bank and non-bank subsidiaries of JPMorgan Chase operate nationally as well as through overseas branches and subsidiaries, representative offices and subsidiary foreign banks. The Firm's principal operating subsidiary outside the U.S. is J.P. Morgan Securities plc, a U.K.-based subsidiary of JPMorgan Chase Bank, N.A.

For management reporting purposes, the Firm's activities are organized into four major reportable business segments, as well as a Corporate segment. The Firm's consumer business is the Consumer & Community Banking ("CCB") segment. The Firm's wholesale business segments are Corporate & Investment Bank ("CIB"), Commercial Banking ("CB"), and Asset & Wealth Management ("AWM"). Refer to Business Segment Results on pages 60–78, and Note 32 for a description of the Firm's business segments, and the products and services they provide to their respective client bases.

This executive overview of the MD&A highlights selected information and does not contain all of the information that is important to readers of this 2019 Form 10-K. For a complete description of the trends and uncertainties, as well as the risks and critical accounting estimates affecting the Firm and its various lines of business ("LOBs"), this 2019 Form 10-K should be read in its entirety.

Financial performance of JPMorgan Chase

Year ended December 31, (in millions, except per share data and ratios)	2019	2018	Change
Selected income statement data			
Total net revenue	**$115,627**	$109,029	6%
Total noninterest expense	**65,497**	63,394	3
Pre-provision profit	**50,130**	45,635	10
Provision for credit losses	**5,585**	4,871	15
Net income	**36,431**	32,474	12
Diluted earnings per share	**10.72**	9.00	19
Selected ratios and metrics			
Return on common equity	**15%**	13%	
Return on tangible common equity	**19**	17	
Book value per share	**$ 75.98**	$ 70.35	8
Tangible book value per share	**60.98**	56.33	8
Capital ratios[(a)]			
CET1	**12.4%**	**12.0%**	
Tier 1 capital	**14.1**	**13.7**	
Total capital	**16.0**	**15.5**	

(a) The Basel III capital rules became fully phased-in effective January 1, 2019. Prior to this date, the required capital measures were subject to the transitional rules which, as of December 31, 2018, were the same on a fully phased-in and transitional basis. Refer to Capital Risk Management on pages 85-92 for additional information on these measures.

Comparisons noted in the sections below are for the full year of 2019 versus the full year of 2018, unless otherwise specified.

Firmwide overview

JPMorgan Chase reported strong results for 2019, with record revenue, net income and EPS of $115.6 billion, $36.4 billion and $10.72 per share, respectively. The Firm reported ROE of 15% and ROTCE of 19%.

- Net income was $36.4 billion, up 12%.
- Total net revenue increased 6%. Net interest income was $57.2 billion, up 4%, driven by continued balance sheet growth and mix as well as higher average short-term rates, partially offset by higher deposit pay rates. Noninterest revenue was $58.4 billion, up 8%, driven by growth across CCB as well as higher Markets revenue in CIB. Noninterest revenue included approximately $500 million of gains on the sales of certain mortgage loans in Home Lending.
- Noninterest expense was $65.5 billion, up 3%, driven by continued investments across the businesses including employees, technology, real estate, and marketing, as well as higher volume- and revenue-related expenses, including depreciation expense on auto lease assets, partially offset by lower FDIC charges.
- Income tax expense included $1.1 billion of tax benefits related to the resolution of certain tax audits.
- The provision for credit losses was $5.6 billion, up $714 million, reflecting increases in both wholesale and consumer. The increase in the wholesale provision reflects additions to the allowance for credit losses in the current year on select client downgrades. The prior year reflected a benefit related to a single name in the Oil & Gas portfolio and higher recoveries. The increase in the consumer provision reflects higher net charge-offs and additions to the allowance for loan losses in Card, predominantly offset by a higher reduction in the allowance for loan losses in Home Lending. The prior year also benefited from larger recoveries in Home Lending on loan sales.
- The total allowance for credit losses was $14.3 billion at December 31, 2019, and the Firm had a loan loss coverage ratio of 1.39%, flat compared with the prior year; excluding the PCI portfolio, the equivalent ratio was 1.31% compared with 1.23% in the prior year. The Firm's nonperforming assets totaled $4.5 billion at December 31, 2019, a decrease from $5.2 billion in the prior year, primarily reflecting paydowns in the wholesale portfolio and improved credit performance in the consumer portfolio.
- Firmwide average total loans of $955 billion were up 1%, or up 3% excluding the impact of certain loan sales in Home Lending.

Selected capital-related metrics

- The Firm's CET1 capital was $188 billion, and the Standardized and Advanced CET1 ratios were 12.4% and 13.4%, respectively.
- The Firm's SLR was 6.3%.
- The Firm continued to grow tangible book value per share ("TBVPS"), ending 2019 at $60.98, up 8%.

ROTCE and TBVPS are non-GAAP financial measures. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59, and Capital Risk Management on pages 85–92 for a further discussion of each of these measures.

Business segment highlights

Selected business metrics for each of the Firm's four LOBs are presented below for the full year of 2019.

Segment	Highlights
CCB ROE 31%	• Record revenue of $55.9 billion, up 7%; record net income of $16.6 billion, up 12% • Average loans down 3%; Home Lending loans down 9% impacted by loan sales; Card loans up 7% • Client investment assets up 27%; average deposits up 3% • Credit card sales volume up 10% and merchant processing volume up 11%
CIB ROE 14%	• Record revenue of $38.3 billion, up 5%; record net income of $11.9 billion, up 1% • Maintained #1 ranking for Global Investment Banking fees with 9.0% wallet share, up 40 basis points ("bps") • Investment Banking revenue of $7.2 billion, up 3% • Total Markets revenue of $20.9 billion, up 7%
CB ROE 17%	• Record Investment Banking revenue of $2.7 billion, up 10% • Average loans and deposits each up 1% • Strong credit quality with NCOs of 8 bps
AWM ROE 26%	• Record revenue of $14.3 billion, up 2% • Average loans up 8%; average deposits up 2% • Assets under management ("AUM") of $2.4 trillion, up 19%

Refer to the Business Segment Results on pages 60-61 for a detailed discussion of results by business segment.

Credit provided and capital raised

JPMorgan Chase continues to support consumers, businesses and communities around the globe. The Firm provided new and renewed credit and raised capital for wholesale and consumer clients during 2019, consisting of:

Amount	Description
$2.3 trillion	Total credit provided and capital raised
$262 billion	Credit for consumers
$33 billion	Credit for U.S. small businesses
$860 billion	Credit for corporations
$1.0 trillion	Capital raised for corporate clients and non-U.S. government entities
$79 billion	Credit and capital raised for nonprofit and U.S. government entities[(a)]

(a) Includes states, municipalities, hospitals and universities.

Recent events

On February 25, 2020, JPMorgan Chase announced additional steps in its initiatives to address climate change and further promote sustainable development. This year, JPMorgan Chase commits to facilitate $200 billion to advance the objectives of the United Nations Sustainable Development Goals (SDGs), including $50 billion toward green initiatives. The new commitment is intended to address a broader set of challenges in the developing world and developed countries where social and economic development gaps persist. As part of this commitment, the Firm had previously announced the creation of the J.P. Morgan Development Finance Institution to expand its financing activities for developing countries.

On December 18, 2019, JPMorgan Chase announced that the China Securities Regulatory Commission has approved the application of J.P. Morgan Securities (China) Company Limited for a Securities and Futures Business Permit. This approval allows J.P. Morgan's majority-owned securities company in China to commence operations.

On December 11, 2019, JPMorgan Chase announced certain organizational changes to its U.S. Wealth Management business. The Firm's advisors across Chase Wealth Management and J.P. Morgan Securities will become one business unit – U.S. Wealth Management.

2020 outlook

These current expectations are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Such forward-looking statements are based on the current beliefs and expectations of JPMorgan Chase's management and are subject to significant risks and uncertainties. Refer to Forward-Looking Statements on page 141*, and the Risk Factors section on* pages 6–28 *of the Firm's 2019 Form 10-K, for a further discussion of certain of those risks and uncertainties and the other factors that could cause JPMorgan Chase's actual results to differ materially because of those risks and uncertainties. There is no assurance that actual results in 2019 will be in line with the outlook set forth below, and the Firm does not undertake to update any forward-looking statements.*

JPMorgan Chase's outlook for 2020 should be viewed against the backdrop of the global and U.S. economies, financial markets activity, the geopolitical environment, the competitive environment, client and customer activity levels, and regulatory and legislative developments in the U.S. and other countries where the Firm does business. Each of these factors will affect the performance of the Firm and its LOBs. The Firm will continue to make appropriate adjustments to its businesses and operations in response to ongoing developments in the business, economic, regulatory, and legal environments in which it operates.

Firmwide full-year 2020

- Management expects full-year 2020 net interest income, on a managed basis, to be approximately $57 billion, market dependent, reflecting the impact of lower interest rates offset by balance sheet growth and mix.
- The Firm continues to take a disciplined approach to managing expenses, while investing for growth and innovation. As a result, management expects Firmwide adjusted expense for the full-year 2020 to be approximately $67 billion.
- The Firm continues to experience charge-off rates at very low levels, reflecting favorable credit trends across the consumer and wholesale portfolios. Management expects full-year 2020 net charge-offs to be just over $6 billion, an increase from prior year, driven by Card on growth and mix.
- Management expects the full-year 2020 effective tax rate, on a reported basis, to be approximately 20%, and approximately 5 to 7 percentage points higher on a managed basis.

First-quarter 2020

- Management expects first-quarter 2020 net interest income, on a managed basis, to be approximately $14.2 billion, market dependent.
- Firmwide adjusted expense for the first-quarter 2020 is expected to be approximately $17 billion.
- The effective tax rate, on a reported basis, for the first quarter of 2020 is expected to be approximately 17% largely as a result of tax benefits related to the vesting of employee share-based awards.
- Markets revenue for the first-quarter of 2020 is expected to be higher when compared with the prior-year quarter by mid-teens percentage points, depending on market conditions.

Business Developments

Departure of the U.K. from the EU

The U.K.'s departure from the EU, which is commonly referred to as "Brexit," occurred on January 31, 2020.

Following this departure, the U.K. has entered a transition period that is scheduled to expire on December 31, 2020. The purpose of the transition period is to enable the U.K. and the EU to negotiate the terms of their future relationship. The transition period can be extended, but both sides need to agree to extend it by July 1, 2020. It is not clear whether the terms of the future relationship can be agreed before the end of 2020, and so significant uncertainty remains about the relationship between the U.K. and the EU after the end of the transition period.

The Firm has a long-standing presence in the U.K., which currently serves as the regional headquarters of the Firm's operations in over 30 countries across Europe, the Middle East, and Africa ("EMEA"). In the region, the Firm serves clients and customers across its business segments. The Firm has approximately 17,000 employees in the U.K., of which approximately two-thirds are in London, with operational and technology support centers in locations such as Bournemouth, Glasgow and Edinburgh.

In light of the ongoing uncertainty, the Firm continues to execute the relevant elements of its Firmwide Brexit Implementation program with the objective of being able to continue delivering the Firm's capabilities to its EU clients. The program covers strategic implementation across all impacted businesses and functions and includes an ongoing assessment of implementation risks including political, legal and regulatory risks and plans for addressing and mitigating those risks under any scenario, including where the U.K. and the EU fail to reach an agreement on their future relationship by the end of 2020 and the transition period is not extended.

The principal operational risks associated with Brexit continue to be the potential for disruption caused by insufficient preparations by individual market participants or in the overall market ecosystem, and risks related to potential disruptions of connectivity among market participants. There continues to be regulatory and legal uncertainty with respect to various matters including contract continuity, access by market participants to liquidity in certain products, such as products subject to potentially conflicting U.K. and EU regulatory requirements in relation to eligible trading venues, including certain cross-border derivative contracts and equities that are listed on both U.K. and EU exchanges, as well as ongoing access to central banks. It is uncertain as to whether any of these issues will be resolved in the negotiations, or whether any of the previous temporary solutions will be available at the end of the transition period to mitigate these risks.

The Firm is focused on the following key areas to ensure continuation of service to its EU clients: regulatory and legal entity readiness; client readiness; and business and operational readiness. Following are the significant updates.

Regulatory and legal entity readiness
The Firm's legal entities in Germany, Luxembourg and Ireland are now prepared and licensed to provide services to the Firm's EU clients, including a branch network covering locations such as Paris, Madrid and Milan.

Client readiness
The agreements covering a significant proportion of the Firm's EU client activity have been re-documented to other EU legal entities to help facilitate continuation of service. The Firm continues to actively engage with clients that have not completed re-documentation to ensure preparedness both in terms of documentation and any operational changes that may be required. The Firm may be negatively impacted by any operational disruption stemming from delays of or lapses in the readiness of other market participants or market infrastructures.

Business and operational readiness
The Firm relocated certain employees during 2019 and added specific employees to certain EU legal entities, where appropriate, to support the level of client activity that has been migrated. The Firm's longer term staffing plan will develop in accordance with the increasing level of activity in the EU entities and alongside the future legal and regulatory framework between the U.K. and EU. The Firm continues to closely monitor legislative developments, and its implementation plan allows for flexibility given the continued uncertainties.

IBOR transition

As a result of the expected discontinuation of certain unsecured benchmark interest rates, including the London Interbank Offered Rate ("LIBOR") and other Interbank Offered Rates ("IBORs") regulators and market participants in various jurisdictions have been working to identify alternative reference rates that are compliant with the International Organization of Securities Commission's standards for transaction-based benchmarks. In the U.S., the Alternative Reference Rates Committee (the "ARRC"), a group of market and official sector participants, identified the Secured Overnight Financing Rate ("SOFR") as its recommended alternative benchmark rate. Other alternative reference rates have been recommended in other jurisdictions. Industry sources estimate that IBORs are referenced in approximately $400 trillion of wholesale and consumer transactions globally spanning a broad range of financial products and contracts. The Firm has a significant number of IBOR-referenced contracts, including derivatives, bilateral and syndicated loans, securities, and debt and preferred stock issuances.

To manage the risks associated with the transition from IBORs, JPMorgan Chase established a Firmwide LIBOR Transition program in early 2018 that is overseen by the Firmwide CFO and the CEO of the CIB. When assessing risks associated with IBOR transition, the program monitors a variety of scenarios, including disorderly transition, measured/regulated transition considering volatility along the SOFR curve and clearinghouse plans to change their discount rates to alternative reference rates, and IBOR in continuity beyond December 2021.

The Firm continues to monitor and facilitate the transition by clients from IBOR-referencing products to products referencing alternative reference rates. The Firm's transition efforts to date include:

- ongoing implementation of new fallback provisions that provide for the determination of replacement rates for LIBOR-linked syndicated loans, securitizations, floating rate notes and bi-lateral business loans based on the recommendations of the ARRC, and introducing SOFR as a replacement benchmark rate for certain of these products;
- planning to adopt further fallback provisions recommended by the ARRC, including for residential ARMs, in conjunction with the adoption of these provisions by market participants; and
- completing its first bilateral SOFR loan in the U.S. and executing its first interest rate swap linked to the Euro short-term rate in Europe.

Market participants are continuing to work closely with the public sector as part of National Working Groups ("NWGs") towards the common goal of facilitating an orderly transition from IBORs. Current NWG efforts include the continued development of cash and derivative markets referencing alternative reference rates, as well as the development of industry consensus for fallback language that would determine the replacement rates to use in various IBOR-indexed contracts when a particular IBOR ceases to be produced. The Firm is monitoring and providing input in the development of the IBOR Fallbacks Protocol of the International Swaps and Derivatives Association ("ISDA"), which is expected to be published in 2020, and is encouraging its clients to actively participate in ISDA and industry consultations in order to ensure the broadest possible industry engagement in and understanding of IBOR transition. The Firm continues to monitor the development of alternative reference rates in other jurisdictions with NWGs.

The Financial Accounting Standards Board ("FASB") has confirmed that it will issue an accounting standards update in 2020 providing optional expedients and exceptions for applying generally accepted accounting principles to contracts and hedge relationships affected by benchmark reform. The International Accounting Standards Board ("IASB") has made amendments to IFRS hedge accounting requirements that provide relief to market participants on the accounting treatment of IBOR-linked products in the period leading up to the expected cessation of IBORs and is also considering further relief for the accounting impacts upon transition to an alternative reference rate.

The U.S. Treasury Department has issued proposed regulations that are intended to avoid adverse tax consequences in connection with the transition from IBORs. Under the proposed regulations, amendments to contracts meeting certain requirements will not be treated as taxable for U.S. federal income tax purposes.

The Firm continues to monitor the transition relief being considered by the FASB, IASB and U.S. Treasury Department regarding accounting and tax implications of reference rate reform. The Firm also continues to develop and implement plans to appropriately mitigate the risks associated with IBOR discontinuation as identified alternative reference rates develop and liquidity in these rates increases. The Firm will continue to engage with regulators and clients as the transition from IBORs progresses.

CONSOLIDATED RESULTS OF OPERATIONS

This section provides a comparative discussion of JPMorgan Chase's Consolidated Results of Operations on a reported basis for the two-year period ended December 31, 2019, unless otherwise specified. Refer to Consolidated Results of Operations on pages 48-51 of the Firm's Annual Report on Form 10-K for the year ended December 31, 2018 (the "2018 Form 10-K") for a discussion of the 2018 versus 2017 results. Factors that relate primarily to a single business segment are discussed in more detail within that business segment. Refer to pages 136-138 for a discussion of the Critical Accounting Estimates Used by the Firm that affect the Consolidated Results of Operations.

Effective January 1, 2018, the Firm adopted several accounting standards. Certain of the accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. Refer to Note 1 for additional information.

Revenue

Year ended December 31, (in millions)	2019	2018	2017
Investment banking fees	$ 7,501	$ 7,550	$ 7,412
Principal transactions	14,018	12,059	11,347
Lending- and deposit-related fees	6,369	6,052	5,933
Asset management, administration and commissions	17,165	17,118	16,287
Investment securities gains/(losses)	258	(395)	(66)
Mortgage fees and related income	2,036	1,254	1,616
Card income	5,304	4,989	4,433
Other income[(a)]	5,731	5,343	3,646
Noninterest revenue	58,382	53,970	50,608
Net interest income	57,245	55,059	50,097
Total net revenue	$ 115,627	$ 109,029	$ 100,705

(a) Included operating lease income of $5.5 billion, $4.5 billion and $3.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Investment banking fees were relatively flat, reflecting in CIB:

- higher debt underwriting fees driven by wallet share gains and increased activity in investment-grade and high-yield bonds,

offset by

- lower advisory fees driven by a decline in industry-wide fees despite wallet share gains.

Refer to CIB segment results on pages 66-70 and Note 6 for additional information.

Principal transactions revenue increased reflecting:

- higher revenue in CIB, which included a gain on the initial public offering ("IPO") of Tradeweb in the second quarter of 2019. Excluding this gain, the increase in CIB's revenue was driven by:
  - higher revenue in Fixed Income Markets, reflecting an overall strong performance, primarily in agency mortgage trading within Securitized Products; the increase in 2019 also reflected the impact of challenging market conditions in Credit in the fourth quarter of 2018; and
  - the favorable impact of tighter funding spreads on derivatives in Credit Adjustments & Other.

The net increase in CIB was partially offset by

- lower revenue in AWM related to hedges on certain investments. The impact of these hedges was more than offset by higher valuation gains on the related investments reflected in other income

Principal transactions revenue in Corporate was relatively flat, reflecting the combined impact of losses on cash deployment transactions in Treasury and CIO, which were more than offset by the related net interest income earned on those transactions, and lower net markdowns on certain legacy private equity investments.

Principal transactions revenue in CIB may in certain cases have offsets across other revenue lines, including net interest income. The Firm assesses its CIB Markets business performance on a total revenue basis.

Refer to CIB, AWM and Corporate segment results on pages 66-70, pages 74-76 and pages 77-78, respectively, and Note 6 for additional information.

Lending- and deposit-related fees increased primarily due to higher deposit-related fees in CCB, reflecting growth in customer accounts and transactions, and higher lending-related commitment fees in the wholesale businesses.

Refer to CCB, CIB and CB segment results on pages 62-65, pages 66-70 and pages 71-73, respectively, and Note 6 for additional information.

Asset management, administration and commissions revenue increased primarily due to higher asset management fees from growth in client investment assets in CCB.

Refer to CCB and AWM segment results on pages 62-65 and pages 74-76, respectively, and Note 6 for additional information.

Investment securities gains/(losses) in both periods reflect the impact of repositioning the investment securities portfolio. Refer to Corporate segment results on pages 77-78 and Note 10 for additional information.

Mortgage fees and related income increased driven by:

- higher net mortgage production revenue reflecting approximately $500 million of gains on sales of certain loans, as well as higher mortgage production volumes and margins,

partially offset by

- lower net mortgage servicing revenue driven by lower operating revenue reflecting faster prepayment speeds on lower rates and the impact of reclassifying certain loans to held-for-sale.

Refer to CCB segment results on pages 62–65, Note 6 and 15 for further information.

Card income increased as the prior year included an adjustment of approximately $330 million to the credit card rewards liability. Excluding this item, Card income was relatively flat. Refer to CCB segment results on pages 62–65 and Note 6 for further information.

Other income increased reflecting:

- higher operating lease income from growth in auto operating lease volume in CCB, and
- higher investment valuation gains in AWM, which were largely offset by the impact of the related hedges that were reflected in principal transactions revenue,

largely offset by

- lower other income in CIB largely related to increased amortization on a higher level of alternative energy investments. The increased amortization was more than offset by lower income tax expense from the associated tax credits.

The prior year included:

- $505 million of fair value gains related to the adoption in the first quarter of 2018 of the recognition and measurement accounting guidance for certain equity investments previously held at cost.

Refer to Note 6 for further information.

Net interest income increased driven by continued balance sheet growth and changes in mix, as well as higher average short-term rates, partially offset by higher rates paid on deposits.

The Firm's average interest-earning assets were $2.3 trillion, up $133 billion, and the yield was 3.61%, up 14 bps. The net yield on these assets, on an FTE basis, was 2.46%, a decrease of 6 bps. The net yield excluding CIB Markets was 3.27%, up 2bps.

Net yield excluding CIB Markets is a non-GAAP financial measure. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59 for a further discussion of this measure.

Provision for credit losses

Year ended December 31, (in millions)	2019	2018	2017
Consumer, excluding credit card	$ (383)	$ (63)	$ 620
Credit card	5,348	4,818	4,973
Total consumer	4,965	4,755	5,593
Wholesale	620	116	(303)
Total provision for credit losses	$ 5,585	$ 4,871	$ 5,290

2019 compared with 2018

The **provision for credit losses** increased driven by both the wholesale and consumer portfolios.

The increase in the **wholesale** provision reflects additions to the allowance for credit losses in the current year on select client downgrades. The prior year reflected a benefit related to a single name in the Oil & Gas portfolio and higher recoveries.

The increase in the **total consumer** provision reflects:

- an increase in credit card due to
  - higher net charge-offs on loan growth, in line with expectations, and
  - a $500 million addition to the allowance for loan losses reflecting loan growth and higher loss rates, as newer vintages season and become a larger part of the portfolio, compared to a $300 million addition in the prior year

largely offset by

- a decrease in consumer, excluding credit card, in CCB due to
  - a $650 million reduction in the allowance for loan losses in the purchase credit-impaired ("PCI") residential real estate portfolio, reflecting continued improvement in home prices and delinquencies, and a $100 million reduction in the allowance for loan losses in the non credit-impaired residential real estate portfolio, compared to a $250 million reduction in the PCI residential real estate portfolio in the prior year, and
  - a $50 million reduction in the allowance for loan losses in the business banking portfolio

  partially offset by

  - lower net recoveries in the residential real estate portfolio as the prior year benefited from larger recoveries on loan sales.

Refer to the segment discussions of CCB on pages 62–65, CIB on pages 66–70, CB on pages 71–73, the Allowance for Credit Losses on pages 116–117 and Note 13 for further discussion of the credit portfolio and the allowance for credit losses.

Noninterest expense

Year ended December 31, (in millions)	2019	2018	2017
Compensation expense	**$ 34,155**	$ 33,117	$ 31,208
Noncompensation expense:			
Occupancy	**4,322**	3,952	3,723
Technology, communications and equipment	**9,821**	8,802	7,715
Professional and outside services	**8,533**	8,502	7,890
Marketing	**3,579**	3,290	2,900
Other[(a)(b)]	**5,087**	5,731	6,079
Total noncompensation expense	**31,342**	30,277	28,307
Total noninterest expense	**$ 65,497**	$ 63,394	$ 59,515

(a) Included Firmwide legal expense/(benefit) of $239 million, $72 million and $(35) million for the years ended December 31, 2019, 2018 and 2017, respectively.
(b) Included FDIC-related expense of $457 million, $1.2 billion and $1.5 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Compensation expense increased driven by investments across the businesses, including front office, as well as technology staff hires.

Noncompensation expense increased as a result of:

- higher investments across the businesses, including technology, real estate and marketing
- higher volume-related expense, including depreciation from growth in auto lease assets in CCB, and brokerage expense in certain businesses in CIB
- higher legal expense, and
- higher pension costs due to changes to actuarial assumptions and estimates,

largely offset by

- lower FDIC charges as a result of the elimination of the surcharge at the end of the third quarter of 2018
- the impact of efficiencies
- lower other regulatory-related assessments in CIB.

The prior year included a loss of $174 million on the liquidation of a legal entity in Corporate recorded in other expense. Refer to Note 24 for additional information on the liquidation of a legal entity.

Income tax expense

Year ended December 31, (in millions, except rate)	2019	2018	2017
Income before income tax expense	**$ 44,545**	$ 40,764	$ 35,900
Income tax expense	**8,114**	8,290	11,459
Effective tax rate	**18.2%**	20.3%	31.9%

2019 compared with 2018

The **effective tax rate** decreased due to the recognition of $1.1 billion of tax benefits related to the resolution of certain tax audits, and changes in the mix of income and expense subject to U.S. federal, and state and local taxes. The decrease was partially offset by lower tax benefits related to the vesting of employee share-based awards. In addition, the prior year included a $302 million net tax benefit resulting from changes in the estimates under the TCJA related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings. Refer to Note 25 for further information.

CONSOLIDATED BALANCE SHEETS AND CASH FLOWS ANALYSIS

Consolidated balance sheets analysis

The following is a discussion of the significant changes between December 31, 2019 and 2018.

Selected Consolidated balance sheets data

December 31, (in millions)	2019	2018	Change
Assets			
Cash and due from banks	$ 21,704	$ 22,324	(3)%
Deposits with banks	241,927	256,469	(6)
Federal funds sold and securities purchased under resale agreements	249,157	321,588	(23)
Securities borrowed	139,758	111,995	25
Trading assets	411,103	413,714	(1)
Investment securities	398,239	261,828	52
Loans	959,769	984,554	(3)
Allowance for loan losses	(13,123)	(13,445)	(2)
Loans, net of allowance for loan losses	946,646	971,109	(3)
Accrued interest and accounts receivable	72,861	73,200	–
Premises and equipment	25,813	14,934	73
Goodwill, MSRs and other intangible assets	53,341	54,349	(2)
Other assets	126,830	121,022	5
Total assets	$ 2,687,379	$ 2,622,532	2 %

Cash and due from banks and deposits with banks decreased primarily as a result of a shift in the deployment of cash to investment securities, and net maturities of short-term borrowings and long term debt in Treasury and CIO, partially offset by an increase in deposits. Deposits with banks reflect the Firm's placements of its excess cash with various central banks, including the Federal Reserve Banks.

Federal funds sold and securities purchased under resale agreements decreased as a result of client-driven market-making activities in Fixed Income Markets in CIB and a shift in the deployment of cash in Treasury and CIO. Refer to Liquidity Risk Management on pages 93–98 and Note 10 for additional information.

Securities borrowed increased in CIB related to client-driven market-making activities in Fixed Income Markets, and to cover customer short positions in prime brokerage. Refer to Liquidity Risk Management on pages 93–98 and Note 10 for additional information.

Trading assets was relatively flat, reflecting:

- a reduction in short-term instruments associated with cash deployment activities in Treasury and CIO,

offset by

- growth in client-driven activities in CIB Markets, primarily debt instruments, and
- in CCB, growth related to originations of mortgage warehouse loans, resulting from the favorable rate environment.

Refer to Notes 2 and 5 for additional information.

Investment securities increased primarily due to net purchases of U.S. Treasuries and U.S. GSE and government agency MBS in Treasury and CIO. The net purchases were primarily driven by cash deployment and interest rate risk management activities. Refer to Corporate segment results on pages 77–78, Investment Portfolio Risk Management on page 118 and Notes 2 and 10 for additional information on investment securities.

Loans decreased reflecting loan sales in Home Lending, and lower loans in CIB, primarily driven by a loan syndication and net paydowns, partially offset by growth in AWM and Card.

The allowance for loan losses decreased driven by:

- an $800 million reduction in the CCB allowance for loan losses, which included $650 million in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies; $100 million in the non credit-impaired residential real estate portfolio; and $50 million in the business banking portfolio; as well as
- a $151 million reduction for write-offs of PCI loans,

largely offset by

- a $500 million addition to the allowance for loan losses in the credit card portfolio reflecting loan growth and higher loss rates as newer vintages season and become a larger part of the portfolio, and
- a $115 million addition in the wholesale allowance for loan losses driven by select client downgrades.

Refer to Credit and Investment Risk Management on pages 100–118, and Notes 2, 3, 12 and 13 for further discussion of loans and the allowance for loan losses.

Premises and equipment increased primarily due to the adoption of the new lease accounting guidance effective January 1, 2019. Refer to Note 18 for additional information.

Goodwill, MSRs and other intangibles decreased reflecting lower MSRs as a result of the realization of expected cash flows and faster prepayment speeds on lower rates, partially offset by net additions to the MSRs. The decrease in MSRs was partially offset by an increase in goodwill related to the acquisition of InstaMed. Refer to Note 15 for additional information.

Other assets increased reflecting higher cash collateral placed with central counterparties in CIB, and higher auto operating lease assets from growth in the business in CCB.

Selected Consolidated balance sheets data

December 31, (in millions)	2019	2018	Change
Liabilities			
Deposits	$ **1,562,431**	$ 1,470,666	6
Federal funds purchased and securities loaned or sold under repurchase agreements	**183,675**	182,320	1
Short-term borrowings	**40,920**	69,276	(41)
Trading liabilities	**119,277**	144,773	(18)
Accounts payable and other liabilities	**210,407**	196,710	7
Beneficial interests issued by consolidated variable interest entities (“VIEs”)	**17,841**	20,241	(12)
Long-term debt	**291,498**	282,031	3
Total liabilities	**2,426,049**	2,366,017	3
Stockholders’ equity	**261,330**	256,515	2
Total liabilities and stockholders’ equity	$ **2,687,379**	$ 2,622,532	2%

Deposits increased reflecting:

- continued growth driven by new accounts in CCB
- growth in operating deposits in CIB driven by client activity, primarily in Treasury Services, and an increase in client-driven net issuances of structured notes in Markets, and
- higher deposits in CB and AWM from growth in interest-bearing deposits; for AWM, the growth was partially offset by migration, predominantly into the Firm’s investment-related products.

Refer to the Liquidity Risk Management discussion on pages 93–98; and Notes 2 and 17 for more information.

Federal funds purchased and securities loaned or sold under repurchase agreements was relatively flat,as the net increase from the Firm’s participation in the Federal Reserve’s open market operations was offset by client-driven activities, and lower secured financing of trading assets-debt instruments, all in CIB. Refer to the Liquidity Risk Management discussion on pages 93–98 and Note 11 for additional information.

Short-term borrowings decreased reflecting lower commercial paper issuances and short-term advances from Federal Home Loan Banks (“FHLB”) in Treasury and CIO, primarily driven by liquidity management. Refer to pages 93–98 for information on changes in Liquidity Risk Management.

Trading liabilities decreased due to client-driven market-making activities in CIB, which resulted in lower levels of short positions in both debt and equity instruments in Markets. Refer to Notes 2 and 5 for additional information.

Accounts payable and other liabilities increased reflecting:

- the impact of the adoption of the new lease accounting guidance effective January 1, 2019, and
- higher client payables related to client-driven activities in CIB.

Refer to Note 18 for additional information on Leases.

Beneficial interests issued by consolidated VIEs decreased due to:

- maturities of credit card securitizations,

largely offset by

- higher levels of Firm-administered multi-seller conduit commercial paper issued to third parties.

Refer to Off-Balance Sheet Arrangements on pages 55–56 and Note 14 and 28 for further information on Firm-sponsored VIEs and loan securitization trusts.

Long-term debt increased as a result of client-driven net issuances of structured notes in CIB’s Markets business, partially offset by net maturities of FHLB advances in Treasury and CIO.

Refer to Liquidity Risk Management on pages 93–98 and Note 20 for additional information on the Firm’s long-term debt activities.

Refer to page 149 for information on changes in stockholders’ equity, and Capital actions on pages 90–91.

Consolidated cash flows analysis

The following is a discussion of cash flow activities during the years ended December 31, 2019 and 2018. Refer to Consolidated cash flows analysis on page 54 of the Firm's 2018 Form 10-K for a discussion of the 2017 activities.

	Year ended December 31,		
(in millions)	**2019**	2018	2017
Net cash provided by/(used in)			
Operating activities	**$ 6,046**	$ 14,187	$ (10,827)
Investing activities	**(54,013)**	(197,993)	28,249
Financing activities	**32,987**	34,158	14,642
Effect of exchange rate changes on cash	**(182)**	(2,863)	8,086
Net increase/(decrease) in cash and due from banks and deposits with banks	**$ (15,162)**	$(152,511)	$ 40,150

Operating activities

JPMorgan Chase's operating assets and liabilities primarily support the Firm's lending and capital markets activities. These assets and liabilities can vary significantly in the normal course of business due to the amount and timing of cash flows, which are affected by client-driven and risk management activities and market conditions. The Firm believes that cash flows from operations, available cash and other liquidity sources, and its capacity to generate cash through secured and unsecured sources, are sufficient to meet its operating liquidity needs.

- In 2019, cash provided primarily reflected net income excluding noncash adjustments and net proceeds of sales, securitizations, and paydowns of loans held-for-sale, partially offset by higher securities borrowed, an increase in other assets and a decrease in trading liabilities.
- In 2018, cash provided primarily reflected net income excluding noncash adjustments, increased trading liabilities and accounts payable and other liabilities, partially offset by an increase in trading assets and net originations of loans held-for-sale.

Investing activities

The Firm's investing activities predominantly include originating held-for-investment loans and investing in the investment securities portfolio and other short-term instruments.

- In 2019, cash used reflected net purchases of investment securities, partially offset by lower securities purchased under resale agreements, and net proceeds from sales and securitizations of loans held-for-investment.
- In 2018, cash used reflected an increase in securities purchased under resale agreements, higher net originations of loans and net purchases of investment securities.

Financing activities

The Firm's financing activities include acquiring customer deposits and issuing long-term debt, as well as preferred and common stock.

- In 2019, cash provided reflected higher deposits, partially offset by a decrease in short-term borrowings and net payments of long term borrowings.
- In 2018, cash provided reflected higher deposits, short-term borrowings, and securities loaned or sold under repurchase agreements, partially offset by net payments of long term borrowings.
- For both periods, cash was used for repurchases of common stock and cash dividends on common and preferred stock.

* * *

Refer to Consolidated Balance Sheets Analysis on pages 52–53, Capital Risk Management on pages 85–92, and Liquidity Risk Management on pages 93–98 for a further discussion of the activities affecting the Firm's cash flows.

OFF-BALANCE SHEET ARRANGEMENTS AND CONTRACTUAL CASH OBLIGATIONS

In the normal course of business, the Firm enters into various off-balance sheet arrangements and contractual obligations that may require future cash payments. Certain obligations are recognized on-balance sheet, while others are disclosed off-balance sheet under accounting principles generally accepted in the U.S. (“U.S. GAAP”).

Special-purpose entities

The Firm has several types of off–balance sheet arrangements, including through nonconsolidated special-purpose entities (“SPEs”), which are a type of VIE, and through lending-related financial instruments (e.g., commitments and guarantees).

The Firm holds capital, as appropriate, against all SPE-related transactions and related exposures, such as derivative contracts and lending-related commitments and guarantees.

The Firm has no commitments to issue its own stock to support any SPE transaction, and its policies require that transactions with SPEs be conducted at arm’s length and reflect market pricing. Consistent with this policy, no JPMorgan Chase employee is permitted to invest in SPEs with which the Firm is involved where such investment would violate the Firm’s Code of Conduct.

The table below provides an index of where in this 2019 Form 10-K a discussion of the Firm’s various off-balance sheet arrangements can be found. Refer to Note 1 for additional information about the Firm’s consolidation policies.

Type of off-balance sheet arrangement	Location of disclosure	Page references
Special-purpose entities: variable interests and other obligations, including contingent obligations, arising from variable interests in nonconsolidated VIEs	Refer to Note 14	242–249
Off-balance sheet lending-related financial instruments, guarantees, and other commitments	Refer to Note 28	272–277

Contractual cash obligations

The accompanying table summarizes, by remaining maturity, JPMorgan Chase's significant contractual cash obligations at December 31, 2019. The contractual cash obligations included in the table below reflect the minimum contractual obligation under legally enforceable contracts with terms that are both fixed and determinable. Excluded from the table are certain liabilities with variable cash flows and/or no obligation to return a stated amount of principal at maturity.

The carrying amount of on-balance sheet obligations on the Consolidated balance sheets may differ from the minimum contractual amount of the obligations reported below. Refer to Note 28 for a discussion of mortgage repurchase liabilities and other obligations.

Contractual cash obligations

By remaining maturity at December 31, (in millions)	2019					2018
	2020	2021-2022	2023-2024	After 2024	**Total**	Total
On-balance sheet obligations						
Deposits[a]	$ 1,546,142	$ 5,840	$ 3,550	$ 2,508	$ 1,558,040	$ 1,468,031
Federal funds purchased and securities loaned or sold under repurchase agreements	183,304	–	–	371	183,675	182,320
Short-term borrowings[a]	35,107	–	–	–	35,107	62,393
Beneficial interests issued by consolidated VIEs	13,628	3,950	–	296	17,874	20,258
Long-term debt[a]	35,031	58,847	50,680	105,857	250,415	258,658
Operating leases[b]	1,604	2,704	2,025	3,757	10,090	10,992
Other[c]	8,695	2,046	1,851	2,976	15,568	11,794
Total on-balance sheet obligations	1,823,511	73,387	58,106	115,765	2,070,769	2,014,446
Off-balance sheet obligations						
Unsettled resale and securities borrowed agreements[d]	117,203	748	–	–	117,951	102,008
Contractual interest payments[e]	7,844	10,517	7,876	28,444	54,681	58,252
Equity investment commitments	539	–	–	–	539	271
Contractual purchases and capital expenditures	1,920	766	210	33	2,929	3,599
Obligations under co-brand programs	351	710	382	105	1,548	1,937
Total off-balance sheet obligations	127,857	12,741	8,468	28,582	177,648	166,067
Total contractual cash obligations	$ 1,951,368	$ 86,128	$ 66,574	$ 144,347	$ 2,248,417	$ 2,180,513

(a) Excludes structured notes on which the Firm is not obligated to return a stated amount of principal at the maturity of the notes, but is obligated to return an amount based on the performance of the structured notes.
(b) Includes noncancelable operating leases for premises and equipment used primarily for business purposes. Excludes the benefit of noncancelable sublease rentals of $846 million and $825 million at December 31, 2019 and 2018, respectively. Refer to Note 18 for further information on operating leases.
(c) Primarily includes dividends declared on preferred and common stock, deferred annuity contracts, pension and other postretirement employee benefit obligations, insurance liabilities and income taxes payable associated with the deemed repatriation under the TCJA.
(d) Refer to unsettled resale and securities borrowed agreements in Note 28 for further information.
(e) Includes accrued interest and future contractual interest obligations. Excludes interest related to structured notes for which the Firm's payment obligation is based on the performance of certain benchmarks.

EXPLANATION AND RECONCILIATION OF THE FIRM'S USE OF NON-GAAP FINANCIAL MEASURES AND KEY PERFORMANCE MEASURES

Non-GAAP financial measures

The Firm prepares its Consolidated Financial Statements in accordance with U.S. GAAP; these financial statements appear on pages 146–150. That presentation, which is referred to as "reported" basis, provides the reader with an understanding of the Firm's results that can be tracked consistently from year-to-year and enables a comparison of the Firm's performance with other companies' U.S. GAAP financial statements.

In addition to analyzing the Firm's results on a reported basis, management reviews Firmwide results, including the overhead ratio, on a "managed" basis; these Firmwide managed basis results are non-GAAP financial measures. The Firm also reviews the results of the LOBs on a managed basis. The Firm's definition of managed basis starts, in each case, with the reported U.S. GAAP results and includes certain reclassifications to present total net revenue for the Firm (and each of the reportable business segments) on an FTE basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in the managed results on a basis comparable to taxable investments and securities. These financial measures allow management to assess the comparability of revenue from year-to-year arising from both taxable and tax-exempt sources. The corresponding income tax impact related to tax-exempt items is recorded within income tax expense. These adjustments have no impact on net income as reported by the Firm as a whole or by the LOBs.

Management also uses certain non-GAAP financial measures at the Firm and business-segment level, because these other non-GAAP financial measures provide information to investors about the underlying operational performance and trends of the Firm or of the particular business segment, as the case may be, and, therefore, facilitate a comparison of the Firm or the business segment with the performance of its relevant competitors. Refer to Business Segment Results on pages 60–78 for additional information on these non-GAAP measures. Non-GAAP financial measures used by the Firm may not be comparable to similarly named non-GAAP financial measures used by other companies.

The following summary table provides a reconciliation from the Firm's reported U.S. GAAP results to managed basis.

	2019			2018			2017		
Year ended December 31, (in millions, except ratios)	Reported	Fully taxable-equivalent adjustments[a]	Managed basis	Reported	Fully taxable-equivalent adjustments[a]	Managed basis	Reported	Fully taxable-equivalent adjustments[a]	Managed basis
Other income	**$ 5,731**	**$ 2,534**	**$ 8,265**	$ 5,343	$ 1,877 [b]	$ 7,220	$ 3,646	$ 2,704	$ 6,350
Total noninterest revenue	**58,382**	**2,534**	**60,916**	53,970	1,877	55,847	50,608	2,704	53,312
Net interest income	**57,245**	**531**	**57,776**	55,059	628 [b]	55,687	50,097	1,313	51,410
Total net revenue	**115,627**	**3,065**	**118,692**	109,029	2,505	111,534	100,705	4,017	104,722
Pre-provision profit	**50,130**	**3,065**	**53,195**	45,635	2,505	48,140	41,190	4,017	45,207
Income before income tax expense	**44,545**	**3,065**	**47,610**	40,764	2,505	43,269	35,900	4,017	39,917
Income tax expense	**8,114**	**3,065**	**11,179**	8,290	2,505 [b]	10,795	11,459	4,017	15,476
Overhead ratio	**57%**	**NM**	**55%**	58%	NM	57%	59%	NM	57%

(a) Predominantly recognized in CIB, CB and Corporate.
(b) The decrease in fully taxable-equivalent adjustments for the year ended December 31, 2018, reflects the impact of the TCJA.

Net interest income and net yield excluding CIB's Markets businesses

In addition to reviewing net interest income and the net yield on a managed basis, management also reviews these metrics excluding CIB's Markets businesses, as shown below; these metrics, which exclude CIB's Markets businesses, are non-GAAP financial measures. Management reviews these metrics to assess the performance of the Firm's lending, investing (including asset-liability management) and deposit-raising activities. The resulting metrics that exclude CIB's Markets businesses are referred to as non-markets-related net interest income and net yield. CIB's Markets businesses are Fixed Income Markets and Equity Markets. Management believes that disclosure of non-markets-related net interest income and net yield provides investors and analysts with other measures by which to analyze the non-markets-related business trends of the Firm and provides a comparable measure to other financial institutions that are primarily focused on lending, investing and deposit-raising activities.

Year ended December 31, (in millions, except rates)	2019	2018	2017
Net interest income – reported	**$ 57,245**	$ 55,059	$ 50,097
Fully taxable-equivalent adjustments	**531**	628	1,313
Net interest income – managed basis[a]	**$ 57,776**	$ 55,687	$ 51,410
Less: CIB Markets net interest income[b]	**3,120**	3,087	4,630
Net interest income excluding CIB Markets[a]	**$ 54,656**	$ 52,600	$ 46,780
Average interest-earning assets[c]	**$2,345,491**	$2,212,908	$ 2,170,974
Less: Average CIB Markets interest-earning assets[b][c]	**672,629**	593,355	531,217
Average interest-earning assets excluding CIB Markets	**$1,672,862**	$1,619,553	$ 1,639,757
Net yield on average interest-earning assets – managed basis[c]	**2.46%**	2.52%	2.37%
Net yield on average CIB Markets interest-earning assets[b][c]	**0.46**	0.52	0.87
Net yield on average interest-earning assets excluding CIB Markets	**3.27%**	3.25%	2.85%

(a) Interest includes the effect of related hedges. Taxable-equivalent amounts are used where applicable.

(b) Refer to page 69 for further information on CIB's Markets businesses.

(c) In the second quarter of 2019, the Firm reclassified balances related to certain instruments from interest-earning to noninterest-earning assets, as the associated returns are recorded in principal transactions revenue and not in net interest income. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

Calculation of certain U.S. GAAP and non-GAAP financial measures

Certain U.S. GAAP and non-GAAP financial measures are calculated as follows:

Book value per share ("BVPS")
Common stockholders' equity at period-end / Common shares at period-end

Overhead ratio
Total noninterest expense / Total net revenue

Return on assets ("ROA")
Reported net income / Total average assets

Return on common equity ("ROE")
Net income* / Average common stockholders' equity

Return on tangible common equity ("ROTCE")
Net income* / Average tangible common equity

Tangible book value per share ("TBVPS")
Tangible common equity at period-end / Common shares at period-end

* Represents net income applicable to common equity

The Firm also reviews adjusted expense, which is noninterest expense excluding Firmwide legal expense and is therefore a non-GAAP financial measure. Additionally, certain credit metrics and ratios disclosed by the Firm exclude PCI loans, and are therefore non-GAAP measures. Management believes that these measures help investors understand the effect of these items on reported results and provide an alternate presentation of the Firm's performance. Refer to Credit and Investment Risk Management on pages 100–118 for additional information on credit metrics and ratios excluding PCI loans.

Tangible common equity, ROTCE and TBVPS

Tangible common equity ("TCE"), ROTCE and TBVPS are each non-GAAP financial measures. TCE represents the Firm's common stockholders' equity (i.e., total stockholders' equity less preferred stock) less goodwill and identifiable intangible assets (other than MSRs), net of related deferred tax liabilities. ROTCE measures the Firm's net income applicable to common equity as a percentage of average TCE. TBVPS represents the Firm's TCE at period-end divided by common shares at period-end. TCE, ROTCE and TBVPS are utilized by the Firm, as well as investors and analysts, in assessing the Firm's use of equity.

The following summary table provides a reconciliation from the Firm's common stockholders' equity to TCE.

	Period-end		Average		
			Year ended December 31,		
(in millions, except per share and ratio data)	**Dec 31, 2019**	Dec 31, 2018	**2019**	2018	2017
Common stockholders' equity	**$ 234,337**	$ 230,447	**$ 232,907**	$ 229,222	$ 230,350
Less: Goodwill	**47,823**	47,471	**47,620**	47,491	47,317
Less: Other intangible assets	**819**	748	**789**	807	832
Add: Certain deferred tax liabilities[a]	**2,381**	2,280	**2,328**	2,231	3,116
Tangible common equity	**$ 188,076**	$ 184,508	**$ 186,826**	$ 183,155	$ 185,317
Return on tangible common equity	**NA**	NA	**19%**	17%	12%
Tangible book value per share	**$ 60.98**	$ 56.33	**NA**	NA	NA

(a) Represents deferred tax liabilities related to tax-deductible goodwill and to identifiable intangibles created in nontaxable transactions, which are netted against goodwill and other intangibles when calculating TCE.

Key performance measures

Core loans is considered a key performance measure. Core loans represents loans considered central to the Firm's ongoing businesses, and excludes loans classified as trading assets, runoff portfolios, discontinued portfolios and portfolios the Firm has an intent to exit. Core loans is a measure utilized by the Firm and its investors and analysts in assessing actual growth in the loan portfolio.

BUSINESS SEGMENT RESULTS

The Firm is managed on an LOB basis. There are four major reportable business segments – Consumer & Community Banking, Corporate & Investment Bank, Commercial Banking and Asset & Wealth Management. In addition, there is a Corporate segment.

The business segments are determined based on the products and services provided, or the type of customer served, and they reflect the manner in which financial information is currently evaluated by the Firm's Operating Committee. Segment results are presented on a managed basis. Refer to Explanation and Reconciliation of the Firm's use of Non-GAAP Financial Measures and Key Performance Measures, on pages 57–59 for a definition of managed basis.

JPMorgan Chase

Consumer Businesses			Wholesale Businesses			
Consumer & Community Banking			**Corporate & Investment Bank**		**Commercial Banking[a]**	**Asset & Wealth Management**
Consumer & Business Banking	Home Lending	Card, Merchant Services & Auto	Banking	Markets & Securities Services	• Middle Market Banking • Corporate Client Banking • Commercial Real Estate Banking	• Asset Management • Wealth Management
• Consumer Banking/ Chase Wealth Management • Business Banking	• Home Lending Production • Home Lending Servicing • Real Estate Portfolios	• Card Services – Credit Card – Merchant Services[a] • Auto	• Investment Banking • Treasury Services[a] • Lending	• Fixed Income Markets • Equity Markets • Securities Services • Credit Adjustments & Other		

(a) Effective in the first quarter of 2020, the Merchant Services business was realigned from CCB to CIB as part of the Firm's Wholesale Payments business. The revenue and expenses of the Merchant Services business will be reported across CCB, CIB and CB based primarily on client relationship.

Description of business segment reporting methodology

Results of the business segments are intended to present each segment as if it were a stand-alone business. The management reporting process that derives business segment results includes the allocation of certain income and expense items, described in more detail below. The Firm also assesses the level of capital required for each LOB on at least an annual basis. The Firm periodically assesses the assumptions, methodologies and reporting classifications used for segment reporting, and further refinements may be implemented in future periods.

Revenue sharing

When business segments join efforts to sell products and services to the Firm's clients, the participating business segments may agree to share revenue from those transactions. Revenue is generally recognized in the segment responsible for the related product or service on a gross basis, with an allocation to the other segment(s) involved in the transaction. The segment results reflect these revenue-sharing agreements.

Expense Allocation
Where business segments use services provided by corporate support units, or another business segment, the costs of those services are allocated to the respective business segments. The expense is generally allocated based on the actual cost and use of services provided. In contrast, certain costs and investments related to corporate support units, technology and operations not currently leveraged by any LOB, are not allocated to the business segments and are retained in Corporate. Expense retained in Corporate generally includes parent company costs that would not be incurred if the segments were stand-alone businesses; adjustments to align corporate support units; and other items not aligned with a particular business segment.

Funds transfer pricing
Funds transfer pricing is the process by which the Firm allocates interest income and expense to each business segment and transfers the primary interest rate risk and liquidity risk exposures to Treasury and CIO within Corporate. The funds transfer pricing process considers the interest rate risk, liquidity risk and regulatory requirements on a product-by-product basis within each business segment. This process is overseen by senior management and reviewed by the Firm's Treasurer Committee.

Debt expense and preferred stock dividend allocation
As part of the funds transfer pricing process, almost all of the cost of the credit spread component of outstanding unsecured long-term debt and preferred stock dividends is allocated to the reportable business segments, while the balance of the cost is retained in Corporate. The methodology to allocate the cost of unsecured long-term debt and preferred stock dividends to the business segments is aligned with the Firm's process to allocate capital. The allocated cost of unsecured long-term debt is included in a business segment's net interest income, and net income is reduced by preferred stock dividends to arrive at a business segment's net income applicable to common equity.

Business segment capital allocation
The amount of capital assigned to each business is referred to as equity. Periodically, the assumptions and methodologies used to allocate capital are assessed and as a result, the capital allocated to the LOBs may change. Refer to Line of business equity on page 90 for additional information on business segment capital allocation.

Segment Results – Managed Basis

The following tables summarize the Firm's results by segment for the periods indicated.

Year ended December 31,	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking		
(in millions, except ratios)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Total net revenue	**$ 55,883**	$ 52,079	$ 46,485	**$ 38,298**	$ 36,448	$ 34,657	**$ 8,984**	$ 9,059	$ 8,605
Total noninterest expense	**28,896**	27,835	26,062	**21,519**	20,918	19,407	**3,500**	3,386	3,327
Pre-provision profit/(loss)	**26,987**	24,244	20,423	**16,779**	15,530	15,250	**5,484**	5,673	5,278
Provision for credit losses	**4,952**	4,753	5,572	**277**	(60)	(45)	**296**	129	(276)
Net income/(loss)	**16,641**	14,852	9,395	**11,922**	11,773	10,813	**3,924**	4,237	3,539
Return on equity ("ROE")	**31%**	28%	17%	**14%**	16%	14%	**17%**	20%	17%

Year ended December 31,	Asset & Wealth Management			Corporate			Total		
(in millions, except ratios)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Total net revenue	**$ 14,316**	$ 14,076	$ 13,835	**$ 1,211**	$ (128)	$ 1,140	**$118,692**	$111,534	$104,722
Total noninterest expense	**10,515**	10,353	10,218	**1,067**	902	501	**65,497**	63,394	59,515
Pre-provision profit/(loss)	**3,801**	3,723	3,617	**144**	(1,030)	639	**53,195**	48,140	45,207
Provision for credit losses	**61**	53	39	**(1)**	(4)	–	**5,585**	4,871	5,290
Net income/(loss)	**2,833**	2,853	2,337	**1,111**	(1,241)	(1,643)	**36,431**	32,474	24,441
Return on equity ("ROE")	**26%**	31%	25%	**NM**	NM	NM	**15%**	13%	10%

Note: Net income in 2019 and 2018 for each of the business segments reflects the favorable impact of the reduction in the U.S. federal statutory income tax rate as a result of the TCJA.

The following sections provide a comparative discussion of the Firms results by segment as of or for the years ended December 31, 2019 and 2018.

CONSUMER & COMMUNITY BANKING

Consumer & Community Banking offers services to consumers and businesses through bank branches, ATMs, digital (including mobile and online) and telephone banking. CCB is organized into Consumer & Business Banking (including Consumer Banking/Chase Wealth Management and Business Banking), Home Lending (including Home Lending Production, Home Lending Servicing and Real Estate Portfolios) and Card, Merchant Services & Auto. Consumer & Business Banking offers deposit and investment products and services to consumers, and lending, deposit, and cash management and payment solutions to small businesses. Home Lending includes mortgage origination and servicing activities, as well as portfolios consisting of residential mortgages and home equity loans. Card, Merchant Services & Auto issues credit cards to consumers and small businesses, offers payment processing services to merchants, and originates and services auto loans and leases.

Selected income statement data

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Revenue			
Lending- and deposit-related fees	**$ 3,859**	$ 3,624	$ 3,431
Asset management, administration and commissions	**2,499**	2,402	2,212
Mortgage fees and related income	**2,035**	1,252	1,613
Card income	**4,847**	4,554	4,024
All other income	**5,402**	4,428	3,430
Noninterest revenue	**18,642**	16,260	14,710
Net interest income	**37,241**	35,819	31,775
Total net revenue	**55,883**	52,079	46,485
Provision for credit losses	**4,952**	4,753	5,572
Noninterest expense			
Compensation expense	**10,700**	10,534	10,133
Noncompensation expense[(a)]	**18,196**	17,301	15,929
Total noninterest expense	**28,896**	27,835	26,062
Income before income tax expense	**22,035**	19,491	14,851
Income tax expense	**5,394**	4,639	5,456
Net income	**$ 16,641**	$ 14,852	$ 9,395
Revenue by line of business			
Consumer & Business Banking	**$ 26,495**	$ 24,805	$ 21,104
Home Lending	**5,179**	5,484	5,955
Card, Merchant Services & Auto	**24,209**	21,790	19,426
Mortgage fees and related income details:			
Net production revenue	**1,618**	268	636
Net mortgage servicing revenue[(b)]	**417**	984	977
Mortgage fees and related income	**$ 2,035**	$ 1,252	$ 1,613
Financial ratios			
Return on equity	**31%**	28%	17%
Overhead ratio	**52**	53	56

Note: In the discussion and the tables which follow, CCB presents certain financial measures which exclude the impact of PCI loans; these are non-GAAP financial measures.

(a) Included depreciation expense on leased assets of $4.1 billion, $3.4 billion and $2.7 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

(b) Included MSR risk management results of $(165) million, $(111) million and $(242) million for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net income was $16.6 billion, an increase of 12%.

Net revenue was $55.9 billion, an increase of 7%. Net production revenue included approximately $500 million of gains on the sales of certain mortgage loans that were predominantly offset by charges in net interest income for the unwind of the related internal funding from Treasury and CIO associated with these loans. The charges reflect the net present value of that funding and is recognized as interest income in Treasury and CIO. Refer to Corporate on pages 77–78 and Funds Transfer Pricing ("FTP") on page 61 of this Form 10-K for further information.

Net interest income was $37.2 billion, up 4%, and included charges from the loan sales mentioned above. Excluding these charges, net interest income increased, driven by:

- higher loan balances and margin expansion in Card, as well as higher deposit margins and growth in deposit balances in CBB,

partially offset by

- lower loan balances due to loan sales, as well as loan spread compression in Home Lending.

Noninterest revenue was $18.6 billion, up 15%, and included gains from the loan sales mentioned above as well as the impact of the prior-year adjustment of approximately $330 million to the credit card rewards liability. Excluding these notable items, noninterest revenue increased 9%, driven by:

- higher auto lease volume, and
- higher net mortgage production revenue reflecting higher production volumes and margins,

partially offset by

- lower net mortgage servicing revenue driven by lower operating revenue reflecting faster prepayment speeds on lower rates and the impact of reclassifying certain loans to held-for-sale.

Refer to Note 15 for further information regarding changes in value of the MSR asset and related hedges, and mortgage fees and related income.

Noninterest expense was $28.9 billion, up 4%, driven by:

- investments in the business including technology and marketing and higher depreciation on auto lease assets,

partially offset by

- expense efficiencies and lower FDIC charges.

The provision for credit losses was $5.0 billion, an increase of 4%, reflecting:

- an increase in credit card due to
  - higher net charge-offs on loan growth, in line with expectations, and
  - a $500 million addition to the allowance for loan losses reflecting loan growth and higher loss rates, as newer vintages season and become a larger part of the portfolio, compared to a $300 million addition in the prior year

largely offset by

- a decrease in consumer, excluding credit card due to
  - a $650 million reduction in the allowance for loan losses in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies, and a $100 million reduction in the allowance for loan losses in the non credit-impaired residential real estate portfolio, compared to a $250 million reduction in the PCI residential real estate portfolio in the prior year, and
  - a $50 million reduction in the allowance for loan losses in the business banking portfolio

  partially offset by

  - lower net recoveries in the residential real estate portfolio as the prior year benefited from larger recoveries on loan sales.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Total assets	**$ 539,090**	$ 557,441	$ 552,601
Loans:			
Consumer & Business Banking	**27,199**	26,612	25,789
Home equity	**30,163**	36,013	42,751
Residential mortgage	**169,636**	203,859	197,339
Home Lending	**199,799**	239,872	240,090
Card	**168,924**	156,632	149,511
Auto	**61,522**	63,573	66,242
Total loans	**457,444**	486,689	481,632
Core loans	**414,107**	434,466	415,167
Deposits	**718,416**	678,854	659,885
Equity	**52,000**	51,000	51,000
Selected balance sheet data (average)			
Total assets	**$ 542,191**	$ 547,368	$ 532,756
Loans:			
Consumer & Business Banking	**26,608**	26,197	24,875
Home equity	**32,975**	39,133	46,398
Residential mortgage	**186,557**	202,624	190,242
Home Lending	**219,532**	241,757	236,640
Card	**156,325**	145,652	140,024
Auto	**61,862**	64,675	65,395
Student	**–**	–	2,880
Total loans	**464,327**	478,281	469,814
Core loans	**416,694**	419,066	393,598
Deposits	**693,550**	670,388	640,219
Equity	**52,000**	51,000	51,000
Headcount	**127,137**	129,518	133,721

Selected metrics

As of or for the year ended December 31, (in millions, except ratio data)	2019	2018	2017
Credit data and quality statistics			
Nonaccrual loans[a][b]	**$ 3,018**	$ 3,339	$ 4,084
Net charge-offs/(recoveries)[c]			
Consumer & Business Banking	**296**	236	257
Home equity	**(48)**	(7)	63
Residential mortgage	**(50)**	(287)	(16)
Home Lending	**(98)**	(294)	47
Card	**4,848**	4,518	4,123
Auto	**206**	243	331
Student	**–**	–	498 [g]
Total net charge-offs/ (recoveries)	**$ 5,252**	$ 4,703	$ 5,256 [g]
Net charge-off/(recovery) rate[c]			
Consumer & Business Banking	**1.11%**	0.90 %	1.03%
Home equity[d]	**(0.19)**	(0.02)	0.18
Residential mortgage[d]	**(0.03)**	(0.16)	(0.01)
Home Lending[d]	**(0.05)**	(0.14)	0.02
Card	**3.10**	3.10	2.95
Auto	**0.33**	0.38	0.51
Student	**–**	–	NM
Total net charge-offs/ (recovery) rate[d]	**1.20**	1.04	1.21 [g]
30+ day delinquency rate			
Home Lending[e][f]	**0.76%**	0.77%	1.19%
Card	**1.87**	1.83	1.80
Auto	**0.94**	0.93	0.89
90+ day delinquency rate - Card	**0.95**	0.92	0.92
Allowance for loan losses			
Consumer & Business Banking	**$ 746**	$ 796	$ 796
Home Lending, excluding PCI loans	**903**	1,003	1,003
Home Lending – PCI loans[c]	**987**	1,788	2,225
Card	**5,683**	5,184	4,884
Auto	**465**	464	464
Total allowance for loan losses[c]	**$ 8,784**	$ 9,235	$ 9,372

(a) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(b) At December 31, 2019, 2018 and 2017, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million, $2.6 billion and $4.3 billion, respectively. These amounts have been excluded based upon the government guarantee.
(c) Net charge-offs/(recoveries) and the net charge-off/(recovery) rates for the years ended December 31, 2019, 2018 and 2017, excluded $151 million, $187 million and $86 million, respectively, of write-offs in the PCI portfolio. These write-offs decreased the allowance for loan losses for PCI loans. Refer to Summary of changes in the allowance for credit losses on page 117 for further information on PCI write-offs.
(d) Excludes the impact of PCI loans. For the years ended December 31, 2019, 2018 and 2017, the net charge-off/(recovery) rates including the impact of PCI loans were as follows: (1) home equity of (0.15)%, (0.02)% and 0.14%, respectively; (2) residential mortgage of (0.03)%, (0.14)% and (0.01)%, respectively; (3)

Home Lending of (0.05)%, (0.12)% and 0.02%, respectively; and (4) total CCB of 1.14%, 0.98% and 1.12%, respectively.

(e) At December 31, 2019, 2018 and 2017, excluded mortgage loans insured by U.S. government agencies of $1.7 billion, $4.1 billion and $6.2 billion, respectively, that are 30 or more days past due. These amounts have been excluded based upon the government guarantee.

(f) Excludes PCI loans. The 30+ day delinquency rate for PCI loans was 8.44%, 9.16% and 10.13% at December 31, 2019, 2018 and 2017, respectively.

(g) Excluding net charge-offs of $467 million related to the student loan portfolio transfer, the total net charge-off rates for the full year 2017 would have been 1.10%.

Selected metrics

As of or for the year ended December 31, (in billions, except ratios and where otherwise noted)	2019	2018	2017
Business Metrics			
CCB households (in millions)	**62.6**	61.7	61.1
Number of branches	**4,976**	5,036	5,130
Active digital customers (in thousands)[(a)]	**52,421**	49,254	46,694
Active mobile customers (in thousands)[(b)]	**37,297**	33,260	30,056
Debit and credit card sales volume	**$ 1,114.4**	$ 1,016.9	$ 916.9
Consumer & Business Banking			
Average deposits	**$ 678.9**	$ 656.5	$ 625.6
Deposit margin	**2.49%**	2.38%	1.98%
Business banking origination volume	**$ 6.6**	$ 6.7	$ 7.3
Client investment assets	**358.0**	282.5	273.3
Home Lending			
Mortgage origination volume by channel			
Retail	**$ 51.0**	$ 38.3	$ 40.3
Correspondent	**54.2**	41.1	57.3
Total mortgage origination volume[(c)]	**$ 105.2**	$ 79.4	$ 97.6
Total loans serviced (period-end)	**$ 761.4**	$ 789.8	$ 816.1
Third-party mortgage loans serviced (period-end)	**520.8**	519.6	553.5
MSR carrying value (period-end)	**4.7**	6.1	6.0
Ratio of MSR carrying value (period-end) to third-party mortgage loans serviced (period-end)	**0.90%**	1.17%	1.08%
MSR revenue multiple[(d)]	**2.65x**	3.34x	3.09x
Card, excluding Commercial Card			
Credit card sales volume	**$ 762.8**	$ 692.4	$ 622.2
New accounts opened (in millions)	**7.8**	7.8	8.4
Card Services			
Net revenue rate	**11.52%**	11.27%	10.57%
Merchant Services			
Merchant processing volume	**$ 1,511.5**	$ 1,366.1	$ 1,191.7
Auto			
Loan and lease origination volume	**$ 34.0**	$ 31.8	$ 33.3
Average Auto operating lease assets	**21.6**	18.8	15.2

(a) Users of all web and/or mobile platforms who have logged in within the past 90 days.

(b) Users of all mobile platforms who have logged in within the past 90 days.

(c) Firmwide mortgage origination volume was $115.9 billion, $86.9 billion and $107.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

(d) Represents the ratio of MSR carrying value (period-end) to third-party mortgage loans serviced (period-end) divided by the ratio of loan servicing-related revenue to third-party mortgage loans serviced (average).

CORPORATE & INVESTMENT BANK

The Corporate & Investment Bank, which consists of Banking and Markets & Securities Services, offers a broad suite of investment banking, market-making, prime brokerage, and treasury and securities products and services to a global client base of corporations, investors, financial institutions, government and municipal entities. Banking offers a full range of investment banking products and services in all major capital markets, including advising on corporate strategy and structure, capital-raising in equity and debt markets, as well as loan origination and syndication. Banking also includes Treasury Services, which provides transaction services, consisting of cash management and liquidity solutions. Markets & Securities Services is a global market-maker in cash securities and derivative instruments, and also offers sophisticated risk management solutions, prime brokerage, and research. Markets & Securities Services also includes Securities Services, a leading global custodian which provides custody, fund accounting and administration, and securities lending products principally for asset managers, insurance companies and public and private investment funds.

Selected income statement data

Year ended December 31, (in millions)	2019	2018	2017
Revenue			
Investment banking fees	**$ 7,575**	$ 7,473	$ 7,356
Principal transactions	**14,396**	12,271	10,873
Lending- and deposit-related fees	**1,518**	1,497	1,531
Asset management, administration and commissions	**4,545**	4,488	4,207
All other income	**1,108**	1,239	572
Noninterest revenue	**29,142**	26,968	24,539
Net interest income	**9,156**	9,480	10,118
Total net revenue[(a)]	**38,298**	36,448	34,657
Provision for credit losses	**277**	(60)	(45)
Noninterest expense			
Compensation expense	**10,618**	10,215	9,531
Noncompensation expense	**10,901**	10,703	9,876
Total noninterest expense	**21,519**	20,918	19,407
Income before income tax expense	**16,502**	15,590	15,295
Income tax expense	**4,580**	3,817	4,482
Net income	**$ 11,922**	$ 11,773	$ 10,813

(a) Includes tax-equivalent adjustments, predominantly due to income tax credits related to alternative energy investments; income tax credits and amortization of the cost of investments in affordable housing projects; and tax-exempt income from municipal bonds of $2.3 billion, $1.7 billion and $2.4 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

Selected income statement data

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Financial ratios			
Return on equity	**14%**	16%	14%
Overhead ratio	**56**	57	56
Compensation expense as percentage of total net revenue	**28**	28	28
Revenue by business			
Investment Banking	**$ 7,215**	$ 6,987	$ 6,852
Treasury Services	**4,565**	4,697	4,172
Lending	**1,331**	1,298	1,429
Total Banking	**13,111**	12,982	12,453
Fixed Income Markets	**14,418**	12,706	12,812
Equity Markets	**6,494**	6,888	5,703
Securities Services	**4,154**	4,245	3,917
Credit Adjustments & Other[(a)]	**121**	(373)	(228)
Total Markets & Securities Services	**25,187**	23,466	22,204
Total net revenue	**$38,298**	$36,448	$34,657

(a) Includes credit valuation adjustments ("CVA") managed centrally within CIB and funding valuation adjustments ("FVA") on derivatives, which are primarily reported in principal transactions revenue. Results are presented net of associated hedging activities and net of CVA and FVA amounts allocated to Fixed Income Markets and Equity Markets. Refer to Notes 2, 3 and 24 for additional information.

2019 compared with 2018

Net income was $11.9 billion, up 1%.

Net revenue was $38.3 billion, up 5%.

Banking revenue was $13.1 billion, up 1%.

- Investment Banking revenue was $7.2 billion, up 3%, with higher debt underwriting fees, largely offset by lower advisory and equity underwriting fees. The Firm maintained its #1 ranking for Global Investment Banking fees with overall share gains, according to Dealogic.
  - Debt underwriting fees were $3.5 billion, up 8%, reflecting wallet share gains and increased activity in investment-grade and high-yield bonds.
  - Advisory fees were $2.4 billion, down 5%, and Equity underwriting fees were $1.7 billion, down 1%, driven by a decline in industry-wide fees despite wallet share gains.
- Treasury Services revenue was $4.6 billion, down 3%, driven by deposit margin compression predominantly offset by higher balances and fee growth.
- Lending revenue was $1.3 billion, up 3%, with higher net interest income largely offset by losses on hedges of accrual loans.

Markets & Securities Services revenue was $25.2 billion, up 7%. Markets revenue was $20.9 billion, up 7% which included a gain on the IPO of Tradeweb in the second quarter of 2019. Prior year results included approximately $500 million of fair value gains recorded in the first quarter of 2018 related to the adoption of the recognition and measurement accounting guidance for certain equity investments previously held at cost.

- Fixed Income Markets revenue was $14.4 billion, up 13%, reflecting an overall strong performance, notably in Securitized Products. The increase in 2019 also reflected the impact of challenging market conditions in Credit and Rates in the fourth quarter of 2018.
- Equity Markets revenue was $6.5 billion, down 6%, compared to a strong prior year, driven by lower client activity in derivatives partially offset by higher client activity in Cash Equities.
- Securities Services revenue was $4.2 billion, down 2%, driven by deposit margin compression and the impact of a business exit largely offset by organic growth.
- Credit Adjustments & Other was a gain of $121 million reflecting tighter funding spreads on derivatives, compared with a loss of $373 million in the prior year.

The provision for credit losses was $277 million, compared with a $60 million net benefit in the prior year. This increase reflects additions to the allowance for credit losses in the current year on select client downgrades, and a benefit related to a single name in the Oil & Gas portfolio and higher recoveries, both in the prior year.

Noninterest expense was $21.5 billion, up 3%, predominantly driven by higher volume-related expenses and investments, including front office and technology staff hires, as well as higher legal expense, partially offset by lower FDIC charges.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Assets	**$ 908,153**	$ 903,051	$ 826,384
Loans:			
Loans retained[(a)]	**121,733**	129,389	108,765
Loans held-for-sale and loans at fair value	**10,112**	13,050	4,321
Total loans	**131,845**	142,439	113,086
Core loans	**131,672**	142,122	112,754
Equity	**80,000**	70,000	70,000
Selected balance sheet data (average)			
Assets	**$ 985,544**	$ 922,758	$ 857,060
Trading assets-debt and equity instruments	**404,363**	349,169	342,124
Trading assets-derivative receivables	**48,196**	60,552	56,466
Loans:			
Loans retained[(a)]	**122,371**	114,417	108,368
Loans held-for-sale and loans at fair value	**8,609**	6,412	4,995
Total loans	**130,980**	120,829	113,363
Core loans	**130,810**	120,560	113,006
Equity	**80,000**	70,000	70,000
Headcount	**55,991**	54,480	51,181

(a) Loans retained includes credit portfolio loans, loans held by consolidated Firm-administered multi-seller conduits, trade finance loans, other held-for-investment loans and overdrafts.

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	2019	2018	2017
Credit data and quality statistics			
Net charge-offs/(recoveries)	**$ 183**	$ 93	$ 71
Nonperforming assets:			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	**308**	443	812
Nonaccrual loans held-for-sale and loans at fair value	**95**	220	–
Total nonaccrual loans	**403**	663	812
Derivative receivables	**30**	60	130
Assets acquired in loan satisfactions	**70**	57	85
Total nonperforming assets	**503**	780	1,027
Allowance for credit losses:			
Allowance for loan losses	**1,202**	1,199	1,379
Allowance for lending-related commitments	**848**	754	727
Total allowance for credit losses	**2,050**	1,953	2,106
Net charge-off/(recovery) rate[(b)]	**0.15%**	0.08%	0.07%
Allowance for loan losses to period-end loans retained	**0.99**	0.93	1.27
Allowance for loan losses to period-end loans retained, excluding trade finance and conduits[(c)]	**1.31**	1.24	1.92
Allowance for loan losses to nonaccrual loans retained[(a)]	**390**	271	170
Nonaccrual loans to total period-end loans	**0.31**	0.47	0.72

(a) Allowance for loan losses of $110 million, $174 million and $316 million were held against these nonaccrual loans at December 31, 2019, 2018 and 2017, respectively.
(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.
(c) Management uses allowance for loan losses to period-end loans retained, excluding trade finance and conduits, a non-GAAP financial measure, to provide a more meaningful assessment of CIB's allowance coverage ratio.

Investment banking fees

	Year ended December 31,		
(in millions)	2019	2018	2017
Advisory	**$ 2,377**	$ 2,509	$ 2,150
Equity underwriting	**1,666**	1,684	1,468
Debt underwriting[(a)]	**3,532**	3,280	3,738
Total investment banking fees	**$ 7,575**	$ 7,473	$ 7,356

(a) Represents long-term debt and loan syndications.

League table results – wallet share

Year ended December 31,	2019			2018			2017		
		Rank	Share		Rank	Share		Rank	Share
Based on fees[a]									
M&A[b]									
Global	#	**2**	**9.2%**	#	2	8.7%	#	2	8.4%
U.S.		**2**	**9.4**		2	8.9		2	9.0
Equity and equity-related[c]									
Global		**1**	**9.4**		1	9.0		2	7.1
U.S.		**1**	**13.4**		1	12.3		1	11.5
Long-term debt[d]									
Global		**1**	**7.8**		1	7.2		1	7.8
U.S.		**1**	**12.0**		1	11.2		2	11.1
Loan syndications									
Global		**1**	**10.1**		1	9.7		1	9.3
U.S.		**1**	**12.8**		1	12.3		1	10.9
Global investment banking fees[e]	#	**1**	**9.0%**	#	1	8.6%	#	1	8.1%

(a) Source: Dealogic as of January 2, 2020. Reflects the ranking of revenue wallet and market share.
(b) Global M&A excludes any withdrawn transactions. U.S. M&A revenue wallet represents wallet from client parents based in the U.S.
(c) Global equity and equity-related ranking includes rights offerings and Chinese A-Shares.
(d) Long-term debt rankings include investment-grade, high-yield, supranationals, sovereigns, agencies, covered bonds, asset-backed securities ("ABS") and mortgage-backed securities ("MBS"); and exclude money market, short-term debt, and U.S. municipal securities.
(e) Global investment banking fees exclude money market, short-term debt and shelf deals.

Markets revenue

The following table summarizes select income statement data for the Markets businesses. Markets includes both Fixed Income Markets and Equity Markets. Markets revenue comprises principal transactions, fees, commissions and other income, as well as net interest income. The Firm assesses its Markets business performance on a total revenue basis, as offsets may occur across revenue line items. For example, securities that generate net interest income may be risk-managed by derivatives that are recorded in principal transactions revenue. Refer to Notes 6 and 7 for a description of the composition of these income statement line items.

Principal transactions reflects revenue on financial instruments and commodities transactions that arise from client-driven market-making activity. Principal transactions revenue includes amounts recognized upon executing new transactions with market participants, as well as "inventory-related revenue", which is revenue recognized from gains and losses on derivatives and other instruments that the Firm has been holding in anticipation of, or in response to, client demand, and changes in the fair value of instruments used by the Firm to actively manage the risk exposure arising from such inventory. Principal transactions revenue recognized upon executing new transactions with market participants is driven by many factors including the level of client activity, the bid-offer spread (which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa), market liquidity and volatility. These factors are interrelated and sensitive to the same factors that drive inventory-related revenue, which include general market conditions, such as interest rates, foreign exchange rates, credit spreads, and equity and commodity prices, as well as other macroeconomic conditions.

For the periods presented below, the predominant source of principal transactions revenue was the amount recognized upon executing new transactions.

Year ended December 31, (in millions, except where otherwise noted)	2019			2018			2017		
	Fixed Income Markets	Equity Markets	Total Markets	Fixed Income Markets	Equity Markets	Total Markets	Fixed Income Markets	Equity Markets	Total Markets
Principal transactions	**$ 8,786**	**$ 5,739**	**$ 14,525**	$ 7,560	$ 5,566	$ 13,126	$ 7,393	$ 3,855	$ 11,248
Lending- and deposit-related fees	**198**	**7**	**205**	197	6	203	191	6	197
Asset management, administration and commissions	**407**	**1,775**	**2,182**	410	1,794	2,204	390	1,635	2,025
All other income	**872**	**8**	**880**	952	22	974	436	(21)	415
Noninterest revenue	**10,263**	**7,529**	**17,792**	9,119	7,388	16,507	8,410	5,475	13,885
Net interest income[a]	**4,155**	**(1,035)**	**3,120**	3,587	(500)	3,087	4,402	228	4,630
Total net revenue	**$ 14,418**	**$ 6,494**	**$ 20,912**	$ 12,706	$ 6,888	$ 19,594	$ 12,812	$ 5,703	$ 18,515
Loss days[b]			1			5			4

(a) The decline in Markets net interest income in 2018 was driven by higher funding costs.
(b) Loss days represent the number of days for which Markets posted losses. The loss days determined under this measure differ from the disclosure of daily market risk-related gains and losses for the Firm in the value-at-risk ("VaR") back-testing discussion on pages 121–123.

Selected metrics

As of or for the year ended December 31, (in millions, except where otherwise noted)		**2019**		2018		2017
Assets under custody ("AUC") by asset class (period-end) (in billions):						
Fixed Income	**$**	**13,498**	$	12,440	$	13,043
Equity		**10,100**		8,078		7,863
Other[(a)]		**3,233**		2,699		2,563
Total AUC	**$**	**26,831**	$	23,217	$	23,469
Client deposits and other third party liabilities (average)[(b)]	**$**	**464,770**	$	434,422	$	408,911

(a) Consists of mutual funds, unit investment trusts, currencies, annuities, insurance contracts, options and other contracts.
(b) Client deposits and other third-party liabilities pertain to the Treasury Services and Securities Services businesses.

International metrics

As of or for the year ended December 31, (in millions, except where otherwise noted)		**2019**		2018[(c)]		2017[(c)]
Total net revenue[(a)]						
Europe/Middle East/Africa	**$**	**11,718**	$	12,260	$	11,590
Asia-Pacific		**5,330**		5,077		4,313
Latin America/Caribbean		**1,549**		1,473		1,232
Total international net revenue		**18,597**		18,810		17,135
North America		**19,701**		17,638		17,522
Total net revenue	**$**	**38,298**	$	36,448	$	34,657
Loans retained (period-end)[(a)]						
Europe/Middle East/Africa	**$**	**23,056**	$	24,842	$	23,689
Asia-Pacific		**15,144**		17,192		15,385
Latin America/Caribbean		**6,189**		6,515		5,895
Total international loans		**44,389**		48,549		44,969
North America		**77,344**		80,840		63,796
Total loans retained	**$**	**121,733**	$	129,389	$	108,765
Client deposits and other third-party liabilities (average)[(b)]						
Europe/Middle East/Africa	**$**	**174,477**	$	162,846	$	154,654
Asia-Pacific		**90,364**		82,867		76,673
Latin America/Caribbean		**29,027**		26,668		25,490
Total international	**$**	**293,868**	$	272,381	$	256,817
North America		**170,902**		162,041		152,094
Total client deposits and other third-party liabilities	**$**	**464,770**	$	434,422	$	408,911
AUC (period-end)[(b)] **(in billions)**						
North America	**$**	**16,855**	$	14,359	$	13,971
All other regions		**9,976**		8,858		9,498
Total AUC	**$**	**26,831**	$	23,217	$	23,469

(a) Total net revenue and loans retained (excluding loans held-for-sale and loans at fair value) are based on the location of the trading desk, booking location, or domicile of the client, as applicable.
(b) Client deposits and other third-party liabilities pertaining to the Treasury Services and Securities Services businesses, and AUC, are based on the domicile of the client.
(c) The prior period amounts have been revised to conform with the current period presentation.

Commercial Banking provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management products across three primary client segments: Middle Market Banking, Corporate Client Banking and Commercial Real Estate Banking. Other includes amounts not aligned with a primary client segment.

Middle Market Banking covers small business and midsized corporations, local governments and nonprofit clients.

Corporate Client Banking covers large corporations.

Commercial Real Estate Banking covers investors, developers, and owners of multifamily, office, retail, industrial and affordable housing properties.

Selected income statement data

Year ended December 31, (in millions)	2019	2018	2017
Revenue			
Lending- and deposit-related fees	**$ 913**	$ 870	$ 919
All other income[(a)]	**1,517**	1,473	1,603
Noninterest revenue	**2,430**	2,343	2,522
Net interest income	**6,554**	6,716	6,083
Total net revenue[(b)]	**8,984**	9,059	8,605
Provision for credit losses	**296**	129	(276)
Noninterest expense			
Compensation expense	**1,785**	1,694	1,534
Noncompensation expense	**1,715**	1,692	1,793
Total noninterest expense	**3,500**	3,386	3,327
Income before income tax expense	**5,188**	5,544	5,554
Income tax expense	**1,264**	1,307	2,015
Net income	**$ 3,924**	$ 4,237	$ 3,539

(a) Effective in the first quarter of 2019, includes revenue from investment banking products, commercial card transactions and asset management fees. The prior period amounts have been revised to conform with the current period presentation.
(b) Total net revenue included tax-equivalent adjustments from income tax credits related to equity investments in designated community development entities and in entities established for rehabilitation of historic properties, as well as tax-exempt income related to municipal financing activities of $460 million, $444 million and $699 million for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net income was $3.9 billion, a decrease of 7%.

Net revenue was $9.0 billion, a decrease of 1%. Net interest income was $6.6 billion, a decrease of 2%, predominantly driven by lower deposit margins. Noninterest revenue was $2.4 billion, an increase of 4%, driven by higher investment banking revenue, predominantly due to increased equity underwriting and M&A activity, and growth in lending and deposit related fees.

Noninterest expense was $3.5 billion, an increase of 3%, driven by continued investments in the business, largely offset by lower FDIC charges.

The provision for credit losses was $296 million, up from $129 million in the prior year. The increase in the provision reflects additions to the allowance for credit losses on select client downgrades in the current year and higher recoveries in the prior year.

CB product revenue consists of the following:

Lending includes a variety of financing alternatives, which are primarily provided on a secured basis; collateral includes receivables, inventory, equipment, real estate or other assets. Products include term loans, revolving lines of credit, bridge financing, asset-based structures, leases, and standby letters of credit.

Treasury services includes revenue from a broad range of products and services that enable CB clients to manage payments and receipts, as well as invest and manage funds.

Investment banking includes revenue from a range of products providing CB clients with sophisticated capital-raising alternatives, as well as balance sheet and risk management tools through advisory, equity underwriting, and loan syndications. Revenue from Fixed Income and Equity Markets products used by CB clients is also included.

Other product revenue primarily includes tax-equivalent adjustments generated from Community Development Banking activities and certain income derived from principal transactions.

Selected income statement data (continued)

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Revenue by product			
Lending	**$ 4,057**	$ 4,049	$ 4,094
Treasury services	**3,920**	4,074	3,444
Investment banking[a]	**919**	852	805
Other	**88**	84	262
Total Commercial Banking net revenue	**$ 8,984**	$ 9,059	$ 8,605
Investment banking revenue, gross[b]	**$ 2,744**	$ 2,491	$ 2,385
Revenue by client segment			
Middle Market Banking	**$ 3,702**	$ 3,708	$ 3,341
Corporate Client Banking	**2,994**	2,984	2,727
Commercial Real Estate Banking[c]	**2,169**	2,249	2,416
Other[c]	**119**	118	121
Total Commercial Banking net revenue	**$ 8,984**	$ 9,059	$ 8,605
Financial ratios			
Return on equity	**17%**	20%	17%
Overhead ratio	**39**	37	39

(a) Includes CB's share of revenue from investment banking products sold to CB clients through the CIB.
(b) Refer to page 60 for a discussion of revenue sharing.
(c) Effective in the first quarter of 2019, client segment data includes Commercial Real Estate Banking which comprises the former Commercial Term Lending and Real Estate Banking client segments, and Community Development Banking (previously part of Other). The prior period amounts have been revised to conform with the current period presentation.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Total assets	**$ 220,514**	$ 220,229	$ 221,228
Loans:			
Loans retained	**207,287**	204,219	202,400
Loans held-for-sale and loans at fair value	**1,009**	1,978	1,286
Total loans	**$ 208,296**	$ 206,197	$ 203,686
Core loans	**208,181**	206,039	203,469
Equity	**22,000**	20,000	20,000
Period-end loans by client segment			
Middle Market Banking	**$ 54,188**	$ 56,656	$ 56,965
Corporate Client Banking	**51,165**	48,343	46,963
Commercial Real Estate Banking[(a)]	**101,951**	100,088	98,297
Other[(a)]	**992**	1,110	1,461
Total Commercial Banking loans	**$ 208,296**	$ 206,197	$ 203,686
Selected balance sheet data (average)			
Total assets	**$ 218,896**	$ 218,259	$ 217,047
Loans:			
Loans retained	**206,837**	204,243	197,203
Loans held-for-sale and loans at fair value	**1,082**	1,258	909
Total loans	**$ 207,919**	$ 205,501	$ 198,112
Core loans	**207,787**	205,320	197,846
Client deposits and other third-party liabilities	**172,734**	170,901	177,018
Equity	**22,000**	20,000	20,000
Average loans by client segment			
Middle Market Banking	**$ 55,690**	$ 57,092	$ 55,474
Corporate Client Banking	**50,360**	47,780	46,037
Commercial Real Estate Banking[(a)]	**100,884**	99,243	95,038
Other[(a)]	**985**	1,386	1,563
Total Commercial Banking loans	**$ 207,919**	$ 205,501	$ 198,112
Headcount	**11,629**	11,042	10,061

(a) Effective in the first quarter of 2019, client segment data includes Commercial Real Estate Banking which comprises the former Commercial Term Lending and Real Estate Banking client segments, and Community Development Banking (previously part of Other). The prior period amounts have been revised to conform with the current period presentation.

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	2019	2018	2017
Credit data and quality statistics			
Net charge-offs/(recoveries)	**$ 160**	$ 53	$ 39
Nonperforming assets			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	**498**	511	617
Nonaccrual loans held-for-sale and loans at fair value	**–**	–	–
Total nonaccrual loans	**498**	511	617
Assets acquired in loan satisfactions	**25**	2	3
Total nonperforming assets	**523**	513	620
Allowance for credit losses:			
Allowance for loan losses	**2,780**	2,682	2,558
Allowance for lending-related commitments	**293**	254	300
Total allowance for credit losses	**3,073**	2,936	2,858
Net charge-off/(recovery) rate[(b)]	**0.08%**	0.03%	0.02%
Allowance for loan losses to period-end loans retained	**1.34**	1.31	1.26
Allowance for loan losses to nonaccrual loans retained[(a)]	**558**	525	415
Nonaccrual loans to period-end total loans	**0.24**	0.25	0.30

(a) Allowance for loan losses of $114 million, $92 million and $92 million was held against nonaccrual loans retained at December 31, 2019, 2018 and 2017, respectively.

(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.

ASSET & WEALTH MANAGEMENT

Asset & Wealth Management, with client assets of $3.2 trillion, is a global leader in investment and wealth management. AWM clients include institutions, high-net-worth individuals and retail investors in major markets throughout the world. AWM offers investment management across most major asset classes including equities, fixed income, alternatives and money market funds. AWM also offers multi-asset investment management, providing solutions for a broad range of clients' investment needs. For Wealth Management clients, AWM also provides retirement products and services, brokerage and banking services including trusts and estates, loans, mortgages and deposits. The majority of AWM's client assets are in actively managed portfolios.

Selected income statement data

Year ended December 31, (in millions, except ratios and headcount)	2019	2018	2017
Revenue			
Asset management, administration and commissions	**$10,212**	$10,171	$ 9,856
All other income	**604**	368	600
Noninterest revenue	**10,816**	10,539	10,456
Net interest income	**3,500**	3,537	3,379
Total net revenue	**14,316**	14,076	13,835
Provision for credit losses	**61**	53	39
Noninterest expense			
Compensation expense	**5,705**	5,495	5,317
Noncompensation expense	**4,810**	4,858	4,901
Total noninterest expense	**10,515**	10,353	10,218
Income before income tax expense	**3,740**	3,670	3,578
Income tax expense	**907**	817	1,241
Net income	**$ 2,833**	$ 2,853	$ 2,337
Revenue by line of business			
Asset Management	**$ 7,254**	$ 7,163	$ 7,257
Wealth Management	**7,062**	6,913	6,578
Total net revenue	**$14,316**	$14,076	$13,835
Financial ratios			
Return on common equity	**26%**	31%	25%
Overhead ratio	**73**	74	74
Pre-tax margin ratio:			
Asset Management	**26**	26	22
Wealth Management	**26**	26	30
Asset & Wealth Management	**26**	26	26
Headcount	**24,191**	23,920	22,975
Number of Wealth Management client advisors	**2,890**	2,865	2,605

2019 compared with 2018

Net income was $2.8 billion, a decrease of 1%.

Net revenue was $14.3 billion, an increase of 2%. Net interest income was $3.5 billion, down 1%, driven by deposit margin compression, predominantly offset by loan and deposit growth. Noninterest revenue was $10.8 billion, up 3%, driven by higher net investment valuation gains and growth in fees on higher average market levels, partially offset by a shift in the mix toward lower fee products.

Revenue from Asset Management was $7.3 billion, up 1%, driven by higher investment valuation gains. The impact on fees from higher average market levels was more than offset by a shift in the mix toward lower fee products.

Revenue from Wealth Management was $7.1 billion, up 2%, driven by loan and deposit growth, growth in fees on the cumulative impact of net inflows and higher average market levels and brokerage activity, largely offset by deposit margin compression.

The provision for credit losses was $61 million, up from $53 million in the prior year, reflecting higher net-charge offs, as well as net additions to the allowance for loan losses, predominantly due to loan growth.

Noninterest expense was $10.5 billion, an increase of 2%, predominantly driven by investments in the business as well as volume- and revenue-related expenses.

AWM's lines of business consist of the following:

Asset Management provides comprehensive global investment services, including asset management, pension analytics, asset-liability management and active risk-budgeting strategies.

Wealth Management offers investment advice and wealth management, including investment management, capital markets and risk management, tax and estate planning, banking, lending and specialty-wealth advisory services.

AWM's client segments consist of the following:

Private Banking clients include high- and ultra-high-net-worth individuals, families, money managers, business owners and small corporations worldwide.

Institutional clients include both corporate and public institutions, endowments, foundations, nonprofit organizations and governments worldwide.

Retail clients include financial intermediaries and individual investors.

Asset Management has two high-level measures of its overall fund performance.

- **Percentage of mutual fund assets under management in funds rated 4- or 5-star:** Mutual fund rating services rank funds based on their risk-adjusted performance over various periods. A 5-star rating is the best rating and represents the top 10% of industry-wide ranked funds. A 4-star rating represents the next 22.5% of industry-wide ranked funds. A 3-star rating represents the next 35% of industry-wide ranked funds. A 2-star rating represents the next 22.5% of industry-wide ranked funds. A 1-star rating is the worst rating and represents the bottom 10% of industry-wide ranked funds. The "overall Morningstar rating" is derived from a weighted average of the performance associated with a fund's three-, five- and ten-year (if applicable) Morningstar Rating metrics. For U.S. domiciled funds, separate star ratings are given at the individual share class level. The Nomura "star rating" is based on three-year risk-adjusted performance only. Funds with fewer than three years of history are not rated and hence excluded from this analysis. All ratings, the assigned peer categories and the asset values used to derive this analysis are sourced from these fund rating providers mentioned in footnote (a). The data providers re-denominate the asset values into U.S. dollars. This % of AUM is based on star ratings at the share class level for U.S. domiciled funds, and at a "primary share class" level to represent the star rating of all other funds except for Japan where Nomura provides ratings at the fund level. The "primary share class", as defined by Morningstar, denotes the share class recommended as being the best proxy for the portfolio and in most cases will be the most retail version (based upon annual management charge, minimum investment, currency and other factors). The performance data could have been different if all funds/accounts would have been included. Past performance is not indicative of future results.
- **Percentage of mutual fund assets under management in funds ranked in the 1st or 2nd quartile (one, three and five years):** All quartile rankings, the assigned peer categories and the asset values used to derive this analysis are sourced from the fund ranking providers mentioned in footnote (b). Quartile rankings are done on the net-of-fee absolute return of each fund. The data providers re-denominate the asset values into U.S. dollars. This % of AUM is based on fund performance and associated peer rankings at the share class level for U.S. domiciled funds and at the "primary share class" level or fund level for all other funds. The "primary share class", as defined by Morningstar, denotes the share class recommended as being the best proxy for the portfolio and in most cases will be the most retail version (based upon annual management charge, minimum investment, currency and other factors). Where peer group rankings given for a fund are in more than one "primary share class" territory both rankings are included to reflect local market competitiveness. The performance data could have been different if all funds/accounts would have been included. Past performance is not indicative of future results.

Selected metrics

As of or for the year ended December 31, (in millions, except ranking data and ratios)	**2019**	2018	2017
% of JPM mutual fund assets rated as 4- or 5-star[(a)]	**61%**	58%	60%
% of JPM mutual fund assets ranked in 1st or 2nd quartile:[(b)]			
1 year	**59**	68	64
3 years	**77**	73	75
5 years	**75**	85	83
Selected balance sheet data (period-end)[(c)]			
Total assets	**$ 182,004**	$ 170,024	$ 151,909
Loans	**160,535**	147,632	130,640
Core loans	**160,535**	147,632	130,640
Deposits	**147,804**	138,546	146,407
Equity	**10,500**	9,000	9,000
Selected balance sheet data (average)[(c)]			
Total assets	**$ 170,764**	$ 160,269	$ 144,206
Loans	**149,655**	138,622	123,464
Core loans	**149,655**	138,622	123,464
Deposits	**140,118**	137,272	148,982
Equity	**10,500**	9,000	9,000
Credit data and quality statistics[(c)]			
Net charge-offs	**$ 31**	$ 10	$ 14
Nonaccrual loans	**116**	263	375
Allowance for credit losses:			
Allowance for loan losses	**354**	326	290
Allowance for lending-related commitments	**19**	16	10
Total allowance for credit losses	**373**	342	300
Net charge-off rate	**0.02%**	0.01%	0.01%
Allowance for loan losses to period-end loans	**0.22**	0.22	0.22
Allowance for loan losses to nonaccrual loans	**305**	124	77
Nonaccrual loans to period-end loans	**0.07**	0.18	0.29

(a) Represents the Nomura "star rating" for Japan domiciled funds and Morningstar for all other domiciled funds. Includes only Asset Management retail open-ended mutual funds that have a rating. Excludes money market funds, Undiscovered Managers Fund, and Brazil domiciled funds.

(b) Quartile ranking sourced from Lipper, Morningstar, Nomura and Fund Doctor based on country of domicile. Includes only Asset Management retail open-ended mutual funds that are ranked by the aforementioned sources. Excludes money market funds, Undiscovered Managers Fund, and Brazil domiciled funds.

(c) Loans, deposits and related credit data and quality statistics relate to the Wealth Management business.

Client assets

2019 compared with 2018

Client assets were $3.2 trillion, an increase of 18%. Assets under management were $2.4 trillion, an increase of 19% driven by the impact of higher market levels and net inflows into both long-term and liquidity products.

Client assets

December 31, (in billions)	2019	2018	2017
Assets by asset class			
Liquidity	$ 542	$ 480	$ 459
Fixed income	602	464	474
Equity	474	384	428
Multi-asset and alternatives	746	659	673
Total assets under management	2,364	1,987	2,034
Custody/brokerage/ administration/deposits	862	746	755
Total client assets	$ 3,226	$ 2,733	$ 2,789
Memo:			
Alternatives client assets[(a)]	$ 185	$ 171	$ 166
Assets by client segment			
Private Banking	$ 672	$ 552	$ 526
Institutional	1,074	926	968
Retail	618	509	540
Total assets under management	$ 2,364	$ 1,987	$ 2,034
Private Banking	$ 1,504	$ 1,274	$ 1,256
Institutional	1,099	946	990
Retail	623	513	543
Total client assets	$ 3,226	$ 2,733	$ 2,789

(a) Represents assets under management, as well as client balances in brokerage accounts.

Client assets (continued)

Year ended December 31, (in billions)	2019	2018	2017
Assets under management rollforward			
Beginning balance	$ 1,987	$ 2,034	$ 1,771
Net asset flows:			
Liquidity	60	31	9
Fixed income	106	(1)	36
Equity	(10)	2	(11)
Multi-asset and alternatives	4	24	43
Market/performance/other impacts	217	(103)	186
Ending balance, December 31	$ 2,364	$ 1,987	$ 2,034
Client assets rollforward			
Beginning balance	$ 2,733	$ 2,789	$ 2,453
Net asset flows	178	88	93
Market/performance/other impacts	315	(144)	243
Ending balance, December 31	$ 3,226	$ 2,733	$ 2,789

International metrics

Year ended December 31, (in billions, except where otherwise noted)	2019	2018	2017
Total net revenue (in millions)[(a)]			
Europe/Middle East/Africa[(b)]	$ 2,869	$ 2,850	$ 2,837
Asia-Pacific[(b)]	1,509	1,538	1,405
Latin America/Caribbean[(b)]	724	755	702
Total international net revenue	5,102	5,143	4,944
North America	9,214	8,933	8,891
Total net revenue	$ 14,316	$ 14,076	$ 13,835
Assets under management			
Europe/Middle East/Africa[(b)]	$ 428	$ 366	$ 393
Asia-Pacific[(b)]	192	163	161
Latin America/Caribbean[(b)]	62	51	51
Total international assets under management	682	580	605
North America	1,682	1,407	1,429
Total assets under management	$ 2,364	$ 1,987	$ 2,034
Client assets			
Europe/Middle East/Africa[(b)]	$ 520	$ 440	$ 466
Asia-Pacific[(b)]	272	226	230
Latin America/Caribbean[(b)]	147	125	124
Total international client assets	939	791	820
North America	2,287	1,942	1,969
Total client assets	$ 3,226	$ 2,733	$ 2,789

(a) Regional revenue is based on the domicile of the client.

(b) The prior period amounts have been revised to conform with the current period presentation.

The Corporate segment consists of Treasury and Chief Investment Office and Other Corporate, which includes corporate staff functions and expense that is centrally managed. Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks. The major Other Corporate functions include Real Estate, Technology, Legal, Corporate Finance, Human Resources, Internal Audit, Risk Management, Compliance, Control Management, Corporate Responsibility and various Other Corporate groups.

Selected income statement and balance sheet data

Year ended December 31, (in millions, except headcount)	2019	2018	2017
Revenue			
Principal transactions	**$ (461)**	$ (426)	$ 284
Investment securities gains/(losses)	**258**	(395)	(66)
All other income[a]	**89**	558	867
Noninterest revenue	**(114)**	(263)	1,085
Net interest income	**1,325**	135	55
Total net revenue[b]	**1,211**	(128)	1,140
Provision for credit losses	**(1)**	(4)	–
Noninterest expense[c]	**1,067**	902	501
Income/(loss) before income tax expense/(benefit)	**145**	(1,026)	639
Income tax expense/(benefit)	**(966)**	215	2,282
Net income/(loss)	**$ 1,111**	$ (1,241)	$ (1,643)
Total net revenue			
Treasury and CIO	**2,032**	510	566
Other Corporate	**(821)**	(638)	574
Total net revenue	**$ 1,211**	$ (128)	$ 1,140
Net income/(loss)			
Treasury and CIO	**1,394**	(69)	60
Other Corporate	**(283)**	(1,172)	(1,703)
Total net income/(loss)	**$ 1,111**	$ (1,241)	$ (1,643)
Total assets (period-end)	**$837,618**	$ 771,787	$ 781,478
Loans (period-end)	**1,649**	1,597	1,653
Core loans[d]	**1,649**	1,597	1,653
Headcount	**38,033**	37,145	34,601

(a) Included revenue related to a legal settlement of $645 million for the year ended December 31, 2017.

(b) Included tax-equivalent adjustments, driven by tax-exempt income from municipal bonds, of $314 million, $382 million and $905 million for the years ended December 31, 2019, 2018 and 2017, respectively. The decrease in taxable-equivalent adjustments for the year ended December 31, 2018, reflects the impact of the TCJA.

(c) Included a net legal benefit of $(214) million, $(241) million and $(593) million for the years ended December 31, 2019, 2018 and 2017, respectively.

(d) Average core loans were $1.7 billion, $1.7 billion and $1.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net Income was $1.1 billion compared with a net loss of $1.2 billion in the prior year.

Net revenue was $1.2 billion, compared with a net loss of $128 million in the prior year driven by higher net interest income and noninterest revenue. The increase in net interest income was driven by balance sheet growth and changes in mix, and also includes income related to the unwind of the internal funding provided to CCB upon the sale of certain mortgage loans. The income reflects the net present value of that funding and is recognized as a charge to net interest income in CCB. Refer to CCB on pages 62-65 and FTP on page 61 of this Form 10-K for further information.

Noninterest revenue increased reflecting:

- investment securities gains, compared with losses in the prior year, due to the repositioning of the investment securities portfolio, and
- lower net markdowns on certain legacy private equity investments,

partially offset by

- market-driven impacts on certain Corporate investments, and
- higher losses on cash deployment transactions which were more than offset by the related net interest income earned on those transactions.

Noninterest expense of $1.1 billion was up $165 million reflecting higher investments in technology and real estate, and higher pension costs due to changes to actuarial assumptions and estimates.

The prior year included a pre-tax loss of $174 million on the liquidation of a legal entity.

The current period included $1.1 billion of tax benefits related to the resolution of certain tax audits. The prior year expense reflected a net benefit of $302 million resulting from changes in estimates under the TCJA related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings, which was more than offset by changes to certain tax reserves and other tax adjustments.

Treasury and CIO overview

Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks. The risks managed by Treasury and CIO arise from the activities undertaken by the Firm's four major reportable business segments to serve their respective client bases, which generate both on- and off-balance sheet assets and liabilities.

Treasury and CIO seek to achieve the Firm's asset-liability management objectives generally by investing in high-quality securities that are managed for the longer-term as part of the Firm's investment securities portfolio. Treasury and CIO also use derivatives to meet the Firm's asset-liability management objectives. Refer to Note 5 for further information on derivatives. In addition, Treasury and CIO manage the Firm's cash position primarily through deposits at central banks and investments in short-term instruments. Refer to Liquidity Risk Management on pages 93–98 for further information on liquidity and funding risk. Refer to Market Risk Management on pages 119–126 for information on interest rate, foreign exchange and other risks.

The investment securities portfolio primarily consists of U.S. GSE and government agency and nonagency mortgage-backed securities, U.S. and non-U.S. government securities, obligations of U.S. states and municipalities, other ABS and corporate debt securities. At December 31, 2019, the investment securities portfolio was $396.4 billion, and the average credit rating of the securities comprising the portfolio was AA+ (based upon external ratings where available and, where not available, based primarily upon internal risk ratings. Refer to Note 10 for further information on the investment securities portfolio and internal risk ratings.

Selected income statement and balance sheet data

As of or for the year ended December 31, (in millions)	2019	2018	2017
Investment securities gains/ (losses)	$ 258	$ (395)	$ (78)
Available-for-sale ("AFS") investment securities (average)	283,205	203,449	219,345
Held-to-maturity ("HTM") investment securities (average)	34,939	31,747	47,927
Investment securities portfolio (average)	318,144	235,196	267,272
AFS investment securities (period-end)	348,876	228,681	200,247
HTM investment securities (period-end)	47,540	31,434	47,733
Investment securities portfolio (period-end)	396,416	260,115	247,980

Risk is an inherent part of JPMorgan Chase's business activities. When the Firm extends a consumer or wholesale loan, advises customers and clients on their investment decisions, makes markets in securities, or offers other products or services, the Firm takes on some degree of risk. The Firm's overall objective is to manage its businesses, and the associated risks, in a manner that balances serving the interests of its clients, customers and investors and protects the safety and soundness of the Firm.

The Firm believes that effective risk management requires, among other things:

- Acceptance of responsibility, including identification and escalation of risk issues, by all individuals within the Firm;
- Ownership of risk identification, assessment, data and management within each of the LOBs and Corporate; and
- Firmwide structures for risk governance.

The Firm strives for continual improvement in its efforts to enhance controls, ongoing employee training and development, talent retention, and other measures. The Firm follows a disciplined and balanced compensation framework with strong internal governance and independent oversight by the Board of Directors (the "Board"). The impact of risk and control issues is carefully considered in the Firm's performance evaluation and incentive compensation processes.

Risk governance and oversight framework

The Firm's risk management governance and oversight framework involves understanding drivers of risks, types of risks, and impacts of risks.

Drivers of Risks are factors that cause a risk to exist. Drivers of risks include the economic environment, regulatory and government policy, competitor and market evolution, business decisions, process and judgment error, deliberate wrongdoing, dysfunctional markets, and natural disasters.

Types of Risks are categories by which risks manifest themselves. Risks are generally categorized in the following four risk types:

- Strategic risk is the risk to earnings, capital, liquidity or reputation associated with poorly designed or failed business plans or inadequate response to changes in the operating environment.
- Credit and investment risk is the risk associated with the default or change in credit profile of a client, counterparty or customer; or loss of principal or a reduction in expected returns on investments, including consumer credit risk, wholesale credit risk, and investment portfolio risk.
- Market risk is the risk associated with the effect of changes in market factors, such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.
- Operational risk is the risk associated with an adverse outcome resulting from inadequate or failed internal processes or systems; human factors; or external events impacting the Firm's processes or systems; it includes compliance, conduct, legal, and estimations and model risk.

Impacts of Risks are consequences of risks, both quantitative and qualitative. There may be many consequences of risks manifesting, such as a reduction in earnings and capital, liquidity outflows, and fines or penalties, or qualitative impacts such as reputation damage, loss of clients and customers, and regulatory and enforcement actions.

The Firm's risk governance and oversight framework is managed on a Firmwide basis. The Firm has an Independent Risk Management ("IRM") function, which consists of the Risk Management and Compliance organizations. The Chief Executive Officer ("CEO") appoints, subject to approval by the Risk Committee of the Board ("Board Risk Committee"), the Firm's Chief Risk Officer ("CRO") to lead the IRM organization and manage the risk governance structure of the Firm. The framework is subject to approval by the Board Risk Committee in the form of the primary risk management policies. The Firm's CRO oversees and delegates authorities to LOB CROs, Firmwide Risk Executives ("FREs"), and the Firm's Chief Compliance Officer ("CCO"), who each establish Risk Management and Compliance organizations, set the Firm's risk governance policies and standards, and define and oversee the implementation of the Firm's risk governance. The LOB CROs are responsible for risks that arise in their LOBs, while FREs oversee risk areas that span across the individual LOB, functions and regions.

Three lines of defense

The Firm relies upon each of its LOBs and Corporate areas giving rise to risk to operate within the parameters identified by the IRM function, and within its own management-identified risk and control standards. Each LOB and Treasury & CIO, including their aligned Operations, Technology and Control Management are the Firm's "first line of defense" and own the identification of risks, as well as the design and execution of controls to manage those risks. The first line of defense is responsible for adherence

to applicable laws, rules and regulations and for the implementation of the risk management structure (which may include policy, standards, limits, thresholds and controls) established by IRM.

The IRM function is independent of the businesses and is the Firm's "second line of defense." The IRM function sets and oversees the risk management structure for Firmwide risk governance, and independently assesses and challenges the first line of defense risk management practices. IRM is also responsible for its own adherence to applicable laws, rules and regulations and for the implementation of policies and standards established by IRM with respect to its own processes.

The Internal Audit function operates independently from other parts of the Firm and performs independent testing and evaluation of processes and controls across the Firm as the "third line of defense." The Internal Audit Function is headed by the General Auditor, who reports to the Audit Committee and administratively to the CEO.

In addition, there are other functions that contribute to the Firmwide control environment including Finance, Human Resources, Legal and Control Management.

Risk identification and ownership

Each LOB and Corporate area owns the ongoing identification of risks, as well as the design and execution of controls, inclusive of IRM-specified controls, to manage those risks. To support this activity, the Firm has a risk identification process designed to facilitate their responsibility to identify material risks inherent to the Firm, catalog them in a central repository and review the most material risks on a regular basis. The IRM function reviews and challenges the LOB and Corporate's identification of risks, maintains the central repository and provides the consolidated Firmwide results to the Firmwide Risk Committee ("FRC") and Board Risk Committee.

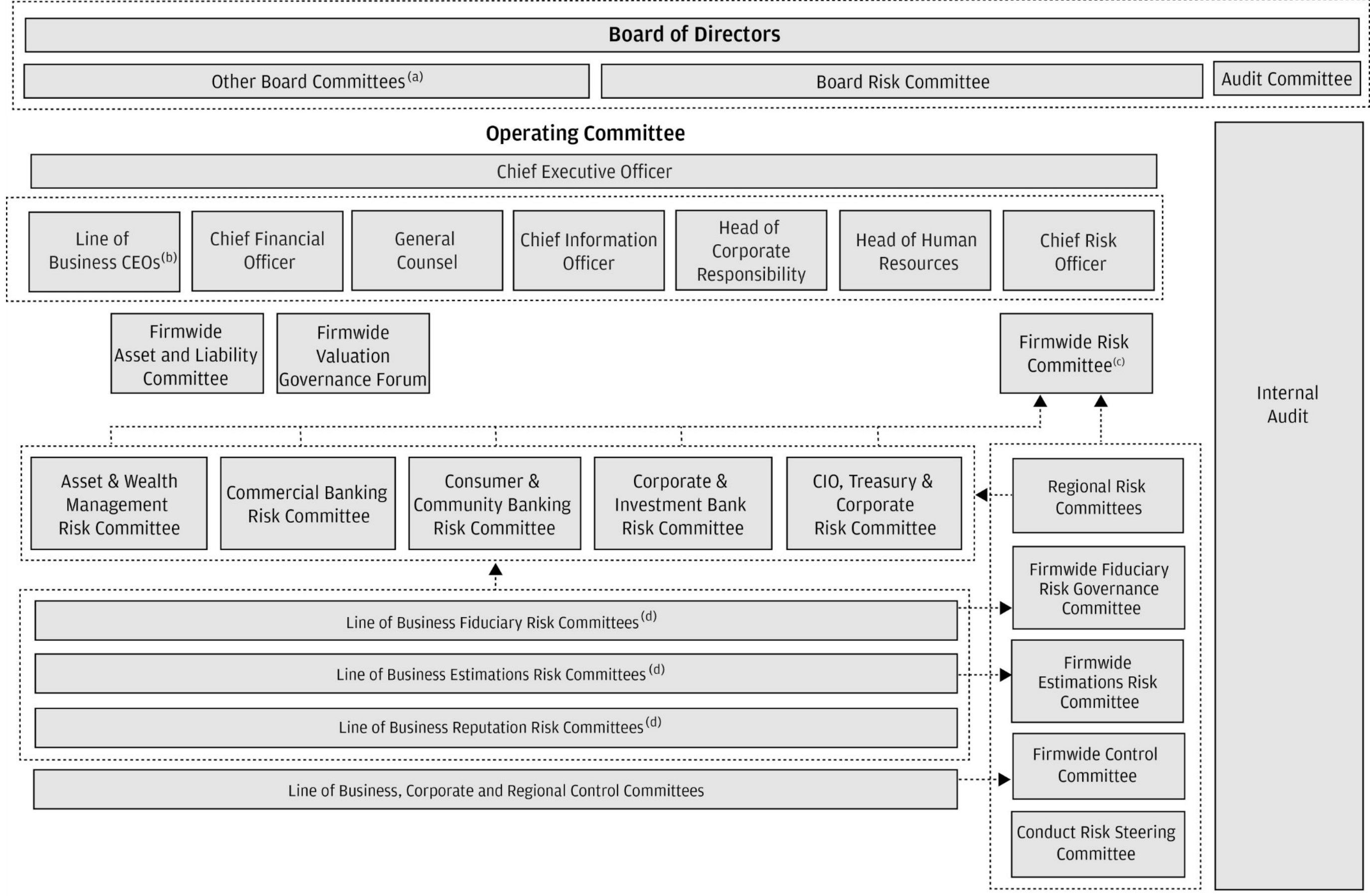
Risk appetite

The Firm's overall appetite for risk is governed by a "Risk Appetite" framework. The framework and the Firm's risk appetite are set and approved by the Firm's CEO, Chief Financial Officer ("CFO") and CRO. Quantitative parameters and qualitative factors are used to monitor and measure the Firm's capacity to take risk consistent with its stated risk appetite. Qualitative factors have been established to assess select operational risks that impact the Firm's reputation. Risk Appetite results are reported to the Board Risk Committee.

Risk governance and oversight structure

The independent status of the IRM function is supported by a governance structure that provides for escalation of risk issues to senior management, the FRC, and the Board of Directors, as appropriate.

The chart below illustrates the Board of Directors' and key senior management-level committees in the Firm's risk governance structure. In addition, there are other committees, forums and paths of escalation that support the oversight of risk which are not shown in the chart below or described in this Form 10-K.



(a) Other Board Committees include the Compensation & Management Development Committee, Corporate Governance & Nominating Committee and Public Responsibility Committee
(b) The LOB CEOs for Corporate & Investment Bank and Consumer & Community Banking are also the firm's Co-Presidents and Co-Chief Operating Officers; the CEO for Consumer Lending reports to the CEO for Consumer & Community Banking and is also a member of the Operating Committee
(c) The Firmwide Risk Committee escalates significant issues directly to the Board Risk Committee as appropriate
(d) As applicable

The Firm's Operating Committee, which consists of the Firm's CEO, CRO, CFO and other senior executives, is accountable to and may refer matters to the Firm's Board of Directors. The Operating Committee is responsible for escalating to the Board the information necessary to facilitate the Board's exercise of its duties.

Board oversight

The Firm's Board of Directors provides oversight of risk. The Board Risk Committee is the principal committee that oversees risk matters. The Audit Committee oversees the control environment, and the Compensation & Management Development Committee oversees compensation and other management-related matters. Each committee of the Board oversees reputational risks and conduct risks within its scope of responsibility.

The JPMorgan Chase Bank, N.A. Board of Directors is responsible for the oversight of management of the bank. The JPMorgan Chase Bank, N.A. Board accomplishes this function acting directly and through the principal standing committees of the Firm's Board of Directors. Risk and control oversight on behalf of JPMorgan Chase Bank N.A. is primarily the responsibility of the Risk Committee and the Audit Committee, respectively, and, with respect to compensation and other management-related matters, the Compensation & Management Development Committee.

The Board Risk Committee assists the Board in its oversight of management's responsibility to implement a global risk management framework reasonably designed to identify, assess and manage the Firm's risks. The Board Risk Committee's responsibilities include approval of applicable primary risk policies and review of certain associated frameworks, analysis and reporting established by management. Breaches in risk appetite and parameters, issues that may have a material adverse impact on the Firm, including capital and liquidity issues, and other significant risk-related matters are escalated to the Board Risk Committee, as appropriate.

The Audit Committee assists the Board in its oversight of management's responsibility to ensure that there is an effective system of controls reasonably designed to safeguard the Firm's assets and income, ensure the integrity of the Firm's financial statements, and maintain compliance with the Firm's ethical standards, policies, plans and procedures, and with laws and regulations. It also assists the Board in its oversight of the Firm's independent registered public accounting firm's qualifications, independence and performance, and of the performance of the Firm's Internal Audit function.

The Compensation & Management Development Committee ("CMDC") assists the Board in its oversight of the Firm's compensation principles and practices. The CMDC reviews and approves the Firm's compensation and benefits programs. In addition, the Committee reviews Operating Committee members' performance against their goals, and approves their compensation awards. The CMDC also reviews the development of and succession for key executives, and provides oversight of the Firm's culture, including reviewing updates from management regarding significant conduct issues and any related employee actions, including compensation actions.

The Public Responsibility Committee assists the Board in its oversight of the Firm's positions and practices on public responsibility matters such as community investment, fair lending, sustainability, consumer practices and other public policy issues that reflect the Firm's values and character and could impact the Firm's reputation among all of its stakeholders. The Committee also provides guidance on these matters to management and the Board, as appropriate.

The Corporate Governance & Nominating Committee exercises general oversight with respect to the governance of the Board. The Committee evaluates and recommends to the Board corporate governance practices applicable to the Firm. It also appraises the framework for assessing the Board's performance and self-evaluation.

Management oversight

The Firm's senior management-level committees that are primarily responsible for key risk-related functions include:

The Firmwide Risk Committee ("FRC") is the Firm's highest management-level risk committee. It provides oversight of the risks inherent in the Firm's businesses and serves as an escalation point for risk topics and issues raised by underlying committees and/or FRC members.

The Firmwide Control Committee ("FCC") is an escalation committee for senior management to review and discuss the Firmwide operational risk environment including identified issues, operational risk metrics and significant events that have been escalated.

The Firmwide Fiduciary Risk Governance Committee ("FFRGC") provides oversight of the governance framework for fiduciary risk or fiduciary-related conflict of interest risk inherent in each of the Firm's LOBs. The FFRGC approves risk or compliance policy exceptions and reviews periodic reports from the LOBs and control functions including fiduciary metrics and control trends.

The Firmwide Estimations Risk Committee ("FERC") provides oversight of the governance framework for quantitative and qualitative estimations and models as specified in the Estimations and Model Risk Management Policy. The FERC also has responsibility to set the prioritization of estimations and model risk activities and drive consistency through review of LOB activities and escalated issues.

The Conduct Risk Steering Committee ("CRSC") is responsible for reviewing, calibrating and consolidating Firmwide Conduct Risk Appetite and setting overall direction for the Firm's Conduct Risk Program.

Line of Business and Regional Risk Committees are responsible for providing oversight of the governance, limits, and controls that are in place through the scope of their activities. These committees review the ways in which the particular LOB or the business operating in a particular region could be exposed to adverse outcomes with a focus on identifying, accepting, escalating and/or requiring remediation of matters brought to these committees.

Line of Business and Corporate Control Committees oversee the control environment of their respective business or function. As part of that mandate, they are responsible for reviewing indicators of elevated or emerging risks and other data that may impact the quality and stability of the processes in a business or function, addressing key operational risk issues, focusing on processes with control concerns and overseeing control remediation.

Line of Business Reputation Risk Committees review and assess transactions, activities and clients that have the potential for material reputation risk to the Firm.

The Firmwide Asset and Liability Committee ("ALCO") is responsible for overseeing the Firm's asset and liability management ("ALM") activities and the management of liquidity risk, balance sheet, interest rate risk, and capital risk. The ALCO is supported by the Treasurer Committee and the Capital Governance Committee. The Treasurer Committee is responsible for monitoring the Firm's overall balance sheet, liquidity risk and interest rate risk. The Capital Governance Committee is responsible for overseeing and providing guidance concerning the effectiveness of the Firm's capital framework, capital policies and regulatory capital implementation.

The Firmwide Valuation Governance Forum ("VGF") is composed of senior finance and risk executives and is responsible for overseeing the management of fair value risks arising from valuation activities conducted across the Firm.

Risk governance and oversight functions

The Firm manages its risk through risk governance and oversight functions. The scope of a particular function may include one or more drivers, types and/or impacts of risk. For example, Country Risk Management oversees country risk which may be a driver of risk or an aggregation of exposures that could give rise to multiple risk types such as credit or market risk.

The following sections discuss the risk governance and oversight functions in place to manage the risks inherent in the Firms business activities.

Risk governance and oversight functions	Page
Strategic risk	84
Capital risk	85-92
Liquidity risk	93-98
Reputation risk	99
Consumer credit risk	103-107
Wholesale credit risk	108-115
Investment portfolio risk	118
Market risk	119-126
Country risk	127-128
Operational risk	129-135
Compliance risk	132
Conduct risk	133
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Estimations and Model risk	135

STRATEGIC RISK MANAGEMENT

Strategic risk is the risk to earnings, capital, liquidity or reputation associated with poorly designed or failed business plans or inadequate response to changes in the operating environment.

Management and oversight

The Operating Committee and the senior leadership of each LOB and Corporate are responsible for managing the Firm's most significant strategic risks. Strategic risks are overseen by IRM through participation in business reviews, LOB and Corporate senior management committees and other relevant governance forums and ongoing discussions. The Board of Directors oversees management's strategic decisions, and the Board Risk Committee oversees IRM and the Firm's risk management framework.

In the process of developing business plans and strategic initiatives, LOB and Corporate leadership identify the associated risks that are incorporated into the Firmwide Risk Identification process and monitored and assessed as part of the Firmwide Risk Appetite framework.

In addition, IRM conducts a qualitative assessment of the LOB and Corporate strategic initiatives to assess their impact on the risk profile of the Firm.

The Firm's strategic planning process, which includes the development and execution of strategic initiatives, is one component of managing the Firm's strategic risk. Guided by the Firm's How We Do Business Principles (the "Principles"), the Operating Committee and management teams in each LOB and Corporate review and update the strategic plan periodically. The process includes evaluating the high-level strategic framework and performance against prior-year initiatives, assessing the operating environment, refining existing strategies and developing new strategies.

These strategic initiatives, along with IRM's assessment, are incorporated in the Firm's budget and provided to the Board for review.

The Firm's balance sheet strategy, which focuses on risk-adjusted returns, strong capital and robust liquidity, is also a component in the management of strategic risk. Refer to Capital Risk Management on pages 85–92 for further information on capital risk. Refer to Liquidity Risk Management on pages 93–98 for further information on liquidity risk. In addition, for further information on reputation risk, refer to Reputation Risk Management on page 99.

Capital risk is the risk the Firm has an insufficient level or composition of capital to support the Firm's business activities and associated risks during normal economic environments and under stressed conditions.

A strong capital position is essential to the Firm's business strategy and competitive position. Maintaining a strong balance sheet to manage through economic volatility is considered a strategic imperative of the Firm's Board of Directors, CEO and Operating Committee. The Firm's fortress balance sheet philosophy focuses on risk-adjusted returns, strong capital and robust liquidity. The Firm's capital risk management strategy focuses on maintaining long-term stability to enable the Firm to build and invest in market-leading businesses, including in highly stressed environments. Senior management considers the implications on the Firm's capital prior to making any significant decisions that could impact future business activities. In addition to considering the Firm's earnings outlook, senior management evaluates all sources and uses of capital with a view to ensuring the Firm's capital strength.

Capital management oversight

The Firm has a Capital Management Oversight function whose primary objective is to provide independent assessment, measuring, monitoring and control of capital risk across the Firm.

Capital Management Oversight's responsibilities include:

- Defining, monitoring and reporting capital risk metrics;
- Establishing, calibrating and monitoring capital risk limits and indicators, including capital risk appetite;
- Developing a process to classify, monitor and report limit breaches; and
- Performing an independent assessment of the Firm's capital management activities, including changes made to the contingency capital plan described below.

In addition, the Basel Independent Review function ("BIR"), which is a part of the IRM function, conducts independent assessments of the Firm's regulatory capital framework. These assessments are intended to ensure compliance with the applicable regulatory capital rules in support of senior management's responsibility for managing capital and for the Board Risk Committee's oversight of management in executing that responsibility.

Capital management

Treasury & CIO is responsible for capital management.

The primary objectives of effective capital management are to:

- Maintain sufficient capital in order to continue to build and invest in the Firm's businesses through the cycle and in stressed environments;
- Retain flexibility to take advantage of future investment opportunities;
- Promote the Firm's ability to serve as a source of strength to its subsidiaries;
- Ensure the Firm operates above the minimum regulatory capital ratios as well as maintain "well-capitalized" status for the Firm and its insured depository institution ("IDI") subsidiaries at all times under applicable regulatory capital requirements;
- Meet capital distribution objectives; and
- Maintain sufficient capital resources to operate throughout a resolution period in accordance with the Firm's preferred resolution strategy.

The Firm addresses these objectives through establishing internal minimum capital requirements and a strong capital management governance framework, both in business as usual conditions and in the event of stress.

Capital risk management is intended to be flexible in order to react to a range of potential events. In its management of capital, the Firm takes into consideration economic risk and all applicable regulatory capital requirements to determine the level of capital needed.

The Firm considers regulatory capital requirements as well as an internal assessment of capital adequacy, in normal economic cycles and in stress events, when setting its minimum capital levels. The capital governance framework requires regular monitoring of the Firm's capital positions, stress testing and defining escalation protocols, both at the Firm and material legal entity levels.

Governance

Committees responsible for overseeing the Firm's capital management include the Capital Governance Committee, the Treasurer Committee and the Firmwide ALCO. Capital management oversight is governed through the CIO, Treasury and Corporate ("CTC") risk committee. In addition, the Board Risk Committee periodically reviews the Firm's capital risk tolerance. Refer to Firmwide Risk Management on pages 79–83 for additional discussion on the Board Risk Committee and the ALCO.

Capital planning and stress testing

Comprehensive Capital Analysis and Review

The Federal Reserve requires large bank holding companies, including the Firm, to submit on an annual basis a capital plan that has been reviewed and approved by the Board of Directors. The Federal Reserve uses Comprehensive Capital Analysis and Review ("CCAR") and other stress testing processes to ensure that large bank holding companies ("BHC") have sufficient capital during periods of economic and financial stress, and have robust, forward-looking capital assessment and planning processes in place that address each BHC's unique risks to enable it to absorb losses under certain stress scenarios. Through CCAR, the Federal Reserve evaluates each BHC's capital adequacy and internal capital adequacy assessment processes ("ICAAP"), as well as its plans to make capital distributions, such as dividend payments or stock repurchases.

On June 27, 2019, the Federal Reserve informed the Firm that it did not object to the Firm's 2019 capital plan. Refer to Capital actions on pages 90-91 for information on actions taken by the Firm's Board of Directors following the 2019 CCAR results.

Internal Capital Adequacy Assessment Process
Annually, the Firm prepares the ICAAP, which informs the Board of Directors of the ongoing assessment of the Firm's processes for managing the sources and uses of capital as well as compliance with supervisory expectations for capital planning and capital adequacy. The Firm's ICAAP integrates stress testing protocols with capital planning.

The CCAR and other stress testing processes assess the potential impact of alternative economic and business scenarios on the Firm's earnings and capital. Economic scenarios, and the parameters underlying those scenarios, are defined centrally and applied uniformly across the businesses. These scenarios are articulated in terms of macroeconomic factors, which are key drivers of business results; global market shocks, which generate short-term but severe trading losses; and idiosyncratic operational risk events. The scenarios are intended to capture and stress key vulnerabilities and idiosyncratic risks facing the Firm. However, when defining a broad range of scenarios, actual events can always be worse. Accordingly, management considers additional stresses outside these scenarios, as necessary. These results are reviewed by management and the Board of Directors.

Contingency capital plan

The Firm's contingency capital plan establishes the capital management framework for the Firm and specifies the principles underlying the Firm's approach towards capital management in normal economic conditions and during stress. The contingency capital plan defines how the Firm calibrates its targeted capital levels and meets minimum capital requirements, monitors the ongoing appropriateness of planned capital distributions, and sets out the capital contingency actions that are expected to be taken or considered at various levels of capital depletion during a period of stress.

Regulatory capital

The Federal Reserve establishes capital requirements, including well-capitalized standards, for the consolidated financial holding company. The Office of the Comptroller of the Currency ("OCC") establishes similar minimum capital requirements for the Firm's IDI subsidiaries, including JPMorgan Chase Bank, N.A. The U.S. capital requirements generally follow the Capital Accord of the Basel Committee, as amended from time to time.

Basel III Overview
The capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for large and internationally active U.S. BHCs and banks, including the Firm and its IDI subsidiaries, including JPMorgan Chase Bank, N.A. The minimum amount of regulatory capital that must be held by BHCs and banks is determined by calculating risk-weighted assets ("RWA"), which are on-balance sheet assets and off-balance sheet exposures, weighted according to risk. Two comprehensive approaches are prescribed for calculating RWA: a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). Effective January 1, 2019, the capital adequacy of the Firm is evaluated against the fully phased-in measures under Basel III and represents the lower of the Standardized or Advanced approaches. During 2018, the required capital measures were subject to the transitional rules and as of December 31, 2018 the results were the same on a fully phased-in and on a transitional basis.

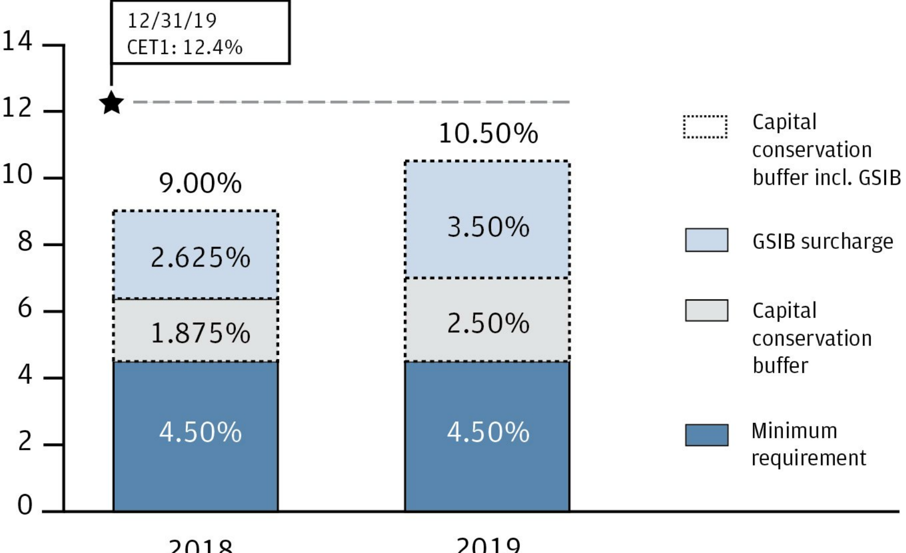
Basel III establishes capital requirements for calculating credit risk RWA and market risk RWA, and in the case of Basel III Advanced, operational risk RWA. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced. In addition to the RWA calculated under these approaches, the Firm may supplement such amounts to incorporate management judgment and feedback from its regulators.

Basel III also includes a requirement for Advanced Approach banking organizations, including the Firm, to calculate the SLR. Refer to SLR on page 90 for additional information.

Key Regulatory Developments
Effective January 1, 2020, the Firm adopted the Financial Instruments – Credit Losses ("CECL") guidance under U.S. GAAP. As provided by the U.S. banking agencies, the Firm elected to phase-in the impact to retained earnings of $2.7 billion to regulatory capital, at 25 percent per year in each of 2020 to 2023 ("CECL transitional period"). Based on the Firm's capital as of December 31, 2019, the estimated impact to the Standardized CET1 capital ratio will be a reduction of approximately 4 bps for each transitional year. Refer to Accounting and Reporting Developments on pages 139-140 and Note 1 for further information.

Risk-based Capital Regulatory Minimums

The following chart presents the Firm's Basel III minimum CET1 capital ratio during the Basel III transitional periods and on a fully phased-in basis under the Basel III rules currently in effect.



The Firm's Basel III Standardized-risk-based ratios are currently more binding than the Basel III Advanced-risk-based ratios, and the Firm expects that this will remain the case for the foreseeable future.

Additional information regarding the Firm's capital ratios, as well as the U.S. federal regulatory capital standards to which the Firm is subject, is presented in Note 27. Refer to the Firm's Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website, for further information on the Firm's Basel III measures.

All banking institutions are currently required to have a minimum CET1 capital ratio of 4.5% of risk-weighted assets. Certain banking organizations, including the Firm, are also required to hold additional amounts of capital to serve as a "capital conservation buffer". The capital conservation buffer is intended to be used to absorb losses in times of financial or economic stress. The capital conservation buffer was subject to a phase-in period that began January 1, 2016 and continued through the end of 2018.

As an expansion of the capital conservation buffer, the Firm is also required to hold additional levels of capital in the form of a global systemically important bank ("GSIB") surcharge and a countercyclical capital buffer.

Under the Federal Reserve's GSIB rule, the Firm is required to calculate its GSIB surcharge on an annual basis under two separately prescribed methods, and is subject to the higher of the two. The first ("Method 1"), reflects the GSIB surcharge as prescribed by the Basel Committee's assessment methodology, and is calculated across five criteria: size, cross-jurisdictional activity, interconnectedness, complexity and substitutability. The second ("Method 2"), modifies the Method 1 requirements to include a measure of short-term wholesale funding in place of substitutability, and introduces a GSIB score "multiplication factor". The following table presents the Firm's GSIB surcharge.

	2019	2018
Fully Phased-In:		
Method 1	2.50%	2.50%
Method 2	3.50%	3.50%
Transitional[(a)]	N/A	2.625%

(a) The GSIB surcharge was subject to transition provisions (in 25% increments) through the end of 2018.

The Firm's effective regulatory minimum GSIB surcharge calculated under Method 2 remains unchanged at 3.5% for 2020.

The Federal Reserve's framework for setting the countercyclical capital buffer takes into account the macro financial environment in which large, internationally active banks function. As of December 31, 2019, the U.S. countercyclical capital buffer remained at 0%. The Federal Reserve will continue to review the buffer at least annually. The buffer can be increased if the Federal Reserve, FDIC and OCC determine that systemic risks are meaningfully above normal and can be calibrated up to an additional 2.5% of RWA subject to a 12-month implementation period.

Failure to maintain regulatory capital equal to or in excess of the risk-based regulatory capital minimum plus the capital conservation buffer (inclusive of the GSIB surcharge) and any countercyclical buffer may result in limitations to the amount of capital that the Firm may distribute, such as through dividends and common equity repurchases.

Leverage-based Capital Regulatory Minimums

Supplementary leverage ratio

The SLR is defined as Tier 1 capital under Basel III divided by the Firm's total leverage exposure. Total leverage exposure is calculated by taking the Firm's total average on-balance sheet assets, less amounts permitted to be

deducted for Tier 1 capital, and adding certain off-balance sheet exposures, such as undrawn commitments and derivatives potential future exposure.

Failure to maintain an SLR ratio equal to or greater than the regulatory minimum may result in limitations on the amount of capital that the Firm may distribute such as through dividends and common equity repurchases.

Other regulatory capital

In addition to meeting the capital ratio requirements of Basel III, the Firm and its IDI subsidiaries also must maintain minimum capital and leverage ratios in order to be "well-capitalized" under the regulations issued by the Federal Reserve and the Prompt Corrective Action ("PCA") requirements of the FDIC Improvement Act ("FDICIA"), respectively. Refer to Note 27 for additional information.

The following tables present the Firm's risk-based and leverage-based capital measures under both the Basel III Standardized and Advanced approaches.

	December 31, 2019			December 31, 2018		
(in millions)	Standardized	Advanced	Minimum capital ratios	Standardized[b]	Advanced[b]	Minimum capital ratios
Risk-based capital metrics:						
CET1 capital	**$ 187,753**	**$ 187,753**		$ 183,474	$ 183,474	
Tier 1 capital	**214,432**	**214,432**		209,093	209,093	
Total capital	**242,589**	**232,112**		237,511	227,435	
Risk-weighted assets	**1,515,869**	**1,397,878**		1,528,916	1,421,205	
CET1 capital ratio	**12.4%**	**13.4%**	**10.5%**	12.0%	12.9%	9.0%
Tier 1 capital ratio	**14.1**	**15.3**	**12.0**	13.7	14.7	10.5
Total capital ratio	**16.0**	**16.6**	**14.0**	15.5	16.0	12.5
Leverage-based capital metrics:						
Adjusted average assets[a]	**$ 2,730,239**	**$ 2,730,239**		$ 2,589,887	$ 2,589,887	
Tier 1 leverage ratio	**7.9%**	**7.9%**	**4.0%**	8.1%	8.1%	4.0%
Total leverage exposure	**NA**	**$ 3,423,431**		NA	$ 3,269,988	
SLR	**NA**	**6.3%**	**5.0%** [c]	NA	6.4%	5.0% [c]

(a) Adjusted average assets, for purposes of calculating the Tier 1 leverage ratio, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) The Firm's capital ratios as of December 31, 2018 were equivalent whether calculated on a transitional or fully phased-in basis.
(c) Represents minimum SLR requirement of 3.0%, as well as supplementary leverage buffer of 2.0%.

The Firm believes that it will operate with a Basel III CET1 capital ratio between 11.5% and 12% over the medium term.

Capital components

The following table presents reconciliations of total stockholders' equity to Basel III CET1 capital, Tier 1 capital and Total capital as of December 31, 2019 and 2018.

(in millions)	December 31, 2019	December 31, 2018
Total stockholders' equity	**$ 261,330**	$ 256,515
Less: Preferred stock	26,993	26,068
Common stockholders' equity	**234,337**	230,447
Less:		
Goodwill	47,823	47,471
Other intangible assets	819	748
Other CET1 capital adjustments	323	1,034
Add:		
Certain deferred tax liabilities[(a)]	2,381	2,280
Standardized/Advanced CET1 capital	**187,753**	183,474
Preferred stock	26,993	26,068
Less: Other Tier 1 adjustments	314	449
Standardized/Advanced Tier 1 capital	**214,432**	209,093
Long-term debt and other instruments qualifying as Tier 2 capital	13,733	13,772
Qualifying allowance for credit losses	14,314	14,500
Other	110	146
Standardized Tier 2 capital	**28,157**	28,418
Standardized Total capital	**242,589**	237,511
Adjustment in qualifying allowance for credit losses for Advanced Tier 2 capital	(10,477)	(10,076)
Advanced Tier 2 capital	**17,680**	18,342
Advanced Total capital	**$ 232,112**	$ 227,435

(a) Represents deferred tax liabilities related to tax-deductible goodwill and to identifiable intangibles created in nontaxable transactions, which are netted against goodwill and other intangibles when calculating CET1 capital.

Capital rollforward

The following table presents the changes in Basel III CET1 capital, Tier 1 capital and Tier 2 capital for the year ended December 31, 2019.

Year Ended December 31, (in millions)	**2019**
Standardized/Advanced CET1 capital at December 31, 2018	$ 183,474
Net income applicable to common equity	34,844
Dividends declared on common stock	(10,897)
Net purchase of treasury stock	(22,555)
Changes in additional paid-in capital	(640)
Changes related to AOCI	2,904
Adjustment related to DVA[(a)]	1,103
Changes related to other CET1 capital adjustments	(480)
Change in Standardized/Advanced CET1 capital	4,279
Standardized/Advanced CET1 capital at December 31, 2019	**187,753**
Standardized/Advanced Tier 1 capital at December 31, 2018	209,093
Change in CET1 capital	4,279
Net issuance of noncumulative perpetual preferred stock	925
Other	135
Change in Standardized/Advanced Tier 1 capital	5,339
Standardized/Advanced Tier 1 capital at December 31, 2019	**214,432**
Standardized Tier 2 capital at December 31, 2018	28,418
Change in long-term debt and other instruments qualifying as Tier 2	(39)
Change in qualifying allowance for credit losses	(186)
Other	(36)
Change in Standardized Tier 2 capital	(261)
Standardized Tier 2 capital at December 31, 2019	**28,157**
Standardized Total capital at December 31, 2019	**242,589**
Advanced Tier 2 capital at December 31, 2018	18,342
Change in long-term debt and other instruments qualifying as Tier 2	(39)
Change in qualifying allowance for credit losses	(587)
Other	(36)
Change in Advanced Tier 2 capital	(662)
Advanced Tier 2 capital at December 31, 2019	**17,680**
Advanced Total capital at December 31, 2019	**$ 232,112**

(a) Includes DVA related to structured notes recorded in AOCI.

RWA rollforward

The following table presents changes in the components of RWA under Basel III Standardized and Advanced approaches for the year ended December 31, 2019. The amounts in the rollforward categories are estimates, based on the predominant driver of the change.

Year ended December 31, 2019 (in millions)	Standardized			Advanced			
	Credit risk RWA	Market risk RWA	**Total RWA**	Credit risk RWA	Market risk RWA	Operational risk RWA	**Total RWA**
December 31, 2018	$ 1,423,053	$ 105,863	**$ 1,528,916**	$ 926,647	$ 105,976	$ 388,582	**$ 1,421,205**
Model & data changes[(a)]	(6,406)	(24,433)	**(30,839)**	(34,584)	(24,433)	–	**(59,017)**
Portfolio runoff[(b)]	(5,800)	–	**(5,800)**	(5,500)	–	–	**(5,500)**
Movement in portfolio levels[(c)]	29,373	(5,781)	**23,592**	46,385	(5,891)	696	**41,190**
Changes in RWA	17,167	(30,214)	**(13,047)**	6,301	(30,324)	696	**(23,327)**
December 31, 2019	**$ 1,440,220**	**$ 75,649**	**$ 1,515,869**	**$ 932,948**	**$ 75,652**	**$ 389,278**	**$ 1,397,878**

(a) Model & data changes refer to material movements in levels of RWA as a result of revised methodologies and/or treatment per regulatory guidance (exclusive of rule changes); and an update to the wholesale credit risk Advanced Approach parameters.
(b) Portfolio runoff for credit risk RWA primarily reflects reduced risk from position rolloffs in legacy portfolios in Home Lending.
(c) Movement in portfolio levels (inclusive of rule changes) refers to: changes in book size, composition, credit quality, and market movements for credit risk RWA; changes in position and market movements for market risk RWA; and updates to cumulative losses for operational risk RWA.

Supplementary leverage ratio

The following table presents the components of the Firm's SLR as of December 31, 2019 and 2018.

(in millions, except ratio)	**December 31, 2019**	December 31, 2018
Tier 1 capital	**$ 214,432**	$ 209,093
Total average assets	2,777,270	$ 2,636,505
Less: Adjustments for deductions from Tier 1 capital	47,031	46,618
Total adjusted average assets[(a)]	2,730,239	2,589,887
Off-balance sheet exposures[(b)]	693,192	680,101
Total leverage exposure	**$ 3,423,431**	$ 3,269,988
SLR	**6.3%**	6.4%

(a) Adjusted average assets, for purposes of calculating the SLR, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) Off-balance sheet exposures are calculated as the average of the three month-end spot balances during the reporting quarter.

Refer to Note 27 for JPMorgan Chase Bank, N.A.'s SLR ratios.

Line of business equity

Each business segment is allocated capital by taking into consideration a variety of factors including capital levels of similarly rated peers and applicable regulatory capital requirements. ROE is measured and internal targets for expected returns are established as key measures of a business segment's performance.

The Firm's allocation methodology incorporates Basel III Standardized RWA, Basel III Advanced RWA, leverage, the GSIB surcharge, and a simulation of capital in a severe stress environment. Periodically, the assumptions and methodologies used to allocate capital are assessed and as a result, the capital allocated to the LOBs may change. The Firm will assess impacts from any regulatory changes to the capital framework as changes are finalized.

The table below presents the Firm's assessed level of capital allocated to each LOB as of the dates indicated.

Line of business equity (Allocated capital)

(in billions)	**January 1, 2020**	December 31, 2019	December 31, 2018
Consumer & Community Banking	**$ 52.0**	$ 52.0	$ 51.0
Corporate & Investment Bank	**80.0**	80.0	70.0
Commercial Banking	**22.0**	22.0	20.0
Asset & Wealth Management	**10.5**	10.5	9.0
Corporate[(a)]	**67.1**	69.8	80.4
Total common stockholders' equity	**$ 231.6**	$ 234.3	$ 230.4

(a) Includes the $2.7 billion (after-tax) impact to retained earnings upon the adoption of CECL on January 1, 2020.

Capital actions

Preferred stock

Preferred stock dividends declared were $1.6 billion for the year ended December 31, 2019.

During the year ended December 31, 2019 and through the date of filing of the 2019 Form 10-K, the Firm issued and redeemed several series of non-cumulative preferred stock. Refer to Note 21 for additional information on the Firm's preferred stock, including issuances and redemptions.

Common stock dividends

The Firm's common stock dividends are planned as part of the Capital Management governance framework in line with the Firm's capital management objectives.

On September 17, 2019, the Firm announced that its Board of Directors had declared a quarterly common stock dividend of $0.90 per share, an increase from $0.80 per share, effective with the dividend paid on October 31, 2019. The Firm's dividends are subject to the Board of Directors' approval on a quarterly basis.

Refer to Note 21 and Note 26 for information regarding dividend restrictions.

The following table shows the common dividend payout ratio based on net income applicable to common equity.

Year ended December 31,	**2019**	2018	2017
Common dividend payout ratio	**31%**	30%	33%

Common equity
The Firm's Board of Directors has authorized the repurchase of up to $29.4 billion of gross common equity between July 1, 2019 and June 30, 2020 as part of the Firm's annual capital plan. As of December 31, 2019, $15.6 billion of authorized repurchase capacity remained under this common equity repurchase program.

The following table sets forth the Firm's repurchases of common equity for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions)	**2019**	2018	2017
Total number of shares of common stock repurchased	**213.0**	181.5	166.6
Aggregate purchase price of common stock repurchases	**$ 24,121**	$ 19,983	$ 15,410

The Firm from time to time enters into written trading plans under Rule 10b5-1 of the Securities Exchange Act of 1934 to facilitate repurchases in accordance with the common equity repurchase program. A Rule 10b5-1 repurchase plan allows the Firm to repurchase its equity during periods when it may otherwise not be repurchasing common equity – for example, during internal trading blackout periods.

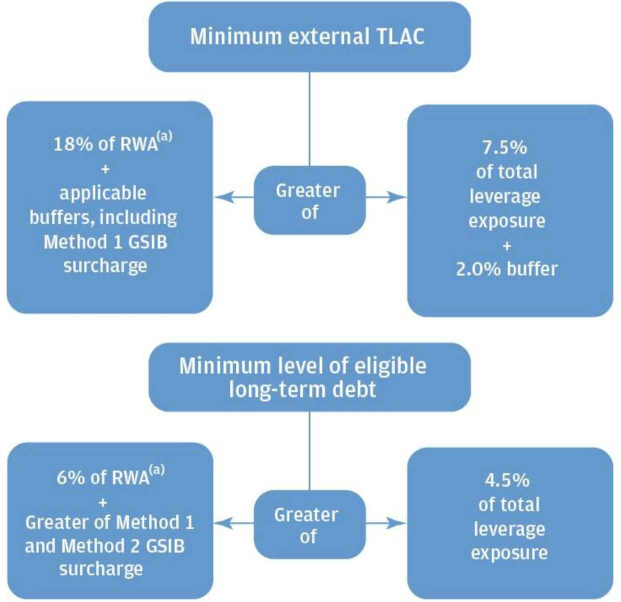
The authorization to repurchase common equity is utilized at management's discretion, and the timing of purchases and the exact amount of common equity that may be repurchased is subject to various factors, including market conditions; legal and regulatory considerations affecting the amount and timing of repurchase activity; the Firm's capital position (taking into account goodwill and intangibles); internal capital generation; and alternative investment opportunities. The repurchase program does not include specific price targets or timetables; may be executed through open market purchases or privately negotiated transactions, or utilizing Rule 10b5-1 plans; and may be suspended by management at any time.

Refer to Part II, Item 5: Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities on page 30 of the 2019 Form 10-K for additional information regarding repurchases of the Firm's equity securities.

Other capital requirements

Total Loss-Absorbing Capacity ("TLAC")
Effective January 1, 2019, the Federal Reserve's TLAC rule requires the U.S. GSIB top-tier holding companies, including JPMorgan Chase & Co., to maintain minimum levels of external TLAC and eligible long-term debt ("eligible LTD").

The minimum external TLAC and the minimum level of eligible long-term debt requirements are shown below:



(a) RWA is the greater of Standardized and Advanced.

Failure to maintain TLAC equal to or in excess of the regulatory minimum plus applicable buffers may result in limitations to the amount of capital that the Firm may distribute, such as through dividends and common equity repurchases.

The following table presents the eligible external TLAC and LTD amounts, as well as a representation of the amounts as a percentage of the Firm's total RWA and total leverage exposure.

December 31, 2019 **(in billions, except ratio)**	Eligible external TLAC	Eligible LTD
Total eligible TLAC & LTD	$ 386.4	$ 161.8
% of RWA	25.5%	10.7%
Minimum requirement	23.0	9.5
Surplus/(shortfall)	$ 37.7	$ 17.8
% of total leverage exposure	11.3%	4.7%
Minimum requirement	9.5	4.5
Surplus/(shortfall)	$ 61.2	$ 7.8

Refer to Part I, Item 1A: Risk Factors on pages 6–28 of the 2019 Form 10-K for information on the financial consequences to holders of the Firm's debt and equity securities in a resolution scenario.

Broker-dealer regulatory capital

J.P. Morgan Securities
JPMorgan Chase's principal U.S. broker-dealer subsidiary is J.P. Morgan Securities. J.P. Morgan Securities is subject to Rule 15c3-1 under the Securities Exchange Act of 1934 (the "Net Capital Rule"). J.P. Morgan Securities is also registered as a futures commission merchant and subject to the Rules of the Commodity Futures Trading Commission ("CFTC").

J.P. Morgan Securities has elected to compute its minimum net capital requirements in accordance with the "Alternative Net Capital Requirements" of the Net Capital Rule.

The following table presents J.P. Morgan Securities' net capital:

December 31, 2019 (in millions)	Actual	Minimum
Net Capital	$ 21,050	$ 3,751

In addition to its alternative minimum net capital requirements, J.P. Morgan Securities is required to hold "tentative net capital" in excess of $1.0 billion and is also required to notify the SEC in the event that its tentative net capital is less than $5.0 billion. Tentative net capital is net capital before deducting market and credit risk charges as defined by the Net Capital Rule. As of December 31, 2019, J.P. Morgan Securities maintained tentative net capital in excess of the minimum and notification requirements.

J.P. Morgan Securities plc
J.P. Morgan Securities plc is a wholly-owned subsidiary of JPMorgan Chase Bank, N.A. and has authority to engage in banking, investment banking and broker-dealer activities. J.P. Morgan Securities plc is jointly regulated by the U.K. Prudential Regulation Authority ("PRA") and the Financial Conduct Authority ("FCA"). J.P. Morgan Securities plc is subject to the European Union Capital Requirements Regulation and the PRA capital rules, each of which implemented Basel III and thereby subject J.P. Morgan Securities plc to its requirements.

The Bank of England requires, on a transitional basis, that U.K. banks, including U.K. regulated subsidiaries of overseas groups, maintain a minimum requirement for own funds and eligible liabilities ("MREL"). As of December 31, 2019, J.P. Morgan Securities plc was compliant with the requirements of the MREL rule.

The following table presents J.P. Morgan Securities plc's capital metrics:

December 31, 2019 (in millions, except ratios)	Estimated	Minimum ratios
Total capital	$ 52,983	
CET1 ratio	16.5%	4.5%
Total capital ratio	21.3%	8.0%

Liquidity risk is the risk that the Firm will be unable to meet its contractual and contingent financial obligations as they arise or that it does not have the appropriate amount, composition and tenor of funding and liquidity to support its assets and liabilities.

Liquidity risk oversight

The Firm has a liquidity risk oversight function whose primary objective is to provide independent assessment, measurement, monitoring, and control of liquidity risk across the Firm. Liquidity Risk Oversight's responsibilities include:

- Defining, monitoring and reporting liquidity risk metrics;
- Establishing and monitoring limits and indicators, including Liquidity Risk Appetite;
- Developing a process to classify, monitor and report limit breaches;
- Performing an independent review of liquidity risk management processes;
- Monitoring and reporting internal firmwide and legal entity liquidity stress tests as well as regulatory defined liquidity stress tests;
- Approving or escalating for review new or updated liquidity stress assumptions; and
- Monitoring liquidity positions, balance sheet variances and funding activities;

Liquidity management

Treasury and CIO is responsible for liquidity management. The primary objectives of effective liquidity management are to:

- Ensure that the Firm's core businesses and material legal entities are able to operate in support of client needs and meet contractual and contingent financial obligations through normal economic cycles as well as during stress events, and
- Manage an optimal funding mix and availability of liquidity sources.

As part of the Firm's overall liquidity management strategy, the Firm manages liquidity and funding using a centralized, global approach in order to:

- Optimize liquidity sources and uses;
- Monitor exposures;
- Identify constraints on the transfer of liquidity between the Firm's legal entities; and
- Maintain the appropriate amount of surplus liquidity at a firmwide and legal entity level, where relevant.

In the context of the Firm's liquidity management, Treasury and CIO is responsible for:

- Analyzing and understanding the liquidity characteristics of the assets and liabilities of the Firm, LOBs and legal entities, taking into account legal, regulatory, and operational restrictions;
- Developing internal liquidity stress testing assumptions;
- Defining and monitoring firmwide and legal entity-specific liquidity strategies, policies, reporting and contingency funding plans;
- Managing liquidity within the Firm's approved liquidity risk appetite tolerances and limits;
- Managing compliance with regulatory requirements related to funding and liquidity risk; and
- Setting transfer pricing in accordance with underlying liquidity characteristics of balance sheet assets and liabilities as well as certain off-balance sheet items.

Governance

Committees responsible for liquidity governance include the firmwide ALCO as well as LOB and regional ALCOs, the Treasurer Committee, and the CTC Risk Committee. In addition, the Board Risk Committee reviews and recommends to the Board of Directors, for formal approval, the Firm's liquidity risk tolerances, liquidity strategy, and liquidity policy. Refer to Firmwide Risk Management on pages 79–83 for further discussion of ALCO and other risk-related committees.

Internal stress testing

Liquidity stress tests are intended to ensure that the Firm has sufficient liquidity under a variety of adverse scenarios, including scenarios analyzed as part of the Firm's resolution and recovery planning. Stress scenarios are produced for JPMorgan Chase & Co. ("Parent Company") and the Firm's material legal entities on a regular basis, and other stress tests are performed in response to specific market events or concerns. Liquidity stress tests assume all of the Firm's contractual financial obligations are met and take into consideration:

- Varying levels of access to unsecured and secured funding markets,
- Estimated non-contractual and contingent cash outflows, and
- Potential impediments to the availability and transferability of liquidity between jurisdictions and material legal entities such as regulatory, legal or other restrictions.

Liquidity outflow assumptions are modeled across a range of time horizons and currency dimensions and contemplate both market and idiosyncratic stresses.

Results of stress tests are considered in the formulation of the Firm's funding plan and assessment of its liquidity position. The Parent Company acts as a source of funding for the Firm through equity and long-term debt issuances, and its intermediate holding company, JPMorgan Chase Holdings LLC (the "IHC") provides funding support to the ongoing operations of the Parent Company and its subsidiaries. The Firm maintains liquidity at the Parent Company, IHC, and operating subsidiaries at levels sufficient to comply with liquidity risk tolerances and minimum

liquidity requirements, and to manage through periods of stress when access to normal funding sources may be disrupted.

Contingency funding plan

The Firm's contingency funding plan ("CFP"), which is approved by the firmwide ALCO and the Board Risk Committee, is a compilation of procedures and action plans for managing liquidity through stress events. The CFP incorporates the limits and indicators set by the Liquidity Risk Oversight group. These limits and indicators are reviewed regularly to identify emerging risks or vulnerabilities in the Firm's liquidity position. The CFP identifies the alternative contingent funding and liquidity resources available to the Firm and its legal entities in a period of stress.

Liquidity Coverage Ratio

The LCR rule requires that the Firm maintain an amount of unencumbered High Quality Liquid Assets ("HQLA") that is sufficient to meet its estimated total net cash outflows over a prospective 30 calendar-day period of significant stress. HQLA is the amount of liquid assets that qualify for inclusion in the LCR. HQLA primarily consist of unencumbered cash and certain high-quality liquid securities as defined in the LCR rule.

Under the LCR rule, the amount of HQLA held by JPMorgan Chase Bank, N.A. that is in excess of its stand-alone 100% minimum LCR requirement, and that is not transferable to non-bank affiliates, must be excluded from the Firm's reported HQLA.

Estimated net cash outflows are based on standardized stress outflow and inflow rates prescribed in the LCR rule, which are applied to the balances of the Firm's assets, sources of funds, and obligations. The LCR is required to be a minimum of 100%.

The following table summarizes the Firm's average LCR for the three months ended December 31, 2019, September 30, 2019 and December 31, 2018 based on the Firm's interpretation of the finalized LCR framework.

Average amount (in millions)	Three months ended		
	December 31, 2019	September 30, 2019	December 31, 2018
HQLA			
Eligible cash[(a)]	**$ 203,296**	$ 199,757	$ 297,069
Eligible securities[(b)(c)]	**341,990**	337,704	232,201
Total HQLA[(d)]	**$ 545,286**	$ 537,461	$ 529,270
Net cash outflows	**$ 469,402**	$ 468,452	$ 467,704
LCR	**116%**	115%	113%
Net excess HQLA [(d)]	**$ 75,884**	$ 69,009	$ 61,566

(a) Represents cash on deposit at central banks, primarily the Federal Reserve Banks.
(b) Predominantly U.S. Treasuries, U.S. GSE and government agency MBS, and sovereign bonds net of applicable haircuts under the LCR rule.
(c) HQLA eligible securities may be reported in securities borrowed or purchased under resale agreements, trading assets, or investment securities on the Firm's Consolidated balance sheets.
(d) Excludes average excess HQLA at JPMorgan Chase Bank, N.A. that are not transferable to non-bank affiliates.

The Firm's average LCR increased during the three months ended December 31, 2019, compared with both the three-month periods ended September 30, 2019 and December 31, 2018, due to an increase in HQLA from unsecured long-term debt issuances. Additionally, liquidity in JPMorgan Chase Bank, N.A. increased during the fourth quarter and from the prior year period primarily due to growth in stable deposits. This increase in excess liquidity is excluded from the Firm's reported LCR under the LCR rule.

The Firm's average LCR fluctuates from period to period, due to changes in its HQLA and estimated net cash outflows as a result of ongoing business activity. Refer to the Firm's U.S. LCR Disclosure reports, which are available on the Firm's website for a further discussion of the Firm's LCR.

Other liquidity sources

In addition to the assets reported in the Firm's HQLA above, the Firm had unencumbered marketable securities, such as equity securities and fixed income debt securities, that the Firm believes would be available to raise liquidity of approximately $315 billion and $226 billion as of December 31, 2019 and 2018, respectively. This includes securities included as part of the excess liquidity at JPMorgan Chase Bank, N.A. that are not transferable to non-bank affiliates, as described above. The amount of such securities increased from the prior year.

The Firm also had available borrowing capacity at FHLBs and the discount window at the Federal Reserve Bank as a result of collateral pledged by the Firm to such banks of approximately $322 billion and $276 billion as of December 31, 2019 and 2018, respectively. This borrowing capacity excludes the benefit of cash and securities reported in the Firm's HQLA or other unencumbered securities that are currently pledged at the Federal Reserve Bank discount window and other central banks. Available borrowing capacity increased from the prior year primarily as a result of an increase in collateral available to be pledged as a result of the merger of Chase Bank USA, N.A. with and into JPMorgan Chase Bank, N.A., and an increase in available collateral as a result of maturities of borrowings from FHLBs. Although available, the Firm does not view this borrowing capacity at the Federal Reserve Bank discount window and the other central banks as a primary source of liquidity.

Funding

Sources of funds

Management believes that the Firm's unsecured and secured funding capacity is sufficient to meet its on- and off-balance sheet obligations.

The Firm funds its global balance sheet through diverse sources of funding including stable deposits, secured and unsecured funding in the capital markets and stockholders' equity. Deposits are the primary funding source for JPMorgan Chase Bank, N.A. Additionally, JPMorgan Chase Bank, N.A. may also access funding through short- or long-term secured borrowings, through the issuance of unsecured long-term debt, or from borrowings from the Parent company or the IHC. The Firm's non-bank subsidiaries are primarily funded from long-term unsecured borrowings and short-term secured borrowings, primarily securities loaned or sold under repurchase agreements. Excess funding is invested by Treasury and CIO in the Firm's investment securities portfolio or deployed in cash or other short-term liquid investments based on their interest rate and liquidity risk characteristics.

Deposits

The table below summarizes, by LOB, the period-end and average deposit balances as of and for the years ended December 31, 2019 and 2018.

As of or for the year ended December 31,			Average	
(in millions)	**2019**	2018	**2019**	2018
Consumer & Community Banking	**$ 718,416**	$ 678,854	**$ 693,550**	$ 670,388
Corporate & Investment Bank	**511,843**	482,084	**515,913**	477,250
Commercial Banking	**184,115**	170,859	**172,666**	170,822
Asset & Wealth Management	**147,804**	138,546	**140,118**	137,272
Corporate	**253**	323	**820**	729
Total Firm	**$ 1,562,431**	$ 1,470,666	**$ 1,523,067**	$ 1,456,461

Deposits provide a stable source of funding and reduce the Firm's reliance on the wholesale funding markets. A significant portion of the Firm's deposits are consumer deposits and wholesale operating deposits, which are both considered to be stable sources of liquidity. Wholesale operating deposits are considered to be stable sources of liquidity because they are generated from customers that maintain operating service relationships with the Firm.

The table below shows the loan and deposit balances, the loans-to-deposits ratios, and deposits as a percentage of total liabilities, as of December 31, 2019 and 2018.

As of December 31, (in billions except ratios)	**2019**	2018
Deposits	**$ 1,562.4**	$ 1,470.7
Deposits as a % of total liabilities	**64%**	62%
Loans	**959.8**	984.6
Loans-to-deposits ratio	**61%**	67%

The Firm believes that average deposit balances are generally more representative of deposit trends than period-end deposit balances.

Average deposits across the Firm increased for the year ended December 31, 2019.

The increase in CIB reflects growth in operating deposits driven by client activity, primarily in Treasury Services, and an increase in client-driven net issuances of structured notes in Markets. The increase in CCB was driven by continued growth in new accounts. The increases in AWM and CB were primarily driven by growth in interest-bearing deposits; for AWM, the growth was partially offset by migration, predominantly into the Firm's investment-related products.

Refer to the discussion of the Firm's Business Segment Results and the Consolidated Balance Sheets Analysis on pages 60–78 and pages 52–53, respectively, for further information on deposit and liability balance trends.

The following table summarizes short-term and long-term funding, excluding deposits, as of December 31, 2019 and 2018, and average balances for the years ended December 31, 2019 and 2018. Refer to the Consolidated Balance Sheets Analysis on pages 52–53 and Note 20 for additional information.

Sources of funds (excluding deposits)

As of or for the year ended December 31, (in millions)	2019	2018	Average 2019	Average 2018
Commercial paper	$ 14,754	$ 30,059	$ 22,977	$ 27,834
Other borrowed funds	7,544	8,789	10,369	11,369
Total short-term unsecured funding	$ 22,298	$ 38,848	$ 33,346	$ 39,203
Securities sold under agreements to repurchase[a]	$ 175,709	$ 171,975	$ 217,807	$ 177,629
Securities loaned[a]	5,983	9,481	8,816	10,692
Other borrowed funds[b]	18,622	30,428	26,050	24,320
Obligations of Firm-administered multi-seller conduits[c]	9,223	4,843	10,929	3,396
Total short-term secured funding	$ 209,537	$ 216,727	$ 263,602	$ 216,037
Senior notes	$ 166,185	$ 162,733	$ 168,546	$ 153,162
Trust preferred securities	–	–	–	471
Subordinated debt	17,591	16,743	17,387	16,178
Structured notes[d]	74,724	53,090	65,487	49,640
Total long-term unsecured funding	$ 258,500	$ 232,566	$ 251,420	$ 219,451
Credit card securitization[c]	$ 6,461	$ 13,404	$ 9,707	$ 15,900
FHLB advances	28,635	44,455	34,143	52,121
Other long-term secured funding[e]	4,363	5,010	4,643	4,842
Total long-term secured funding	$ 39,459	$ 62,869	$ 48,493	$ 72,863
Preferred stock[f]	$ 26,993	$ 26,068	$ 27,511	$ 26,249
Common stockholders' equity[f]	$ 234,337	$ 230,447	$ 232,907	$ 229,222

(a) Primarily consists of short-term securities loaned or sold under agreements to repurchase.
(b) There were no FHLB advances with original maturities of less than one year as of December 31, 2019. As of December 31, 2018, includes FHLB advances with original maturities of less than one year of $11.4 billion.
(c) Included in beneficial interests issued by consolidated variable interest entities on the Firm's Consolidated balance sheets.
(d) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.
(e) Includes long-term structured notes which are secured.
(f) Refer to Capital Risk Management on pages 85–92, Consolidated statements of changes in stockholders' equity on page 149, and Note 21 and Note 22 for additional information on preferred stock and common stockholders' equity.

Short-term funding

The Firm's sources of short-term secured funding primarily consist of securities loaned or sold under agreements to repurchase. These instruments are secured predominantly by high-quality securities collateral, including government-issued debt, U.S. GSE and government agency MBS. Securities loaned or sold under agreements to repurchase were relatively flat at December 31, 2019, compared with December 31, 2018, as the net increase from the Firm's participation in the Federal Reserve's open market operations was offset by client-driven activities, and lower secured financing of trading assets-debt instruments, all in CIB.

The balances associated with securities loaned or sold under agreements to repurchase fluctuate over time due to customers' investment and financing activities, the Firm's demand for financing, the ongoing management of the mix of the Firm's liabilities, including its secured and unsecured financing (for both the investment securities and market-making portfolios), and other market and portfolio factors.

The Firm's sources of short-term unsecured funding primarily consist of issuance of wholesale commercial paper. The decrease in commercial paper at December 31, 2019, from December 31, 2018, was due to lower net issuance primarily for short-term liquidity management.

Long-term funding and issuance

Long-term funding provides additional sources of stable funding and liquidity for the Firm. The Firm's long-term funding plan is driven primarily by expected client activity, liquidity considerations, and regulatory requirements, including TLAC. Long-term funding objectives include maintaining diversification, maximizing market access and optimizing funding costs. The Firm evaluates various funding markets, tenors and currencies in creating its optimal long-term funding plan.

The significant majority of the Firm's long-term unsecured funding is issued by the Parent Company to provide flexibility in support of both bank and non-bank subsidiary funding needs. The Parent Company advances substantially all net funding proceeds to its subsidiary, the IHC. The IHC does not issue debt to external counterparties. The following table summarizes long-term unsecured issuance and maturities or redemptions for the years ended December 31, 2019 and 2018. Refer to Note 20 for additional information on long-term debt.

Long-term unsecured funding

Year ended December 31,	**2019**	2018	**2019**	2018
(Notional in millions)	Parent Company		Subsidiaries	
Issuance				
Senior notes issued in the U.S. market	**$ 14,000**	$ 22,000	**$ 1,750**	$ 9,562
Senior notes issued in non-U.S. markets	**5,867**	1,502	**—**	—
Total senior notes	**19,867**	23,502	**1,750**	9,562
Structured notes[a]	**5,844**	2,444	**33,563**	25,410
Total long-term unsecured funding – issuance	**$ 25,711**	$ 25,946	**$ 35,313**	$ 34,972
Maturities/redemptions				
Senior notes	**$ 18,098**	$ 19,141	**$ 5,367**	$ 4,466
Subordinated debt	**183**	136	**—**	—
Structured notes	**2,944**	2,678	**19,271**	15,049
Total long-term unsecured funding – maturities/redemptions	**$ 21,225**	$ 21,955	**$ 24,638**	$ 19,515

(a) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.

The Firm can also raise secured long-term funding through securitization of consumer credit card loans and advances from the FHLBs. The following table summarizes the securitization issuance and FHLB advances and their respective maturities or redemptions for the years ended December 31, 2019 and 2018.

Long-term secured funding

Year ended December 31,	Issuance		Maturities/Redemptions	
(in millions)	**2019**	2018	**2019**	2018
Credit card securitization	**$ —**	$ 1,396	**$ 6,975**	$ 9,250
FHLB advances	**—**	9,000	**15,817**	25,159
Other long-term secured funding[a]	**204**	377	**927**	289
Total long-term secured funding	**$ 204**	$ 10,773	**$ 23,719**	$ 34,698

(a) Includes long-term structured notes which are secured.

The Firm's wholesale businesses also securitize loans for client-driven transactions; those client-driven loan securitizations are not considered to be a source of funding for the Firm and are not included in the table above. Refer to Note 14 for further description of the client-driven loan securitizations.

Credit ratings

The cost and availability of financing are influenced by credit ratings. Reductions in these ratings could have an adverse effect on the Firm's access to liquidity sources, increase the cost of funds, trigger additional collateral or funding requirements and decrease the number of investors and counterparties willing to lend to the Firm. The nature and magnitude of the impact of ratings downgrades depends on numerous contractual and behavioral factors, which the Firm believes are incorporated in its liquidity risk and stress testing metrics. The Firm believes that it maintains sufficient liquidity to withstand a potential decrease in funding capacity due to ratings downgrades.

Additionally, the Firm's funding requirements for VIEs and other third- party commitments may be adversely affected by a decline in credit ratings.

The credit ratings of the Parent Company and the Firm's principal bank and non-bank subsidiaries as of December 31, 2019, were as follows.

	JPMorgan Chase & Co.			JPMorgan Chase Bank, N.A.[a]			J.P. Morgan Securities LLC J.P. Morgan Securities plc		
December 31, 2019	Long-term issuer	Short-term issuer	Outlook	Long-term issuer	Short-term issuer	Outlook	Long-term issuer	Short-term issuer	Outlook
Moody's Investors Service	A2	P-1	Stable	Aa2	P-1	Stable	Aa3	P-1	Stable
Standard & Poor's	A-	A-2	Stable	A+	A-1	Stable	A+	A-1	Stable
Fitch Ratings	AA-	F1+	Stable	AA	F1+	Stable	AA	F1+	Stable

(a) On May 18, 2019, Chase Bank USA, N.A. merged with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. The credit rating for JPMorgan Chase Bank, N.A. reflects the credit rating of the merged entity.

JPMorgan Chase's unsecured debt does not contain requirements that would call for an acceleration of payments, maturities or changes in the structure of the existing debt, provide any limitations on future borrowings or require additional collateral, based on unfavorable changes in the Firm's credit ratings, financial ratios, earnings, or stock price.

Critical factors in maintaining high credit ratings include a stable and diverse earnings stream, strong capital and liquidity ratios, strong credit quality and risk management controls, and diverse funding sources. Rating agencies continue to evaluate economic and geopolitical trends, regulatory developments, future profitability, risk management practices, and litigation matters, as well as their broader ratings methodologies. Changes in any of these factors could lead to changes in the Firm's credit ratings.

Reputation risk is the risk that an action or inaction may negatively impact the Firm's integrity and reduce confidence in the Firm's competence held by various constituents, including clients, counterparties, customers, investors, regulators, employees, communities or the broader public.

Organization and management

Reputation Risk Management is an independent risk management function that establishes the governance framework for managing reputation risk across the Firm. As reputation risk is inherently difficult to identify, manage, and quantify, an independent reputation risk management governance function is critical.

The Firm's reputation risk management function includes the following activities:

- Establishing a Firmwide Reputation Risk Governance policy and standards consistent with the reputation risk framework
- Managing the governance infrastructure and processes that support consistent identification, escalation, management and monitoring of reputation risk issues Firmwide
- Providing guidance to LOB Reputation Risk Offices ("RRO"), as appropriate

The types of events that give rise to reputation risk are broad and could be introduced in various ways, including by the Firm's employees and the clients, customers and counterparties with which the Firm does business. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Firm.

Governance and oversight

The Firm's Reputation Risk Governance policy establishes the principles for managing reputation risk for the Firm. It is the responsibility of employees in each LOB and Corporate to consider the reputation of the Firm when deciding whether to offer a new product, engage in a transaction or client relationship, enter a new jurisdiction, initiate a business process or other matters. Increasingly, sustainability, social responsibility and environmental impacts are important considerations in assessing the Firm's reputation risk, and are considered as part of reputation risk governance.

Reputation risk issues deemed material are escalated as appropriate.

CREDIT AND INVESTMENT RISK MANAGEMENT

Credit and investment risk is the risk associated with the default or change in credit profile of a client, counterparty or customer; or loss of principal or a reduction in expected returns on investments, including consumer credit risk, wholesale credit risk, and investment portfolio risk.

Credit risk management

Credit risk is the risk associated with the default or change in credit profile of a client, counterparty or customer. The Firm provides credit to a variety of customers, ranging from large corporate and institutional clients to individual consumers and small businesses. In its consumer businesses, the Firm is exposed to credit risk primarily through its home lending, credit card, auto, and business banking businesses. In its wholesale businesses, the Firm is exposed to credit risk through its underwriting, lending, market-making, and hedging activities with and for clients and counterparties, as well as through its operating services activities (such as cash management and clearing activities), securities financing activities, investment securities portfolio, and cash placed with banks.

Credit Risk Management is an independent risk management function that monitors, measures and manages credit risk throughout the Firm and defines credit risk policies and procedures. The Firm's credit risk management governance includes the following activities:

- Establishing a credit risk policy framework
- Monitoring, measuring and managing credit risk across all portfolio segments, including transaction and exposure approval
- Setting industry and geographic concentration limits, as appropriate, and establishing underwriting guidelines
- Assigning and managing credit authorities in connection with the approval of credit exposure
- Managing criticized exposures and delinquent loans
- Estimating credit losses and ensuring appropriate credit risk-based capital management

Risk identification and measurement

The Credit Risk Management function monitors, measures, manages and limits credit risk across the Firm's businesses. To measure credit risk, the Firm employs several methodologies for estimating the likelihood of obligor or counterparty default. Methodologies for measuring credit risk vary depending on several factors, including type of asset (e.g., consumer versus wholesale), risk measurement parameters (e.g., delinquency status and borrower's credit score versus wholesale risk-rating) and risk management and collection processes (e.g., retail collection center versus centrally managed workout groups). Credit risk measurement is based on the probability of default of an obligor or counterparty, the loss severity given a default event and the exposure at default.

Based on these factors and the methodology and estimates described in Note 13, the Firm estimates credit losses for its exposures. The allowance for loan losses reflects credit losses related to the consumer and wholesale held-for-investment loan portfolios, and the allowance for lending-related commitments reflects credit losses related to the Firm's lending-related commitments. Refer to Note 13 and Critical Accounting Estimates used by the Firm on pages 136-138 for further information.

In addition, potential and unexpected credit losses are reflected in the allocation of credit risk capital and represent the potential volatility of actual losses relative to the established allowances for loan losses and lending-related commitments. The analyses for these losses include stress testing that considers alternative economic scenarios as described in the Stress testing section below.

Stress testing

Stress testing is important in measuring and managing credit risk in the Firm's credit portfolio. The process assesses the potential impact of alternative economic and business scenarios on estimated credit losses for the Firm. Economic scenarios and the underlying parameters are defined centrally, articulated in terms of macroeconomic factors and applied across the businesses. The stress test results may indicate credit migration, changes in delinquency trends and potential losses in the credit portfolio. In addition to the periodic stress testing processes, management also considers additional stresses outside these scenarios, including industry and country-specific stress scenarios, as necessary. The Firm uses stress testing to inform decisions on setting risk appetite both at a Firm and LOB level, as well as to assess the impact of stress on individual counterparties.

Risk monitoring and management

The Firm has developed policies and practices that are designed to preserve the independence and integrity of the approval and decision-making process of extending credit to ensure credit risks are assessed accurately, approved properly, monitored regularly and managed actively at both the transaction and portfolio levels. The policy framework establishes credit approval authorities, concentration limits, risk-rating methodologies, portfolio review parameters and guidelines for management of distressed exposures. In addition, certain models, assumptions and inputs used in evaluating and monitoring credit risk are independently validated by groups that are separate from the LOBs.

Consumer credit risk is monitored for delinquency and other trends, including any concentrations at the portfolio level, as certain of these trends can be modified through changes in underwriting policies and portfolio guidelines. Consumer Risk Management evaluates delinquency and other trends against business expectations, current and forecasted economic conditions, and industry benchmarks. Historical and forecasted economic performance and trends are incorporated into the modeling of estimated consumer credit losses and are part of the monitoring of the credit risk profile of the portfolio.

Wholesale credit risk is monitored regularly at an aggregate portfolio, industry, and individual client and counterparty level with established concentration limits that are reviewed and revised periodically as deemed appropriate by management. Industry and counterparty limits, as measured in terms of exposure and economic risk appetite, are subject to stress-based loss constraints. In addition, wrong-way risk, that is the risk that exposure to a counterparty is positively correlated with the impact of a default by the same counterparty, which could cause exposure to increase at the same time as the counterparty's capacity to meet its obligations is decreasing - is actively monitored as this risk could result in greater exposure at default compared with a transaction with another counterparty that does not have this risk.

Management of the Firm's wholesale credit risk exposure is accomplished through a number of means, including:

- Loan underwriting and credit approval process
- Loan syndications and participations
- Loan sales and securitizations
- Credit derivatives
- Master netting agreements
- Collateral and other risk-reduction techniques

In addition to Credit Risk Management, an independent Credit Review function is responsible for:

- Independently validating or changing the risk grades assigned to exposures in the Firm's wholesale and commercial-oriented retail credit portfolios, and assessing the timeliness of risk grade changes initiated by responsible business units; and
- Evaluating the effectiveness of business units' credit management processes, including the adequacy of credit analyses and risk grading/LGD rationales, proper monitoring and management of credit exposures, and compliance with applicable grading policies and underwriting guidelines.

Refer to Note 12 for further discussion of consumer and wholesale loans.

Risk reporting

To enable monitoring of credit risk and effective decision-making, aggregate credit exposure, credit quality forecasts, concentration levels and risk profile changes are reported regularly to senior members of Credit Risk Management. Detailed portfolio reporting of industry, clients, counterparties and customers, product and geography are prepared, and the appropriateness of the allowance for credit losses is reviewed by senior management at least on a quarterly basis. Through the risk reporting and governance structure, credit risk trends and limit exceptions are provided regularly to, and discussed with, risk committees, senior management and the Board of Directors as appropriate.

CREDIT PORTFOLIO

Credit risk is the risk associated with the default or change in credit profile of a client, counterparty or customer.

In the following tables, reported loans include loans retained (i.e., held-for-investment); loans held-for-sale; and certain loans accounted for at fair value. The following tables do not include loans which the Firm accounts for at fair value and classifies as trading assets; refer to Notes 2 and 3 for further information regarding these loans. Refer to Notes 12, 28, and 5 for additional information on the Firm's loans, lending-related commitments and derivative receivables, including the Firm's accounting policies.

Refer to Note 10 for information regarding the credit risk inherent in the Firm's investment securities portfolio; and refer to Note 11 for information regarding credit risk inherent in the securities financing portfolio. Refer to Consumer Credit Portfolio on pages 103–107 and Note 12 for a further discussion of the consumer credit environment and consumer loans. Refer to Wholesale Credit Portfolio on pages 108–115 and Note 12 for a further discussion of the wholesale credit environment and wholesale loans.

Total credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming[d][e]	
	2019	2018	**2019**	2018
Loans retained	**$ 945,601**	$ 969,415	**$ 3,983**	$ 4,611
Loans held-for-sale	**7,064**	11,988	**7**	–
Loans at fair value	**7,104**	3,151	**90**	220
Total loans – reported	**959,769**	984,554	**4,080**	4,831
Derivative receivables	**49,766**	54,213	**30**	60
Receivables from customers and other[a]	**33,706**	30,217	**–**	–
Total credit-related assets	**1,043,241**	1,068,984	**4,110**	4,891
Assets acquired in loan satisfactions				
Real estate owned	**NA**	NA	**344**	269
Other	**NA**	NA	**43**	30
Total assets acquired in loan satisfactions	**NA**	NA	**387**	299
Lending-related commitments	**1,106,247**	1,039,258	**474**	469
Total credit portfolio	**$ 2,149,488**	$ 2,108,242	**$ 4,971**	$ 5,659
Credit derivatives used in credit portfolio management activities[b]	**$ (18,030)**	$ (12,682)	**$ –**	$ –
Liquid securities and other cash collateral held against derivatives[c]	**(16,009)**	(15,322)	**NA**	NA

Year ended December 31, (in millions, except ratios)	**2019**	2018
Net charge-offs	**$ 5,629**	$ 4,856
Average retained loans		
Loans	**941,919**	936,829
Loans – reported, excluding residential real estate PCI loans	**919,702**	909,386
Net charge-off rates		
Loans	**0.60%**	0.52%
Loans – excluding PCI	**0.61**	0.53

(a) Receivables from customers and other primarily represents brokerage-related held-for-investment customer receivables.
(b) Represents the net notional amount of protection purchased and sold through credit derivatives used to manage both performing and nonperforming wholesale credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. Refer to Credit derivatives on page 115 and Note 5 for additional information.
(c) Includes collateral related to derivative instruments where appropriate legal opinions have not been either sought or obtained with respect to master netting agreements.
(d) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(e) At December 31, 2019 and 2018, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $41 million and $75 million, respectively. These amounts have been excluded based upon the government guarantee. In addition, the Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status as permitted by regulatory guidance issued by the Federal Financial Institutions Examination Council ("FFIEC").

CONSUMER CREDIT PORTFOLIO

The Firm's retained consumer portfolio consists primarily of residential real estate loans, credit card loans, auto loans, and business banking loans, as well as associated lending-related commitments. The Firm's focus is on serving primarily the prime segment of the consumer credit market. Originated mortgage loans are retained in the mortgage portfolio, securitized or sold to U.S. government agencies and U.S. government-sponsored enterprises; other types of consumer loans are typically retained on the balance sheet. The credit performance of the consumer portfolio continues to benefit from discipline in credit underwriting as well as improvement in the economy driven by low unemployment and increasing home prices. Refer to Note 12 for further information on the consumer loan portfolio. Refer to Note 28 for further information on lending-related commitments.

The following table presents consumer credit-related information with respect to the credit portfolio held by CCB, scored prime mortgage and scored home equity loans held by AWM, and scored prime mortgage loans held by Corporate. Refer to Note 12 for further information about the Firm's nonaccrual and charge-off accounting policies.

Consumer credit portfolio

As of or for the year ended December 31, (in millions, except ratios)	Credit exposure		Nonaccrual loans[f][g]		Net charge-offs/ (recoveries)[h]		Net charge-off/ (recovery) rate[h][i]	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018
Consumer, excluding credit card								
Loans, excluding PCI loans and loans held-for-sale								
Residential mortgage	**$ 199,037**	$ 231,078	**$ 1,618**	$ 1,765	**$ (44)**	$ (291)	**(0.02)%**	(0.13)%
Home equity	**23,917**	28,340	**1,162**	1,323	**(46)**	(5)	**(0.18)**	(0.02)
Auto[a][b]	**61,522**	63,573	**113**	128	**206**	243	**0.33**	0.38
Consumer & Business Banking[b][c]	**27,199**	26,612	**247**	245	**296**	236	**1.11**	0.90
Total loans, excluding PCI loans and loans held-for-sale	**311,675**	349,603	**3,140**	3,461	**412**	183	**0.13**	0.05
Loans – PCI								
Home equity	**7,377**	8,963	**NA**	NA	**NA**	NA	**NA**	NA
Prime mortgage	**3,965**	4,690	**NA**	NA	**NA**	NA	**NA**	NA
Subprime mortgage	**1,740**	1,945	**NA**	NA	**NA**	NA	**NA**	NA
Option ARMs	**7,281**	8,436	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – PCI	**20,363**	24,034	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – retained	**332,038**	373,637	**3,140**	3,461	**412**	183	**0.12**	0.05
Loans held-for-sale	**3,002**	95	**2**	–	**NA**	NA	**NA**	NA
Total consumer, excluding credit card loans	**335,040**	373,732	**3,142**	3,461	**412**	183	**0.12**	0.05
Lending-related commitments[d]	**51,412**	46,066						
Receivables from customers	**–**	154						
Total consumer exposure, excluding credit card	**386,452**	419,952						
Credit Card								
Loans retained[e]	**168,924**	156,616	**–**	–	**4,848**	4,518	**3.10**	3.10
Loans held-for-sale	**–**	16	**–**	–	**NA**	NA	**NA**	NA
Total credit card loans	**168,924**	156,632	**–**	–	**4,848**	4,518	**3.10**	3.10
Lending-related commitments[d]	**650,720**	605,379						
Total credit card exposure	**819,644**	762,011						
Total consumer credit portfolio	**$ 1,206,096**	$ 1,181,963	**$ 3,142**	$ 3,461	**$ 5,260**	$ 4,701	**1.04 %**	0.90 %
Memo: Total consumer credit portfolio, excluding PCI	**$ 1,185,733**	$ 1,157,929	**$ 3,142**	$ 3,461	**$ 5,260**	$ 4,701	**1.09 %**	0.95 %

(a) At December 31, 2019 and 2018, excluded operating lease assets of $22.8 billion and $20.5 billion, respectively. These operating lease assets are included in other assets on the Firm's Consolidated balance sheets. Refer to Note 18 for further information.
(b) Includes certain business banking and auto dealer risk-rated loans for which the wholesale methodology is applied for determining the allowance for loan losses; these loans are managed by CCB, and therefore, for consistency in presentation, are included within the consumer portfolio.
(c) Predominantly includes Business Banking loans.
(d) Credit card and home equity lending-related commitments represent the total available lines of credit for these products. The Firm has not experienced, and does not anticipate, that all available lines of credit would be used at the same time. For credit card commitments, and if certain conditions are met, home equity commitments, the Firm can reduce or cancel these lines of credit by providing the borrower notice or, in some cases as permitted by law, without notice. Refer to Note 28 for further information.
(e) Includes billed interest and fees net of an allowance for uncollectible interest and fees.
(f) At December 31, 2019 and 2018, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively. These amounts have been excluded from nonaccrual loans based upon the government guarantee. In addition, the Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status, as permitted by regulatory guidance issued by the FFIEC.
(g) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(h) Net charge-offs/(recoveries) and net charge-off/(recovery) rates excluded write-offs in the PCI portfolio of $151 million and $187 million for the years ended December 31, 2019 and 2018, respectively. These write-offs decreased the allowance for loan losses for PCI loans. Refer to Allowance for Credit Losses on pages 116–117 for further information.
(i) Average consumer loans held-for-sale were $2.9 billion and $387 million for the years ended December 31, 2019 and 2018, respectively. These amounts were excluded when calculating net charge-off/(recovery) rates.

Consumer, excluding credit card

Portfolio analysis

Loan balances decreased from December 31, 2018 due to lower residential real estate loans, predominantly driven by loan sales.

The following discussions provide information concerning individual loan products, excluding PCI loans which are addressed separately. Refer to Note 12 for further information about this portfolio, including information about delinquencies, loan modifications and other credit quality indicators.

Residential mortgage: The residential mortgage portfolio, including loans held-for-sale, predominantly consists of prime mortgage loans. The portfolio decreased from December 31, 2018 driven by paydowns as well as loan sales in Home Lending, largely offset by originations of prime mortgage loans that have been retained on the balance sheet. Net recoveries for the year ended December 31, 2019 were lower when compared with the prior year as the prior year benefited from larger recoveries on loan sales.

At December 31, 2019 and 2018, the Firm's residential mortgage portfolio included $22.4 billion and $21.6 billion, respectively, of interest-only loans. These loans have an interest-only payment period generally followed by an adjustable-rate or fixed-rate fully amortizing payment period to maturity and are typically originated as higher-balance loans to higher-income borrowers, predominantly in AWM. Performance of this portfolio for the year ended December 31, 2019 was consistent with the performance of the broader residential mortgage portfolio for the same period.

The following table provides a summary of the Firm's residential mortgage portfolio insured and/or guaranteed by U.S. government agencies, including loans held-for-sale. The Firm monitors its exposure to certain potential unrecoverable claim payments related to government insured loans and considers this exposure in estimating the allowance for loan losses.

(in millions)	December 31, 2019	December 31, 2018
Current	$ 1,280	$ 2,884
30-89 days past due	695	1,528
90 or more days past due	961	2,600
Total government guaranteed loans	**$ 2,936**	$ 7,012

Home equity: The home equity portfolio declined from December 31, 2018 primarily reflecting paydowns.

At December 31, 2019, approximately 90% of the Firm's home equity portfolio consists of home equity lines of credit ("HELOCs") and the remainder consisted of home equity loans ("HELOANs"). HELOANs are generally fixed-rate, closed-end, amortizing loans, with terms ranging from 3–30 years. In general, HELOCs originated by the Firm are revolving loans for a 10-year period, after which time the HELOC recasts into a loan with a 20-year amortization period.

The carrying value of HELOCs outstanding was $22 billion at December 31, 2019. This amount included $10 billion of HELOCs that have recast from interest-only to fully amortizing payments or have been modified and $3 billion of interest-only balloon HELOCs, which primarily mature after 2030. The Firm manages the risk of HELOCs during their revolving period by closing or reducing the undrawn line to the extent permitted by law when borrowers are exhibiting a material deterioration in their credit risk profile.

Auto: The auto portfolio predominantly consists of prime-quality loans. The portfolio declined when compared with December 31, 2018, as paydowns and charge-offs or liquidation of delinquent loans were predominantly offset by new originations.

Consumer & Business Banking: Consumer & Business Banking loans increased when compared with December 31, 2018 as loan originations were predominantly offset by paydowns and charge-offs of delinquent loans. Net charge-offs for the year ended December 31, 2019 increased when compared with the prior year primarily due to higher deposit overdraft losses.

Purchased credit-impaired loans: PCI loans represent certain loans that were acquired and deemed to be credit-impaired on the acquisition date. PCI loans decreased from December 31, 2018 due to portfolio run-off. As of December 31, 2019, approximately 9% of the option ARM PCI loans were delinquent and approximately 71% of the portfolio has been modified into fixed-rate, fully amortizing loans. The borrowers for substantially all of the remaining option ARM loans are making amortizing payments, although such payments are not necessarily fully amortizing. This latter group of loans is subject to the risk of payment shock due to future payment recast. Default rates generally increase on option ARM loans when payment recast results in a payment increase. The expected increase in default rates is considered in the Firm's quarterly impairment assessment.

The following table provides a summary of lifetime principal loss estimates included in either the nonaccretable difference or the allowance for loan losses.

Summary of PCI loans lifetime principal loss estimates

December 31, (in billions)	Lifetime loss estimates[a]		Life-to-date liquidation losses[b]	
	2019	2018	**2019**	2018
Home equity	**$ 13.9**	$ 14.1	**$ 13.0**	$ 13.0
Prime mortgage	**4.1**	4.1	**3.9**	3.9
Subprime mortgage	**3.4**	3.3	**3.2**	3.2
Option ARMs	**10.3**	10.3	**10.0**	9.9
Total	**$ 31.7**	$ 31.8	**$ 30.1**	$ 30.0

(a) Includes the original nonaccretable difference established in purchase accounting of $30.5 billion for principal losses plus additional principal losses recognized subsequent to acquisition through the provision and allowance for loan losses. The remaining nonaccretable difference for principal losses was $466 million and $512 million at December 31, 2019 and 2018, respectively.
(b) Represents both realization of loss upon loan resolution and any principal forgiven upon modification.

Refer to Note 12 for further information on the Firm's PCI loans, including write-offs.

Geographic composition of residential real estate loans

At December 31, 2019, $142.7 billion, or 64% of the total retained residential real estate loan portfolio, excluding mortgage loans insured by U.S. government agencies and PCI loans, were concentrated in California, New York, Illinois, Texas and Florida, compared with $160.3 billion, or 63%, at December 31, 2018. Refer to Note 12 for additional information on the geographic composition of the Firm's residential real estate loans.

Current estimated loan-to-values of residential real estate loans

Average current estimated loan-to-value ("LTV") ratios have declined consistent with recent improvements in home prices, customer pay-downs, and charge-offs or liquidations of higher LTV loans. Refer to Note 12 for further information on current estimated LTVs of residential real estate loans.

Modified residential real estate loans

The following table presents information as of December 31, 2019 and 2018, relating to modified retained residential real estate loans for which concessions have been granted to borrowers experiencing financial difficulty. Refer to Note 12 for further information on modifications for the years ended December 31, 2019 and 2018.

December 31, (in millions)	**2019** Retained loans	**2019** Nonaccrual retained loans[d]	2018 Retained loans	2018 Nonaccrual retained loans[d]
Modified residential real estate loans, excluding PCI loans[a][b]				
Residential mortgage	**$ 4,005**	**$ 1,367**	$ 4,565	$ 1,459
Home equity	**1,921**	**965**	2,058	963
Total modified residential real estate loans, excluding PCI loans	**$ 5,926**	**$ 2,332**	$ 6,623	$ 2,422
Modified PCI loans[c]				
Home equity	**$ 1,986**	**NA**	$ 2,086	NA
Prime mortgage	**2,825**	**NA**	3,179	NA
Subprime mortgage	**1,869**	**NA**	2,041	NA
Option ARMs	**5,692**	**NA**	6,410	NA
Total modified PCI loans	**$12,372**	**NA**	$13,716	NA

(a) Amounts represent the carrying value of modified residential real estate loans.
(b) At December 31, 2019 and 2018, $14 million and $4.1 billion, respectively, of loans modified subsequent to repurchase from Ginnie Mae in accordance with the standards of the appropriate government agency (i.e., Federal Housing Administration ("FHA"), U.S. Department of Veterans Affairs ("VA"), Rural Housing Service of the U.S. Department of Agriculture ("RHS")) are not included in the table above. When such loans perform subsequent to modification in accordance with Ginnie Mae guidelines, they are generally sold back into Ginnie Mae loan pools. Modified loans that do not re-perform become subject to foreclosure. Refer to Note 14 for additional information about sales of loans in securitization transactions with Ginnie Mae.
(c) Amounts represent the unpaid principal balance of modified PCI loans.
(d) As of December 31, 2019 and 2018, nonaccrual loans included $1.9 billion and $2.0 billion, respectively, of troubled debt restructurings ("TDRs") for which the borrowers were less than 90 days past due. Refer to Note 12 for additional information about loans modified in a TDR that are on nonaccrual status.

Nonperforming assets

The following table presents information as of December 31, 2019 and 2018, about consumer, excluding credit card, nonperforming assets.

Nonperforming assets[a]

December 31, (in millions)	2019	2018
Nonaccrual loans[b]		
Residential real estate	**$ 2,782**	$ 3,088
Other consumer	**360**	373
Total nonaccrual loans	**3,142**	3,461
Assets acquired in loan satisfactions		
Real estate owned[c]	**214**	196
Other	**24**	30
Total assets acquired in loan satisfactions	**238**	226
Total nonperforming assets	**$ 3,380**	$ 3,687

(a) At December 31, 2019 and 2018, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $41 million and $75 million, respectively. These amounts have been excluded based upon the government guarantee.
(b) Excludes PCI loans, which are accounted for on a pool basis. Since each pool is accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows, the past-due status of the pools, or that of individual loans within the pools, is not meaningful. The Firm is recognizing interest income on each pool of loans as each of the pools is performing.
(c) The prior period amount has been revised to conform with the current period presentation.

Nonaccrual loans: The following table presents changes in the consumer, excluding credit card, nonaccrual loans for the years ended December 31, 2019 and 2018.

Nonaccrual loan activity

Year ended December 31, (in millions)	2019	2018
Beginning balance	**$ 3,461**	$ 4,209
Additions	**2,210**	2,799
Reductions:		
Principal payments and other[a]	**1,026**	1,407
Charge-offs	**421**	468
Returned to performing status	**834**	1,399
Foreclosures and other liquidations	**248**	273
Total reductions	**2,529**	3,547
Net changes	**(319)**	(748)
Ending balance	**$ 3,142**	$ 3,461

(a) Other reductions includes loan sales.

Active and suspended foreclosure: Refer to Note 12 for information on loans that were in the process of active or suspended foreclosure.

Credit card

Total credit card loans increased from December 31, 2018 due to higher sales volume from existing customers and new account growth. Net charge-offs increased for the year ended December 31, 2019 when compared with the prior year, due to loan growth, in line with expectations.

Consistent with the Firm's policy, all credit card loans typically remain on accrual status until charged off. However, the Firm establishes an allowance, which is offset against loans and reduces interest income, for the estimated uncollectible portion of accrued and billed interest and fee income. Refer to Note 12 for further information about this portfolio, including information about delinquencies.

Geographic and FICO composition of credit card loans

At December 31, 2019, $77.5 billion, or 46% of the total retained credit card loan portfolio, was concentrated in California, Texas, New York, Florida and Illinois, compared with $71.2 billion, or 45%, at December 31, 2018. Refer to Note 12 for additional information on the geographic and FICO composition of the Firm's credit card loans.

Modifications of credit card loans

At December 31, 2019 and 2018, the Firm had $1.5 billion and $1.3 billion, respectively, of credit card loans outstanding that have been modified in TDRs. Refer to Note 12 for additional information about loan modification programs for borrowers.

WHOLESALE CREDIT PORTFOLIO

In its wholesale businesses, the Firm is exposed to credit risk primarily through its underwriting, lending, market-making, and hedging activities with and for clients and counterparties, as well as through various operating services (such as cash management and clearing activities), securities financing activities and cash placed with banks. A portion of the loans originated or acquired by the Firm's wholesale businesses is generally retained on the balance sheet. The Firm distributes a significant percentage of the loans that it originates into the market as part of its syndicated loan business and to manage portfolio concentrations and credit risk.

The credit performance of the wholesale portfolio remained favorable for the year ended December 31, 2019, characterized by continued low levels of criticized exposure, nonaccrual loans and charge-offs. Refer to the industry discussion on pages 109–111 for further information. Loans held-for-sale decreased, driven by a loan syndication in CIB. The wholesale portfolio is actively managed, in part by conducting ongoing, in-depth reviews of client credit quality and transaction structure inclusive of collateral where applicable, and of industry, product and client concentrations.

In the following tables, the Firm's wholesale credit portfolio includes exposure held in CIB, CB, AWM and Corporate. It excludes all exposure managed by CCB, scored prime mortgage and scored home equity loans held in AWM and scored prime mortgage loans held in Corporate.

Wholesale credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming	
	2019	2018	**2019**	2018
Loans retained	**$444,639**	$439,162	**$ 843**	$ 1,150
Loans held-for-sale	**4,062**	11,877	**5**	–
Loans at fair value	**7,104**	3,151	**90**	220
Loans – reported	**455,805**	454,190	**938**	1,370
Derivative receivables	**49,766**	54,213	**30**	60
Receivables from customers and other[(a)]	**33,706**	30,063	**–**	–
Total wholesale credit-related assets	**539,277**	538,466	**968**	1,430
Assets acquired in loan satisfactions				
Real estate owned	**NA**	NA	**130**	73
Other	**NA**	NA	**19**	–
Total assets acquired in loan satisfactions	**NA**	NA	**149**	73
Lending-related commitments	**404,115**	387,813	**474**	469
Total wholesale credit portfolio	**$943,392**	$926,279	**$ 1,591**	$ 1,972
Credit derivatives used in credit portfolio management activities[(b)]	**$ (18,030)**	$ (12,682)	**$ –**	$ –
Liquid securities and other cash collateral held against derivatives	**(16,009)**	(15,322)	**NA**	NA

(a) Receivables from customers and other include $33.7 billion and $30.1 billion of brokerage-related held-for-investment customer receivables at December 31, 2019 and 2018, respectively, to clients in CIB and AWM; these are classified in accrued interest and accounts receivable on the Consolidated balance sheets.
(b) Represents the net notional amount of protection purchased and sold through credit derivatives used to manage both performing and nonperforming wholesale credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. Refer to Credit derivatives on page 115 and Note 5 for additional information.

The following tables present the maturity and internal risk ratings profiles of the wholesale credit portfolio as of December 31, 2019 and 2018. The Firm considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade. Refer to Note 12 for further information on internal risk ratings.

Wholesale credit exposure – maturity and ratings profile

	Maturity profile[d]				Ratings profile			
December 31, 2019 (in millions, except ratios)	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	**Total**	Investment-grade	Noninvestment -grade	**Total**	Total % of IG
Loans retained	**$ 128,430**	**$ 209,397**	**$ 106,812**	**$ 444,639**	**$ 344,199**	**$ 100,440**	**$ 444,639**	**77%**
Derivative receivables				**49,766**			**49,766**	
Less: Liquid securities and other cash collateral held against derivatives				**(16,009)**			**(16,009)**	
Total derivative receivables, net of all collateral	**6,561**	**6,960**	**20,236**	**33,757**	**26,966**	**6,791**	**33,757**	**80**
Lending-related commitments	**77,298**	**314,281**	**12,536**	**404,115**	**288,864**	**115,251**	**404,115**	**71**
Subtotal	**212,289**	**530,638**	**139,584**	**882,511**	**660,029**	**222,482**	**882,511**	**75**
Loans held-for-sale and loans at fair value[a]				**11,166**			**11,166**	
Receivables from customers and other				**33,706**			**33,706**	
Total exposure – net of liquid securities and other cash collateral held against derivatives				**$ 927,383**			**$ 927,383**	
Credit derivatives used in credit portfolio management activities[b][c]	**$ (4,912)**	**$ (10,031)**	**$ (3,087)**	**$ (18,030)**	**$ (16,276)**	**$ (1,754)**	**$ (18,030)**	**90%**

	Maturity profile[d]				Ratings profile			
December 31, 2018 (in millions, except ratios)	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	Total	Investment-grade	Noninvestment-grade	Total	Total % of IG
Loans retained	$ 138,458	$ 196,974	$ 103,730	$ 439,162	$ 339,729	$ 99,433	$ 439,162	77%
Derivative receivables				54,213			54,213	
Less: Liquid securities and other cash collateral held against derivatives				(15,322)			(15,322)	
Total derivative receivables, net of all collateral	11,038	9,169	18,684	38,891	31,794	7,097	38,891	82
Lending-related commitments	79,400	294,855	13,558	387,813	288,724	99,089	387,813	74
Subtotal	228,896	500,998	135,972	865,866	660,247	205,619	865,866	76
Loans held-for-sale and loans at fair value[a]				15,028			15,028	
Receivables from customers and other				30,063			30,063	
Total exposure – net of liquid securities and other cash collateral held against derivatives				$ 910,957			$ 910,957	
Credit derivatives used in credit portfolio management activities[b][c]	$ (447)	$ (9,318)	$ (2,917)	$ (12,682)	$ (11,213)	$ (1,469)	$ (12,682)	88%

(a) Represents loans held-for-sale, primarily related to syndicated loans and loans transferred from the retained portfolio, and loans at fair value.
(b) These derivatives do not qualify for hedge accounting under U.S. GAAP.
(c) The notional amounts are presented on a net basis by underlying reference entity and the ratings profile shown is based on the ratings of the reference entity on which protection has been purchased. Predominantly all of the credit derivatives entered into by the Firm where it has purchased protection used in credit portfolio management activities are executed with investment-grade counterparties.
(d) The maturity profile of retained loans, lending-related commitments and derivative receivables is based on remaining contractual maturity. Derivative contracts that are in a receivable position at December 31, 2019, may become payable prior to maturity based on their cash flow profile or changes in market conditions.

Wholesale credit exposure – industry exposures

The Firm focuses on the management and diversification of its industry exposures, and pays particular attention to industries with actual or potential credit concerns. Exposures deemed criticized align with the U.S. banking regulators' definition of criticized exposures, which consist of the special mention, substandard and doubtful categories. The total criticized component of the portfolio, excluding loans held-for-sale and loans at fair value, was $14.3 billion at December 31, 2019, compared with $12.1 billion at December 31, 2018. The increase was driven by select client downgrades.

Below are summaries of the Firm's exposures as of December 31, 2019 and 2018. The industry of risk category is generally based on the client or counterparty's primary business activity. Refer to Note 4 for additional information on industry concentrations.

Wholesale credit exposure – industries[a]

As of or for the year ended December 31, 2019 (in millions)	Credit exposure[f]	Investment-grade	Noninvestment-grade			Selected metrics			
			Noncriticized	Criticized performing	Criticized nonperforming	30 days or more past due and accruing loans	Net charge-offs/ (recoveries)	Credit derivative hedges[g]	Liquid securities and other cash collateral held against derivative receivables
Real Estate	$ 149,267	$ 121,283	$ 26,534	$ 1,401	$ 49	$ 98	$ 12	$ (100)	$ –
Individuals and Individual Entities[b]	102,292	90,865	11,219	171	37	386	28	–	(641)
Consumer & Retail	99,331	57,587	39,524	2,062	158	80	112	(235)	(11)
Technology, Media & Telecommunications	59,021	35,602	20,368	2,923	128	13	26	(658)	(17)
Industrials	58,250	38,760	18,264	1,050	176	161	41	(746)	(9)
Asset Managers	51,775	45,208	6,550	4	13	18	–	–	(4,785)
Banks & Finance Cos	50,091	34,599	14,692	795	5	–	–	(834)	(2,112)
Healthcare	46,638	36,231	9,248	1,074	85	79	6	(405)	(145)
Oil & Gas	41,570	22,221	17,780	992	577	–	98	(429)	(10)
Utilities	34,753	22,196	12,246	301	10	1	39	(414)	(50)
State & Municipal Govt[c]	26,697	26,195	502	–	–	29	–	–	(46)
Automotive	17,317	10,000	6,759	558	–	5	–	(194)	–
Chemicals & Plastics	17,276	11,984	5,080	212	–	3	–	(10)	(13)
Metals & Mining	15,337	7,020	7,620	658	39	1	(1)	(33)	(6)
Central Govt	14,843	14,502	341	–	–	–	–	(9,018)	(1,963)
Transportation	13,917	8,644	4,863	347	63	29	7	(37)	(37)
Insurance	12,202	9,413	2,768	17	4	3	–	(36)	(1,998)
Securities Firms	7,335	5,969	1,339	27	–	–	–	(48)	(3,201)
Financial Markets Infrastructure	4,116	3,969	147	–	–	–	–	–	(6)
All other[d]	76,492	72,565	3,548	376	3	4	1	(4,833)	(959)
Subtotal	$ 898,520	$ 674,813	$ 209,392	$ 12,968	$ 1,347	$ 910	$ 369	$ (18,030)	$ (16,009)
Loans held-for-sale and loans at fair value	11,166								
Receivables from customers and other	33,706								
Total[e]	$ 943,392								

As of or for the year ended December 31, 2018 (in millions)	Credit exposure[f]	Investment-grade	Noninvestment-grade			Selected metrics			
			Noncriticized	Criticized performing	Criticized nonperforming	30 days or more past due and accruing loans	Net charge-offs/ (recoveries)	Credit derivative hedges[g]	Liquid securities and other cash collateral held against derivative receivables
Real Estate	$ 143,316	$ 117,988	$ 24,174	$ 1,019	$ 135	$ 70	$ (20)	$ (2)	$ (1)
Individuals and Individual Entities[b]	97,077	86,581	10,164	174	158	703	12	–	(915)
Consumer & Retail	94,815	60,678	31,901	2,033	203	43	55	(248)	(14)
Technology, Media & Telecommunications	72,646	46,334	24,081	2,170	61	8	12	(1,011)	(12)
Industrials	58,528	38,487	18,594	1,311	136	171	20	(207)	(29)
Asset Managers	42,807	36,722	6,067	4	14	10	–	–	(5,829)
Banks & Finance Cos	49,920	34,120	15,496	299	5	11	–	(575)	(2,290)
Healthcare	48,142	36,687	10,625	761	69	23	(5)	(150)	(133)
Oil & Gas	42,600	23,356	17,451	1,158	635	6	36	(248)	–
Utilities	28,172	23,558	4,326	138	150	–	38	(142)	(60)
State & Municipal Govt[c]	27,351	26,746	603	2	–	18	(1)	–	(42)
Automotive	17,339	9,637	7,310	392	–	1	–	(125)	–
Chemicals & Plastics	16,035	11,490	4,427	118	–	4	–	–	–
Metals & Mining	15,359	8,188	6,767	385	19	1	–	(174)	(22)
Central Govt	18,456	18,251	124	81	–	4	–	(7,994)	(2,130)
Transportation	15,660	10,508	4,699	393	60	21	6	(31)	(112)
Insurance	12,639	9,777	2,830	–	32	–	–	(36)	(2,080)
Securities Firms	4,558	3,099	1,459	–	–	–	–	(158)	(823)
Financial Markets Infrastructure	7,484	6,746	738	–	–	–	–	–	(26)
All other[d]	68,284	64,664	3,606	12	2	2	2	(1,581)	(804)
Subtotal	$ 881,188	$ 673,617	$ 195,442	$ 10,450	$ 1,679	$ 1,096	$ 155	$ (12,682)	$ (15,322)
Loans held-for-sale and loans at fair value	15,028								
Receivables from customers and other	30,063								
Total[e]	$ 926,279								

(a) The industry rankings presented in the table as of December 31, 2018, are based on the industry rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.
(b) Individuals and Individual Entities predominantly consists of Wealth Management clients within AWM and includes exposure to personal investment companies and personal and testamentary trusts.
(c) In addition to the credit risk exposure to states and municipal governments (both U.S. and non-U.S.) at December 31, 2019 and 2018, noted above, the Firm held: $6.5 billion and $7.8 billion, respectively, of trading assets; $29.8 billion and $37.7 billion, respectively, of AFS securities; and $4.8 billion at both periods of held-to-maturity ("HTM") securities, issued by U.S. state and municipal governments. Refer to Note 2 and Note 10 for further information.
(d) All other includes: SPEs and Private education and civic organizations, representing approximately 92% and 8%, respectively, at both December 31, 2019 and 2018.
(e) Excludes cash placed with banks of $254.0 billion and $268.1 billion, at December 31, 2019 and 2018, respectively, which is predominantly placed with various central banks, primarily Federal Reserve Banks.
(f) Credit exposure is net of risk participations and excludes the benefit of credit derivatives used in credit portfolio management activities held against derivative receivables or loans and liquid securities and other cash collateral held against derivative receivables.
(g) Represents the net notional amounts of protection purchased and sold through credit derivatives used to manage the credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. The All other category includes purchased credit protection on certain credit indices.

Real Estate

Presented below is additional information on the Real Estate industry, to which the Firm has significant exposure.

Real Estate exposure increased $6.0 billion to $149.3 billion during the year ended December 31, 2019, and the investment grade percentage of the portfolio remained relatively flat at 81%. Refer to Note 12 for further information on Real Estate loans.

	December 31, 2019				
(in millions, except ratios)	**Loans and Lending-related Commitments**	**Derivative Receivables**	**Credit exposure**	**% Investment-grade**	**% Drawn[c]**
Multifamily[a]	**$ 86,326**	**$ 58**	**$ 86,384**	**91%**	**92%**
Other	**62,322**	**561**	**62,883**	**68**	**59**
Total Real Estate Exposure[b]	**148,648**	**619**	**149,267**	**81**	**78**

	December 31, 2018				
(in millions, except ratios)	Loans and Lending-related Commitments	Derivative Receivables	Credit exposure	% Investment-grade	% Drawn[c]
Multifamily[a]	$ 85,683	$ 33	$ 85,716	89%	92%
Other	57,469	131	57,600	72	63
Total Real Estate Exposure[b]	143,152	164	143,316	82	81

(a) Multifamily exposure is largely in California.
(b) Real Estate exposure is predominantly secured; unsecured exposure is largely investment-grade.
(c) Represents drawn exposure as a percentage of credit exposure.

Loans

In its wholesale businesses, the Firm provides loans to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals. Refer to Note 12 for a further discussion on loans, including information about delinquencies, loan modifications and other credit quality indicators.

The following table presents the change in the nonaccrual loan portfolio for the years ended December 31, 2019 and 2018.

Wholesale nonaccrual loan activity

Year ended December 31, (in millions)	**2019**	2018
Beginning balance	**$ 1,370**	$ 1,734
Additions	**2,141**	1,188
Reductions:		
Paydowns and other	**1,435**	692
Gross charge-offs	**376**	299
Returned to performing status	**556**	234
Sales	**206**	327
Total reductions	**2,573**	1,552
Net changes	**(432)**	(364)
Ending balance	**$ 938**	$ 1,370

The following table presents net charge-offs/recoveries, which are defined as gross charge-offs less recoveries, for the years ended December 31, 2019 and 2018. The amounts in the table below do not include gains or losses from sales of nonaccrual loans.

Wholesale net charge-offs/(recoveries)

Year ended December 31, (in millions, except ratios)	**2019**	2018
Loans – reported		
Average loans retained	**$ 435,876**	$ 416,828
Gross charge-offs	**411**	313
Gross recoveries	**(42)**	(158)
Net charge-offs/(recoveries)	**369**	155
Net charge-off/(recovery) rate	**0.08%**	0.04%

Lending-related commitments

The Firm uses lending-related financial instruments, such as commitments (including revolving credit facilities) and guarantees, to address the financing needs of its clients. The contractual amounts of these financial instruments represent the maximum possible credit risk should the clients draw down on these commitments or when the Firm fulfills its obligations under these guarantees, and the clients subsequently fail to perform according to the terms of these contracts. Most of these commitments and guarantees are refinanced, extended, cancelled, or expire without being drawn upon or a default occurring. As a result, the Firm does not believe that the total contractual amount of these wholesale lending-related commitments is representative of the Firm's expected future credit exposure or funding requirements. Refer to Note 28 for further information on wholesale lending-related commitments.

Receivables from Customers

Receivables from customers primarily represent held-for-investment margin loans to brokerage clients in CIB and AWM that are collateralized by assets maintained in the clients' brokerage accounts (e.g., cash on deposit, liquid and readily marketable debt or equity securities), as such no allowance is held against these receivables. To manage its credit risk the Firm establishes margin requirements and monitors the required margin levels on an ongoing basis, and requires clients to deposit additional cash or other collateral, or to reduce positions, when appropriate. These receivables are reported within accrued interest and accounts receivable on the Firm's Consolidated balance sheets.

Clearing services

The Firm provides clearing services for clients entering into certain securities and derivative contracts. Through the provision of these services the Firm is exposed to the risk of non-performance by its clients and may be required to share in losses incurred by CCPs. Where possible, the Firm seeks to mitigate its credit risk to its clients through the collection of adequate margin at inception and throughout the life of the transactions and can also cease the provision of clearing services if clients do not adhere to their obligations under the clearing agreement. Refer to Note 28 for a further discussion of clearing services.

Derivative contracts

Derivatives enable clients and counterparties to manage risks including credit risk and risks arising from fluctuations in interest rates, foreign exchange, equities, and commodities. The Firm makes markets in derivatives in order to meet these needs and uses derivatives to manage certain risks associated with net open risk positions from its market-making activities, including the counterparty credit risk arising from derivative receivables. The Firm also uses derivative instruments to manage its own credit and other market risk exposure. The nature of the counterparty and the settlement mechanism of the derivative affect the credit risk to which the Firm is exposed. For OTC derivatives the Firm is exposed to the credit risk of the derivative counterparty. For exchange-traded derivatives ("ETD"), such as futures and options, and cleared over-the-counter ("OTC-cleared") derivatives, the Firm is generally exposed to the credit risk of the relevant CCP. Where possible, the Firm seeks to mitigate its credit risk exposures arising from derivative contracts through the use of legally enforceable master netting arrangements and collateral agreements. Refer to Note 5 for a further discussion of derivative contracts, counterparties and settlement types.

The following table summarizes the net derivative receivables for the periods presented.

Derivative receivables

December 31, (in millions)	2019	2018
Total, net of cash collateral	**$ 49,766**	$ 54,213
Liquid securities and other cash collateral held against derivative receivables[(a)]	**(16,009)**	(15,322)
Total, net of all collateral	**$ 33,757**	$ 38,891

(a) Includes collateral related to derivative instruments where appropriate legal opinions have not been either sought or obtained with respect to master netting agreements.

The fair value of derivative receivables reported on the Consolidated balance sheets were $49.8 billion and $54.2 billion at December 31, 2019 and 2018, respectively. Derivative receivables represent the fair value of the derivative contracts after giving effect to legally enforceable master netting agreements and cash collateral held by the Firm. However, in management's view, the appropriate measure of current credit risk should also take into consideration additional liquid securities (primarily U.S. government and agency securities and other group of seven nations ("G7") government securities) and other cash collateral held by the Firm aggregating $16.0 billion and $15.3 billion at December 31, 2019 and 2018, respectively, that may be used as security when the fair value of the client's exposure is in the Firm's favor.

The Firm also holds additional collateral (primarily cash, G7 government securities, other liquid government agency and guaranteed securities, and corporate debt and equity securities) delivered by clients at the initiation of transactions, as well as collateral related to contracts that have a non-daily call frequency and collateral that the Firm has agreed to return but has not yet settled as of the reporting date. Although this collateral does not reduce the balances and is not included in the table above, it is available as security against potential exposure that could arise should the fair value of the client's derivative contracts move in the Firm's favor. The derivative receivables fair value, net of all collateral, also does not include other credit enhancements, such as letters of credit. Refer to Note 5 for additional information on the Firm's use of collateral agreements.

While useful as a current view of credit exposure, the net fair value of the derivative receivables does not capture the potential future variability of that credit exposure. To capture the potential future variability of credit exposure, the Firm calculates, on a client-by-client basis, three measures of potential derivatives-related credit loss: Peak, Derivative Risk Equivalent ("DRE"), and Average exposure

("AVG"). These measures all incorporate netting and collateral benefits, where applicable.

Peak represents a conservative measure of potential exposure to a counterparty calculated in a manner that is broadly equivalent to a 97.5% confidence level over the life of the transaction. Peak is the primary measure used by the Firm for setting credit limits for derivative contracts, senior management reporting and derivatives exposure management.

DRE exposure is a measure that expresses the risk of derivative exposure on a basis intended to be equivalent to the risk of loan exposures. DRE is a less extreme measure of potential credit loss than Peak and is used as an input for aggregating derivative credit risk exposures with loans and other credit risk.

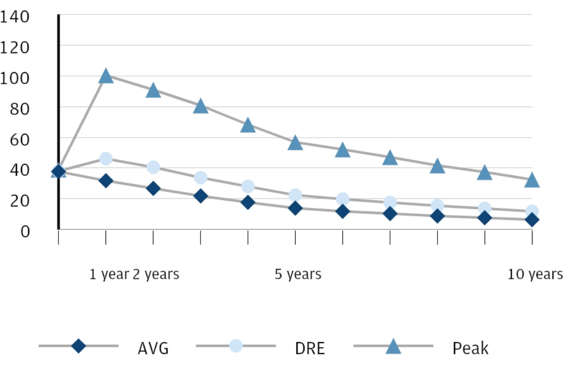
Finally, AVG is a measure of the expected fair value of the Firm's derivative receivables at future time periods, including the benefit of collateral. AVG over the total life of the derivative contract is used as the primary metric for pricing purposes and is used to calculate credit risk capital and CVA, as further described below.

The fair value of the Firm's derivative receivables incorporates CVA to reflect the credit quality of counterparties. CVA is based on the Firm's AVG to a counterparty and the counterparty's credit spread in the credit derivatives market. The Firm believes that active risk management is essential to controlling the dynamic credit risk in the derivatives portfolio. In addition, the Firm's risk management process takes into consideration the potential impact of wrong-way risk, which is broadly defined as the potential for increased correlation between the Firm's exposure to a counterparty (AVG) and the counterparty's credit quality. Many factors may influence the nature and magnitude of these correlations over time. To the extent that these correlations are identified, the Firm may adjust the CVA associated with that counterparty's AVG. The Firm risk manages exposure to changes in CVA by entering into credit derivative contracts, as well as interest rate, foreign exchange, equity and commodity derivative contracts.

The below graph shows exposure profiles to the Firm's current derivatives portfolio over the next 10 years as calculated by the Peak, DRE and AVG metrics. The three measures generally show that exposure will decline after the first year, if no new trades are added to the portfolio.

Exposure profile of derivatives measures

December 31, 2019
(in billions)



The following table summarizes the ratings profile of the Firm's derivative receivables, including credit derivatives, net of all collateral, at the dates indicated. The Firm considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade. Refer to Note 12 for further information on internal risk ratings.

Ratings profile of derivative receivables

Internal rating equivalent	2019		2018	
December 31, (in millions, except ratios)	Exposure net of all collateral	% of exposure net of all collateral	Exposure net of all collateral	% of exposure net of all collateral
AAA/Aaa to AA-/Aa3	$ 8,347	25%	$ 11,831	31%
A+/A1 to A-/A3	5,471	16	7,428	19
BBB+/Baa1 to BBB-/Baa3	13,148	39	12,536	32
BB+/Ba1 to B-/B3	6,225	18	6,373	16
CCC+/Caa1 and below	566	2	723	2
Total	$ 33,757	100%	$ 38,891	100%

As previously noted, the Firm uses collateral agreements to mitigate counterparty credit risk. The percentage of the Firm's over-the-counter derivative transactions subject to collateral agreements – excluding foreign exchange spot trades, which are not typically covered by collateral agreements due to their short maturity and centrally cleared trades that are settled daily – was approximately 90% at both December 31, 2019 and 2018.

Credit derivatives

The Firm uses credit derivatives for two primary purposes: first, in its capacity as a market-maker, and second, as an end-user, to manage the Firm's own credit risk associated with various exposures.

Credit portfolio management activities

Included in the Firm's end-user activities are credit derivatives used to mitigate the credit risk associated with traditional lending activities (loans and unfunded commitments) and derivatives counterparty exposure in the Firm's wholesale businesses (collectively, "credit portfolio management" activities). Information on credit portfolio management activities is provided in the table below.

The Firm also uses credit derivatives as an end-user to manage other exposures, including credit risk arising from certain securities held in the Firm's market-making businesses. These credit derivatives are not included in credit portfolio management activities.

Credit derivatives used in credit portfolio management activities

	Notional amount of protection purchased and sold [(a)]	
December 31, (in millions)	**2019**	2018
Credit derivatives used to manage:		
Loans and lending-related commitments	**$ 2,047**	$ 1,272
Derivative receivables	**15,983**	11,410
Credit derivatives used in credit portfolio management activities	**$ 18,030**	$ 12,682

(a) Amounts are presented net, considering the Firm's net protection purchased or sold with respect to each underlying reference entity or index.

The credit derivatives used in credit portfolio management activities do not qualify for hedge accounting under U.S. GAAP; these derivatives are reported at fair value, with gains and losses recognized in principal transactions revenue. In contrast, the loans and lending-related commitments being risk-managed are accounted for on an accrual basis. This asymmetry in accounting treatment, between loans and lending-related commitments and the credit derivatives used in credit portfolio management activities, causes earnings volatility that is not representative, in the Firm's view, of the true changes in value of the Firm's overall credit exposure.

The effectiveness of credit default swaps ("CDS") as a hedge against the Firm's exposures may vary depending on a number of factors, including the named reference entity (i.e., the Firm may experience losses on specific exposures that are different than the named reference entities in the purchased CDS); the contractual terms of the CDS (which may have a defined credit event that does not align with an actual loss realized by the Firm); and the maturity of the Firm's CDS protection (which in some cases may be shorter than the Firm's exposures). However, the Firm generally seeks to purchase credit protection with a maturity date that is the same or similar to the maturity date of the exposure for which the protection was purchased, and remaining differences in maturity are actively monitored and managed by the Firm. Refer to Credit derivatives in Note 5 for a detailed description of credit derivatives.

ALLOWANCE FOR CREDIT LOSSES

The Firm's allowance for credit losses covers the retained consumer and wholesale loan portfolios, as well as the Firm's wholesale and certain consumer lending-related commitments.

Refer to Critical Accounting Estimates Used by the Firm on pages 136–138 and Note 13 for further information on the components of the allowance for credit losses and related management judgments.

At least quarterly, the allowance for credit losses is reviewed by the CRO, the CFO and the Controller of the Firm. As of December 31, 2019, JPMorgan Chase deemed the allowance for credit losses to be appropriate and sufficient to absorb probable credit losses inherent in the portfolio.

The allowance for credit losses decreased compared with December 31, 2018 driven by:

- an $800 million reduction in the CCB allowance for loan losses, which included $650 million in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies; $100 million in the non credit-impaired residential real estate portfolio; and $50 million in the business banking portfolio; as well as
- a $151 million reduction for write-offs of PCI loans,

predominantly offset by

- a $500 million addition to the allowance for loan losses in the credit card portfolio reflecting loan growth and higher loss rates as newer vintages season and become a larger part of the portfolio, and
- a $251 million addition in the wholesale allowance for credit losses driven by select client downgrades.

Refer to Consumer Credit Portfolio on pages 103–107, Wholesale Credit Portfolio on pages 108–115 and Note 12 for additional information on the consumer and wholesale credit portfolios.

Summary of changes in the allowance for credit losses

Year ended December 31, (in millions, except ratios)	2019 Consumer, excluding credit card	2019 Credit card	2019 Wholesale	2019 Total	2018 Consumer, excluding credit card	2018 Credit card	2018 Wholesale	2018 Total
Allowance for loan losses								
Beginning balance at January 1,	**$ 4,146**	**$ 5,184**	**$ 4,115**	**$ 13,445**	$ 4,579	$ 4,884	$ 4,141	$ 13,604
Gross charge-offs	**963**	**5,436**	**411**	**6,810**	1,025	5,011	313	6,349
Gross recoveries	**(551)**	**(588)**	**(42)**	**(1,181)**	(842)	(493)	(158)	(1,493)
Net charge-offs	**412**	**4,848**	**369**	**5,629**	183	4,518	155	4,856
Write-offs of PCI loans[(a)]	**151**	**–**	**–**	**151**	187	–	–	187
Provision for loan losses	**(383)**	**5,348**	**484**	**5,449**	(63)	4,818	130	4,885
Other	**(1)**	**(1)**	**11**	**9**	–	–	(1)	(1)
Ending balance at December 31,	**$ 3,199**	**$ 5,683**	**$ 4,241**	**$ 13,123**	$ 4,146	$ 5,184	$ 4,115	$ 13,445
Impairment methodology								
Asset-specific[(b)]	**$ 136**	**$ 477**	**$ 234**	**$ 847**	$ 196	$ 440	$ 297	$ 933
Formula-based	**2,076**	**5,206**	**4,007**	**11,289**	2,162	4,744	3,818	10,724
PCI	**987**	**–**	**–**	**987**	1,788	–	–	1,788
Total allowance for loan losses	**$ 3,199**	**$ 5,683**	**$ 4,241**	**$ 13,123**	$ 4,146	$ 5,184	$ 4,115	$ 13,445
Allowance for lending-related commitments								
Beginning balance at January 1,	**$ 33**	**$ –**	**$ 1,022**	**$ 1,055**	$ 33	$ –	$ 1,035	$ 1,068
Provision for lending-related commitments	**–**	**–**	**136**	**136**	–	–	(14)	(14)
Other	**–**	**–**	**–**	**–**	–	–	1	1
Ending balance at December 31,	**$ 33**	**$ –**	**$ 1,158**	**$ 1,191**	$ 33	$ –	$ 1,022	$ 1,055
Impairment methodology								
Asset-specific	**$ –**	**$ –**	**$ 102**	**$ 102**	$ –	$ –	$ 99	$ 99
Formula-based	**33**	**–**	**1,056**	**1,089**	33	–	923	956
Total allowance for lending-related commitments[(c)]	**$ 33**	**$ –**	**$ 1,158**	**$ 1,191**	$ 33	$ –	$ 1,022	$ 1,055
Total allowance for credit losses	**$ 3,232**	**$ 5,683**	**$ 5,399**	**$ 14,314**	$ 4,179	$ 5,184	$ 5,137	$ 14,500
Memo:								
Retained loans, end of period	**$ 332,038**	**$ 168,924**	**$ 444,639**	**$ 945,601**	$ 373,637	$ 156,616	$ 439,162	$ 969,415
Retained loans, average	**349,724**	**156,319**	**435,876**	**941,919**	374,395	145,606	416,828	936,829
PCI loans, end of period	**20,363**	**–**	**–**	**20,363**	24,034	–	3	24,037
Credit ratios								
Allowance for loan losses to retained loans	**0.96%**	**3.36%**	**0.95%**	**1.39%**	1.11%	3.31%	0.94%	1.39%
Allowance for loan losses to retained nonaccrual loans[(d)]	**102**	**NM**	**503**	**329**	120	NM	358	292
Allowance for loan losses to retained nonaccrual loans excluding credit card	**102**	**NM**	**503**	**187**	120	NM	358	179
Net charge-off rates	**0.12**	**3.10**	**0.08**	**0.60**	0.05	3.10	0.04	0.52
Credit ratios, excluding residential real estate PCI loans								
Allowance for loan losses to retained loans	**0.71**	**3.36**	**0.95**	**1.31**	0.67	3.31	0.94	1.23
Allowance for loan losses to retained nonaccrual loans[(d)]	**70**	**NM**	**503**	**305**	68	NM	358	253
Allowance for loan losses to retained nonaccrual loans excluding credit card	**70**	**NM**	**503**	**162**	68	NM	358	140
Net charge-off rates	**0.13%**	**3.10%**	**0.08%**	**0.61%**	0.05%	3.10%	0.04%	0.53%

Note: In the table above, the financial measures which exclude the impact of PCI loans are non-GAAP financial measures.

(a) Write-offs of PCI loans are recorded against the allowance for loan losses when actual losses for a pool exceed estimated losses that were recorded as purchase accounting adjustments at the time of acquisition. A write-off of a PCI loan is recognized when the underlying loan is removed from a pool.

(b) Includes risk-rated loans that have been placed on nonaccrual status and loans that have been modified in a TDR. The asset-specific credit card allowance for loan losses modified in a TDR is calculated based on the loans' original contractual interest rates and does not consider any incremental penalty rates.

(c) The allowance for lending-related commitments is reported in accounts payable and other liabilities on the Consolidated balance sheets.

(d) The Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status as permitted by regulatory guidance.

INVESTMENT PORTFOLIO RISK MANAGEMENT

Investment portfolio risk is the risk associated with the loss of principal or a reduction in expected returns on investments arising from the investment securities portfolio or from principal investments. The investment securities portfolio is predominantly held by Treasury and CIO in connection with the Firm's balance sheet or asset-liability management objectives. Principal investments are predominantly privately-held financial instruments and are managed in the LOBs and Corporate. Investments are typically intended to be held over extended periods and, accordingly, the Firm has no expectation for short-term realized gains with respect to these investments.

Investment securities risk

Investment securities risk includes the exposure associated with a default in the payment of principal and interest. This risk is mitigated given that the investment securities portfolio held by Treasury and CIO is predominantly invested in high-quality securities. At December 31, 2019, the Treasury and CIO investment securities portfolio was $396.4 billion, and the average credit rating of the securities comprising the portfolio was AA+ (based upon external ratings where available and where not available, based primarily upon internal risk ratings. Refer to Corporate segment results on pages 77–78 and Note 10 for further information on the investment securities portfolio and internal risk ratings. Refer to Market Risk Management on pages 119–126 for further information on the market risk inherent in the portfolio. Refer to Liquidity Risk Management on pages 93–98 for further information on related liquidity risk.

Governance and oversight

Investment securities risks are governed by the Firm's Risk Appetite framework, and reviewed at the CTC Risk Committee with regular updates to the Board Risk Committee.

The Firm's independent control functions are responsible for reviewing the appropriateness of the carrying value of investment securities in accordance with relevant policies. Approved levels for investment securities are established for each risk category, including capital and credit risks.

Principal investment risk

Principal investments are typically private non-traded financial instruments representing ownership or other forms of junior capital. Principal investments span multiple asset classes and are made either in stand-alone investing businesses or as part of a broader business platform. In general, new principal investments include tax-oriented investments, as well as investments made to enhance or accelerate LOB and Corporate strategic business initiatives. The Firm's principal investments are managed by the LOBs and Corporate and are reflected within their respective financial results.

As of December 31, 2019 and 2018, the aggregate carrying values of the principal investment portfolios were $24.2 billion and $22.2 billion, respectively, which included tax-oriented investments (e.g., affordable housing and alternative energy investments) of $18.2 billion and $16.6 billion, respectively, and private equity, various debt and equity instruments, and real assets of $6.0 billion and $5.6 billion, respectively.

Governance and oversight

The Firm's approach to managing principal risk is consistent with the Firm's risk governance structure. A Firmwide risk policy framework exists for all principal investing activities and includes approval by executives who are independent from the investing businesses, as appropriate.

The Firm's independent control functions are responsible for reviewing the appropriateness of the carrying value of investments in accordance with relevant policies. As part of the risk governance structure, approved levels for investments are established and monitored for each relevant business or segment in order to manage the overall size of the portfolios. The Firm also conducts stress testing on these portfolios using specific scenarios that estimate losses based on significant market moves and/or other risk events.

Market risk is the risk associated with the effect of changes in market factors, such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.

Market Risk Management

Market Risk Management monitors market risks throughout the Firm and defines market risk policies and procedures.

Market Risk Management seeks to manage risk, facilitate efficient risk/return decisions, reduce volatility in operating performance and provide transparency into the Firm's market risk profile for senior management, the Board of Directors and regulators. Market Risk Management is responsible for the following functions:

- Establishing a market risk policy framework
- Independently measuring, monitoring and controlling LOB, Corporate, and Firmwide market risk
- Defining, approving and monitoring of limits
- Performing stress testing and qualitative risk assessments

Risk measurement

Measures used to capture market risk

There is no single measure to capture market risk and therefore Market Risk Management uses various metrics, both statistical and nonstatistical, to assess risk including:

- Value-at-risk (VaR)
- Stress testing
- Profit and loss drawdowns
- Earnings-at-risk
- Other sensitivity-based measures

Risk monitoring and control

Market risk exposure is managed primarily through a series of limits set in the context of the market environment and business strategy. In setting limits, Market Risk Management takes into consideration factors such as market volatility, product liquidity, accommodation of client business, and management experience. Market Risk Management maintains different levels of limits. Firm level limits include VaR and stress limits. Similarly, LOB and Corporate limits include VaR and stress limits and may be supplemented by certain nonstatistical risk measures such as profit and loss drawdowns. Limits may also be set within the LOBs and Corporate, as well as at the legal entity level.

Market Risk Management sets limits and regularly reviews and updates them as appropriate. Senior management is responsible for reviewing and approving certain of these risk limits on an ongoing basis. Limits that have not been reviewed within specified time periods by Market Risk Management are escalated to senior management. The LOBs and Corporate are responsible for adhering to established limits against which exposures are monitored and reported.

Limit breaches are required to be reported in a timely manner to limit approvers, which include Market Risk Management and senior management. In the event of a breach, Market Risk Management consults with appropriate members of the Firm to determine the suitable course of action required to return the applicable positions to compliance, which may include a reduction in risk in order to remedy the breach or granting a temporary increase in limits to accommodate an expected increase in client activity and/or market volatility. Certain Firm, Corporate or LOB-level limit breaches are escalated as appropriate.

The following table summarizes the predominant business activities and related market risks, as well as positions which give rise to market risk and certain measures used to capture those risks, for each LOB and Corporate.

In addition to the predominant business activities, each LOB and Corporate may engage in principal investing activities. To the extent principal investments are deemed market risk sensitive, they are reflected in relevant risk measures (i.e., VaR or Other sensitivity-based measures) and captured in the table below. Refer to Investment Portfolio Risk Management on page 118 for additional discussion on principal investments.

LOBs and Corporate	Predominant business activities	Related market risks	Positions included in Risk Management VaR	Positions included in earnings-at-risk	Positions included in other sensitivity-based measures
CCB	• Services mortgage loans • Originates loans and takes deposits	• Risk from changes in the probability of newly originated mortgage commitments closing • Interest rate risk and prepayment risk	• Mortgage commitments, classified as derivatives • Warehouse loans, classified as trading assets - debt instruments • MSRs • Hedges of mortgage commitments, warehouse loans and MSRs, classified as derivatives • Interest-only securities, classified as trading assets debt instruments, and related hedges, classified as derivatives • Fair value option elected liabilities	• Retained loan portfolio • Deposits	
CIB	• Makes markets and services clients across fixed income, foreign exchange, equities and commodities • Originates loans and takes deposits	• Risk of loss from adverse movements in market prices and implied volatilities across interest rate, foreign exchange, credit, commodity and equity instruments • Basis and correlation risk from changes in the way asset values move relative to one another • Interest rate risk and prepayment risk	• Trading assets/liabilities – debt and marketable equity instruments, and derivatives, including hedges of the retained loan portfolio • Certain securities purchased, loaned or sold under resale agreements and securities borrowed • Fair value option elected liabilities • Derivative CVA and associated hedges • Marketable equity investments	• Retained loan portfolio • Deposits	• Privately held equity and other investments measured at fair value • Derivatives FVA and fair value option elected liabilities DVA
CB	• Originates loans and takes deposits	• Interest rate risk and prepayment risk	• Marketable equity investments[(a)]	• Retained loan portfolio • Deposits	
AWM	• Provides initial capital investments in products such as mutual funds and capital invested alongside third-party investors • Originates loans and takes deposits	• Risk from adverse movements in market factors (e.g., rates and credit spreads) • Interest rate risk and prepayment risk	• Debt securities held in advance of distribution to clients, classified as trading assets - debt instruments[(a)]	• Retained loan portfolio • Deposits	• Initial seed capital investments and related hedges, classified as derivatives • Capital invested alongside third-party investors, typically in privately distributed collective vehicles managed by AWM (i.e., co-investments)
Corporate	• Manages the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks	• Structural interest rate risk from the Firm's traditional banking activities • Structural non-USD foreign exchange risks	• Derivative positions measured at fair value through noninterest revenue in earnings • Marketable equity investments	• Deposits with banks • Investment securities portfolio and related interest rate hedges • Long-term debt and related interest rate hedges	• Privately held equity and other investments measured at fair value • Foreign exchange exposure related to Firm-issued non-USD long-term debt ("LTD") and related hedges

(a) The AWM and CB contributions to Firmwide average VaR were not material for the year ended December 31, 2019 and 2018.

Value-at-risk

JPMorgan Chase utilizes VaR, a statistical risk measure, to estimate the potential loss from adverse market moves in the current market environment. The Firm has a single VaR framework used as a basis for calculating Risk Management VaR and Regulatory VaR.

The framework is employed across the Firm using historical simulation based on data for the previous 12 months. The framework's approach assumes that historical changes in market values are representative of the distribution of potential outcomes in the immediate future. The Firm believes the use of Risk Management VaR provides a daily measure of risk that is closely aligned to risk management decisions made by the LOBs and Corporate and, along with other market risk measures, provides the appropriate information needed to respond to risk events.

The Firm's Risk Management VaR is calculated assuming a one-day holding period and an expected tail-loss methodology which approximates a 95% confidence level. Risk Management VaR provides a consistent framework to measure risk profiles and levels of diversification across product types and is used for aggregating risks and monitoring limits across businesses. VaR results are reported to senior management, the Board of Directors and regulators.

Under the Firm's Risk Management VaR methodology, assuming current changes in market values are consistent with the historical changes used in the simulation, the Firm would expect to incur VaR "back-testing exceptions," defined as losses greater than that predicted by VaR estimates, an average of five times every 100 trading days. The number of VaR back-testing exceptions observed can differ from the statistically expected number of back-testing exceptions if the current level of market volatility is materially different from the level of market volatility during the 12 months of historical data used in the VaR calculation.

Underlying the overall VaR model framework are individual VaR models that simulate historical market returns for individual risk factors and/or product types. To capture material market risks as part of the Firm's risk management framework, comprehensive VaR model calculations are performed daily for businesses whose activities give rise to market risk. These VaR models are granular and incorporate numerous risk factors and inputs to simulate daily changes in market values over the historical period; inputs are selected based on the risk profile of each portfolio, as sensitivities and historical time series used to generate daily market values may be different across product types or risk management systems. The VaR model results across all portfolios are aggregated at the Firm level.

As VaR is based on historical data, it is an imperfect measure of market risk exposure and potential future losses. In addition, based on their reliance on available historical data, limited time horizons, and other factors, VaR measures are inherently limited in their ability to measure certain risks and to predict losses, particularly those associated with market illiquidity and sudden or severe shifts in market conditions.

For certain products, specific risk parameters are not captured in VaR due to the lack of inherent liquidity and availability of appropriate historical data. The Firm uses proxies to estimate the VaR for these and other products when daily time series are not available. It is likely that using an actual price-based time series for these products, if available, would affect the VaR results presented. The Firm therefore considers other nonstatistical measures such as stress testing, in addition to VaR, to capture and manage its market risk positions.

The daily market data used in VaR models may be different than the independent third-party data collected for VCG price testing in its monthly valuation process. For example, in cases where market prices are not observable, or where proxies are used in VaR historical time series, the data sources may differ. Refer to Valuation process in Note 2 for further information on the Firm's valuation process. As VaR model calculations require daily data and a consistent source for valuation, it may not be practical to use the data collected in the VCG monthly valuation process for VaR model calculations.

The Firm's VaR model calculations are periodically evaluated and enhanced in response to changes in the composition of the Firm's portfolios, changes in market conditions, improvements in the Firm's modeling techniques and measurements, and other factors. Such changes may affect historical comparisons of VaR results. Refer to Estimations and Model Risk Management on page 135 for information regarding model reviews and approvals.

The Firm calculates separately a daily aggregated VaR in accordance with regulatory rules ("Regulatory VaR"), which is used to derive the Firm's regulatory VaR-based capital requirements under Basel III. This Regulatory VaR model framework currently assumes a ten business-day holding period and an expected tail loss methodology which approximates a 99% confidence level. Regulatory VaR is applied to "covered" positions as defined by Basel III, which may be different than the positions included in the Firm's Risk Management VaR. For example, credit derivative hedges of accrual loans are included in the Firm's Risk Management VaR, while Regulatory VaR excludes these credit derivative hedges. In addition, in contrast to the Firm's Risk Management VaR, Regulatory VaR currently excludes the diversification benefit for certain VaR models.

Refer to JPMorgan Chase's Basel III Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website, for additional information on Regulatory VaR and the other components of market risk regulatory capital for the Firm (e.g., VaR-based measure, stressed VaR-based measure and the respective backtesting).

The table below shows the results of the Firm's Risk Management VaR measure using a 95% confidence level. VaR can vary significantly as positions change, market volatility fluctuates, and diversification benefits change.

Total VaR

As of or for the year ended December 31,	2019			2018		
(in millions)	Avg.	Min	Max	Avg.	Min	Max
CIB trading VaR by risk type						
Fixed income	**$ 40**	**$ 31**	**$ 50**	$ 33	$ 25	$ 46
Foreign exchange	**7**	**4**	**15**	6	3	15
Equities	**20**	**13**	**31**	17	13	26
Commodities and other	**8**	**6**	**12**	8	4	13
Diversification benefit to CIB trading VaR	**(33)** (a)	**NM** (b)	**NM** (b)	(26) (a)	NM (b)	NM (b)
CIB trading VaR	**42**	**29** (b)	**61** (b)	38	26 (b)	58 (b)
Credit portfolio VaR	**5**	**3**	**7**	3	3	4
Diversification benefit to CIB VaR	**(5)** (a)	**NM** (b)	**NM** (b)	(2) (a)	NM (b)	NM (b)
CIB VaR	**42**	**29** (b)	**63** (b)	39	26 (b)	59 (b)
CCB VaR	**5**	**1**	**11**	1	–	3
Corporate and other LOB VaR	**10**	**9**	**13**	12	9	14
Diversification benefit to other VaR	**(4)** (a)	**NM** (b)	**NM** (b)	(1) (a)	NM (b)	NM (b)
Other VaR	**11**	**8** (b)	**17** (b)	12	9 (b)	14 (b)
Diversification benefit to CIB and other VaR	**(10)** (a)	**NM** (b)	**NM** (b)	(10) (a)	NM (b)	NM (b)
Total VaR	**$ 43**	**$ 30** (b)	**$ 65** (b)	$ 41	$ 28 (b)	$ 62 (b)

(a) Average portfolio VaR is less than the sum of the VaR of the components described above, which is due to portfolio diversification. The diversification effect reflects that the risks are not perfectly correlated.
(b) Diversification benefit represents the difference between the total VaR and each reported level and the sum of its individual components. Diversification benefit reflects the non-additive nature of VaR due to imperfect correlation across LOBs, Corporate, and risk types. The maximum and minimum VaR for each portfolio may have occurred on different trading days than the components and consequently diversification benefit is not meaningful.

Average Total VaR increased $2 million for the year-ended December 31, 2019 as compared with the prior year. This was predominantly due to increased exposure in the Fixed Income risk type, increases in the Equities risk type driven by the inclusion of Tradeweb following its IPO in the second quarter of 2019, and increased volatility in the one-year historical look-back period, partially offset by increases in diversification benefit.

In addition, average CCB VaR increased by $4 million, driven by MSR risk management activities.

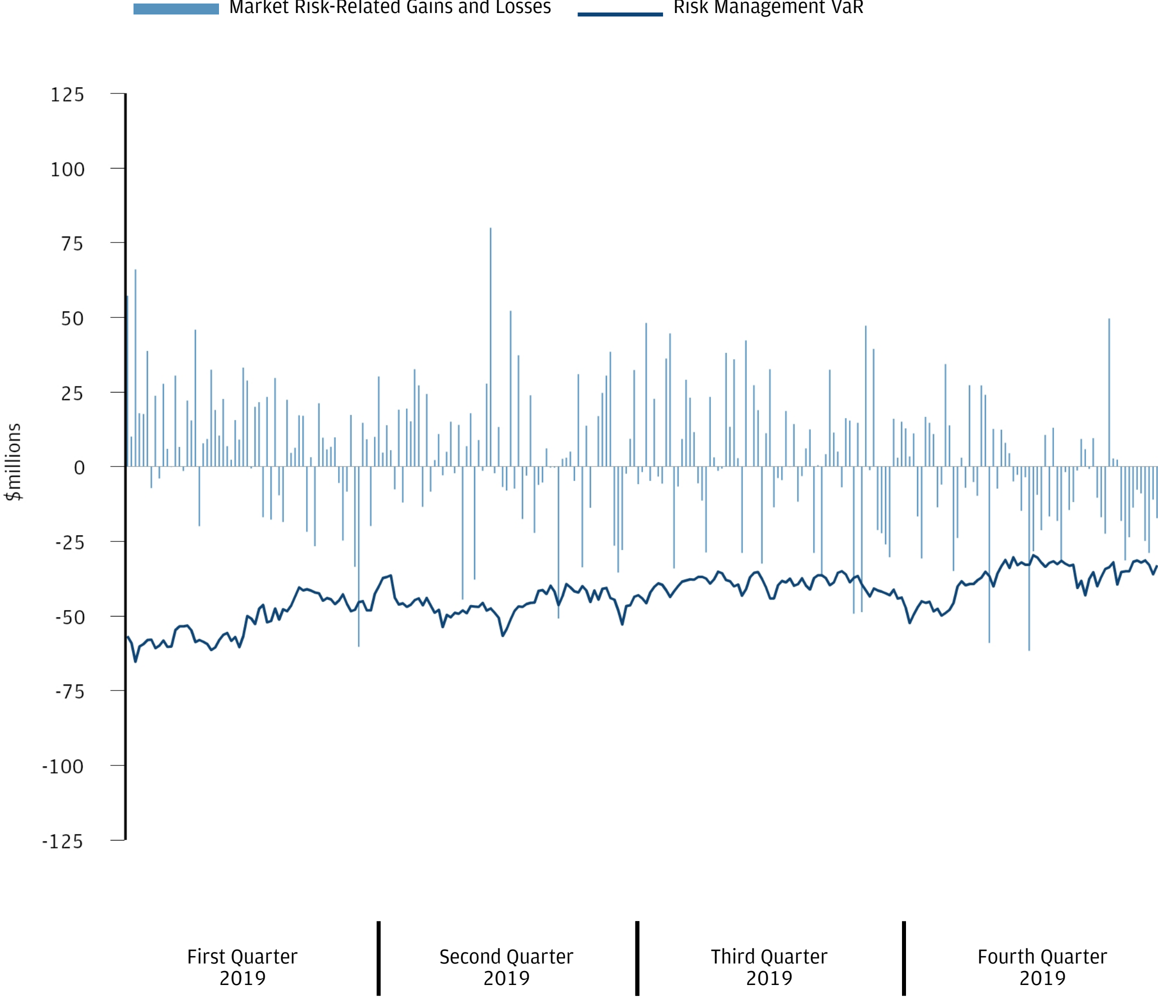
VaR back-testing

The Firm performs daily VaR model back-testing, which compares the daily Risk Management VaR results with the daily gains and losses actually recognized on market-risk related revenue.

The Firm's definition, of market risk-related gains and losses is consistent with the definition used by the banking regulators under Basel III. Under this definition, market risk-related gains and losses are defined as: gains and losses on the positions included in the Firm's Risk Management VaR excluding select components of revenue such as fees, commissions, certain valuation adjustments, net interest income, and gains and losses arising from intraday trading.

The following chart compares actual daily market risk-related gains and losses with the Firm's Risk Management VaR for the year ended December 31, 2019. As the chart presents market risk-related gains and losses related to those positions included in the Firm's Risk Management VaR, the results in the table below differ from the results of back-testing disclosed in the Market Risk section of the Firm's Basel III Pillar 3 Regulatory Capital Disclosures reports, which are based on Regulatory VaR applied to the Firm's covered positions. For the year ended December 31, 2019 the Firm observed eight VaR back-testing exceptions and posted market risk-related gains on 141 of the 259 days.

Daily Market Risk-Related Gains and Losses
vs. Risk Management VaR (1-day, 95% Confidence level)
Year ended December 31, 2019



Other risk measures

Stress testing

Along with VaR, stress testing is an important tool used to assess risk. While VaR reflects the risk of loss due to adverse changes in markets using recent historical market behavior, stress testing reflects the risk of loss from hypothetical changes in the value of market risk sensitive positions applied simultaneously. Stress testing measures the Firm's vulnerability to losses under a range of stressed but possible economic and market scenarios. The results are used to understand the exposures responsible for those potential losses and are measured against limits.

The Firm's stress framework covers Corporate and all LOBs with market risk sensitive positions. The framework is used to calculate multiple magnitudes of potential stress for both market rallies and market sell-offs, assuming significant changes in market factors such as credit spreads, equity prices, interest rates, currency rates and commodity prices, and combines them in multiple ways to capture an array of hypothetical economic and market scenarios.

The Firm generates a number of scenarios that focus on tail events in specific asset classes and geographies, including how the event may impact multiple market factors simultaneously. Scenarios also incorporate specific idiosyncratic risks and stress basis risk between different products. The flexibility in the stress framework allows the Firm to construct new scenarios that can test the outcomes against possible future stress events. Stress testing results are reported on a regular basis to senior management of the Firm, as appropriate.

Stress scenarios are governed by an overall stress framework and are subject to the standards outlined in the Firm's policies related to model risk management. Significant changes to the framework are reviewed as appropriate.

The Firm's stress testing framework is utilized in calculating the Firm's CCAR and other stress test results, which are reported to the Board of Directors. In addition, stress testing results are incorporated into the Firm's Risk Appetite framework, and are reported periodically to the Board Risk Committee.

Profit and loss drawdowns

Profit and loss drawdowns are used to highlight trading losses above certain levels of risk tolerance. A profit and loss drawdown is a decline in revenue from its year-to-date peak level.

Earnings-at-risk

The effect of interest rate exposure on the Firm's reported net income is important as interest rate risk represents one of the Firm's significant market risks. Interest rate risk arises not only from trading activities but also from the Firm's traditional banking activities, which include extension of loans and credit facilities, taking deposits and issuing debt as well as from the investment securities portfolio. Refer to the table on page 120 for a summary by LOB and Corporate, identifying positions included in earnings-at-risk.

The CTC Risk Committee establishes the Firm's structural interest rate risk policy and related limits, which are subject to approval by the Board Risk Committee. Treasury and CIO, working in partnership with the LOBs, calculates the Firm's structural interest rate risk profile and reviews it with senior management, including the CTC Risk Committee. In addition, oversight of structural interest rate risk is managed through a dedicated risk function reporting to the CTC. This risk function is responsible for providing independent oversight and governance around assumptions and establishing and monitoring limits for structural interest rate risk. The Firm manages structural interest rate risk generally through its investment securities portfolio and interest rate derivatives.

Structural interest rate risk can occur due to a variety of factors, including:

- Differences in timing among the maturity or repricing of assets, liabilities and off-balance sheet instruments
- Differences in the amounts of assets, liabilities and off-balance sheet instruments that are maturing or repricing at the same time
- Differences in the amounts by which short-term and long-term market interest rates change (for example, changes in the slope of the yield curve)
- The impact of changes in the maturity of various assets, liabilities or off-balance sheet instruments as interest rates change

The Firm manages interest rate exposure related to its assets and liabilities on a consolidated, Firmwide basis. Business units transfer their interest rate risk to Treasury and CIO through funds transfer pricing, which takes into account the elements of interest rate exposure that can be risk-managed in financial markets. These elements include asset and liability balances and contractual rates of interest, contractual principal payment schedules, expected prepayment experience, interest rate reset dates and maturities, rate indices used for repricing, and any interest rate ceilings or floors for adjustable rate products. All transfer-pricing assumptions are dynamically reviewed.

One way the Firm evaluates its structural interest rate risk is through earnings-at-risk. Earnings-at-risk estimates the Firm's interest rate exposure for a given interest rate scenario. It is presented as a sensitivity to a baseline, which includes net interest income and certain interest rate sensitive fees. The baseline uses market interest rates and in the case of deposits, pricing assumptions. The Firm conducts simulations of changes to this baseline for interest rate-sensitive assets and liabilities denominated in U.S. dollars and other currencies ("non-U.S. dollar" currencies). These simulations primarily include retained loans, deposits, deposits with banks, investment securities, long-term debt and any related interest rate hedges, and exclude other positions in risk management VaR and other sensitivity-based measures as described on page 120.

Earnings-at-risk scenarios estimate the potential change to a net interest income baseline, over the following 12 months, utilizing multiple assumptions. These scenarios include a parallel shift involving changes to both short-term and long-term rates by an equal amount; a steeper yield curve involving holding short-term rates constant and increasing long-term rates or decreasing short-term rates and holding long-term rates constant; and a flatter yield curve involving increasing short-term rates and holding long-term rates constant or holding short-term rates constant and decreasing long-term rates. These scenarios consider many different factors, including:

- The impact on exposures as a result of instantaneous changes in interest rates from baseline rates.
- Forecasted balance sheet, as well as modeled prepayment and reinvestment behavior, but do not include assumptions about actions that could be taken by the Firm in response to any such instantaneous rate changes. Mortgage prepayment assumptions are based on the interest rates used in the scenarios compared with underlying contractual rates, the time since origination, and other factors which are updated periodically based on historical experience.
- The pricing sensitivity of deposits, using normalized deposit betas which represent the amount by which deposit rates paid could change upon a given change in market interest rates over the cycle. The deposit rates paid in these scenarios differ from actual deposit rates paid, particularly for retail deposits, due to repricing lags and other factors.

The Firm's earnings-at-risk scenarios are periodically evaluated and enhanced in response to changes in the composition of the Firm's balance sheet, changes in market conditions, improvements in the Firm's simulation and other factors. While a relevant measure of the Firm's interest rate exposure, the earnings at risk analysis does not represent a forecast of the Firm's net interest income (Refer to the 2020 Outlook on page 45 for additional information).

The Firm's U.S. dollar sensitivities are presented in the table below.

December 31, (in billions)	2019	2018
Parallel shift:		
+100 bps shift in rates	$ **0.3**	$ 0.9
-100 bps shift in rates	**(2.0)**	(2.1)
Steeper yield curve:		
+100 bps shift in long-term rates	**1.2**	0.5
-100 bps shift in short-term rates	**(0.2)**	(1.2)
Flatter yield curve:		
+100 bps shift in short-term rates	**(0.9)**	0.4
-100 bps shift in long-term rates	**(1.8)**	(0.9)

The change in the Firm's U.S. dollar sensitivities as of December 31, 2019 compared to December 31, 2018 reflected updates to the Firm's baseline for lower short-term and long-term rates as well as the impact of changes in the Firm's balance sheet. The Firm's sensitivity to short-term rates reflected updates to the Firm's baseline for lower rates but changes in the Firm's balance sheet more than offset the impacts of the lower rates. The Firm's sensitivity to long-term rates increased as a result of updates to the Firm's baseline to reflect lower rates in addition to changes in the Firm's balance sheet. The increased sensitivity to long-term rates is more impactful to the downward scenario due to the Firm's sensitivity to mortgage prepayments.

The Firm's non-U.S. dollar sensitivities are presented in the table below.

December 31, (in billions)	2019	2018
Parallel shift:		
+100 bps shift in rates	$ **0.5**	$ 0.5
Flatter yield curve:		
+100 bps shift in short-term rates	**0.5**	0.5

The results of the non-U.S. dollar interest rate scenario involving a steeper yield curve with long-term rates rising by 100 basis points and short-term rates staying at current levels were not material to the Firm's earnings-at-risk at December 31, 2019 and 2018.

Non-U.S. dollar foreign exchange risk

Non-U.S. dollar FX risk is the risk that changes in foreign exchange rates affect the value of the Firm's assets or liabilities or future results. The Firm has structural non-U.S. dollar FX exposures arising from capital investments, forecasted expense and revenue, the investment securities portfolio and non-U.S. dollar-denominated debt issuance. Treasury and CIO, working in partnership with the LOBs, primarily manage these risks on behalf of the Firm. Treasury and CIO may hedge certain of these risks using derivatives.

Other sensitivity-based measures

The Firm quantifies the market risk of certain investment and funding activities by assessing the potential impact on net revenue and other comprehensive income ("OCI") due to changes in relevant market variables. Refer to the table Predominant business activities that give rise to market risk on page 120 for additional information on the positions captured in other sensitivity-based measures.

The table below represents the potential impact to net revenue or OCI for market risk sensitive instruments that are not included in VaR or earnings-at-risk. Where appropriate, instruments used for hedging purposes are reported along with the positions being hedged. The sensitivities disclosed in the table below may not be representative of the actual gain or loss that would have been realized at December 31, 2019 and 2018, as the movement in market parameters across maturities may vary and are not intended to imply management's expectation of future changes in these sensitivities.

Year ended December 31, **Gain/(loss)** (in millions) **Activity**	**Description**	**Sensitivity measure**	**2019**	**2018**
Investment activities[a]				
Investment management activities	Consists of seed capital and related hedges; and fund co-investments	10% decline in market value	$ (68)	$ (102)
Other investments	Consists of privately held equity and other investments held at fair value	10% decline in market value	(192)	(218)
Funding activities				
Non-USD LTD cross-currency basis	Represents the basis risk on derivatives used to hedge the foreign exchange risk on the non-USD LTD[b]	1 basis point parallel tightening of cross currency basis	(17)	(13)
Non-USD LTD hedges foreign currency ("FX") exposure	Primarily represents the foreign exchange revaluation on the fair value of the derivative hedges[b]	10% depreciation of currency	15	17
Derivatives – funding spread risk	Impact of changes in the spread related to derivatives FVA	1 basis point parallel increase in spread	(5)	(4)
Fair value option elected liabilities – funding spread risk	Impact of changes in the spread related to fair value option elected liabilities DVA[b]	1 basis point parallel increase in spread	29	30
Fair value option elected liabilities – interest rate sensitivity	Interest rate sensitivity on fair value option liabilities resulting from a change in the Firm's own credit spread[b]	1 basis point parallel increase in spread	(2)	1

(a) Excludes equity securities without readily determinable fair values that are measured under the measurement alternative. Refer to Note 2 for additional information.
(b) Impact recognized through OCI.

The Firm, through its LOBs and Corporate, may be exposed to country risk resulting from financial, economic, political or other significant developments which adversely affect the value of the Firm's exposures related to a particular country or set of countries. The Country Risk Management group actively monitors the various portfolios which may be impacted by these developments and measures the extent to which the Firm's exposures are diversified given the Firm's strategy and risk tolerance relative to a country.

Organization and management

Country Risk Management is an independent risk management function that assesses, manages and monitors country risk originated across the Firm.

The Firm's country risk management function includes the following activities:

- Establishing policies, procedures and standards consistent with a comprehensive country risk framework
- Assigning sovereign ratings, assessing country risks and establishing risk tolerance relative to a country
- Measuring and monitoring country risk exposure and stress across the Firm
- Managing and approving country limits and reporting trends and limit breaches to senior management
- Developing surveillance tools, such as signaling models and ratings indicators, for early identification of potential country risk concerns
- Providing country risk scenario analysis

Sources and measurement

The Firm is exposed to country risk through its lending and deposits, investing, and market-making activities, whether cross-border or locally funded. Country exposure includes activity with both government and private-sector entities in a country. Under the Firm's internal country risk management approach, attribution of exposure to a specific country is based on the country where the largest proportion of the assets of the counterparty, issuer, obligor or guarantor are located or where the largest proportion of its revenue is derived, which may be different than the domicile (i.e. legal residence) or country of incorporation of the counterparty, issuer, obligor or guarantor. Country exposures are generally measured by considering the Firm's risk to an immediate default of the counterparty, issuer, obligor or guarantor, with zero recovery. Assumptions are sometimes required in determining the measurement and allocation of country exposure, particularly in the case of certain non-linear or index exposures. The use of different measurement approaches or assumptions could affect the amount of reported country exposure.

Under the Firm's internal country risk measurement framework:

- Lending exposures are measured at the total committed amount (funded and unfunded), net of the allowance for credit losses and eligible cash and marketable securities collateral received
- Deposits are measured as the cash balances placed with central and commercial banks
- Securities financing exposures are measured at their receivable balance, net of eligible collateral received
- Debt and equity securities are measured at the fair value of all positions, including both long and short positions
- Counterparty exposure on derivative receivables is measured at the derivative's fair value, net of the fair value of the eligible collateral received
- Credit derivatives protection purchased and sold is reported based on the underlying reference entity and is measured at the notional amount of protection purchased or sold, net of the fair value of the recognized derivative receivable or payable. Credit derivatives protection purchased and sold in the Firm's market-making activities is measured on a net basis, as such activities often result in selling and purchasing protection related to the same underlying reference entity; this reflects the manner in which the Firm manages these exposures

Some activities may create contingent or indirect exposure related to a country (for example, providing clearing services or secondary exposure to collateral on securities financing receivables). These exposures are managed in the normal course of business through the Firm's credit, market, and operational risk governance, rather than through Country Risk Management.

The Firm's internal country risk reporting differs from the reporting provided under the FFIEC bank regulatory requirements. Refer to Cross-border outstandings on page 306 of the 2019 Form 10-K for further information on the FFIEC's reporting methodology.

Stress testing

Stress testing is an important component of the Firm's country risk management framework, which aims to estimate and limit losses arising from a country crisis by measuring the impact of adverse asset price movements to a country based on market shocks combined with counterparty specific assumptions. Country Risk Management periodically designs and runs tailored stress scenarios to test vulnerabilities to individual countries or sets of countries in response to specific or potential market events, sector performance concerns, sovereign actions and geopolitical risks. These tailored stress results are used to inform potential risk reduction across the Firm, as necessary.

Risk reporting

Country exposure and stress are measured and reported regularly, and used by Country Risk Management to identify trends, and monitor high usages and breaches against limits.

For country risk management purposes, the Firm may report exposure to jurisdictions that are not fully autonomous, including Special Administrative Regions ("SAR") and dependent territories, separately from the independent sovereign states with which they are associated.

The following table presents the Firm's top 20 exposures by country (excluding the U.S.) as of December 31, 2019, and their comparative exposures as of December 31, 2018. The selection of countries represents the Firm's largest total exposures by country, based on the Firm's internal country risk management approach, and does not represent the Firm's view of any actual or potentially adverse credit conditions.

Country exposures may fluctuate from period to period due to client activity and market flows. The increase in exposure in Japan is largely due to increased cash balances placed with the central bank of Japan, driven by client activity.

Top 20 country exposures (excluding the U.S.)[a]

December 31, (in billions)	2019				2018[e]
	Lending and deposits[b]	Trading and investing[c]	Other[d]	Total exposure	Total exposure
Germany	$ 45.8	$ 5.4	$ 0.4	$ 51.6	$ 62.1
Japan	35.5	8.0	0.3	43.8	29.1
United Kingdom	31.0	9.9	1.5	42.4	40.7
China	11.3	6.5	1.4	19.2	19.3
Switzerland	10.9	0.8	6.6	18.3	12.8
France	10.7	6.5	0.9	18.1	17.9
Canada	12.0	1.1	0.1	13.2	14.3
Luxembourg	12.1	0.8	–	12.9	11.0
Australia	6.9	4.8	–	11.7	13.0
India	4.6	3.6	3.1	11.3	11.8
Netherlands	4.4	0.8	3.8	9.0	5.8
Brazil	4.8	2.4	–	7.2	7.3
Singapore	4.3	1.6	0.9	6.8	6.8
Italy	2.4	4.2	0.2	6.8	6.4
South Korea	4.5	1.8	0.1	6.4	7.6
Spain	3.2	2.6	–	5.8	5.1
Saudi Arabia	4.7	0.5	–	5.2	5.3
Hong Kong SAR	2.6	1.7	0.8	5.1	5.4
Mexico	3.9	0.8	–	4.7	5.5
Malaysia	1.8	0.8	0.8	3.4	4.3

(a) Top 20 country exposures reflect approximately 88% and 87% of total Firmwide non-U.S. exposure, where exposure is attributed to a specific country, at December 31, 2019 and 2018, respectively.
(b) Lending and deposits includes loans and accrued interest receivable (net of eligible collateral and the allowance for loan losses), deposits with banks (including central banks), acceptances, other monetary assets, issued letters of credit net of participations, and unused commitments to extend credit. Excludes intra-day and operating exposures, such as those from settlement and clearing activities.
(c) Includes market-making inventory, AFS securities, and counterparty exposure on derivative and securities financings net of eligible collateral and hedging. Includes exposure from single reference entity ("single-name"), index and other multiple reference entity transactions for which one or more of the underlying reference entities is in a country listed in the above table.
(d) Predominantly includes physical commodity inventory.
(e) The country rankings presented in the table as of December 31, 2018, are based on the country rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.

Operational risk is the risk associated with an adverse outcome resulting from inadequate or failed internal processes or systems; human factors; or external events impacting the Firm's processes or systems; it includes compliance, conduct, legal, and estimations and model risk. Operational risk is inherent in the Firm's activities and can manifest itself in various ways, including fraudulent acts, business interruptions, cybersecurity attacks, inappropriate employee behavior, failure to comply with applicable laws and regulations or failure of vendors to perform in accordance with their agreements. Operational Risk Management attempts to manage operational risk at appropriate levels in light of the Firm's financial position, the characteristics of its businesses, and the markets and regulatory environments in which it operates.

Operational Risk Management Framework

The Firm's Compliance, Conduct, and Operational Risk ("CCOR") Management Framework is designed to enable the Firm to govern, identify, measure, monitor and test, manage and report on the Firm's operational risk.

Operational Risk Governance

The LOBs and Corporate hold ownership, responsibility and accountability for the management of operational risk. The Control Management Organization, which consists of control managers within each LOB and Corporate, is responsible for the day-to-day execution of the CCOR Framework and the evaluation of the effectiveness of their control environments to determine where targeted remediation efforts may be required.

LOBs and Corporate control committees are responsible for reviewing data that indicates the quality and stability of processes, addressing key operational risk issues, focusing on processes with control concerns, and overseeing control remediation.

The Firm's Global Chief Compliance Officer ("CCO") and FRE for Operational Risk is responsible for defining the CCOR Management Framework and establishing minimum standards for its execution. Operational Risk Officers ("OROs") report to both the LOB CROs and to the FRE for Operational Risk, and are independent of the respective businesses or functions they oversee.

The Firm's CCOR Management policy establishes the CCOR Management Framework for the Firm. The CCOR Management Framework is articulated in the Risk Governance and Oversight Policy which is reviewed and approved by the Board Risk Committee periodically.

Operational Risk identification

The Firm utilizes a structured risk and control self-assessment process that is executed by the LOBs and Corporate. As part of this process, the LOBs and Corporate evaluate the effectiveness of their control environment to assess where controls have failed, and to determine where remediation efforts may be required. CCOR Management provides oversight of these activities and may also perform independent assessments of significant operational risk events and areas of concentrated or emerging risk.

Operational Risk Measurement

CCOR Management performs independent risk assessments of the Firm's operational risks, which includes assessing the effectiveness of the control environment and reporting the results to senior management.

In addition, operational risk measurement includes operational risk-based capital and operational risk loss projections under both baseline and stressed conditions.

The primary component of the operational risk capital estimate is the Loss Distribution Approach ("LDA") statistical model, which simulates the frequency and severity of future operational risk loss projections based on historical data. The LDA model is used to estimate an aggregate operational risk loss over a one-year time horizon, at a 99.9% confidence level. The LDA model incorporates actual internal operational risk losses in the quarter following the period in which those losses were realized, and the calculation generally continues to reflect such losses even after the issues or business activities giving rise to the losses have been remediated or reduced.

As required under the Basel III capital framework, the Firm's operational risk-based capital methodology, which uses the Advanced Measurement Approach ("AMA"), incorporates internal and external losses as well as management's view of tail risk captured through operational risk scenario analysis, and evaluation of key business environment and internal control metrics. The Firm does not reflect the impact of insurance in its AMA estimate of operational risk capital.

The Firm considers the impact of stressed economic conditions on operational risk losses and develops a forward looking view of material operational risk events that may occur in a stressed environment. The Firm's operational risk stress testing framework is utilized in calculating results for the Firm's CCAR and other stress testing processes.

Refer to Capital Risk Management section, on pages 85-92 for information related to operational risk RWA, and CCAR.

Operational Risk Monitoring and testing

The results of risk assessments performed by CCOR Management are leveraged as one of the key criteria in the independent monitoring and testing of the LOBs and Corporate's compliance with laws and regulation. Through monitoring and testing, CCOR Management independently identifies areas of operational risk and tests the effectiveness of controls within the LOBs and Corporate.

Management of Operational Risk
The operational risk areas or issues identified through monitoring and testing are escalated to the LOBs and Corporate to be remediated through action plans, as needed, to mitigate operational risk. CCOR Management may advise the LOBs and Corporate in the development and implementation of action plans.

Operational Risk Reporting
Escalation of risks is a fundamental expectation for employees at the Firm. Risks identified by CCOR Management are escalated to the appropriate LOB and Corporate Control Committees, as needed. CCOR Management has established standards to ensure that consistent operational risk reporting and operational risk reports are produced on a Firmwide basis as well as by LOBs and Corporate. Reporting includes the evaluation of key risk indicators and key performance indicators against established thresholds as well as the assessment of different types of operational risk against stated risk appetite. The standards reinforce escalation protocols to senior management and to the Board of Directors.

Subcategories and examples of operational risks

Operational risk can manifest itself in various ways. Operational risk subcategories such as Compliance risk, Conduct risk, Legal risk, and Estimations and Model risk as well as other operational risks, can lead to losses which are captured through the Firm's operational risk measurement processes. Refer to pages 132, 133, and 134, respectively for more information on Compliance, Conduct, Legal, and Estimations and Model risk. Details on other select examples of operational risks are provided below.

Cybersecurity risk
Cybersecurity risk is an important, continuous and evolving focus for the Firm. The Firm devotes significant resources to protecting and continuing to improve the security of its computer systems, software, networks and other technology assets. The Firm's security efforts are designed to protect against, among other things, cybersecurity attacks by unauthorized parties attempting to obtain access to confidential information, destroy data, disrupt or degrade service, sabotage systems or cause other damage. The Firm continues to make significant investments in enhancing its cyberdefense capabilities and to strengthen its partnerships with the appropriate government and law enforcement agencies and other businesses in order to understand the full spectrum of cybersecurity risks in the operating environment, enhance defenses and improve resiliency against cybersecurity threats. The Firm actively participates in discussions of cybersecurity risks with law enforcement, government officials, peer and industry groups, and has significantly increased efforts to educate employees and certain clients on the topic.

Third parties with which the Firm does business or that facilitate the Firm's business activities (e.g., vendors, exchanges, clearing houses, central depositories, and financial intermediaries) are also sources of cybersecurity risk to the Firm. Third party cybersecurity incidents such as system breakdowns or failures, misconduct by the employees of such parties, or cyberattacks could affect their ability to deliver a product or service to the Firm or result in lost or compromised information of the Firm or its clients. Clients are also sources of cybersecurity risk to the Firm, particularly when their activities and systems are beyond the Firm's own security and control systems. As a result, the Firm engages in regular and ongoing discussions with certain vendors and clients regarding cybersecurity risks and opportunities to improve security. However, where cybersecurity incidents occur as a result of client failures to maintain the security of their own systems and processes, clients are responsible for losses incurred.

To protect the confidentiality, integrity and availability of the Firm's infrastructure, resources and information, the Firm maintains a cybersecurity program designed to prevent, detect, and respond to cyberattacks. The Audit Committee is updated periodically on the Firm's Information Security Program, recommended changes, cybersecurity policies and practices, ongoing efforts to improve security, as well as its efforts regarding significant cybersecurity events. In addition, the Firm has a cybersecurity incident response plan ("IRP") designed to enable the Firm to respond to attempted cybersecurity incidents, coordinate such responses with law enforcement and other government agencies, and notify clients and customers, as applicable. Among other key focus areas, the IRP is designed to mitigate the risk of insider trading connected to a cybersecurity incident, and includes various escalation points.

The Cybersecurity and Technology Control functions are responsible for governance and oversight of the Firm's Information Security Program. In partnership with the Firm's LOBs and Corporate, the Cybersecurity and Technology Control organization identifies information security risk issues and oversees programs for the technological protection of the Firm's information resources including applications, infrastructure as well as confidential and personal information related to the Firm's customers. The Cybersecurity and Technology organization is comprised of business aligned information security managers that are supported within the organization by the following products that execute the Information Security Program for the Firm:

- Cyber Defense & Fraud
- Data Management, Protection & Privacy
- Identity & Access Management
- Governance & Controls
- Production Management & Resiliency
- Software & Platform Enablement

The Global Cybersecurity and Technology Control governance structure is designed to identify, escalate, and mitigate information security risks. This structure uses key governance forums to disseminate information and monitor

technology efforts. These forums are established at multiple levels throughout the Firm and include representatives from each LOB and Corporate. Reports containing overviews of key technology risks and efforts to enhance related controls are produced for these forums, and are reviewed by management at multiple levels. The forums are used to escalate information security risks or other matters as appropriate.

The IRM function provides oversight of the activities designed to identify, assess, measure, and mitigate cybersecurity risk.

The Firm's Security Awareness Program includes training that reinforces the Firm's Information Technology Risk and Security Management policies, standards and practices, as well as the expectation that employees comply with these policies. The Security Awareness Program engages personnel through training on how to identify potential cybersecurity risks and protect the Firm's resources and information. This training is mandatory for all employees globally on a periodic basis, and it is supplemented by Firmwide testing initiatives, including periodic phishing tests. Finally, the Firm's Global Privacy Program requires all employees to take periodic awareness training on data privacy. This privacy-focused training includes information about confidentiality and security, as well as responding to unauthorized access to or use of information.

Business and technology resiliency risk

Business disruptions can occur due to forces beyond the Firm's control such as severe weather, power or telecommunications loss, accidents, failure of a third party to provide expected services, cyberattack, flooding, transit strikes, terrorism, health emergencies, the spread of infectious diseases or pandemics. The safety of the Firm's employees and customers is of the highest priority. The Firmwide resiliency program is intended to enable the Firm to recover its critical business functions and supporting assets (i.e., staff, technology and facilities) in the event of a business interruption. The program includes governance, awareness training, and testing of recovery strategies, as well as strategic and tactical initiatives to identify, assess, and manage business interruption and public safety risks. The strength and proficiency of the Firmwide resiliency program has played an integral role in maintaining the Firm's business operations during and after various events.

Payment fraud risk

Payment fraud risk is the risk of external and internal parties unlawfully obtaining personal monetary benefit through misdirected or otherwise improper payment. The risk of payment fraud remains at a heightened level across the industry. The complexities of these incidents and the strategies used by perpetrators continue to evolve. Under the Payments Control Program, methods are developed for managing the risk, implementing controls, and providing employee and client education and awareness trainings. The Firm's monitoring of customer behavior is periodically evaluated and enhanced in an effort to detect and mitigate new strategies implemented by fraud perpetrators.

Third-party outsourcing risk

The Firm's Third-Party Oversight ("TPO") and Inter-affiliates Oversight ("IAO") framework assist the LOBs and Corporate in selecting, documenting, onboarding, monitoring and managing their supplier relationships including services provided by affiliates. The objectives of the TPO framework is to hold suppliers to a high level of operational performance and to mitigate key risks including data loss and business disruption. The Corporate Third-Party Oversight group is responsible for Firmwide training, monitoring, reporting and standards.

Insurance

One of the ways in which operational risk may be mitigated is through insurance maintained by the Firm. The Firm purchases insurance from commercial insurers and maintains a wholly-owned captive insurer, Park Assurance Company. Insurance may also be required by third parties with whom the Firm does business.

COMPLIANCE RISK MANAGEMENT

Compliance risk, a subcategory of operational risk, is the risk of failing to comply with laws, rules, regulations or codes of conduct and standards of self-regulatory organizations.

Overview

Each LOB and Corporate hold primary ownership of and accountability for managing compliance risk. The Firm's Compliance Organization ("Compliance"), which is independent of the LOBs, provides independent review, monitoring and oversight of business operations with a focus on compliance with the legal and regulatory obligations applicable to the delivery of the Firm's products and services to clients and customers.

These compliance risks relate to a wide variety of legal and regulatory obligations, depending on the LOB and the jurisdiction, and include risks related to financial products and services, relationships and interactions with clients and customers, and employee activities. For example, compliance risks include those associated with anti-money laundering compliance, trading activities, market conduct, and complying with the rules and regulations related to the offering of products and services across jurisdictional borders. Compliance risk is also inherent in the Firm's fiduciary activities, including the failure to exercise the applicable standard of care (such as the duties of loyalty or care), to act in the best interest of clients and customers or to treat clients and customers fairly.

Other functions provide oversight of significant regulatory obligations that are specific to their respective areas of responsibility.

CCOR Management implements policies and standards designed to govern, identify, measure, monitor and test, manage, and report compliance risk.

Governance and oversight

Compliance is led by the Firm's Global CCO and FRE for Operational Risk.

The Firm maintains oversight and coordination of its compliance risk through the implementation of the CCOR Risk Management Framework. The Firm's CCO also provides regular updates to the Audit Committee and the Board Risk Committee. In addition, certain Special Purpose Committees of the Board have previously been established to oversee the Firm's compliance with regulatory Consent Orders.

Code of Conduct

The Firm has a Code of Conduct (the "Code") that sets forth the Firm's expectation that employees will conduct themselves with integrity at all times and provides the principles that govern employee conduct with clients, customers, shareholders and one another, as well as with the markets and communities in which the Firm does business. The Code requires employees to promptly report any known or suspected violation of the Code, any internal Firm policy, or any law or regulation applicable to the Firm's business. It also requires employees to report any illegal conduct, or conduct that violates the underlying principles of the Code, by any of the Firm's employees, clients, customers, suppliers, contract workers, business partners, or agents. All newly hired employees are assigned Code training and current employees are periodically assigned Code training on an ongoing basis. Employees are required to affirm their compliance with the Code periodically.

Employees can report any potential or actual violations of the Code through the Code Reporting Hotline by phone or the internet. The Hotline is anonymous, except in certain non-U.S. jurisdictions where laws prohibit anonymous reporting, and is available at all times globally, with translation services. It is administered by an outside service provider. The Code prohibits retaliation against anyone who raises an issue or concern in good faith. Periodically, the Audit Committee receives reports on the Code of Conduct program.

Conduct risk, a subcategory of operational risk, is the risk that any action or inaction by an employee or employees could lead to unfair client or customer outcomes, impact the integrity of the markets in which the Firm operates, or compromise the Firm's reputation.

Overview

Each LOB and Corporate is accountable for identifying and managing its conduct risk to provide appropriate engagement, ownership and sustainability of a culture consistent with the Firm's How We Do Business Principles (the "Principles"). The Principles serve as a guide for how employees are expected to conduct themselves. With the Principles serving as a guide, the Firm's Code sets out the Firm's expectations for each employee and provides information and resources to help employees conduct business ethically and in compliance with the laws everywhere the Firm operates. Refer to Compliance Risk Management on page 132 for further discussion of the Code.

Governance and oversight

The Conduct Risk Program is governed by the CCOR Management policy, which establishes the framework for governance, identification, measurement, monitoring and testing, management and reporting conduct risk in the Firm.

The Conduct Risk Steering Committee (CRSC) provides oversight of the Firm's conduct initiatives to develop a more holistic view of conduct risks and to connect key programs across the Firm in order to identify opportunities and emerging areas of focus.

Each committee of the Board oversees conduct risks within its scope of responsibilities, and the CRSC may escalate to such committees as appropriate.

Conduct risk management encompasses various aspects of people management practices throughout the employee life cycle, including recruiting, onboarding, training and development, performance management, promotion and compensation processes. Each LOB, Treasury and CIO, and designated corporate functions completes an assessment of conduct risk periodically, reviews metrics and issues which may involve conduct risk, and provides business conduct training as appropriate.

LEGAL RISK MANAGEMENT

Legal risk, a subcategory of operational risk, is the risk of loss primarily caused by the actual or alleged failure to meet legal obligations that arise from the rule of law in jurisdictions in which the Firm operates, agreements with clients and customers, and products and services offered by the Firm.

Overview

The global Legal function ("Legal") provides legal services and advice to the Firm. Legal is responsible for managing the Firm's exposure to legal risk by:

- managing actual and potential litigation and enforcement matters, including internal reviews and investigations related to such matters
- advising on products and services, including contract negotiation and documentation
- advising on offering and marketing documents and new business initiatives
- managing dispute resolution
- interpreting existing laws, rules and regulations, and advising on changes thereto
- advising on advocacy in connection with contemplated and proposed laws, rules and regulations, and
- providing legal advice to the LOBs and Corporate, in alignment with the lines of defense described under Firmwide Risk Management on pages 79-83.

Legal selects, engages and manages outside counsel for the Firm on all matters in which outside counsel is engaged. In addition, Legal advises the Firm's Conflicts Office which reviews the Firm's wholesale transactions that may have the potential to create conflicts of interest for the Firm.

Governance and oversight

The Firm's General Counsel reports to the CEO and is a member of the Operating Committee, the Firmwide Risk Committee and the Firmwide Control Committee. The Firm's General Counsel and other members of Legal report on significant legal matters to the Firm's Board of Directors and periodically to the Audit Committee.

Legal serves on and advises various committees (including new business initiative and reputation risk committees) and advises the Firm's LOBs and Corporate on potential reputation risk issues.

ESTIMATIONS AND MODEL RISK MANAGEMENT

Estimations and Model risk, a subcategory of operational risk, is the potential for adverse consequences from decisions based on incorrect or misused estimation outputs.

The Firm uses models and other analytical and judgment-based estimations across various businesses and functions. The estimation methods are of varying levels of sophistication and are used for many purposes, such as the valuation of positions and measurement of risk, assessing regulatory capital requirements, conducting stress testing, and making business decisions. A dedicated independent function, Model Risk Governance and Review ("MRGR"), defines and governs the Firm's policies relating to the management of model risk and risks associated with certain analytical and judgment-based estimations, such as those used in risk management, budget forecasting and capital planning and analysis.

The governance of analytical and judgment-based estimations within MRGR's scope follows a consistent approach to the approach used for models, which is described in detail below.

Model risks are owned by the users of the models within the Firm based on the specific purposes of such models. Users and developers of models are responsible for developing, implementing and testing their models, as well as referring models to the Model Risk function for review and approval. Once models have been approved, model users and developers are responsible for maintaining a robust operating environment, and must monitor and evaluate the performance of the models on an ongoing basis. Model users and developers may seek to enhance models in response to changes in the portfolios and in product and market developments, as well as to capture improvements in available modeling techniques and systems capabilities.

Models are tiered based on an internal standard according to their complexity, the exposure associated with the model and the Firm's reliance on the model. This tiering is subject to the approval of the Model Risk function. In its review of a model, the Model Risk function considers whether the model is suitable for the specific purposes for which it will be used. When reviewing a model, the Model Risk function analyzes and challenges the model methodology and the reasonableness of model assumptions, and may perform or require additional testing, including back-testing of model outcomes. Model reviews are approved by the appropriate level of management within the Model Risk function based on the relevant model tier.

Under the Firm's Estimations and Model Risk Management Policy, the Model Risk function reviews and approves new models, as well as material changes to existing models, prior to implementation in the operating environment. In certain circumstances exceptions may be granted to the Firm's policy to allow a model to be used prior to review or approval. The Model Risk function may also require the user to take appropriate actions to mitigate the model risk if it is to be used in the interim. These actions will depend on the model and may include, for example, limitation of trading activity.

Refer to Critical Accounting Estimates Used by the Firm on pages 136–138 and Note 2 for a summary of model-based valuations and other valuation techniques.

CRITICAL ACCOUNTING ESTIMATES USED BY THE FIRM

JPMorgan Chase's accounting policies and use of estimates are integral to understanding its reported results. The Firm's most complex accounting estimates require management's judgment to ascertain the appropriate carrying value of assets and liabilities. The Firm has established policies and control procedures intended to ensure that estimation methods, including any judgments made as part of such methods, are well-controlled, independently reviewed and applied consistently from period to period. The methods used and judgments made reflect, among other factors, the nature of the assets or liabilities and the related business and risk management strategies, which may vary across the Firm's businesses and portfolios. In addition, the policies and procedures are intended to ensure that the process for changing methodologies occurs in an appropriate manner. The Firm believes its estimates for determining the carrying value of its assets and liabilities are appropriate. The following is a brief description of the Firm's critical accounting estimates involving significant judgments.

Allowance for credit losses

The Firm's allowance for credit losses covers the retained consumer and wholesale loan portfolios, as well as the Firm's wholesale and certain consumer lending-related commitments. The allowance for loan losses is intended to adjust the carrying value of the Firm's loans to reflect probable credit losses inherent in the loan portfolio as of the balance sheet date. Similarly, the allowance for lending-related commitments is established to cover probable credit losses inherent in the lending-related commitments portfolio as of the balance sheet date.

The allowance for credit losses includes a formula-based component, an asset-specific component, and a component related to PCI loans. The determination of each of these components involves significant judgment on a number of matters. Refer to Allowance for credit losses on pages 116–117 and Note 13 for further information on these components, areas of judgment and methodologies used in establishing the Firm's allowance for credit losses.

Allowance for credit losses sensitivity

The Firm's allowance for credit losses is sensitive to numerous factors, which may differ depending on the portfolio. Changes in economic conditions or in the Firm's assumptions and estimates could affect its estimate of probable credit losses inherent in the portfolio at the balance sheet date. The Firm uses its best judgment to assess these economic conditions and loss data in estimating the allowance for credit losses and these estimates are subject to periodic refinement based on changes to underlying external or Firm-specific historical data. Refer to Note 13 for further discussion.

To illustrate the potential magnitude of certain alternate judgments, the Firm estimates that changes in the following inputs would have the following effects on the Firm's modeled credit loss estimates as of December 31, 2019, without consideration of any offsetting or correlated effects of other inputs in the Firm's allowance for loan losses:

- A combined 5% decline in housing prices and a 100 basis point increase in unemployment rates from expectations could imply:
  - an increase to modeled credit loss estimates of approximately $250 million for PCI loans.
  - an increase to modeled annual credit loss estimates of approximately $50 million for residential real estate loans, excluding PCI loans.
- For credit card loans, a 100 basis point increase in unemployment rates from expectations could imply an increase to modeled annual credit loss estimates of approximately $850 million.
- An increase in probability of default ("PD") factors consistent with a one-notch downgrade in the Firm's internal risk ratings for its entire wholesale loan portfolio could imply an increase in the Firm's modeled credit loss estimates of approximately $1.6 billion.
- A 100 basis point increase in estimated loss given default ("LGD") for the Firm's entire wholesale loan portfolio could imply an increase in the Firm's modeled credit loss estimates of approximately $200 million.

The purpose of these sensitivity analyses is to provide an indication of the isolated impacts of hypothetical alternative assumptions on modeled loss estimates. The changes in the inputs presented above are not intended to imply management's expectation of future deterioration of those risk factors. In addition, these analyses are not intended to estimate changes in the overall allowance for loan losses, which would also be influenced by the judgment management applies to the modeled loss estimates to reflect the uncertainty and imprecision of these modeled loss estimates based on then-current circumstances and conditions.

It is difficult to estimate how potential changes in specific factors might affect the overall allowance for credit losses because management considers a variety of factors and inputs in estimating the allowance for credit losses. Changes in these factors and inputs may not occur at the same rate and may not be consistent across all geographies or product types, and changes in factors may be directionally inconsistent, such that improvement in one factor may offset deterioration in other factors. In addition, it is difficult to predict how changes in specific economic conditions or assumptions could affect borrower behavior or other factors considered by management in estimating the allowance for credit losses. Given the process the Firm follows and the judgments made in evaluating the risk factors related to its loss estimates, management believes that its current estimate of the allowance for credit losses is appropriate.

Fair value

JPMorgan Chase carries a portion of its assets and liabilities at fair value. The majority of such assets and liabilities are measured at fair value on a recurring basis, including, derivatives and structured note products. Certain assets and liabilities are measured at fair value on a nonrecurring basis, including certain mortgage, home equity and other

loans, where the carrying value is based on the fair value of the underlying collateral.

Assets measured at fair value

The following table includes the Firm's assets measured at fair value and the portion of such assets that are classified within level 3 of the valuation hierarchy. Refer to Note 2 for further information.

December 31, 2019 (in billions, except ratios)	Total assets at fair value	Total level 3 assets
Trading debt and equity instruments	$ 361.3	$ 3.4
Derivative receivables[(a)]	49.7	4.7
Trading assets	411.0	8.1
AFS securities	350.7	–
Loans	7.1	–
MSRs	4.7	4.7
Other	29.3	0.7
Total assets measured at fair value on a recurring basis	802.8	13.5
Total assets measured at fair value on a nonrecurring basis	4.8	1.3
Total assets measured at fair value	$ 807.6	$ 14.8
Total Firm assets	$ 2,687.4	
Level 3 assets as a percentage of total Firm assets[(a)]		0.6%
Level 3 assets as a percentage of total Firm assets at fair value[(a)]		1.8%

(a) For purposes of the table above, the derivative receivables total reflects the impact of netting adjustments; however, the $4.7 billion of derivative receivables classified as level 3 does not reflect the netting adjustment as such netting is not relevant to a presentation based on the transparency of inputs to the valuation of an asset. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral.

Valuation

Details of the Firm's processes for determining fair value are set out in Note 2. Estimating fair value requires the application of judgment. The type and level of judgment required is largely dependent on the amount of observable market information available to the Firm. For instruments valued using internally developed valuation models and other valuation techniques that use significant unobservable inputs and are therefore classified within level 3 of the valuation hierarchy, judgments used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2.

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation technique to use. Second, the lack of observability of certain significant inputs requires management to assess all relevant empirical data in deriving valuation inputs including, for example, transaction details, yield curves, interest rates, prepayment rates, default rates, volatilities, correlations, equity or debt prices, valuations of comparable instruments, foreign exchange rates and credit curves. Refer to Note 2 for a further discussion of the valuation of level 3 instruments, including unobservable inputs used.

For instruments classified in levels 2 and 3, management judgment must be applied to assess the appropriate level of valuation adjustments to reflect counterparty credit quality, the Firm's creditworthiness, market funding rates, liquidity considerations, unobservable parameters, and for portfolios that meet specified criteria, the size of the net open risk position. The judgments made are typically affected by the type of product and its specific contractual terms, and the level of liquidity for the product or within the market as a whole. Refer to Note 2 for a further discussion of valuation adjustments applied by the Firm.

Imprecision in estimating unobservable market inputs or other factors can affect the amount of gain or loss recorded for a particular position. Furthermore, while the Firm believes its valuation methods are appropriate and consistent with those of other market participants, the methods and assumptions used reflect management judgment and may vary across the Firm's businesses and portfolios.

The Firm uses various methodologies and assumptions in the determination of fair value. The use of methodologies or assumptions different than those used by the Firm could result in a different estimate of fair value at the reporting date. Refer to Note 2 for a detailed discussion of the Firm's valuation process and hierarchy, and its determination of fair value for individual financial instruments.

Goodwill impairment

Under U.S. GAAP, goodwill must be allocated to reporting units and tested for impairment at least annually. The Firm's process and methodology used to conduct goodwill impairment testing is described in Note 15.

Management applies significant judgment when testing goodwill for impairment. The goodwill associated with each business combination is allocated to the related reporting units for goodwill impairment testing.

For the year ended December 31, 2019, the Firm reviewed current economic conditions, estimated market cost of equity, as well as actual and projections of business performance for all its businesses. Based upon such reviews, the Firm concluded that the goodwill allocated to its reporting units was not impaired as of December 31, 2019. The fair values of these reporting units exceeded their carrying values by approximately 15% or higher and did not indicate a significant risk of goodwill impairment based on current projections and valuations.

The projections for all of the Firm's reporting units are consistent with management's current short-term business outlook assumptions, and in the longer term, incorporate a set of macroeconomic assumptions and the Firm's best estimates of long-term growth and returns on equity of its businesses. Where possible, the Firm uses third-party and peer data to benchmark its assumptions and estimates.

Refer to Note 15 for additional information on goodwill, including the goodwill impairment assessment as of December 31, 2019.

Credit card rewards liability

JPMorgan Chase offers credit cards with various rewards programs which allow cardholders to earn rewards points based on their account activity and the terms and conditions of the rewards program. Generally, there are no limits on the points that an eligible cardholder can earn, nor

do the points expire, and the points can be redeemed for a variety of rewards, including cash (predominantly in the form of account credits), gift cards and travel. The Firm maintains a rewards liability which represents the estimated cost of rewards points earned and expected to be redeemed by cardholders. The rewards liability is sensitive to various assumptions, including cost per point and redemption rates for each of the various rewards programs, which are evaluated periodically. The liability is accrued as the cardholder earns the benefit and is reduced when the cardholder redeems points. This liability was $6.4 billion and $5.8 billion at December 31, 2019 and 2018, respectively, and is recorded in accounts payable and other liabilities on the Consolidated balance sheets.

Income taxes

JPMorgan Chase is subject to the income tax laws of the various jurisdictions in which it operates, including U.S. federal, state and local, and non-U.S. jurisdictions. These laws are often complex and may be subject to different interpretations. To determine the financial statement impact of accounting for income taxes, including the provision for income tax expense and unrecognized tax benefits, JPMorgan Chase must make assumptions and judgments about how to interpret and apply these complex tax laws to numerous transactions and business events, as well as make judgments regarding the timing of when certain items may affect taxable income in the U.S. and non-U.S. tax jurisdictions.

JPMorgan Chase's interpretations of tax laws around the world are subject to review and examination by the various taxing authorities in the jurisdictions where the Firm operates, and disputes may occur regarding its view on a tax position. These disputes over interpretations with the various taxing authorities may be settled by audit, administrative appeals or adjudication in the court systems of the tax jurisdictions in which the Firm operates. JPMorgan Chase regularly reviews whether it may be assessed additional income taxes as a result of the resolution of these matters, and the Firm records additional reserves as appropriate. In addition, the Firm may revise its estimate of income taxes due to changes in income tax laws, legal interpretations, and business strategies. It is possible that revisions in the Firm's estimate of income taxes may materially affect the Firm's results of operations in any reporting period.

The Firm's provision for income taxes is composed of current and deferred taxes. Deferred taxes arise from differences between assets and liabilities measured for financial reporting versus income tax return purposes. Deferred tax assets are recognized if, in management's judgment, their realizability is determined to be more likely than not. The Firm has also recognized deferred tax assets in connection with certain tax attributes, including net operating loss ("NOL") carryforwards and foreign tax credit ("FTC") carryforwards. The Firm performs regular reviews to ascertain whether its deferred tax assets are realizable. These reviews include management's estimates and assumptions regarding future taxable income, which also incorporates various tax planning strategies, including strategies that may be available to utilize NOLs before they expire. In connection with these reviews, if it is determined that a deferred tax asset is not realizable, a valuation allowance is established. The valuation allowance may be reversed in a subsequent reporting period if the Firm determines that, based on revised estimates of future taxable income or changes in tax planning strategies, it is more likely than not that all or part of the deferred tax asset will become realizable. As of December 31, 2019, management has determined it is more likely than not that the Firm will realize its deferred tax assets, net of the existing valuation allowance.

The Firm adjusts its unrecognized tax benefits as necessary when additional information becomes available. Uncertain tax positions that meet the more-likely-than-not recognition threshold are measured to determine the amount of benefit to recognize. An uncertain tax position is measured at the largest amount of benefit that management believes is more likely than not to be realized upon settlement. It is possible that the reassessment of JPMorgan Chase's unrecognized tax benefits may have a material impact on its effective income tax rate in the period in which the reassessment occurs.

Refer to Note 25 for additional information on income taxes.

Litigation reserves

Refer to Note 30 for a description of the significant estimates and judgments associated with establishing litigation reserves.

Financial Accounting Standards Board ("FASB") Standards Adopted during 2019

Standard	Summary of guidance	Effects on financial statements
Leases *Issued February 2016*	• Requires lessees to recognize all leases longer than twelve months on the Consolidated balance sheets as a lease liability with a corresponding right-of-use asset. • Requires lessees and lessors to classify most leases using principles similar to existing lease accounting, but eliminates the "bright line" classification tests. • Expands qualitative and quantitative leasing disclosures.	• Adopted January 1, 2019. • The Firm elected the available practical expedient to not reassess whether existing contracts contain a lease or whether classification or unamortized initial lease costs would be different under the new lease guidance. The Firm elected the modified retrospective transition method, through a cumulative-effect adjustment to retained earnings without revising prior periods. • Refer to Note 18 for further information.

FASB Standards Issued but not adopted as of December 31, 2019

Standard	Summary of guidance	Effects on financial statements
Financial Instruments – Credit Losses ("CECL") *Issued June 2016*	• Establishes a single allowance framework for all financial assets carried at amortized cost and certain off-balance sheet credit exposures. This framework requires that management's estimate reflects credit losses over the full remaining expected life and considers expected future changes in macroeconomic conditions. • Eliminates existing guidance for PCI loans, and requires recognition of the nonaccretable difference as an increase to the allowance for expected credit losses on financial assets purchased with more than insignificant credit deterioration since origination, with a corresponding increase in the recorded investment of the related loans. • Requires inclusion of expected recoveries, limited to the cumulative amount of prior write-offs, when estimating the allowance for credit losses for in scope financial assets (including collateral dependent assets). • Amends existing impairment guidance for AFS securities to incorporate an allowance, which will allow for reversals of credit impairments in the event that the credit of an issuer improves. • Requires a cumulative-effect adjustment to retained earnings as of the beginning of the reporting period of adoption.	• Adopted January 1, 2020. • The adoption of this guidance resulted in a net increase to the allowance for credit losses of $4.3 billion and a decrease to retained earnings of $2.7 billion, primarily driven by Card. Under the CECL framework, the Firm estimates losses over a two-year forecast period using the weighted-average of a range of macroeconomic scenarios (established on a Firmwide basis), and then reverts to longer term historical loss experience to estimate losses over more extended periods. • The Firm elected to phase-in the impact to retained earnings of $2.7 billion to regulatory capital, at 25 percent per year in each of 2020 to 2023 ("CECL transitional period"). Based on the Firm's capital as of December 31, 2019, the estimated impact to the Standardized CET1 capital ratio will be a reduction of approximately 4 bps for each transitional year. • As permitted by the guidance, the Firm elected the fair value option for certain securities financing agreements. The difference between their carrying amount and fair value was immaterial and was recorded as part of the Firm's cumulative-effect adjustment. • Refer to Note 1 for further information.
Goodwill *Issued January 2017*	• Requires recognition of an impairment loss when the estimated fair value of a reporting unit falls below its carrying value. • Eliminates the requirement that an impairment loss be recognized only if the estimated implied fair value of the goodwill is below its carrying value.	• Adopted January 1, 2020. • No impact upon adoption as the guidance is to be applied prospectively.

FORWARD-LOOKING STATEMENTS

From time to time, the Firm has made and will make forward-looking statements. These statements can be identified by the fact that they do not relate strictly to historical or current facts. Forward-looking statements often use words such as “anticipate,” “target,” “expect,” “estimate,” “intend,” “plan,” “goal,” “believe,” or other words of similar meaning. Forward-looking statements provide JPMorgan Chase’s current expectations or forecasts of future events, circumstances, results or aspirations. JPMorgan Chase’s disclosures in this 2019 Form 10-K contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. The Firm also may make forward-looking statements in its other documents filed or furnished with the SEC. In addition, the Firm’s senior management may make forward-looking statements orally to investors, analysts, representatives of the media and others.

All forward-looking statements are, by their nature, subject to risks and uncertainties, many of which are beyond the Firm’s control. JPMorgan Chase’s actual future results may differ materially from those set forth in its forward-looking statements. While there is no assurance that any list of risks and uncertainties or risk factors is complete, below are certain factors which could cause actual results to differ from those in the forward-looking statements:

- Local, regional and global business, economic and political conditions and geopolitical events;
- Changes in laws and regulatory requirements, including capital and liquidity requirements affecting the Firm’s businesses, and the ability of the Firm to address those requirements;
- Heightened regulatory and governmental oversight and scrutiny of JPMorgan Chase’s business practices, including dealings with retail customers;
- Changes in trade, monetary and fiscal policies and laws;
- Changes in income tax laws and regulations;
- Securities and capital markets behavior, including changes in market liquidity and volatility;
- Changes in investor sentiment or consumer spending or savings behavior;
- Ability of the Firm to manage effectively its capital and liquidity, including approval of its capital plans by banking regulators;
- Changes in credit ratings assigned to the Firm or its subsidiaries;
- Damage to the Firm’s reputation;
- Ability of the Firm to appropriately address social, environmental and sustainability concerns that may arise from its business activities;
- Ability of the Firm to deal effectively with an economic slowdown or other economic or market disruption, including, but not limited to, in the interest rate environment;
- Technology changes instituted by the Firm, its counterparties or competitors;
- The effectiveness of the Firm’s control agenda;
- Ability of the Firm to develop or discontinue products and services, and the extent to which products or services previously sold by the Firm (including but not limited to mortgages and asset-backed securities) require the Firm to incur liabilities or absorb losses not contemplated at their initiation or origination;
- Acceptance of the Firm’s new and existing products and services by the marketplace and the ability of the Firm to innovate and to increase market share;
- Ability of the Firm to attract and retain qualified employees;
- Ability of the Firm to control expenses;
- Competitive pressures;
- Changes in the credit quality of the Firm’s clients, customers and counterparties;
- Adequacy of the Firm’s risk management framework, disclosure controls and procedures and internal control over financial reporting;
- Adverse judicial or regulatory proceedings;
- Changes in applicable accounting policies, including the introduction of new accounting standards;
- Ability of the Firm to determine accurate values of certain assets and liabilities;
- Occurrence of natural or man-made disasters or calamities, including health emergencies, the spread of infectious diseases, pandemics or outbreaks of hostilities, or the effects of climate change, and the Firm’s ability to deal effectively with disruptions caused by the foregoing;
- Ability of the Firm to maintain the security of its financial, accounting, technology, data processing and other operational systems and facilities;
- Ability of the Firm to withstand disruptions that may be caused by any failure of its operational systems or those of third parties;
- Ability of the Firm to effectively defend itself against cyberattacks and other attempts by unauthorized parties to access information of the Firm or its customers or to disrupt the Firm’s systems; and
- The other risks and uncertainties detailed in Part I, Item 1A: Risk Factors in the JPMorgan Chase’s 2019 Form 10-K.

Any forward-looking statements made by or on behalf of the Firm speak only as of the date they are made, and JPMorgan Chase does not undertake to update any forward-looking statements. The reader should, however, consult any further disclosures of a forward-looking nature the Firm may make in any subsequent Form 10-Ks, Quarterly Reports on Form 10-Qs, or Current Reports on Form 8-K.

Management's report on internal control over financial reporting

Management of JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm") is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed by, or under the supervision of, the Firm's principal executive and principal financial officers, or persons performing similar functions, and effected by JPMorgan Chase's Board of Directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America ("U.S. GAAP").

JPMorgan Chase's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records, that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the Firm's assets; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, and that receipts and expenditures of the Firm are being made only in accordance with authorizations of JPMorgan Chase's management and directors; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Firm's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. Management has completed an assessment of the effectiveness of the Firm's internal control over financial reporting as of December 31, 2019. In making the assessment, management used the "Internal Control — Integrated Framework" ("COSO 2013") promulgated by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO").

Based upon the assessment performed, management concluded that as of December 31, 2019, JPMorgan Chase's internal control over financial reporting was effective based upon the COSO 2013 framework. Additionally, based upon management's assessment, the Firm determined that there were no material weaknesses in its internal control over financial reporting as of December 31, 2019.

The effectiveness of the Firm's internal control over financial reporting as of December 31, 2019, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

James Dimon
Chairman and Chief Executive Officer

Jennifer Piepszak
Executive Vice President and Chief Financial Officer

February 25, 2020

To the Board of Directors and Shareholders of JPMorgan Chase & Co.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of JPMorgan Chase & Co. and its subsidiaries (the "Firm") as of December 31, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Firm's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Firm as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Firm maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the COSO.

Basis for Opinions

The Firm's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's report on internal control over financial reporting. Our responsibility is to express opinions on the Firm's consolidated financial statements and on the Firm's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Firm in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

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Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Fair Value of Certain Level 3 Financial Instruments

As described in Notes 2 and 3 to the consolidated financial statements, the Firm carries $802.8 billion of its assets and $233.8 billion of its liabilities at fair value on a recurring basis. Included in these balances are $8.1 billion of trading assets and $37.7 billion of liabilities measured at fair value on a recurring basis, collectively financial instruments, which are classified as level 3 as they contain one or more inputs to valuation which are unobservable and significant to their fair value measurement. The Firm utilized internally developed valuation models and unobservable inputs to estimate fair value of the level 3 financial instruments. The unobservable inputs used by management to estimate the fair value of certain of these financial instruments include volatility relating to interest rates and correlation relating to interest rates, equity prices and foreign exchange rates.

The principal considerations for our determination that performing procedures relating to the fair value of certain level 3 financial instruments is a critical audit matter are (i) there was significant judgment and estimation by management in determining the inputs to estimate fair value, which in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures related to the fair value of these financial instruments, and (ii) the audit effort involved professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained from these procedures.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the Firm's processes for determining fair value which include controls over models, inputs, and data. These procedures also included, among others, the involvement of professionals with specialized skill and knowledge to assist in developing an independent estimate of fair value for a sample of these financial instruments. Developing the independent estimate involved testing the completeness and accuracy of data provided by management, developing independent inputs and, as appropriate, evaluating and utilizing management's aforementioned unobservable inputs; and comparing management's estimate to the independently developed estimate of fair value.

Fair Value of Mortgage Servicing Rights Assets

As described in Note 15 to the consolidated financial statements, the Firm has elected to account for the Firm's mortgage servicing rights assets at fair value, with balances of $4.7 billion as of December 31, 2019. Management estimates the fair value of mortgage servicing rights using an option-adjusted spread model, which projects cash flows over multiple interest rate scenarios in conjunction with the Firm's prepayment model, and then discounts these cash flows at risk-adjusted rates. The key economic assumptions used to determine the fair value of mortgage servicing rights are prepayment speeds and option adjusted spread.

The principal considerations for our determination that performing procedures relating to the fair value of mortgage servicing rights assets is a critical audit matter are (i) there was significant judgment and estimation by management in determining the fair value of mortgage servicing rights, which in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and in evaluating the audit evidence obtained related to the prepayment speed and option adjusted spread assumptions, and (ii) the audit effort involved professionals with specialized skill and knowledge to assist in evaluating the audit evidence obtained from these procedures.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the valuation of mortgage servicing rights, including controls over the Firm's models, assumptions, and data. These procedures also included, among others, the involvement of professionals with specialized skill and knowledge to assist in testing management's process including testing and evaluating the reasonableness of prepayment speed and option adjusted spread assumptions used in the model.

Allowance for Loan Losses - Wholesale Loan, Credit Card Loan and Consumer Loan Portfolios

As described in Note 13 to the consolidated financial statements, the Firm's allowance for loan losses represents management's estimate of probable credit losses inherent in the Firm's retained loan portfolios, which primarily consists of wholesale loans, credit card loans and consumer loans. As of December 31, 2019, the allowance for loan losses was $13.1 billion on total retained loans of $945.6 billion. The Firm's allowance for loan losses is determined for each of the retained loan portfolios utilizing a statistical credit loss estimate. These statistical credit loss estimates are calculated using statistical credit loss factors, specifically the probability of default and loss severity for the credit card and consumer loans and the probability of default and loss given default for the wholesale loans. Management then applies judgment to adjust these statistical loss estimates to take into consideration model imprecision, external factors and economic events that have occurred but are not yet reflected in the loss factors.

The principal considerations for our determination that performing procedures relating to the allowance for loan losses for the wholesale loan, credit card loan, and consumer loan portfolios is a critical audit matter are (i) there was

significant judgment and estimation by management in determining the modeling techniques utilized in their statistical credit loss estimates, which in turn led to a high degree of auditor judgment, subjectivity and effort in performing procedures and in evaluating audit evidence obtained relating to the statistical credit loss estimates and the appropriateness of the adjustments to the statistical loss estimates, and (ii) the audit effort involved professionals with specialized skill and knowledge to assist in evaluating the audit evidence.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the Firm's allowance for loan losses estimation processes. These procedures also included, among others, testing management's process for estimating the allowance for loan losses, which included evaluating the appropriateness of the models and methodologies used in the statistical credit loss estimates for the wholesale, credit card and consumer loan portfolios; testing the completeness and accuracy of data; and evaluating the reasonableness of assumptions and judgments used in the statistical credit loss estimate and the adjustments to the statistical credit loss estimates. This included, as relevant, evaluating the reasonableness of probabilities of default, loss severities and loss given default. Evaluating management's adjustment to the statistical credit loss estimate included evaluating the reasonableness of the impacts of model imprecision and external factors and economic events which have occurred but are not yet otherwise reflected in the statistical credit loss estimate. The procedures included the use of professionals with specialized skill and knowledge to assist in evaluating the appropriateness of certain models, methodologies and inputs into the statistical credit loss estimates.

PricewaterhouseCoopers LLP

February 25, 2020

We have served as the Firm's auditor since 1965.

Consolidated statements of income

Year ended December 31, (in millions, except per share data)	2019	2018	2017
Revenue			
Investment banking fees	$ 7,501	$ 7,550	$ 7,412
Principal transactions	14,018	12,059	11,347
Lending- and deposit-related fees	6,369	6,052	5,933
Asset management, administration and commissions	17,165	17,118	16,287
Investment securities gains/(losses)	258	(395)	(66)
Mortgage fees and related income	2,036	1,254	1,616
Card income	5,304	4,989	4,433
Other income	5,731	5,343	3,646
Noninterest revenue	58,382	53,970	50,608
Interest income[(a)]	84,040	76,100	63,971
Interest expense[(a)]	26,795	21,041	13,874
Net interest income	57,245	55,059	50,097
Total net revenue	115,627	109,029	100,705
Provision for credit losses	5,585	4,871	5,290
Noninterest expense			
Compensation expense	34,155	33,117	31,208
Occupancy expense	4,322	3,952	3,723
Technology, communications and equipment expense	9,821	8,802	7,715
Professional and outside services	8,533	8,502	7,890
Marketing	3,579	3,290	2,900
Other expense	5,087	5,731	6,079
Total noninterest expense	65,497	63,394	59,515
Income before income tax expense	44,545	40,764	35,900
Income tax expense	8,114	8,290	11,459
Net income	$ 36,431	$ 32,474	$ 24,441
Net income applicable to common stockholders	$ 34,642	$ 30,709	$ 22,567
Net income per common share data			
Basic earnings per share	$ 10.75	$ 9.04	$ 6.35
Diluted earnings per share	10.72	9.00	6.31
Weighted-average basic shares	3,221.5	3,396.4	3,551.6
Weighted-average diluted shares	3,230.4	3,414.0	3,576.8

(a) In the second quarter of 2019, the Firm implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation. Refer to Note 7 for additional information.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of comprehensive income

Year ended December 31, (in millions)	2019	2018	2017
Net income	**$ 36,431**	$ 32,474	$ 24,441
Other comprehensive income/(loss), after–tax			
Unrealized gains/(losses) on investment securities	**2,855**	(1,858)	640
Translation adjustments, net of hedges	**20**	20	(306)
Fair value hedges	**30**	(107)	NA
Cash flow hedges	**172**	(201)	176
Defined benefit pension and OPEB plans	**964**	(373)	738
DVA on fair value option elected liabilities	**(965)**	1,043	(192)
Total other comprehensive income/(loss), after–tax	**3,076**	(1,476)	1,056
Comprehensive income	**$ 39,507**	$ 30,998	$ 25,497

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated balance sheets

December 31, (in millions, except share data)		2019		2018
Assets				
Cash and due from banks	**$**	**21,704**	$	22,324
Deposits with banks		**241,927**		256,469
Federal funds sold and securities purchased under resale agreements (included **$14,561** and $13,235 at fair value)		**249,157**		321,588
Securities borrowed (included **$6,237** and $5,105 at fair value)		**139,758**		111,995
Trading assets (included assets pledged of **$111,522** and $89,073)		**411,103**		413,714
Investment securities (included **$350,699** and $230,394 at fair value and assets pledged of **$10,325** and $11,432)		**398,239**		261,828
Loans (included **$7,104** and $3,151 at fair value)		**959,769**		984,554
Allowance for loan losses		**(13,123)**		(13,445)
Loans, net of allowance for loan losses		**946,646**		971,109
Accrued interest and accounts receivable		**72,861**		73,200
Premises and equipment		**25,813**		14,934
Goodwill, MSRs and other intangible assets		**53,341**		54,349
Other assets (included **$9,111** and $9,630 at fair value and assets pledged of **$3,349** and $3,457)		**126,830**		121,022
Total assets[(a)]	**$**	**2,687,379**	$	2,622,532
Liabilities				
Deposits (included **$28,589** and $23,217 at fair value)	**$**	**1,562,431**	$	1,470,666
Federal funds purchased and securities loaned or sold under repurchase agreements (included **$549** and $935 at fair value)		**183,675**		182,320
Short-term borrowings (included **$5,920** and $7,130 at fair value)		**40,920**		69,276
Trading liabilities		**119,277**		144,773
Accounts payable and other liabilities (included **$3,728** and $3,269 at fair value)		**210,407**		196,710
Beneficial interests issued by consolidated VIEs (included **$36** and $28 at fair value)		**17,841**		20,241
Long-term debt (included **$75,745** and $54,886 at fair value)		**291,498**		282,031
Total liabilities[(a)]		**2,426,049**		2,366,017
Commitments and contingencies (refer to Notes 28, 29 and 30)				
Stockholders' equity				
Preferred stock ($1 par value; authorized 200,000,000 shares: issued **2,699,250** and 2,606,750 shares)		**26,993**		26,068
Common stock ($1 par value; authorized 9,000,000,000 shares; issued **4,104,933,895** shares)		**4,105**		4,105
Additional paid-in capital		**88,522**		89,162
Retained earnings		**223,211**		199,202
Accumulated other comprehensive income/loss		**1,569**		(1,507)
Shares held in restricted stock units ("RSU") trust, at cost (**472,953** shares)		**(21)**		(21)
Treasury stock, at cost (**1,020,912,567** and 829,167,674 shares)		**(83,049)**		(60,494)
Total stockholders' equity		**261,330**		256,515
Total liabilities and stockholders' equity	**$**	**2,687,379**	$	2,622,532

(a) The following table presents information on assets and liabilities related to VIEs that are consolidated by the Firm at December 31, 2019 and 2018. The assets of the consolidated VIEs are used to settle the liabilities of those entities. The holders of the beneficial interests do not have recourse to the general credit of JPMorgan Chase. The assets and liabilities in the table below include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation. Refer to Note 14 for a further discussion.

December 31, (in millions)		2019		2018
Assets				
Trading assets	**$**	**2,633**	$	1,966
Loans		**42,931**		59,456
All other assets		**881**		1,013
Total assets	**$**	**46,445**	$	62,435
Liabilities				
Beneficial interests issued by consolidated VIEs	**$**	**17,841**	$	20,241
All other liabilities		**447**		312
Total liabilities	**$**	**18,288**	$	20,553

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of changes in stockholders' equity

Year ended December 31, (in millions, except per share data)	**2019**	2018	2017
Preferred stock			
Balance at January 1	**$ 26,068**	$ 26,068	$ 26,068
Issuance	**5,000**	1,696	1,258
Redemption	**(4,075)**	(1,696)	(1,258)
Balance at December 31	**26,993**	26,068	26,068
Common stock			
Balance at January 1 and December 31	**4,105**	4,105	4,105
Additional paid-in capital			
Balance at January 1	**89,162**	90,579	91,627
Shares issued and commitments to issue common stock for employee share-based compensation awards, and related tax effects	**(591)**	(738)	(734)
Other	**(49)**	(679)	(314)
Balance at December 31	**88,522**	89,162	90,579
Retained earnings			
Balance at January 1	**199,202**	177,676	162,440
Cumulative effect of change in accounting principles	**62**	(183)	–
Net income	**36,431**	32,474	24,441
Dividends declared:			
Preferred stock	**(1,587)**	(1,551)	(1,663)
Common stock (**$3.40**, $2.72 and $2.12 per share for 2019, 2018 and 2017, respectively)	**(10,897)**	(9,214)	(7,542)
Balance at December 31	**223,211**	199,202	177,676
Accumulated other comprehensive income			
Balance at January 1	**(1,507)**	(119)	(1,175)
Cumulative effect of change in accounting principles	**–**	88	–
Other comprehensive income/(loss), after-tax	**3,076**	(1,476)	1,056
Balance at December 31	**1,569**	(1,507)	(119)
Shares held in RSU Trust, at cost			
Balance at January 1 and December 31	**(21)**	(21)	(21)
Treasury stock, at cost			
Balance at January 1	**(60,494)**	(42,595)	(28,854)
Repurchase	**(24,121)**	(19,983)	(15,410)
Reissuance	**1,566**	2,084	1,669
Balance at December 31	**(83,049)**	(60,494)	(42,595)
Total stockholders' equity	**$ 261,330**	$ 256,515	$ 255,693

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of cash flows

Year ended December 31, (in millions)	2019	2018	2017
Operating activities			
Net income	**$ 36,431**	$ 32,474	$ 24,441
Adjustments to reconcile net income to net cash provided by/(used in) operating activities:			
Provision for credit losses	**5,585**	4,871	5,290
Depreciation and amortization	**8,368**	7,791	6,179
Deferred tax expense	**949**	1,721	2,312
Other	**1,996**	2,717	2,136
Originations and purchases of loans held-for-sale	**(70,980)**	(102,141)	(94,628)
Proceeds from sales, securitizations and paydowns of loans held-for-sale	**79,182**	93,453	93,270
Net change in:			
Trading assets	**(652)**	(38,371)	5,673
Securities borrowed	**(27,631)**	(6,861)	(8,653)
Accrued interest and accounts receivable	**(78)**	(5,849)	(15,868)
Other assets	**(17,949)**	(8,833)	3,982
Trading liabilities	**(14,516)**	18,290	(26,256)
Accounts payable and other liabilities	**(352)**	14,630	(16,508)
Other operating adjustments	**5,693**	295	7,803
Net cash provided by/(used in) operating activities	**6,046**	14,187	(10,827)
Investing activities			
Net change in:			
Federal funds sold and securities purchased under resale agreements	**72,396**	(123,201)	31,448
Held-to-maturity securities:			
Proceeds from paydowns and maturities	**3,423**	2,945	4,563
Purchases	**(13,427)**	(9,368)	(2,349)
Available-for-sale securities:			
Proceeds from paydowns and maturities	**52,200**	37,401	56,117
Proceeds from sales	**70,181**	46,067	90,201
Purchases	**(242,149)**	(95,091)	(105,309)
Proceeds from sales and securitizations of loans held-for-investment	**62,095**	29,826	15,791
Other changes in loans, net	**(53,697)**	(81,586)	(61,650)
All other investing activities, net	**(5,035)**	(4,986)	(563)
Net cash provided by/(used in) investing activities	**(54,013)**	(197,993)	28,249
Financing activities			
Net change in:			
Deposits	**101,002**	26,728	57,022
Federal funds purchased and securities loaned or sold under repurchase agreements	**1,347**	23,415	(6,739)
Short-term borrowings	**(28,561)**	18,476	16,540
Beneficial interests issued by consolidated VIEs	**4,289**	1,712	(1,377)
Proceeds from long-term borrowings	**61,085**	71,662	56,271
Payments of long-term borrowings	**(69,610)**	(76,313)	(83,079)
Proceeds from issuance of preferred stock	**5,000**	1,696	1,258
Redemption of preferred stock	**(4,075)**	(1,696)	(1,258)
Treasury stock repurchased	**(24,001)**	(19,983)	(15,410)
Dividends paid	**(12,343)**	(10,109)	(8,993)
All other financing activities, net	**(1,146)**	(1,430)	407
Net cash provided by financing activities	**32,987**	34,158	14,642
Effect of exchange rate changes on cash and due from banks and deposits with banks	**(182)**	(2,863)	8,086
Net increase/(decrease) in cash and due from banks and deposits with banks	**(15,162)**	(152,511)	40,150
Cash and due from banks and deposits with banks at the beginning of the period	**278,793**	431,304	391,154
Cash and due from banks and deposits with banks at the end of the period	**$ 263,631**	$ 278,793	$ 431,304
Cash interest paid	**$ 29,918**	$ 21,152	$ 14,153
Cash income taxes paid, net	**5,624**	3,542	4,325

The Notes to Consolidated Financial Statements are an integral part of these statements.

Note 1 – Basis of presentation

JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm"), a financial holding company incorporated under Delaware law in 1968, is a leading global financial services firm and one of the largest banking institutions in the U.S. with operations worldwide. The Firm is a leader in investment banking, financial services for consumers and small business, commercial banking, financial transaction processing and asset management. Refer to Note 32 for a discussion of the Firm's business segments.

The accounting and financial reporting policies of JPMorgan Chase and its subsidiaries conform to U.S. GAAP. Additionally, where applicable, the policies conform to the accounting and reporting guidelines prescribed by regulatory authorities.

Certain amounts reported in prior periods have been reclassified to conform with the current presentation.

Consolidation

The Consolidated Financial Statements include the accounts of JPMorgan Chase and other entities in which the Firm has a controlling financial interest. All material intercompany balances and transactions have been eliminated.

Assets held for clients in an agency or fiduciary capacity by the Firm are not assets of JPMorgan Chase and are not included on the Consolidated balance sheets.

The Firm determines whether it has a controlling financial interest in an entity by first evaluating whether the entity is a voting interest entity or a variable interest entity.

Voting interest entities

Voting interest entities are entities that have sufficient equity and provide the equity investors voting rights that enable them to make significant decisions relating to the entity's operations. For these types of entities, the Firm's determination of whether it has a controlling interest is primarily based on the amount of voting equity interests held. Entities in which the Firm has a controlling financial interest, through ownership of the majority of the entities' voting equity interests, or through other contractual rights that give the Firm control, are consolidated by the Firm.

Investments in companies in which the Firm has significant influence over operating and financing decisions (but does not own a majority of the voting equity interests) are accounted for (i) in accordance with the equity method of accounting (which requires the Firm to recognize its proportionate share of the entity's net earnings), or (ii) at fair value if the fair value option was elected. These investments are generally included in other assets, with income or loss included in noninterest revenue.

Certain Firm-sponsored asset management funds are structured as limited partnerships or limited liability companies. For many of these entities, the Firm is the general partner or managing member, but the non-affiliated partners or members have the ability to remove the Firm as the general partner or managing member without cause (i.e., kick-out rights), based on a simple majority vote, or the non-affiliated partners or members have rights to participate in important decisions. Accordingly, the Firm does not consolidate these voting interest entities. However, in the limited cases where the non-managing partners or members do not have substantive kick-out or participating rights, the Firm evaluates the funds as VIEs and consolidates the funds if the Firm is the general partner or managing member and has a potentially significant interest.

The Firm's investment companies and asset management funds have investments in both publicly-held and privately-held entities, including investments in buyouts, growth equity and venture opportunities. These investments are accounted for under investment company guidelines and, accordingly, irrespective of the percentage of equity ownership interests held, are carried on the Consolidated balance sheets at fair value, and are recorded in other assets, with income or loss included in noninterest revenue. If consolidated, the Firm retains such specialized investment company guidelines.

Variable interest entities

VIEs are entities that, by design, either (1) lack sufficient equity to permit the entity to finance its activities without additional subordinated financial support from other parties, or (2) have equity investors that do not have the ability to make significant decisions relating to the entity's operations through voting rights, or do not have the obligation to absorb the expected losses, or do not have the right to receive the residual returns of the entity.

The most common type of VIE is an SPE. SPEs are commonly used in securitization transactions in order to isolate certain assets and distribute the cash flows from those assets to investors. The basic SPE structure involves a company selling assets to the SPE; the SPE funds the purchase of those assets by issuing securities to investors. The legal documents that govern the transaction specify how the cash earned on the assets must be allocated to the SPE's investors and other parties that have rights to those cash flows. SPEs are generally structured to insulate investors from claims on the SPE's assets by creditors of other entities, including the creditors of the seller of the assets.

The primary beneficiary of a VIE (i.e., the party that has a controlling financial interest) is required to consolidate the assets and liabilities of the VIE. The primary beneficiary is the party that has both (1) the power to direct the activities of the VIE that most significantly impact the VIE's economic performance; and (2) through its interests in the VIE, the obligation to absorb losses or the right to receive benefits from the VIE that could potentially be significant to the VIE.

To assess whether the Firm has the power to direct the activities of a VIE that most significantly impact the VIE's economic performance, the Firm considers all the facts and

circumstances, including its role in establishing the VIE and its ongoing rights and responsibilities. This assessment includes, first, identifying the activities that most significantly impact the VIE's economic performance; and second, identifying which party, if any, has power over those activities. In general, the parties that make the most significant decisions affecting the VIE (such as asset managers, collateral managers, servicers, or owners of call options or liquidation rights over the VIE's assets) or have the right to unilaterally remove those decision-makers are deemed to have the power to direct the activities of a VIE.

To assess whether the Firm has the obligation to absorb losses of the VIE or the right to receive benefits from the VIE that could potentially be significant to the VIE, the Firm considers all of its economic interests, including debt and equity investments, servicing fees, and derivatives or other arrangements deemed to be variable interests in the VIE. This assessment requires that the Firm apply judgment in determining whether these interests, in the aggregate, are considered potentially significant to the VIE. Factors considered in assessing significance include: the design of the VIE, including its capitalization structure; subordination of interests; payment priority; relative share of interests held across various classes within the VIE's capital structure; and the reasons why the interests are held by the Firm.

The Firm performs on-going reassessments of: (1) whether entities previously evaluated under the majority voting-interest framework have become VIEs, based on certain events, and are therefore subject to the VIE consolidation framework; and (2) whether changes in the facts and circumstances regarding the Firm's involvement with a VIE cause the Firm's consolidation conclusion to change.

Refer to Note 14 for further discussion of the Firm's VIEs.

Revenue recognition

Interest income

The Firm recognizes interest income on loans, debt securities, and other debt instruments, generally on a level-yield basis, based on the underlying contractual rate. Refer to Note 7 for further discussion of interest income.

Revenue from contracts with customers

JPMorgan Chase recognizes noninterest revenue from certain contracts with customers, in investment banking fees, deposit-related fees, asset management administration and commissions, and components of card income, when the Firm's related performance obligations are satisfied. Refer to Note 6 for further discussion of the Firm's revenue from contracts with customers.

Principal transactions revenue

JPMorgan Chase carries a portion of its assets and liabilities at fair value. Changes in fair value are reported primarily in principal transactions revenue. Refer to Notes 2 and 3 for further discussion of fair value measurement. Refer to Note 6 for further discussion of principal transactions revenue.

Use of estimates in the preparation of consolidated financial statements

The preparation of the Consolidated Financial Statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenue and expense, and disclosures of contingent assets and liabilities. Actual results could be different from these estimates.

Foreign currency translation

JPMorgan Chase revalues assets, liabilities, revenue and expense denominated in non-U.S. currencies into U.S. dollars using applicable exchange rates.

Gains and losses relating to translating functional currency financial statements for U.S. reporting are included in the Consolidated statements of comprehensive income. Gains and losses relating to nonfunctional currency transactions, including non-U.S. operations where the functional currency is the U.S. dollar, are reported in the Consolidated statements of income.

Offsetting assets and liabilities

U.S. GAAP permits entities to present derivative receivables and derivative payables with the same counterparty and the related cash collateral receivables and payables on a net basis on the Consolidated balance sheets when a legally enforceable master netting agreement exists. U.S. GAAP also permits securities sold and purchased under repurchase agreements and securities borrowed or loaned under securities loan agreements to be presented net when specified conditions are met, including the existence of a legally enforceable master netting agreement. The Firm has elected to net such balances when the specified conditions are met.

The Firm uses master netting agreements to mitigate counterparty credit risk in certain transactions, including derivative contracts, resale, repurchase, securities borrowed and securities loaned agreements. A master netting agreement is a single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due). Upon the exercise of derivatives termination rights by the non-defaulting party (i) all transactions are terminated, (ii) all transactions are valued and the positive values of "in the money" transactions are netted against the negative values of "out of the money" transactions and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount. Upon exercise of default rights under repurchase agreements and securities loan agreements in general (i) all transactions are terminated and accelerated, (ii) all values of securities or cash held or to be delivered are calculated, and all such sums are netted against each other and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount.

Typical master netting agreements for these types of transactions also often contain a collateral/margin agreement that provides for a security interest in, or title transfer of, securities or cash collateral/margin to the party that has the right to demand margin (the "demanding party"). The collateral/margin agreement typically requires a party to transfer collateral/margin to the demanding party with a value equal to the amount of the margin deficit on a net basis across all transactions governed by the master netting agreement, less any threshold. The collateral/margin agreement grants to the demanding party, upon default by the counterparty, the right to set-off any amounts payable by the counterparty against any posted collateral or the cash equivalent of any posted collateral/margin. It also grants to the demanding party the right to liquidate collateral/margin and to apply the proceeds to an amount payable by the counterparty.

Refer to Note 5 for further discussion of the Firm's derivative instruments. Refer to Note 11 for further discussion of the Firm's securities financing agreements.

Statements of cash flows

For JPMorgan Chase's Consolidated statements of cash flows, cash is defined as those amounts included in cash and due from banks and deposits with banks.

Accounting standard adopted January 1, 2020

Financial Instruments – Credit Losses ("CECL")

The adoption of this guidance established a single allowance framework for all financial assets carried at amortized cost and certain off-balance sheet credit exposures. This framework requires that management's estimate reflects credit losses over the full remaining expected life and considers expected future changes in macroeconomic conditions.

The following table presents the impacts to the allowance for credit losses and retained earnings upon adoption of this guidance on January 1, 2020:

(in billions)	December 31, 2019	CECL adoption impact	January 1, 2020
Allowance for credit losses			
Consumer, excluding credit card	$ 3.2	$ 0.2	$ 3.4
Credit card	5.7	5.5	11.2
Wholesale	5.4	(1.4)	4.0
Firmwide	$ 14.3	$ 4.3	$ 18.6
Retained earnings			
Firmwide allowance increase		$ 4.3	
Balance sheet reclassification[a]		(0.8)	
Total pre-tax impact		3.5	
Tax effect		(0.8)	
Decrease to retained earnings		$ 2.7	

(a) Represents the recognition of the nonaccretable difference on purchased credit deteriorated assets and the Firm's election to recognize the reserve for uncollectible accrued interest on credit card loans in the allowance, both of which resulted in a corresponding increase to loans.

Accounting standards adopted January 1, 2018

Effective January 1, 2018, the Firm adopted several accounting standards resulting in a net decrease of $183 million to retained earnings and a net increase of $88 million to AOCI. Certain of these standards were adopted retrospectively and, accordingly, prior period amounts were revised. The adoption of the recognition and measurement guidance resulted in $505 million of fair value gains in the first quarter of 2018, recorded in total net revenue, on certain equity investments that were previously held at cost.

Significant accounting policies

The following table identifies JPMorgan Chase's other significant accounting policies and the Note and page where a detailed description of each policy can be found.

Fair value measurement	Note 2	page 154
Fair value option	Note 3	page 175
Derivative instruments	Note 5	page 180
Noninterest revenue and noninterest expense	Note 6	page 195
Interest income and Interest expense	Note 7	page 198
Pension and other postretirement employee benefit plans	Note 8	page 199
Employee share-based incentives	Note 9	page 206
Investment securities	Note 10	page 208
Securities financing activities	Note 11	page 214
Loans	Note 12	page 217
Allowance for credit losses	Note 13	page 237
Variable interest entities	Note 14	page 242
Goodwill and Mortgage servicing rights	Note 15	page 250
Premises and equipment	Note 16	page 254
Leases	Note 18	page 254
Long-term debt	Note 20	page 257
Income taxes	Note 25	page 265
Off-balance sheet lending-related financial instruments, guarantees and other commitments	Note 28	page 272
Litigation	Note 30	page 279

Note 2 – Fair value measurement

JPMorgan Chase carries a portion of its assets and liabilities at fair value. These assets and liabilities are predominantly carried at fair value on a recurring basis (i.e., assets and liabilities that are measured and reported at fair value on the Firm's Consolidated balance sheets). Certain assets, liabilities and unfunded lending-related commitments are measured at fair value on a nonrecurring basis; that is, they are not measured at fair value on an ongoing basis but are subject to fair value adjustments only in certain circumstances (for example, when there is evidence of impairment).

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value is based on quoted market prices or inputs, where available. If prices or quotes are not available, fair value is based on valuation models and other valuation techniques that consider relevant transaction characteristics (such as maturity) and use, as inputs, observable or unobservable market parameters, including yield curves, interest rates, volatilities, prices (such as commodity, equity or debt prices), correlations, foreign exchange rates and credit curves. Valuation adjustments may be made to ensure that financial instruments are recorded at fair value, as described below.

The level of precision in estimating unobservable market inputs or other factors can affect the amount of gain or loss recorded for a particular position. Furthermore, while the Firm believes its valuation methods are appropriate and consistent with those of other market participants, the methods and assumptions used reflect management judgment and may vary across the Firm's businesses and portfolios.

The Firm uses various methodologies and assumptions in the determination of fair value. The use of different methodologies or assumptions by other market participants compared with those used by the Firm could result in the Firm deriving a different estimate of fair value at the reporting date.

Valuation process

Risk-taking functions are responsible for providing fair value estimates for assets and liabilities carried on the Consolidated balance sheets at fair value. The Firm's VCG, which is part of the Firm's Finance function and independent of the risk-taking functions, is responsible for verifying these estimates and determining any fair value adjustments that may be required to ensure that the Firm's positions are recorded at fair value. The VGF is composed of senior finance and risk executives and is responsible for overseeing the management of risks arising from valuation activities conducted across the Firm. The Firmwide VGF is chaired by the Firmwide head of the VCG (under the direction of the Firm's Controller), and includes sub-forums covering the CIB, CCB, CB, AWM and certain corporate functions including Treasury and CIO.

Price verification process

The VCG verifies fair value estimates provided by the risk-taking functions by leveraging independently derived prices, valuation inputs and other market data, where available. Where independent prices or inputs are not available, the VCG performs additional review to ensure the reasonableness of the estimates. The additional review may include evaluating the limited market activity including client unwinds, benchmarking valuation inputs to those used for similar instruments, decomposing the valuation of structured instruments into individual components, comparing expected to actual cash flows, reviewing profit and loss trends, and reviewing trends in collateral valuation. There are also additional levels of management review for more significant or complex positions.

The VCG determines any valuation adjustments that may be required to the estimates provided by the risk-taking functions. No adjustments to quoted prices are applied for instruments classified within level 1 of the fair value hierarchy (refer to the discussion below for further information on the fair value hierarchy). For other positions, judgment is required to assess the need for valuation adjustments to appropriately reflect liquidity considerations, unobservable parameters, and, for certain portfolios that meet specified criteria, the size of the net open risk position. The determination of such adjustments follows a consistent framework across the Firm:

- Liquidity valuation adjustments are considered where an observable external price or valuation parameter exists but is of lower reliability, potentially due to lower market activity. Liquidity valuation adjustments are made based on current market conditions. Factors that may be considered in determining the liquidity adjustment include analysis of: (1) the estimated bid-offer spread for the instrument being traded; (2) alternative pricing points for similar instruments in active markets; and (3) the range of reasonable values that the price or parameter could take.
- The Firm manages certain portfolios of financial instruments on the basis of net open risk exposure and, as permitted by U.S. GAAP, has elected to estimate the fair value of such portfolios on the basis of a transfer of the entire net open risk position in an orderly transaction. Where this is the case, valuation adjustments may be necessary to reflect the cost of exiting a larger-than-normal market-size net open risk position. Where applied, such adjustments are based on factors that a relevant market participant would consider in the transfer of the net open risk position, including the size of the adverse market move that is likely to occur during the period required to reduce the net open risk position to a normal market-size.
- Uncertainty adjustments related to unobservable parameters may be made when positions are valued using prices or input parameters to valuation models that are unobservable due to a lack of market activity or because they cannot be implied from observable market data. Such prices or parameters must be estimated and are, therefore, subject to management judgment.

Adjustments are made to reflect the uncertainty inherent in the resulting valuation estimate.

- Where appropriate, the Firm also applies adjustments to its estimates of fair value in order to appropriately reflect counterparty credit quality (CVA), the Firm's own creditworthiness (DVA) and the impact of funding (FVA), using a consistent framework across the Firm. Refer to Credit and funding adjustments on page 171 of this Note for more information on such adjustments.

Valuation model review and approval

If prices or quotes are not available for an instrument or a similar instrument, fair value is generally determined using valuation models that consider relevant transaction terms such as maturity and use as inputs market-based or independently sourced parameters. Where this is the case the price verification process described above is applied to the inputs in those models.

Under the Firm's Estimations and Model Risk Management Policy, the Model Risk function reviews and approves new models, as well as material changes to existing models, prior to implementation in the operating environment. In certain circumstances exceptions may be granted to the Firm's policy to allow a model to be used prior to review or approval. The Model Risk function may also require the user to take appropriate actions to mitigate the model risk if it is to be used in the interim. These actions will depend on the model and may include, for example, limitation of trading activity.

Valuation hierarchy

A three-level valuation hierarchy has been established under U.S. GAAP for disclosure of fair value measurements. The valuation hierarchy is based on the observability of inputs to the valuation of an asset or liability as of the measurement date. The three levels are defined as follows.

- Level 1 – inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.
- Level 2 – inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.
- Level 3 – one or more inputs to the valuation methodology are unobservable and significant to the fair value measurement.

A financial instrument's categorization within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The following table describes the valuation methodologies generally used by the Firm to measure its significant products/ instruments at fair value, including the general classification of such instruments pursuant to the valuation hierarchy.

<table>
<tr><th>Product/instrument</th><th>Valuation methodology</th><th>Classifications in the valuation hierarchy</th></tr>
<tr><td>Securities financing agreements</td><td>Valuations are based on discounted cash flows, which consider:
• Derivative features: refer to the discussion of derivatives below for further information.
• Market rates for the respective maturity
• Collateral characteristics</td><td>Predominantly level 2</td></tr>
<tr><td>Loans and lending-related commitments — wholesale</td><td></td><td></td></tr>
<tr><td>Loans carried at fair value (e.g., trading loans and non-trading loans) and associated lending-related commitments</td><td>Where observable market data is available, valuations are based on:
• Observed market prices (circumstances are infrequent)
• Relevant broker quotes
• Observed market prices for similar instruments
Where observable market data is unavailable or limited, valuations are based on discounted cash flows, which consider the following:
• Credit spreads derived from the cost of CDS; or benchmark credit curves developed by the Firm, by industry and credit rating
• Prepayment speed
• Collateral characteristics</td><td>Level 2 or 3</td></tr>
<tr><td>Loans — consumer</td><td></td><td></td></tr>
<tr><td>Trading loans — conforming residential mortgage loans expected to be sold</td><td>Fair value is based on observable prices for mortgage-backed securities with similar collateral and incorporates adjustments to these prices to account for differences between the securities and the value of the underlying loans, which include credit characteristics, portfolio composition, and liquidity.</td><td>Predominantly level 2</td></tr>
<tr><td>Investment and trading securities</td><td>Quoted market prices</td><td>Level 1</td></tr>
<tr><td></td><td>In the absence of quoted market prices, securities are valued based on:
• Observable market prices for similar securities
• Relevant broker quotes
• Discounted cash flows
In addition, the following inputs to discounted cash flows are used for the following products:
Mortgage- and asset-backed securities specific inputs:
• Collateral characteristics
• Deal-specific payment and loss allocations
• Current market assumptions related to yield, prepayment speed, conditional default rates and loss severity
Collateralized loan obligations (“CLOs”) specific inputs:
• Collateral characteristics
• Deal-specific payment and loss allocations
• Expected prepayment speed, conditional default rates, loss severity
• Credit spreads
• Credit rating data</td><td>Level 2 or 3</td></tr>
<tr><td>Physical commodities</td><td>Valued using observable market prices or data.</td><td>Level 1 or 2</td></tr>
</table>

<table>
<tr><th>Product/instrument</th><th>Valuation methodology</th><th>Classifications in the valuation hierarchy</th></tr>
<tr><td>Derivatives</td><td>Exchange-traded derivatives that are actively traded and valued using the exchange price.</td><td>Level 1</td></tr>
<tr><td></td><td>Derivatives that are valued using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs as well as considering the contractual terms.

The key valuation inputs used will depend on the type of derivative and the nature of the underlying instruments and may include equity prices, commodity prices, interest rate yield curves, foreign exchange rates, volatilities, correlations, CDS spreads and recovery rates. Additionally, the credit quality of the counterparty and of the Firm as well as market funding levels may also be considered.

In addition, specific inputs used for derivatives that are valued based on models with significant unobservable inputs are as follows:

Structured credit derivatives specific inputs include:
• CDS spreads and recovery rates
• Credit correlation between the underlying debt instruments

Equity option specific inputs include:
• Forward equity price
• Equity volatility
• Equity correlation
• Equity-FX correlation
• Equity-IR correlation

Interest rate and FX exotic options specific inputs include:
• Interest rate volatility
• Interest rate spread volatility
• Interest rate correlation
• Foreign exchange correlation
• Interest rate-FX correlation

Commodity derivatives specific inputs include:
• Commodity volatility
• Forward commodity price

Additionally, adjustments are made to reflect counterparty credit quality (CVA) and the impact of funding (FVA). Refer to page 171 of this Note.</td><td>Level 2 or 3</td></tr>
<tr><td>Mortgage servicing rights</td><td>Refer to Mortgage servicing rights in Note 15.</td><td>Level 3</td></tr>
<tr><td>Private equity direct investments</td><td>Fair value is estimated using all available information; the range of potential inputs include:
• Transaction prices
• Trading multiples of comparable public companies
• Operating performance of the underlying portfolio company
• Adjustments as required, since comparable public companies are not identical to the company being valued, and for company-specific issues and lack of liquidity.
• Additional available inputs relevant to the investment.</td><td>Level 2 or 3</td></tr>
<tr><td>Fund investments (e.g., mutual/collective investment funds, private equity funds, hedge funds, and real estate funds)</td><td>Net asset value
• NAV is supported by the ability to redeem and purchase at the NAV level.</td><td>Level 1</td></tr>
<tr><td></td><td>• Adjustments to the NAV as required, for restrictions on redemption (e.g., lock-up periods or withdrawal limitations) or where observable activity is limited.</td><td>Level 2 or 3[(a)]</td></tr>
<tr><td>Beneficial interests issued by consolidated VIEs</td><td>Valued using observable market information, where available.

In the absence of observable market information, valuations are based on the fair value of the underlying assets held by the VIE.</td><td>Level 2 or 3</td></tr>
</table>

(a) Excludes certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient.

Product/instrument	Valuation methodology	Classification in the valuation hierarchy
Structured notes (included in deposits, short-term borrowings and long-term debt)	• Valuations are based on discounted cash flow analyses that consider the embedded derivative and the terms and payment structure of the note. • The embedded derivative features are considered using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs, depending on the embedded derivative. The specific inputs used vary according to the nature of the embedded derivative features, as described in the discussion above regarding derivatives valuation. Adjustments are then made to this base valuation to reflect the Firm’s own credit risk (DVA). Refer to page 171 of this Note.	Level 2 or 3

The following table presents the assets and liabilities reported at fair value as of December 31, 2019 and 2018, by major product category and fair value hierarchy.

Assets and liabilities measured at fair value on a recurring basis

	Fair value hierarchy				
December 31, 2019 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments[f]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ –	$ 14,561	$ –	$ –	$ 14,561
Securities borrowed	–	6,237	–	–	6,237
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	44,510	797	–	45,307
Residential – nonagency	–	1,977	23	–	2,000
Commercial – nonagency	–	1,486	4	–	1,490
Total mortgage-backed securities	–	47,973	824	–	48,797
U.S. Treasury, GSEs and government agencies[a]	78,289	10,295	–	–	88,584
Obligations of U.S. states and municipalities	–	6,468	10	–	6,478
Certificates of deposit, bankers' acceptances and commercial paper	–	252	–	–	252
Non-U.S. government debt securities	26,600	27,169	155	–	53,924
Corporate debt securities	–	17,956	558	–	18,514
Loans[b]	–	47,047	1,382	–	48,429
Asset-backed securities	–	2,593	37	–	2,630
Total debt instruments	104,889	159,753	2,966	–	267,608
Equity securities	71,890	244	196	–	72,330
Physical commodities[c]	3,638	3,579	–	–	7,217
Other	–	13,896	232	–	14,128
Total debt and equity instruments[d]	180,417	177,472	3,394	–	361,283
Derivative receivables:					
Interest rate	721	311,173	1,400	(285,873)	27,421
Credit	–	14,252	624	(14,175)	701
Foreign exchange	117	137,938	432	(129,482)	9,005
Equity	–	43,642	2,085	(39,250)	6,477
Commodity	–	17,058	184	(11,080)	6,162
Total derivative receivables	838	524,063	4,725	(479,860)	49,766
Total trading assets[e]	181,255	701,535	8,119	(479,860)	411,049
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	110,117	–	–	110,117
Residential – nonagency	–	12,989	1	–	12,990
Commercial – nonagency	–	5,188	–	–	5,188
Total mortgage-backed securities	–	128,294	1	–	128,295
U.S. Treasury and government agencies	139,436	–	–	–	139,436
Obligations of U.S. states and municipalities	–	29,810	–	–	29,810
Certificates of deposit	–	77	–	–	77
Non-U.S. government debt securities	12,966	8,821	–	–	21,787
Corporate debt securities	–	845	–	–	845
Asset-backed securities:					
Collateralized loan obligations	–	24,991	–	–	24,991
Other	–	5,458	–	–	5,458
Total available-for-sale securities	152,402	198,296	1	–	350,699
Loans	–	7,104	–	–	7,104
Mortgage servicing rights	–	–	4,699	–	4,699
Other assets[e]	7,305	452	724	–	8,481
Total assets measured at fair value on a recurring basis	$ 340,962	$ 928,185	$ 13,543	$ (479,860)	$ 802,830
Deposits	$ –	$ 25,229	$ 3,360	$ –	$ 28,589
Federal funds purchased and securities loaned or sold under repurchase agreements	–	549	–	–	549
Short-term borrowings	–	4,246	1,674	–	5,920
Trading liabilities:					
Debt and equity instruments[d]	59,047	16,481	41	–	75,569
Derivative payables:					
Interest rate	795	276,746	1,732	(270,670)	8,603
Credit	–	14,358	763	(13,469)	1,652
Foreign exchange	109	143,960	1,039	(131,950)	13,158
Equity	–	47,261	5,480	(40,204)	12,537
Commodity	–	19,685	200	(12,127)	7,758
Total derivative payables	904	502,010	9,214	(468,420)	43,708
Total trading liabilities	59,951	518,491	9,255	(468,420)	119,277
Accounts payable and other liabilities	3,231	452	45	–	3,728
Beneficial interests issued by consolidated VIEs	–	36	–	–	36
Long-term debt	–	52,406	23,339	–	75,745
Total liabilities measured at fair value on a recurring basis	$ 63,182	$ 601,409	$ 37,673	$ (468,420)	$ 233,844

December 31, 2018 (in millions)	Fair value hierarchy Level 1	Level 2	Level 3	Derivative netting adjustments[f]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ –	$ 13,235	$ –	$ –	$ 13,235
Securities borrowed	–	5,105	–	–	5,105
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	76,249	549	–	76,798
Residential – nonagency	–	1,798	64	–	1,862
Commercial – nonagency	–	1,501	11	–	1,512
Total mortgage-backed securities	–	79,548	624	–	80,172
U.S. Treasury, GSEs and government agencies[a]	51,477	7,702	–	–	59,179
Obligations of U.S. states and municipalities	–	7,121	689	–	7,810
Certificates of deposit, bankers' acceptances and commercial paper	–	1,214	–	–	1,214
Non-U.S. government debt securities	27,878	27,056	155	–	55,089
Corporate debt securities	–	18,655	334	–	18,989
Loans[b]	–	40,047	1,706	–	41,753
Asset-backed securities	–	2,756	127	–	2,883
Total debt instruments	79,355	184,099	3,635	–	267,089
Equity securities	71,119	482	232	–	71,833
Physical commodities[c]	5,182	1,855	–	–	7,037
Other	–	13,192	301	–	13,493
Total debt and equity instruments[d]	155,656	199,628	4,168	–	359,452
Derivative receivables:					
Interest rate	682	266,380	1,642	(245,490)	23,214
Credit	–	19,235	860	(19,483)	612
Foreign exchange	771	166,238	676	(154,235)	13,450
Equity	–	46,777	2,508	(39,339)	9,946
Commodity	–	20,339	131	(13,479)	6,991
Total derivative receivables	1,453	518,969	5,817	(472,026)	54,213
Total trading assets[e]	157,109	718,597	9,985	(472,026)	413,665
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	68,646	–	–	68,646
Residential – nonagency	–	8,519	1	–	8,520
Commercial – nonagency	–	6,654	–	–	6,654
Total mortgage-backed securities	–	83,819	1	–	83,820
U.S. Treasury and government agencies	56,059	–	–	–	56,059
Obligations of U.S. states and municipalities	–	37,723	–	–	37,723
Certificates of deposit	–	75	–	–	75
Non-U.S. government debt securities	15,313	8,789	–	–	24,102
Corporate debt securities	–	1,918	–	–	1,918
Asset-backed securities:	–	–	–	–	–
Collateralized loan obligations	–	19,437	–	–	19,437
Other	–	7,260	–	–	7,260
Total available-for-sale securities	71,372	159,021	1	–	230,394
Loans	–	3,029	122	–	3,151
Mortgage servicing rights	–	–	6,130	–	6,130
Other assets[e]	7,810	195	927	–	8,932
Total assets measured at fair value on a recurring basis	$ 236,291	$ 899,182	$ 17,165	$ (472,026)	$ 680,612
Deposits	$ –	$ 19,048	$ 4,169	$ –	$ 23,217
Federal funds purchased and securities loaned or sold under repurchase agreements	–	935	–	–	935
Short-term borrowings	–	5,607	1,523	–	7,130
Trading liabilities:					
Debt and equity instruments[d]	80,199	22,755	50	–	103,004
Derivative payables:					
Interest rate	1,526	239,576	1,680	(234,998)	7,784
Credit	–	19,309	967	(18,609)	1,667
Foreign exchange	695	163,549	973	(152,432)	12,785
Equity	–	46,462	4,733	(41,034)	10,161
Commodity	–	21,158	1,260	(13,046)	9,372
Total derivative payables	2,221	490,054	9,613	(460,119)	41,769
Total trading liabilities	82,420	512,809	9,663	(460,119)	144,773
Accounts payable and other liabilities	3,063	196	10	–	3,269
Beneficial interests issued by consolidated VIEs	–	27	1	–	28
Long-term debt	–	35,468	19,418	–	54,886
Total liabilities measured at fair value on a recurring basis	$ 85,483	$ 574,090	$ 34,784	$ (460,119)	$ 234,238

(a) At December 31, 2019 and 2018, included total U.S. GSE obligations of $104.5 billion and $92.3 billion, respectively, which were mortgage-related.
(b) At December 31, 2019 and 2018, included within trading loans were $19.8 billion and $13.2 billion, respectively, of residential first-lien mortgages, and $3.4 billion and $2.3 billion, respectively, of commercial first-lien mortgages. Residential mortgage loans include conforming mortgage loans originated with the intent to sell to U.S. GSEs and government agencies of $13.6 billion and $7.6 billion, respectively.
(c) Physical commodities inventories are generally accounted for at the lower of cost or net realizable value. "Net realizable value" is a term defined in U.S. GAAP as not exceeding fair value less costs to sell ("transaction costs"). Transaction costs for the Firm's physical commodities inventories are either not applicable or immaterial to the value of the inventory. Therefore, net realizable value approximates fair value for the Firm's physical commodities inventories. When fair value hedging has been applied (or when net realizable value is below cost), the carrying value of physical commodities

approximates fair value, because under fair value hedge accounting, the cost basis is adjusted for changes in fair value. Refer to Note 5 for a further discussion of the Firm's hedge accounting relationships. To provide consistent fair value disclosure information, all physical commodities inventories have been included in each period presented.

(d) Balances reflect the reduction of securities owned (long positions) by the amount of identical securities sold but not yet purchased (short positions).

(e) Certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not required to be classified in the fair value hierarchy. At December 31, 2019 and 2018, the fair values of these investments, which include certain hedge funds, private equity funds, real estate and other funds, were $684 million and $747 million, respectively. Included in these balances at December 31, 2019 and 2018, were trading assets of $54 million and $49 million, respectively, and other assets of $630 million and $698 million, respectively.

(f) As permitted under U.S. GAAP, the Firm has elected to net derivative receivables and derivative payables and the related cash collateral received and paid when a legally enforceable master netting agreement exists. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral.

Level 3 valuations

The Firm has established well-structured processes for determining fair value, including for instruments where fair value is estimated using significant unobservable inputs (level 3). Refer to pages 154–158 of this Note for further information on the Firm's valuation process and a detailed discussion of the determination of fair value for individual financial instruments.

Estimating fair value requires the application of judgment. The type and level of judgment required is largely dependent on the amount of observable market information available to the Firm. For instruments valued using internally developed valuation models and other valuation techniques that use significant unobservable inputs and are therefore classified within level 3 of the fair value hierarchy, judgments used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2.

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation model or other valuation technique to use. Second, due to the lack of observability of significant inputs, management must assess relevant empirical data in deriving valuation inputs including transaction details, yield curves, interest rates, prepayment speed, default rates, volatilities, correlations, prices (such as commodity, equity or debt prices), valuations of comparable instruments, foreign exchange rates and credit curves.

The following table presents the Firm's primary level 3 financial instruments, the valuation techniques used to measure the fair value of those financial instruments, the significant unobservable inputs, the range of values for those inputs and, for certain instruments, the weighted averages of such inputs. While the determination to classify an instrument within level 3 is based on the significance of the unobservable inputs to the overall fair value measurement, level 3 financial instruments typically include observable components (that is, components that are actively quoted and can be validated to external sources) in addition to the unobservable components. The level 1 and/or level 2 inputs are not included in the table. In addition, the Firm manages the risk of the observable components of level 3 financial instruments using securities and derivative positions that are classified within levels 1 or 2 of the fair value hierarchy.

The range of values presented in the table is representative of the highest and lowest level input used to value the significant groups of instruments within a product/instrument classification. Where provided, the weighted averages of the input values presented in the table are calculated based on the fair value of the instruments that the input is being used to value.

In the Firm's view, the input range and the weighted average value do not reflect the degree of input uncertainty or an assessment of the reasonableness of the Firm's estimates and assumptions. Rather, they reflect the characteristics of the various instruments held by the Firm and the relative distribution of instruments within the range of characteristics. For example, two option contracts may have similar levels of market risk exposure and valuation uncertainty, but may have significantly different implied volatility levels because the option contracts have different underlyings, tenors, or strike prices. The input range and weighted average values will therefore vary from period-to-period and parameter-to-parameter based on the characteristics of the instruments held by the Firm at each balance sheet date.

For the Firm's derivatives and structured notes positions classified within level 3 at December 31, 2019, interest rate correlation inputs used in estimating fair value were distributed across the range; equity correlation, equity-FX and equity-IR correlation inputs were concentrated in the middle of the range; commodity correlation inputs were concentrated in the middle of the range; credit correlation inputs were concentrated towards the lower end of the range; and forward equity prices and the interest rate-foreign exchange ("IR-FX") correlation inputs were distributed across the range. In addition, the interest rate volatility and interest rate spread volatility inputs used in estimating fair value were distributed across the range; equity volatilities and commodity volatilities were concentrated towards the lower end of the range; and forward commodity prices used in estimating the fair value of commodity derivatives were concentrated in the middle of the range. Prepayment speed inputs used in estimating the fair value of interest rate derivatives were concentrated towards the lower end of the range. Recovery rate inputs used in estimating the fair value of credit derivatives were distributed across the range; credit spreads were concentrated towards the lower end of the range; conditional default rates and loss severity inputs were concentrated towards the upper end of the range and price inputs were concentrated towards the lower end of the range.

Level 3 inputs(a)

December 31, 2019							
Product/Instrument	**Fair value (in millions)**	**Principal valuation technique**	**Unobservable inputs(g)**	**Range of input values**			**Weighted average**
Residential mortgage-backed securities and loans(b)	$ 976	Discounted cash flows	Yield	2%	–	18%	6%
			Prepayment speed	0%	–	26%	13%
			Conditional default rate	0%	–	5%	0%
			Loss severity	0%	–	100%	5%
Commercial mortgage-backed securities and loans(c)	99	Market comparables	Price	$0	–	$100	$79
Obligations of U.S. states and municipalities	10	Market comparables	Price	$71	–	$100	$95
Corporate debt securities	558	Market comparables	Price	$4	–	$112	$72
Loans(d)	193	Discounted cash flows	Yield	5%	–	28%	8%
	939	Market comparables	Price	$2	–	$116	$70
Asset-backed securities	37	Market comparables	Price	$1	–	$102	$71
Net interest rate derivatives	(395)	Option pricing	Interest rate volatility	6%	–	44%	
			Interest rate spread volatility	20bps	–	30bps	
			Interest rate correlation	(65)%	–	94%	
			IR-FX correlation	(58)%	–	40%	
	63	Discounted cash flows	Prepayment speed	4%	–	30%	
Net credit derivatives	(174)	Discounted cash flows	Credit correlation	31%	–	59%	
			Credit spread	3bps	–	1,308bps	
			Recovery rate	15%	–	70%	
			Conditional default rate	2%	–	18%	
			Loss severity		100%		
	35	Market comparables	Price	$1	–	$115	
Net foreign exchange derivatives	(469)	Option pricing	IR-FX correlation	(58)%	–	65%	
	(138)	Discounted cash flows	Prepayment speed		9%		
Net equity derivatives	(3,395)	Option pricing	Forward equity price(h)	92%	–	105%	
			Equity volatility	9%	–	93%	
			Equity correlation	10%	–	97%	
			Equity-FX correlation	(81)%	–	60%	
			Equity-IR correlation	25%	–	35%	
Net commodity derivatives	(16)	Option pricing	Forward commodity price	$39	–	$ 76 per barrel	
			Commodity volatility	5%	–	105%	
			Commodity correlation	(48)%	–	95%	
MSRs	4,699	Discounted cash flows	Refer to Note 15				
Other assets	222	Discounted cash flows	Credit spread		45bps		45bps
			Yield		12%		12%
	734	Market comparables	Price	$17	–	$117	$37
Long-term debt, short-term borrowings, and deposits(e)	28,373	Option pricing	Interest rate volatility	6%	–	44%	
			Interest rate correlation	(65)%	–	94%	
			IR-FX correlation	(58)%	–	40%	
			Equity correlation	10%	–	97%	
			Equity-FX correlation	(81)%	–	60%	
			Equity-IR correlation	25%	–	35%	
Other level 3 assets and liabilities, net(f)	265						

(a) The categories presented in the table have been aggregated based upon the product type, which may differ from their classification on the Consolidated balance sheets. Furthermore, the inputs presented for each valuation technique in the table are, in some cases, not applicable to every instrument valued using the technique as the characteristics of the instruments can differ.
(b) Comprises U.S. GSEs and government agency securities of $797 million, nonagency securities of $24 million and trading loans of $155 million.
(c) Comprises nonagency securities of $4 million and trading loans of $95 million.
(d) Comprises trading loans.
(e) Long-term debt, short-term borrowings and deposits include structured notes issued by the Firm that are financial instruments that typically contain embedded derivatives. The estimation of the fair value of structured notes includes the derivative features embedded within the instrument. The significant unobservable inputs are broadly consistent with those presented for derivative receivables.
(f) Includes level 3 assets and liabilities that are insignificant both individually and in aggregate.
(g) Price is a significant unobservable input for certain instruments. When quoted market prices are not readily available, reliance is generally placed on price-based internal valuation techniques. The price input is expressed assuming a par value of $100.
(h) Forward equity price is expressed as a percentage of the current equity price.

Changes in and ranges of unobservable inputs

The following discussion provides a description of the impact on a fair value measurement of a change in each unobservable input in isolation, and the interrelationship between unobservable inputs, where relevant and significant. The impact of changes in inputs may not be independent, as a change in one unobservable input may give rise to a change in another unobservable input. Where relationships do exist between two unobservable inputs, those relationships are discussed below. Relationships may also exist between observable and unobservable inputs (for example, as observable interest rates rise, unobservable prepayment rates decline); such relationships have not been included in the discussion below. In addition, for each of the individual relationships described below, the inverse relationship would also generally apply.

The following discussion also provides a description of attributes of the underlying instruments and external market factors that affect the range of inputs used in the valuation of the Firm's positions.

Yield – The yield of an asset is the interest rate used to discount future cash flows in a discounted cash flow calculation. An increase in the yield, in isolation, would result in a decrease in a fair value measurement.

Credit spread – The credit spread is the amount of additional annualized return over the market interest rate that a market participant would demand for taking exposure to the credit risk of an instrument. The credit spread for an instrument forms part of the discount rate used in a discounted cash flow calculation. Generally, an increase in the credit spread would result in a decrease in a fair value measurement.

The yield and the credit spread of a particular mortgage-backed security primarily reflect the risk inherent in the instrument. The yield is also impacted by the absolute level of the coupon paid by the instrument (which may not correspond directly to the level of inherent risk). Therefore, the range of yield and credit spreads reflects the range of risk inherent in various instruments owned by the Firm. The risk inherent in mortgage-backed securities is driven by the subordination of the security being valued and the characteristics of the underlying mortgages within the collateralized pool, including borrower FICO scores, LTV ratios for residential mortgages and the nature of the property and/or any tenants for commercial mortgages. For corporate debt securities, obligations of U.S. states and municipalities and other similar instruments, credit spreads reflect the credit quality of the obligor and the tenor of the obligation.

Prepayment speed – The prepayment speed is a measure of the voluntary unscheduled principal repayments of a prepayable obligation in a collateralized pool. Prepayment speeds generally decline as borrower delinquencies rise. An increase in prepayment speeds, in isolation, would result in a decrease in a fair value measurement of assets valued at a premium to par and an increase in a fair value measurement of assets valued at a discount to par.

Prepayment speeds may vary from collateral pool to collateral pool, and are driven by the type and location of the underlying borrower, and the remaining tenor of the obligation as well as the level and type (e.g., fixed or floating) of interest rate being paid by the borrower. Typically collateral pools with higher borrower credit quality have a higher prepayment rate than those with lower borrower credit quality, all other factors being equal.

Conditional default rate – The conditional default rate is a measure of the reduction in the outstanding collateral balance underlying a collateralized obligation as a result of defaults. While there is typically no direct relationship between conditional default rates and prepayment speeds, collateralized obligations for which the underlying collateral has high prepayment speeds will tend to have lower conditional default rates. An increase in conditional default rates would generally be accompanied by an increase in loss severity and an increase in credit spreads. An increase in the conditional default rate, in isolation, would result in a decrease in a fair value measurement. Conditional default rates reflect the quality of the collateral underlying a securitization and the structure of the securitization itself. Based on the types of securities owned in the Firm's market-making portfolios, conditional default rates are most typically at the lower end of the range presented.

Loss severity – The loss severity (the inverse concept is the recovery rate) is the expected amount of future realized losses resulting from the ultimate liquidation of a particular loan, expressed as the net amount of loss relative to the outstanding loan balance. An increase in loss severity is generally accompanied by an increase in conditional default rates. An increase in the loss severity, in isolation, would result in a decrease in a fair value measurement.

The loss severity applied in valuing a mortgage-backed security investment depends on factors relating to the underlying mortgages, including the LTV ratio, the nature of the lender's lien on the property and other instrument-specific factors.

Correlation – Correlation is a measure of the relationship between the movements of two variables. Correlation is a pricing input for a derivative product where the payoff is driven by one or more underlying risks. Correlation inputs are related to the type of derivative (e.g., interest rate, credit, equity, foreign exchange and commodity) due to the nature of the underlying risks. When parameters are positively correlated, an increase in one parameter will result in an increase in the other parameter. When parameters are negatively correlated, an increase in one parameter will result in a decrease in the other parameter. An increase in correlation can result in an increase or a decrease in a fair value measurement. Given a short correlation position, an increase in correlation, in isolation, would generally result in a decrease in a fair value measurement.

The level of correlation used in the valuation of derivatives with multiple underlying risks depends on a number of factors including the nature of those risks. For example, the correlation between two credit risk exposures would be different than that between two interest rate risk exposures. Similarly, the tenor of the transaction may also impact the correlation input, as the relationship between the underlying risks may be different over different time periods. Furthermore, correlation levels are very much dependent on market conditions and could have a relatively wide range of levels within or across asset classes over time, particularly in volatile market conditions.

Volatility – Volatility is a measure of the variability in possible returns for an instrument, parameter or market index given how much the particular instrument, parameter or index changes in value over time. Volatility is a pricing input for options, including equity options, commodity options, and interest rate options. Generally, the higher the volatility of the underlying, the riskier the instrument. Given a long position in an option, an increase in volatility, in isolation, would generally result in an increase in a fair value measurement.

The level of volatility used in the valuation of a particular option-based derivative depends on a number of factors, including the nature of the risk underlying the option (e.g., the volatility of a particular equity security may be significantly different from that of a particular commodity index), the tenor of the derivative as well as the strike price of the option.

Forward price - Forward price is the price at which the buyer agrees to purchase the asset underlying a forward contract on the predetermined future delivery date, and is such that the value of the contract is zero at inception.

The forward price is used as an input in the valuation of certain derivatives and depends on a number of factors including interest rates, the current price of the underlying asset, and the expected income to be received and costs to be incurred by the seller as a result of holding that asset until the delivery date. An increase in the forward can result in an increase or a decrease in a fair value measurement.

Changes in level 3 recurring fair value measurements

The following tables include a rollforward of the Consolidated balance sheets amounts (including changes in fair value) for financial instruments classified by the Firm within level 3 of the fair value hierarchy for the years ended December 31, 2019, 2018 and 2017. When a determination is made to classify a financial instrument within level 3, the determination is based on the significance of the unobservable inputs to the overall fair value measurement. However, level 3 financial instruments typically include, in addition to the unobservable or level 3 components, observable components (that is, components that are actively quoted and can be validated to external sources); accordingly, the gains and losses in the table below include changes in fair value due in part to observable factors that are part of the valuation methodology. Also, the Firm risk-manages the observable components of level 3 financial instruments using securities and derivative positions that are classified within level 1 or 2 of the fair value hierarchy; as these level 1 and level 2 risk management instruments are not included below, the gains or losses in the following tables do not reflect the effect of the Firm's risk management activities related to such level 3 instruments.

Year ended December 31, 2019 (in millions)	Fair value measurements using significant unobservable inputs								Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2019
	Fair value at January 1, 2019	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2019	
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 549	$ (62)	$ 773	$ (310)	$ (134)	$ 1	$ (20)	$ 797	$ (58)
Residential – nonagency	64	25	83	(86)	(20)	15	(58)	23	2
Commercial – nonagency	11	2	20	(26)	(14)	15	(4)	4	1
Total mortgage-backed securities	624	(35)	876	(422)	(168)	31	(82)	824	(55)
U.S. Treasury, GSEs and government agencies	–	–	–	–	–	–	–	–	–
Obligations of U.S. states and municipalities	689	13	85	(159)	(8)	–	(610)	10	13
Non-U.S. government debt securities	155	1	290	(287)	–	14	(18)	155	4
Corporate debt securities	334	47	437	(247)	(52)	112	(73)	558	40
Loans	1,706	132	727	(708)	(562)	625	(538)	1,382	51
Asset-backed securities	127	–	37	(93)	(40)	28	(22)	37	(3)
Total debt instruments	3,635	158	2,452	(1,916)	(830)	810	(1,343)	2,966	50
Equity securities	232	(41)	58	(103)	(22)	181	(109)	196	(18)
Other	301	(36)	50	(26)	(54)	2	(5)	232	91
Total trading assets – debt and equity instruments	4,168	81 [c]	2,560	(2,045)	(906)	993	(1,457)	3,394	123 [c]
Net derivative receivables:[b]									
Interest rate	(38)	(394)	109	(125)	5	(7)	118	(332)	(599)
Credit	(107)	(36)	20	(9)	8	29	(44)	(139)	(127)
Foreign exchange	(297)	(551)	17	(67)	312	(22)	1	(607)	(380)
Equity	(2,225)	(310)	397	(573)	(503)	(405)	224	(3,395)	(1,608)
Commodity	(1,129)	497	36	(348)	89	(6)	845	(16)	130
Total net derivative receivables	(3,796)	(794) [c]	579	(1,122)	(89)	(411)	1,144	(4,489)	(2,584) [c]
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	–	–	–	–	–	–	–	–	–
Total available-for-sale securities	1	–	–	–	–	–	–	1	–
Loans	122	4 [c]	–	–	(125)	–	(1)	–	–
Mortgage servicing rights	6,130	(1,180) [d]	1,489	(789)	(951)	–	–	4,699	(1,180) [d]
Other assets	927	(198) [c]	194	(165)	(33)	6	(7)	724	(180) [c]

Year ended December 31, 2019 (in millions)	Fair value measurements using significant unobservable inputs									Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2019
	Fair value at January 1, 2019	Total realized/ unrealized (gains)/ losses	Purchases	Sales	Issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2019	
Liabilities:[a]										
Deposits	$ 4,169	$ 278 [c][e]	$ –	$ –	$ 916	$ (806)	$ 12	$ (1,209)	$ 3,360	$ 307 [c][e]
Short-term borrowings	1,523	229 [c][e]	–	–	3,441	(3,356)	85	(248)	1,674	155 [c][e]
Trading liabilities – debt and equity instruments	50	2 [c]	(22)	41	–	1	16	(47)	41	3 [c]
Accounts payable and other liabilities	10	(2) [c]	(84)	115	–	–	6	–	45	29 [c]
Beneficial interests issued by consolidated VIEs	1	(1) [c]	–	–	–	–	–	–	–	–
Long-term debt	19,418	2,815 [c][e]	–	–	10,441	(8,538)	651	(1,448)	23,339	2,822 [c][e]

Year ended December 31, 2018 (in millions)	Fair value measurements using significant unobservable inputs								Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2018
	Fair value at January 1, 2018	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2018	
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 307	$ (23)	$ 478	$ (164)	$ (73)	$ 94	$ (70)	$ 549	$ (21)
Residential – nonagency	60	(2)	78	(50)	(7)	59	(74)	64	1
Commercial – nonagency	11	2	18	(18)	(17)	36	(21)	11	(2)
Total mortgage-backed securities	378	(23)	574	(232)	(97)	189	(165)	624	(22)
U.S. Treasury, GSEs and government agencies	1	–	–	–	–	–	(1)	–	–
Obligations of U.S. states and municipalities	744	(17)	112	(70)	(80)	–	–	689	(17)
Non-U.S. government debt securities	78	(22)	459	(277)	(12)	23	(94)	155	(9)
Corporate debt securities	312	(18)	364	(309)	(48)	262	(229)	334	(1)
Loans	2,719	26	1,364	(1,793)	(658)	813	(765)	1,706	(1)
Asset-backed securities	153	28	98	(41)	(55)	45	(101)	127	22
Total debt instruments	4,385	(26)	2,971	(2,722)	(950)	1,332	(1,355)	3,635	(28)
Equity securities	295	(40)	118	(120)	(1)	107	(127)	232	9
Other	690	(285)	55	(40)	(118)	3	(4)	301	(301)
Total trading assets – debt and equity instruments	5,370	(351) [c]	3,144	(2,882)	(1,069)	1,442	(1,486)	4,168	(320) [c]
Net derivative receivables:[b]									
Interest rate	264	150	107	(133)	(430)	(15)	19	(38)	187
Credit	(35)	(40)	5	(7)	(57)	4	23	(107)	(28)
Foreign exchange	(396)	103	52	(20)	30	(108)	42	(297)	(63)
Equity	(3,409)	198	1,676	(2,208)	1,805	(617)	330	(2,225)	561
Commodity	(674)	(73)	1	(72)	(301)	7	(17)	(1,129)	146
Total net derivative receivables	(4,250)	338 [c]	1,841	(2,440)	1,047	(729)	397	(3,796)	803 [c]
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	276	1	–	–	(277)	–	–	–	–
Total available-for-sale securities	277	1 [i]	–	–	(277)	–	–	1	–
Loans	276	(7) [c]	123	–	(196)	–	(74)	122	(7) [c]
Mortgage servicing rights	6,030	230 [d]	1,246	(636)	(740)	–	–	6,130	230 [d]
Other assets	1,265	(328) [c]	61	(37)	(37)	4	(1)	927	(340) [c]

Year ended December 31, 2018 (in millions)	Fair value measurements using significant unobservable inputs									Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2018
	Fair value at January 1, 2018	Total realized/ unrealized (gains)/ losses	Purchases	Sales	Issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2018	
Liabilities:[a]										
Deposits	$ 4,142	$ (136) [c][e]	$ –	$ –	$ 1,437	$ (736)	$ 2	$ (540)	$ 4,169	$ (204) [c][e]
Short-term borrowings	1,665	(329) [c][e]	–	–	3,455	(3,388)	272	(152)	1,523	(131) [c][e]
Trading liabilities – debt and equity instruments	39	19 [c]	(99)	114	–	(1)	14	(36)	50	16 [c]
Accounts payable and other liabilities	13	–	(12)	5	–	–	4	–	10	–
Beneficial interests issued by consolidated VIEs	39	–	–	1	–	(39)	–	–	1	–
Long-term debt	16,125	(1,169) [c][e]	–	–	11,919	(7,769)	1,143	(831)	19,418	(1,385) [c][e]

Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs								Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2017
	Fair value at January 1, 2017	Total realized/ unrealized gains/ (losses)	Purchases[f]	Sales	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2017	
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	$ 392	$ (11)	$ 161	$ (171)	$ (70)	$ 49	$ (43)	$ 307	$ (20)
Residential – nonagency	83	19	53	(30)	(64)	132	(133)	60	11
Commercial – nonagency	17	9	27	(44)	(13)	64	(49)	11	1
Total mortgage-backed securities	492	17	241	(245)	(147)	245	(225)	378	(8)
U.S. Treasury, GSEs and government agencies	–	–	–	–	–	1	–	1	–
Obligations of U.S. states and municipalities	649	18	152	(70)	(5)	–	–	744	15
Non-U.S. government debt securities	46	–	559	(518)	–	62	(71)	78	–
Corporate debt securities	576	11	872	(612)	(497)	157	(195)	312	18
Loans	4,837	333	2,389	(2,832)	(1,323)	806	(1,491)	2,719	43
Asset-backed securities	302	32	354	(356)	(56)	75	(198)	153	–
Total debt instruments	6,902	411	4,567	(4,633)	(2,028)	1,346	(2,180)	4,385	68
Equity securities	231	39	176	(148)	(4)	59	(58)	295	21
Other	761	100	30	(46)	(162)	17	(10)	690	39
Total trading assets – debt and equity instruments	7,894	550 (c)	4,773	(4,827)	(2,194)	1,422	(2,248)	5,370	128 (c)
Net derivative receivables:[b]									
Interest rate	1,263	72	60	(82)	(1,040)	(8)	(1)	264	(473)
Credit	98	(164)	1	(6)	–	77	(41)	(35)	32
Foreign exchange	(1,384)	43	13	(10)	854	(61)	149	(396)	42
Equity	(2,252)	(417)	1,116	(551)	(245)	(1,482)	422	(3,409)	(161)
Commodity	(85)	(149)	–	–	(433)	(6)	(1)	(674)	(718)
Total net derivative receivables	(2,360)	(615) (c)	1,190	(649)	(864)	(1,480)	528	(4,250)	(1,278) (c)
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	–	–	–	1	–
Asset-backed securities	663	15	–	(50)	(352)	–	–	276	14
Total available-for-sale securities	664	15 (i)	–	(50)	(352)	–	–	277	14 (i)
Loans	570	35 (c)	–	(26)	(303)	–	–	276	3 (c)
Mortgage servicing rights	6,096	(232) (d)	1,103	(140)	(797)	–	–	6,030	(232) (d)
Other assets	2,223	244 (c)	66	(177)	(870)	–	(221)	1,265	74 (c)

Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs									Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2017
	Fair value at January 1, 2017	Total realized/ unrealized (gains)/ losses	Purchases	Sales	Issuances	Settlements[g]	Transfers into level 3[h]	Transfers (out of) level 3[h]	Fair value at Dec. 31, 2017	
Liabilities:[a]										
Deposits	$ 2,117	$ 152 (c)(e)	$ –	$ –	$ 3,027	$ (291)	$ 11	$ (874)	$ 4,142	$ 198 (c)(e)
Short-term borrowings	1,134	42 (c)(e)	–	–	3,289	(2,748)	150	(202)	1,665	7 (c)(e)
Trading liabilities – debt and equity instruments	43	(3) (c)	(46)	48	–	3	3	(9)	39	–
Accounts payable and other liabilities	13	(2) (c)	(1)	–	–	3	–	–	13	(2) (c)
Beneficial interests issued by consolidated VIEs	48	2 (c)	(122)	39	–	(6)	78	–	39	–
Long-term debt	12,850	1,067 (c)(e)	–	–	12,458	(10,985)	1,660	(925)	16,125	552 (c)(e)

(a) Level 3 assets as a percentage of total Firm assets accounted for at fair value (including assets measured at fair value on a nonrecurring basis) were 2%, 3% and 3% at December 31, 2019, 2018 and 2017, respectively. Level 3 liabilities as a percentage of total Firm liabilities accounted for at fair value (including liabilities measured at fair value on a nonrecurring basis) were 16%, 15% and 15% at December 31, 2019, 2018 and 2017, respectively.
(b) All level 3 derivatives are presented on a net basis, irrespective of underlying counterparty.
(c) Predominantly reported in principal transactions revenue, except for changes in fair value for CCB mortgage loans, and lending-related commitments originated with the intent to sell, and mortgage loan purchase commitments, which are reported in mortgage fees and related income.
(d) Changes in fair value for MSRs are reported in mortgage fees and related income.
(e) Realized (gains)/losses due to DVA for fair value option elected liabilities are reported in principal transactions revenue, and they were not material for the years ended December 31, 2019, 2018 and 2017, respectively. Unrealized (gains)/losses are reported in OCI, and they were $319 million, $(277) million and $(48) million for the years ended December 31, 2019, 2018 and 2017, respectively.
(f) Loan originations are included in purchases.
(g) Includes financial assets and liabilities that have matured, been partially or fully repaid, impacts of modifications, deconsolidation associated with beneficial interests in VIEs and other items.
(h) All transfers into and/or out of level 3 are based on changes in the observability and/or significance of the valuation inputs and are assumed to occur at the beginning of the quarterly reporting period in which they occur.
(i) Realized gains/(losses) on AFS securities, as well as other-than-temporary impairment ("OTTI") losses that are recorded in earnings, are reported in investment securities gains/(losses). Unrealized gains/(losses) are reported in OCI. There were no realized gains/(losses) and foreign exchange hedge accounting adjustments recorded in income on AFS securities for the years ended December 31, 2019 and 2017, respectively and $1 million recorded for the year ended December 31, 2018. There were no unrealized gains/(losses) recorded on AFS securities in OCI for the years ended December 31, 2019 and 2018, respectively and $15 million recorded for the year ended December 31, 2017.

Level 3 analysis

Consolidated balance sheets changes

Level 3 assets (including assets measured at fair value on a nonrecurring basis) were 0.6% of total Firm assets at December 31, 2019. The following describes significant changes to level 3 assets since December 31, 2018, for those items measured at fair value on a recurring basis. Refer to Assets and liabilities measured at fair value on a nonrecurring basis on page 172 for further information on changes impacting items measured at fair value on a nonrecurring basis.

For the year ended December 31, 2019

Level 3 assets were $13.5 billion at December 31, 2019, reflecting a decrease of $3.6 billion from December 31, 2018, partially due to a $1.4 billion decrease in MSRs. Refer to the Gains and losses section below for additional information.

Transfers between levels for instruments carried at fair value on a recurring basis

During the year ended December 31, 2019, significant transfers from level 2 into level 3 included the following:

- $993 million of total debt and equity instruments, the majority of which were trading loans, driven by a decrease in observability.
- $904 million of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.

During the year ended December 31, 2019, significant transfers from level 3 into level 2 included the following:

- $1.5 billion of total debt and equity instruments, the majority of which were obligations of U.S. states and municipalities and trading loans, driven by an increase in observability.
- $1.1 billion of gross equity derivative receivables and $1.3 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $962 million of gross commodities derivative payables as a result of an increase in observability.
- $1.2 billion of deposits as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $1.4 billion of long-term debt as a result of an increase in observability and a decrease in the significance of unobservable inputs.

During the year ended December 31, 2018, significant transfers from level 2 into level 3 included the following:

- $1.4 billion of total debt and equity instruments, the majority of which were trading loans, driven by a decrease in observability.
- $1.0 billion of gross equity derivative receivables and $1.6 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.1 billion of long-term debt driven by a decrease in observability and an increase in the significance of unobservable inputs for certain structured notes.

During the year ended December 31, 2018, significant transfers from level 3 into level 2 included the following:

- $1.5 billion of total debt and equity instruments, the majority of which were trading loans, driven by an increase in observability.
- $1.2 billion of gross equity derivative receivables and $1.5 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.

During the year ended December 31, 2017, significant transfers from level 2 into level 3 included the following:

- $1.0 billion of gross equity derivative receivables and $2.5 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.7 billion of long-term debt driven by a decrease in observability and an increase in the significance of unobservable inputs for certain structured notes.

During the year ended December 31, 2017, significant transfers from level 3 into level 2 included the following:

- $1.5 billion of trading loans driven by an increase in observability.
- $1.2 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.

All transfers are based on changes in the observability and/or significance of the valuation inputs and are assumed to occur at the beginning of the quarterly reporting period in which they occur.

Gains and losses

The following describes significant components of total realized/unrealized gains/(losses) for instruments measured at fair value on a recurring basis for the years ended December 31, 2019, 2018 and 2017. These amounts exclude any effects of the Firm's risk management activities where the financial instruments are classified as level 1 and 2 of the fair value hierarchy. Refer to Changes in level 3 recurring fair value measurements rollforward tables on pages 165–169 for further information on these instruments.

2019

- $2.1 billion of net losses on assets largely due to MSRs reflecting faster prepayment speeds on lower rates. Refer to Note 15 for additional information on MSRs.
- $3.3 billion of net losses on liabilities predominantly driven by market movements in long-term debt.

2018

- $1.6 billion of net gains on liabilities largely driven by market movements in long-term debt.

2017

- $1.3 billion of net losses on liabilities predominantly driven by market movements in long-term debt.

Credit and funding adjustments – derivatives

Derivatives are generally valued using models that use as their basis observable market parameters. These market parameters generally do not consider factors such as counterparty nonperformance risk, the Firm's own credit quality, and funding costs. Therefore, it is generally necessary to make adjustments to the base estimate of fair value to reflect these factors.

CVA represents the adjustment, relative to the relevant benchmark interest rate, necessary to reflect counterparty nonperformance risk. The Firm estimates CVA using a scenario analysis to estimate the expected positive credit exposure across all of the Firm's existing positions with each counterparty, and then estimates losses based on the probability of default and estimated recovery rate as a result of a counterparty credit event considering contractual factors designed to mitigate the Firm's credit exposure, such as collateral and legal rights of offset. The key inputs to this methodology are (i) the probability of a default event occurring for each counterparty, as derived from observed or estimated CDS spreads; and (ii) estimated recovery rates implied by CDS spreads, adjusted to consider the differences in recovery rates as a derivative creditor relative to those reflected in CDS spreads, which generally reflect senior unsecured creditor risk.

FVA represents the adjustment to reflect the impact of funding and is recognized where there is evidence that a market participant in the principal market would incorporate it in a transfer of the instrument. The Firm's FVA framework, applied to uncollateralized (including partially collateralized) over-the-counter ("OTC") derivatives incorporates key inputs such as: (i) the expected funding requirements arising from the Firm's positions with each counterparty and collateral arrangements; and (ii) the estimated market funding cost in the principal market which, for derivative liabilities, considers the Firm's credit risk (DVA). For collateralized derivatives, the fair value is estimated by discounting expected future cash flows at the relevant overnight indexed swap rate given the underlying collateral agreement with the counterparty, and therefore a separate FVA is not necessary.

The following table provides the impact of credit and funding adjustments on principal transactions revenue in the respective periods, excluding the effect of any associated hedging activities. The FVA presented below includes the impact of the Firm's own credit quality on the inception value of liabilities as well as the impact of changes in the Firm's own credit quality over time.

Year ended December 31, (in millions)	**2019**	2018	2017
Credit and funding adjustments:			
Derivatives CVA	**$ 241**	$ 193	$ 802
Derivatives FVA	**199**	(74)	(295)

Valuation adjustments on fair value option elected liabilities

The valuation of the Firm's liabilities for which the fair value option has been elected requires consideration of the Firm's own credit risk. DVA on fair value option elected liabilities reflects changes (subsequent to the issuance of the liability) in the Firm's probability of default and LGD, which are estimated based on changes in the Firm's credit spread observed in the bond market. Realized (gains)/losses due to DVA for fair value option elected liabilities are reported in principal transactions revenue. Unrealized (gains)/losses are reported in OCI. Refer to page 169 in this Note and Note 24 for further information.

Assets and liabilities measured at fair value on a nonrecurring basis

The following tables present the assets held as of December 31, 2019 and 2018, respectively, for which a nonrecurring fair value adjustment was recorded during the years ended December 31, 2019 and 2018, respectively, by major product category and fair value hierarchy.

December 31, 2019 (in millions)	Fair value hierarchy			Total fair value
	Level 1	Level 2	Level 3	
Loans	$ –	$ 3,462 [b]	$ 269 [c]	$ 3,731
Other assets[a]	–	14	1,029	1,043
Total assets measured at fair value on a nonrecurring basis	**$ –**	**$ 3,476**	**$ 1,298**	**$ 4,774**

December 31, 2018 (in millions)	Fair value hierarchy			Total fair value
	Level 1	Level 2	Level 3	
Loans	$ –	$ 273	$ 264	$ 537
Other assets	–	8	815	823
Total assets measured at fair value on a nonrecurring basis	$ –	$ 281	$ 1,079	$ 1,360

(a) Primarily includes equity securities without readily determinable fair values that were adjusted based on observable price changes in orderly transactions from an identical or similar investment of the same issuer (measurement alternative). Of the $1.0 billion in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2019, $787 million related to such equity securities. These equity securities are classified as level 3 due to the infrequency of the observable prices and/or the restrictions on the shares.

(b) Primarily includes certain mortgage loans that were reclassified to held-for-sale.

(c) Of the $269 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2019, $248 million related to residential real estate loans carried at the net realizable value of the underlying collateral (e.g., collateral-dependent loans and other loans charged off in accordance with regulatory guidance). These amounts are classified as level 3 as they are valued using information from broker's price opinions, appraisals and automated valuation models and discounted based upon the Firm's experience with actual liquidation values. These discounts ranged from 14% to 49% with a weighted average of 28%.

There were no liabilities measured at fair value on a nonrecurring basis at December 31, 2019 and 2018.

Nonrecurring fair value changes

The following table presents the total change in value of assets and liabilities for which a fair value adjustment has been recognized for the years ended December 31, 2019, 2018 and 2017, related to assets and liabilities held at those dates.

December 31, (in millions)	2019	2018	2017
Loans	**$ (274)** [a]	$ (68)	$ (159)
Other assets	**168** [b]	132 [b]	(148)
Accounts payable and other liabilities	**–**	–	(1)
Total nonrecurring fair value gains/(losses)	**$ (106)**	$ 64	$ (308)

(a) Primarily includes the impact of certain mortgage loans that were reclassified to held-for-sale.

(b) Included $187 million and $149 million for the years ended December 31, 2019 and 2018, respectively, of net gains as a result of the measurement alternative.

Refer to Note 12 for further information about the measurement of impaired collateral-dependent loans, and other loans where the carrying value is based on the fair value of the underlying collateral (e.g., residential mortgage loans charged off in accordance with regulatory guidance).

Equity securities without readily determinable fair values

The Firm measures certain equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer, with such changes recognized in other income.

In its determination of the new carrying values upon observable price changes, the Firm may adjust the prices if deemed necessary to arrive at the Firm's estimated fair values. Such adjustments may include adjustments to reflect the different rights and obligations of similar securities, and other adjustments that are consistent with the Firm's valuation techniques for private equity direct investments.

The following table presents the carrying value of equity securities without readily determinable fair values held as of December 31, 2019 and 2018, that are measured under the measurement alternative and the related adjustments recorded during the periods presented for those securities with observable price changes. These securities are included in the nonrecurring fair value tables when applicable price changes are observable.

As of or for the year ended December 31, (in millions)	2019	2018
Other assets		
Carrying value	**$ 2,441**	$ 1,510
Upward carrying value changes[(a)]	**229**	309
Downward carrying value changes/impairment[(b)]	**(42)**	(160)

(a) The cumulative upward carrying value changes between January 1, 2018 and December 31, 2019 were $528 million.
(b) The cumulative downward carrying value changes/impairment between January 1, 2018 and December 31, 2019 were $(200) million.

Included in other assets above is the Firm's interest in approximately 40 million Visa Class B shares, recorded at a nominal carrying value. These shares are subject to certain transfer restrictions currently and will be convertible into Visa Class A shares upon final resolution of certain litigation matters involving Visa. The conversion rate of Visa Class B shares into Visa Class A shares is 1.6228 at December 31, 2019, and may be adjusted by Visa depending on developments related to the litigation matters.

Additional disclosures about the fair value of financial instruments that are not carried on the Consolidated balance sheets at fair value

U.S. GAAP requires disclosure of the estimated fair value of certain financial instruments, which are included in the following table. However, this table does not include other items, such as nonfinancial assets, intangible assets, certain financial instruments, and customer relationships. In the opinion of management, these items, in the aggregate, add significant value to JPMorgan Chase, but their fair value is not disclosed in this table.

Financial instruments for which carrying value approximates fair value

Certain financial instruments that are not carried at fair value on the Consolidated balance sheets are carried at amounts that approximate fair value, due to their short-term nature and generally negligible credit risk. These instruments include cash and due from banks, deposits with banks, federal funds sold, securities purchased under resale agreements and securities borrowed, short-term receivables and accrued interest receivable, short-term borrowings, federal funds purchased, securities loaned and sold under repurchase agreements, accounts payable, and accrued liabilities. In addition, U.S. GAAP requires that the fair value of deposit liabilities with no stated maturity (i.e., demand, savings and certain money market deposits) be equal to their carrying value; recognition of the inherent funding value of these instruments is not permitted.

The following table presents by fair value hierarchy classification the carrying values and estimated fair values at December 31, 2019 and 2018, of financial assets and liabilities, excluding financial instruments that are carried at fair value on a recurring basis, and their classification within the fair value hierarchy.

	December 31, 2019					December 31, 2018				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value
Financial assets										
Cash and due from banks	**$ 21.7**	**$ 21.7**	**$ –**	**$ –**	**$ 21.7**	$ 22.3	$ 22.3	$ –	$ –	$ 22.3
Deposits with banks	**241.9**	**241.9**	**–**	**–**	**241.9**	256.5	256.5	–	–	256.5
Accrued interest and accounts receivable	**71.3**	**–**	**71.2**	**0.1**	**71.3**	72.0	–	71.9	0.1	72.0
Federal funds sold and securities purchased under resale agreements	**234.6**	**–**	**234.6**	**–**	**234.6**	308.4	–	308.4	–	308.4
Securities borrowed	**133.5**	**–**	**133.5**	**–**	**133.5**	106.9	–	106.9	–	106.9
Investment securities, held-to-maturity	**47.5**	**0.1**	**48.8**	**–**	**48.9**	31.4	–	31.5	–	31.5
Loans, net of allowance for loan losses[(a)]	**939.5**	**–**	**214.1**	**734.9**	**949.0**	968.0	–	241.5	728.5	970.0
Other	**61.3**	**–**	**60.6**	**0.8**	**61.4**	60.5	–	59.6	1.0	60.6
Financial liabilities										
Deposits	**$ 1,533.8**	**$ –**	**$ 1,534.1**	**$ –**	**$ 1,534.1**	$ 1,447.4	$ –	$ 1,447.5	$ –	$ 1,447.5
Federal funds purchased and securities loaned or sold under repurchase agreements	**183.1**	**–**	**183.1**	**–**	**183.1**	181.4	–	181.4	–	181.4
Short-term borrowings	**35.0**	**–**	**35.0**	**–**	**35.0**	62.1	–	62.1	–	62.1
Accounts payable and other liabilities	**164.0**	**0.1**	**160.0**	**3.5**	**163.6**	160.6	0.2	157.0	3.0	160.2
Beneficial interests issued by consolidated VIEs	**17.8**	**–**	**17.9**	**–**	**17.9**	20.2	–	20.2	–	20.2
Long-term debt and junior subordinated deferrable interest debentures	**215.5**	**–**	**218.3**	**3.5**	**221.8**	227.1	–	224.6	3.3	227.9

(a) Fair value is typically estimated using a discounted cash flow model that incorporates the characteristics of the underlying loans (including principal, contractual interest rate and contractual fees) and other key inputs, including expected lifetime credit losses, interest rates, prepayment rates, and primary origination or secondary market spreads. For certain loans, the fair value is measured based on the value of the underlying collateral. The difference between the estimated fair value and carrying value of a financial asset or liability is the result of the different methodologies used to determine fair value as compared with carrying value. For example, credit losses are estimated for a financial asset's remaining life in a fair value calculation but are estimated for a loss emergence period in the allowance for loan losses calculation; future loan income (interest and fees) is incorporated in a fair value calculation but is generally not considered in the allowance for loan losses.

The majority of the Firm's lending-related commitments are not carried at fair value on a recurring basis on the Consolidated balance sheets. The carrying value of the wholesale allowance for lending-related commitments and the estimated fair value of these wholesale lending-related commitments were as follows for the periods indicated.

	December 31, 2019					December 31, 2018				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value[(b)]
Wholesale lending-related commitments	**$ 1.2**	**$ –**	**$ –**	**$ 1.9**	**$ 1.9**	$ 1.0	$ –	$ –	$ 2.2	$ 2.2

(a) Excludes the current carrying values of the guarantee liability and the offsetting asset, each of which is recognized at fair value at the inception of the guarantees.
(b) The prior period amounts have been revised to conform with the current period presentation.

The Firm does not estimate the fair value of consumer lending-related commitments. In many cases, the Firm can reduce or cancel these commitments by providing the borrower notice or, in some cases as permitted by law, without notice. Refer to page 156 of this Note for a further discussion of the valuation of lending-related commitments.

Note 3 – Fair value option

The fair value option provides an option to elect fair value as an alternative measurement for selected financial assets, financial liabilities, unrecognized firm commitments, and written loan commitments.

The Firm has elected to measure certain instruments at fair value for several reasons including to mitigate income statement volatility caused by the differences between the measurement basis of elected instruments (e.g., certain instruments that otherwise would be accounted for on an accrual basis) and the associated risk management arrangements that are accounted for on a fair value basis, as well as to better reflect those instruments that are managed on a fair value basis.

The Firm's election of fair value includes the following instruments:

- Loans purchased or originated as part of securitization warehousing activity, subject to bifurcation accounting, or managed on a fair value basis, including lending-related commitments
- Certain securities financing agreements, such as those with an embedded derivative and/or a maturity of greater than one year
- Owned beneficial interests in securitized financial assets that contain embedded credit derivatives, which would otherwise be required to be separately accounted for as a derivative instrument
- Structured notes, which are predominantly financial instruments that contain embedded derivatives, that are issued as part of client-driven activities
- Certain long-term beneficial interests issued by CIB's consolidated securitization trusts where the underlying assets are carried at fair value

Changes in fair value under the fair value option election

The following table presents the changes in fair value included in the Consolidated statements of income for the years ended December 31, 2019, 2018 and 2017, for items for which the fair value option was elected. The profit and loss information presented below only includes the financial instruments that were elected to be measured at fair value; related risk management instruments, which are required to be measured at fair value, are not included in the table.

	2019			2018			2017		
December 31, (in millions)	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]
Federal funds sold and securities purchased under resale agreements	$ (36)	$ –	$ (36)	$ (35)	$ –	$ (35)	$ (97)	$ –	$ (97)
Securities borrowed	133	–	133	22	–	22	50	–	50
Trading assets:									
Debt and equity instruments, excluding loans	2,482	(1) [c]	2,481	(1,680)	1 [c]	(1,679)	1,943	2 [c]	1,945
Loans reported as trading assets:									
Changes in instrument-specific credit risk	763	2 [c]	765	414	1 [c]	415	330	14 [c]	344
Other changes in fair value	254	1,224 [c]	1,478	160	185 [c]	345	217	747 [c]	964
Loans:									
Changes in instrument-specific credit risk	(26)	–	(26)	(1)	–	(1)	(1)	–	(1)
Other changes in fair value	1	–	1	(1)	–	(1)	(12)	3 [c]	(9)
Other assets	5	6 [d]	11	5	(45) [d]	(40)	11	(55) [d]	(44)
Deposits[a]	(1,730)	–	(1,730)	181	–	181	(533)	–	(533)
Federal funds purchased and securities loaned or sold under repurchase agreements	(8)	–	(8)	11	–	11	11	–	11
Short-term borrowings[a]	(693)	–	(693)	862	–	862	(747)	–	(747)
Trading liabilities	6	–	6	1	–	1	(1)	–	(1)
Other liabilities	(16)	–	(16)	–	–	–	–	–	–
Long-term debt[a][b]	(6,173)	1 [c]	(6,172)	2,695	–	2,695	(2,022)	–	(2,022)

(a) Unrealized gains/(losses) due to instrument-specific credit risk (DVA) for liabilities for which the fair value option has been elected is recorded in OCI, while realized gains/(losses) are recorded in principal transactions revenue. Realized gains/(losses) due to instrument-specific credit risk recorded in principal transactions revenue were not material for the years ended December 31, 2019, 2018 and 2017.
(b) Long-term debt measured at fair value predominantly relates to structured notes. Although the risk associated with the structured notes is actively managed, the gains/(losses) reported in this table do not include the income statement impact of the risk management instruments used to manage such risk.
(c) Reported in mortgage fees and related income.
(d) Reported in other income.
(e) Changes in fair value exclude contractual interest, which is included in interest income and interest expense for all instruments other than hybrid financial instruments. Refer to Note 7 for further information regarding interest income and interest expense.

Determination of instrument-specific credit risk for items for which a fair value election was made

The following describes how the gains and losses that are attributable to changes in instrument-specific credit risk, were determined.

- Loans and lending-related commitments: For floating-rate instruments, all changes in value are attributed to instrument-specific credit risk. For fixed-rate instruments, an allocation of the changes in value for the period is made between those changes in value that are interest rate-related and changes in value that are credit-related. Allocations are generally based on an analysis of borrower-specific credit spread and recovery information, where available, or benchmarking to similar entities or industries.
- Long-term debt: Changes in value attributable to instrument-specific credit risk were derived principally from observable changes in the Firm's credit spread as observed in the bond market.
- Securities financing agreements: Generally, for these types of agreements, there is a requirement that collateral be maintained with a market value equal to or in excess of the principal amount loaned; as a result, there would be no adjustment or an immaterial adjustment for instrument-specific credit risk related to these agreements.

Difference between aggregate fair value and aggregate remaining contractual principal balance outstanding

The following table reflects the difference between the aggregate fair value and the aggregate remaining contractual principal balance outstanding as of December 31, 2019 and 2018, for loans, long-term debt and long-term beneficial interests for which the fair value option has been elected.

	2019			2018		
December 31, (in millions)	Contractual principal outstanding	Fair value	Fair value over/ (under) contractual principal outstanding	Contractual principal outstanding	Fair value	Fair value over/ (under) contractual principal outstanding
Loans[a]						
Nonaccrual loans						
Loans reported as trading assets	$ 3,717	$ 1,111	$ (2,606)	$ 4,240	$ 1,350	$ (2,890)
Loans	178	139	(39)	39	–	(39)
Subtotal	3,895	1,250	(2,645)	4,279	1,350	(2,929)
All other performing loans						
Loans reported as trading assets	48,570	47,318	(1,252)	42,215	40,403	(1,812)
Loans	7,046	6,965	(81)	3,186	3,151	(35)
Total loans	$ 59,511	$ 55,533	$ (3,978)	$ 49,680	$ 44,904	$ (4,776)
Long-term debt						
Principal-protected debt	$ 40,124 (c)	$ 39,246	$ (878)	$ 32,674 (c)	$ 28,718	$ (3,956)
Nonprincipal-protected debt[b]	NA	36,499	NA	NA	26,168	NA
Total long-term debt	NA	$ 75,745	NA	NA	$ 54,886	NA
Long-term beneficial interests						
Nonprincipal-protected debt[b]	NA	$ 36	NA	NA	$ 28	NA
Total long-term beneficial interests	NA	$ 36	NA	NA	$ 28	NA

(a) There were no performing loans that were ninety days or more past due as of December 31, 2019 and 2018.
(b) Remaining contractual principal is not applicable to nonprincipal-protected structured notes and long-term beneficial interests. Unlike principal-protected structured notes and long-term beneficial interests, for which the Firm is obligated to return a stated amount of principal at maturity, nonprincipal-protected structured notes and long-term beneficial interests do not obligate the Firm to return a stated amount of principal at maturity, but for structured notes to return an amount based on the performance of an underlying variable or derivative feature embedded in the note. However, investors are exposed to the credit risk of the Firm as issuer for both nonprincipal-protected and principal-protected notes.
(c) Where the Firm issues principal-protected zero-coupon or discount notes, the balance reflects the contractual principal payment at maturity or, if applicable, the contractual principal payment at the Firm's next call date.

At December 31, 2019 and 2018, the contractual amount of lending-related commitments for which the fair value option was elected was $4.6 billion and $6.9 billion, respectively, with a corresponding fair value of $(94) million and $(92) million, respectively. Refer to Note 28 for further information regarding off-balance sheet lending-related financial instruments.

Structured note products by balance sheet classification and risk component

The following table presents the fair value of structured notes, by balance sheet classification and the primary risk type.

	December 31, 2019				December 31, 2018			
(in millions)	Long-term debt	Short-term borrowings	Deposits	Total	Long-term debt	Short-term borrowings	Deposits	Total
Risk exposure								
Interest rate	$ 35,470	$ 34	$ 16,692	$ 52,196	$ 24,137	$ 62	$ 12,372	$ 36,571
Credit	5,715	875	–	6,590	4,009	995	–	5,004
Foreign exchange	3,862	48	5	3,915	3,169	157	38	3,364
Equity	29,294	4,852	8,177	42,323	21,382	5,422	7,368	34,172
Commodity	472	32	1,454	1,958	372	34	1,207	1,613
Total structured notes	$ 74,813	$ 5,841	$ 26,328	$ 106,982	$ 53,069	$ 6,670	$ 20,985	$ 80,724

Note 4 – Credit risk concentrations

Concentrations of credit risk arise when a number of clients, counterparties or customers are engaged in similar business activities or activities in the same geographic region, or when they have similar economic features that would cause their ability to meet contractual obligations to be similarly affected by changes in economic conditions.

JPMorgan Chase regularly monitors various segments of its credit portfolios to assess potential credit risk concentrations and to obtain additional collateral when deemed necessary and permitted under the Firm's agreements. Senior management is significantly involved in the credit approval and review process, and risk levels are adjusted as needed to reflect the Firm's risk appetite.

In the Firm's consumer portfolio, concentrations are managed primarily by product and by U.S. geographic region, with a key focus on trends and concentrations at the portfolio level, where potential credit risk concentrations can be remedied through changes in underwriting policies and portfolio guidelines. Refer to Note 12 for additional information on the geographic composition of the Firm's consumer loan portfolios. In the wholesale portfolio, credit risk concentrations are evaluated primarily by industry and monitored regularly on both an aggregate portfolio level and on an individual client or counterparty basis.

The Firm's wholesale exposure is managed through loan syndications and participations, loan sales, securitizations, credit derivatives, master netting agreements, collateral and other risk-reduction techniques. Refer to Note 12 for additional information on loans.

The Firm does not believe that its exposure to any particular loan product or industry segment (e.g., real estate), or its exposure to residential real estate loans with high LTV ratios, results in a significant concentration of credit risk.

Terms of loan products and collateral coverage are included in the Firm's assessment when extending credit and establishing its allowance for loan losses.

The table below presents both on–balance sheet and off–balance sheet consumer and wholesale-related credit exposure by the Firm's three credit portfolio segments as of December 31, 2019 and 2018.

	2019				2018			
		On-balance sheet				On-balance sheet		
December 31, (in millions)	Credit exposure[g]	Loans	Derivatives	Off-balance sheet[h]	Credit exposure[g]	Loans	Derivatives	Off-balance sheet[h]
Consumer, excluding credit card	$ 386,452	$ 335,040	$ –	$ 51,412	$ 419,798	$ 373,732	$ –	$ 46,066
Receivables from customers	–	–	–	–	154	–	–	–
Total Consumer, excluding credit card	386,452	335,040	–	51,412	419,952	373,732	–	46,066
Credit card	819,644	168,924	–	650,720	762,011	156,632	–	605,379
Total consumer-related	1,206,096	503,964	–	702,132	1,181,963	530,364	–	651,445
Wholesale-related[a]								
Real Estate	149,267	116,244	619	32,404	143,316	115,737	164	27,415
Individuals and Individual Entities[b]	102,292	91,980	694	9,618	97,077	86,586	1,017	9,474
Consumer & Retail	99,331	30,879	1,424	67,028	94,815	36,921	1,093	56,801
Technology, Media & Telecommunications	59,021	14,680	2,766	41,575	72,646	16,980	2,667	52,999
Industrials	58,250	19,096	878	38,276	58,528	19,126	958	38,444
Asset Managers	51,775	23,939	7,160	20,676	42,807	16,806	9,033	16,968
Banks & Finance Cos	50,091	30,639	5,165	14,287	49,920	28,825	5,903	15,192
Healthcare	46,638	13,951	2,078	30,609	48,142	16,347	1,874	29,921
Oil & Gas	41,570	13,064	852	27,654	42,600	13,008	559	29,033
Utilities	34,753	5,085	2,573	27,095	28,172	5,591	1,740	20,841
State & Municipal Govt[c]	26,697	9,924	2,000	14,773	27,351	10,319	2,000	15,032
Automotive	17,317	5,408	368	11,541	17,339	5,170	399	11,770
Chemicals & Plastics	17,276	4,710	459	12,107	16,035	4,902	181	10,952
Metals & Mining	15,337	5,202	402	9,733	15,359	5,370	488	9,501
Central Govt	14,843	2,818	10,477	1,548	18,456	3,867	12,869	1,720
Transportation	13,917	4,804	715	8,398	15,660	6,391	1,102	8,167
Insurance	12,202	1,269	2,282	8,651	12,639	1,356	2,569	8,714
Securities Firms	7,335	752	4,507	2,076	4,558	645	2,029	1,884
Financial Markets Infrastructure	4,116	9	2,482	1,625	7,484	18	5,941	1,525
All other[d]	76,492	50,186	1,865	24,441	68,284	45,197	1,627	21,460
Subtotal	898,520	444,639	49,766	404,115	881,188	439,162	54,213	387,813
Loans held-for-sale and loans at fair value	11,166	11,166	–	–	15,028	15,028	–	–
Receivables from customers and other[e]	33,706	–	–	–	30,063	–	–	–
Total wholesale-related	943,392	455,805	49,766	404,115	926,279	454,190	54,213	387,813
Total exposure[f][g]	$2,149,488	$ 959,769	$ 49,766	$1,106,247	$2,108,242	$ 984,554	$ 54,213	$1,039,258

(a) The industry rankings presented in the table as of December 31, 2018, are based on the industry rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.
(b) Individuals and Individual Entities predominantly consists of Wealth Management clients within AWM and includes exposure to personal investment companies and personal and testamentary trusts.
(c) In addition to the credit risk exposure to states and municipal governments (both U.S. and non-U.S.) at December 31, 2019 and 2018, noted above, the Firm held: $6.5 billion and $7.8 billion, respectively, of trading assets; $29.8 billion and $37.7 billion, respectively, of AFS securities; and $4.8 billion at both periods of held-to-maturity ("HTM") securities, issued by U.S. state and municipal governments. Refer to Note 2 and Note 10 for further information.
(d) All other includes: SPEs and Private education and civic organizations, representing approximately 92% and 8%, respectively, at both December 31, 2019 and 2018. Refer to Note 14 for more information on exposures to SPEs.
(e) Receivables from customers primarily represent held-for-investment margin loans to brokerage clients in CIB and AWM that are collateralized by assets maintained in the clients' brokerage accounts (e.g., cash on deposit, liquid and readily marketable debt or equity securities), as such no allowance is held against these receivables. To manage its credit risk the Firm establishes margin requirements and monitors the required margin levels on an ongoing basis, and requires clients to deposit additional cash or other collateral, or to reduce positions, when appropriate. These receivables are reported within accrued interest and accounts receivable on the Firm's Consolidated balance sheets.
(f) Excludes cash placed with banks of $254.0 billion and $268.1 billion, at December 31, 2019 and 2018, respectively, which is predominantly placed with various central banks, primarily Federal Reserve Banks.
(g) Credit exposure is net of risk participations and excludes the benefit of credit derivatives used in credit portfolio management activities held against derivative receivables or loans and liquid securities and other cash collateral held against derivative receivables.
(h) Represents lending-related financial instruments.

Note 5 – Derivative instruments

Derivative contracts derive their value from underlying asset prices, indices, reference rates, other inputs or a combination of these factors and may expose counterparties to risks and rewards of an underlying asset or liability without having to initially invest in, own or exchange the asset or liability. JPMorgan Chase makes markets in derivatives for clients and also uses derivatives to hedge or manage its own risk exposures. Predominantly all of the Firm's derivatives are entered into for market-making or risk management purposes.

Market-making derivatives
The majority of the Firm's derivatives are entered into for market-making purposes. Clients use derivatives to mitigate or modify interest rate, credit, foreign exchange, equity and commodity risks. The Firm actively manages the risks from its exposure to these derivatives by entering into other derivative contracts or by purchasing or selling other financial instruments that partially or fully offset the exposure from client derivatives.

Risk management derivatives
The Firm manages certain market and credit risk exposures using derivative instruments, including derivatives in hedge accounting relationships and other derivatives that are used to manage risks associated with specified assets and liabilities.

The Firm generally uses interest rate derivatives to manage the risk associated with changes in interest rates. Fixed-rate assets and liabilities appreciate or depreciate in market value as interest rates change. Similarly, interest income and expense increase or decrease as a result of variable-rate assets and liabilities resetting to current market rates, and as a result of the repayment and subsequent origination or issuance of fixed-rate assets and liabilities at current market rates. Gains and losses on the derivative instruments related to these assets and liabilities are expected to substantially offset this variability.

Foreign currency derivatives are used to manage the foreign exchange risk associated with certain foreign currency–denominated (i.e., non-U.S. dollar) assets and liabilities and forecasted transactions, as well as the Firm's net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. As a result of fluctuations in foreign currencies, the U.S. dollar–equivalent values of the foreign currency–denominated assets and liabilities or the forecasted revenues or expenses increase or decrease. Gains or losses on the derivative instruments related to these foreign currency–denominated assets or liabilities, or forecasted transactions, are expected to substantially offset this variability.

Commodities derivatives are used to manage the price risk of certain commodities inventories. Gains or losses on these derivative instruments are expected to substantially offset the depreciation or appreciation of the related inventory.

Credit derivatives are used to manage the counterparty credit risk associated with loans and lending-related commitments. Credit derivatives compensate the purchaser when the entity referenced in the contract experiences a credit event, such as bankruptcy or a failure to pay an obligation when due. Credit derivatives primarily consist of CDS. Refer to the discussion in the Credit derivatives section on pages 191–194 of this Note for a further discussion of credit derivatives.

Refer to the risk management derivatives gains and losses table on page 191 of this Note, and the hedge accounting gains and losses tables on pages 188–191 of this Note for more information about risk management derivatives.

Derivative counterparties and settlement types
The Firm enters into OTC derivatives, which are negotiated and settled bilaterally with the derivative counterparty. The Firm also enters into, as principal, certain ETD such as futures and options, and OTC-cleared derivative contracts with CCPs. ETD contracts are generally standardized contracts traded on an exchange and cleared by the CCP, which is the Firm's counterparty from the inception of the transactions. OTC-cleared derivatives are traded on a bilateral basis and then novated to the CCP for clearing.

Derivative clearing services
The Firm provides clearing services for clients in which the Firm acts as a clearing member at certain derivative exchanges and clearing houses. The Firm does not reflect the clients' derivative contracts in its Consolidated Financial Statements. Refer to Note 28 for further information on the Firm's clearing services.

Accounting for derivatives

All free-standing derivatives that the Firm executes for its own account are required to be recorded on the Consolidated balance sheets at fair value.

As permitted under U.S. GAAP, the Firm nets derivative assets and liabilities, and the related cash collateral receivables and payables, when a legally enforceable master netting agreement exists between the Firm and the derivative counterparty. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. The accounting for changes in value of a derivative depends on whether or not the transaction has been designated and qualifies for hedge accounting. Derivatives that are not designated as hedges are reported and measured at fair value through earnings. The tabular disclosures on pages 184–191 of this Note provide additional information on the amount of, and reporting for, derivative assets, liabilities, gains and losses. Refer to Notes 2 and 3 for further discussion of derivatives embedded in structured notes.

Derivatives designated as hedges

The Firm applies hedge accounting to certain derivatives executed for risk management purposes – generally interest rate, foreign exchange and commodity derivatives. However, JPMorgan Chase does not seek to apply hedge accounting to all of the derivatives involved in the Firm's risk management activities. For example, the Firm does not apply hedge accounting to purchased CDS used to manage the credit risk of loans and lending-related commitments, because of the difficulties in qualifying such contracts as hedges. For the same reason, the Firm does not apply hedge accounting to certain interest rate, foreign exchange, and commodity derivatives used for risk management purposes.

To qualify for hedge accounting, a derivative must be highly effective at reducing the risk associated with the exposure being hedged. In addition, for a derivative to be designated as a hedge, the risk management objective and strategy must be documented. Hedge documentation must identify the derivative hedging instrument, the asset or liability or forecasted transaction and type of risk to be hedged, and how the effectiveness of the derivative is assessed prospectively and retrospectively. To assess effectiveness, the Firm uses statistical methods such as regression analysis, nonstatistical methods such as dollar-value comparisons of the change in the fair value of the derivative to the change in the fair value or cash flows of the hedged item, and qualitative comparisons of critical terms and the evaluation of any changes in those terms. The extent to which a derivative has been, and is expected to continue to be, highly effective at offsetting changes in the fair value or cash flows of the hedged item must be assessed and documented at least quarterly. If it is determined that a derivative is not highly effective at hedging the designated exposure, hedge accounting is discontinued.

There are three types of hedge accounting designations: fair value hedges, cash flow hedges and net investment hedges. JPMorgan Chase uses fair value hedges primarily to hedge fixed-rate long-term debt, AFS securities and certain commodities inventories. For qualifying fair value hedges, the changes in the fair value of the derivative, and in the value of the hedged item for the risk being hedged, are recognized in earnings. Certain amounts excluded from the assessment of effectiveness are recorded in OCI and recognized in earnings over the life of the derivative. If the hedge relationship is terminated, then the adjustment to the hedged item continues to be reported as part of the basis of the hedged item, and for benchmark interest rate hedges, is amortized to earnings as a yield adjustment. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily net interest income and principal transactions revenue.

JPMorgan Chase uses cash flow hedges primarily to hedge the exposure to variability in forecasted cash flows from floating-rate assets and liabilities and foreign currency–denominated revenue and expense. For qualifying cash flow hedges, changes in the fair value of the derivative are recorded in OCI and recognized in earnings as the hedged item affects earnings. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily noninterest revenue, net interest income and compensation expense. If the hedge relationship is terminated, then the change in value of the derivative recorded in AOCI is recognized in earnings when the cash flows that were hedged affect earnings. For hedge relationships that are discontinued because a forecasted transaction is not expected to occur according to the original hedge forecast, any related derivative values recorded in AOCI are immediately recognized in earnings.

JPMorgan Chase uses net investment hedges to protect the value of the Firm's net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. For qualifying net investment hedges, changes in the fair value of the derivatives due to changes in spot foreign exchange rates are recorded in OCI as translation adjustments. Amounts excluded from the assessment of effectiveness are recorded directly in earnings.

The following table outlines the Firm's primary uses of derivatives and the related hedge accounting designation or disclosure category.

Type of Derivative	Use of Derivative	Designation and disclosure	Affected segment or unit	Page reference
Manage specifically identified risk exposures in qualifying hedge accounting relationships:				
• Interest rate	Hedge fixed rate assets and liabilities	Fair value hedge	Corporate	188
• Interest rate	Hedge floating-rate assets and liabilities	Cash flow hedge	Corporate	190
• Foreign exchange	Hedge foreign currency-denominated assets and liabilities	Fair value hedge	Corporate	188
• Foreign exchange	Hedge foreign currency-denominated forecasted revenue and expense	Cash flow hedge	Corporate	190
• Foreign exchange	Hedge the value of the Firm's investments in non-U.S. dollar functional currency entities	Net investment hedge	Corporate	191
• Commodity	Hedge commodity inventory	Fair value hedge	CIB	188
Manage specifically identified risk exposures not designated in qualifying hedge accounting relationships:				
• Interest rate	Manage the risk associated with mortgage commitments, warehouse loans and MSRs	Specified risk management	CCB	191
• Credit	Manage the credit risk associated with wholesale lending exposures	Specified risk management	CIB	191
• Interest rate and foreign exchange	Manage the risk associated with certain other specified assets and liabilities	Specified risk management	Corporate	191
Market-making derivatives and other activities:				
• Various	Market-making and related risk management	Market-making and other	CIB	191
• Various	Other derivatives	Market-making and other	CIB, AWM, Corporate	191

Notional amount of derivative contracts

The following table summarizes the notional amount of derivative contracts outstanding as of December 31, 2019 and 2018.

	Notional amounts[b]	
December 31, (in billions)	**2019**	2018
Interest rate contracts		
Swaps	**$ 21,228**	$ 21,763
Futures and forwards	**3,152**	3,562
Written options	**3,938**	3,997
Purchased options	**4,361**	4,322
Total interest rate contracts	**32,679**	33,644
Credit derivatives[a]	**1,242**	1,501
Foreign exchange contracts		
Cross-currency swaps	**3,604**	3,548
Spot, futures and forwards	**5,577**	5,871
Written options	**700**	835
Purchased options	**718**	830
Total foreign exchange contracts	**10,599**	11,084
Equity contracts		
Swaps	**406**	346
Futures and forwards	**142**	101
Written options	**646**	528
Purchased options	**611**	490
Total equity contracts	**1,805**	1,465
Commodity contracts		
Swaps	**147**	134
Spot, futures and forwards	**211**	156
Written options	**135**	135
Purchased options	**124**	120
Total commodity contracts	**617**	545
Total derivative notional amounts	**$ 46,942**	$ 48,239

(a) Refer to the Credit derivatives discussion on pages 191-194 for more information on volumes and types of credit derivative contracts.
(b) Represents the sum of gross long and gross short third-party notional derivative contracts.

While the notional amounts disclosed above give an indication of the volume of the Firm's derivatives activity, the notional amounts significantly exceed, in the Firm's view, the possible losses that could arise from such transactions. For most derivative contracts, the notional amount is not exchanged; it is simply a reference amount used to calculate payments.

Impact of derivatives on the Consolidated balance sheets

The following table summarizes information on derivative receivables and payables (before and after netting adjustments) that are reflected on the Firm's Consolidated balance sheets as of December 31, 2019 and 2018, by accounting designation (e.g., whether the derivatives were designated in qualifying hedge accounting relationships or not) and contract type.

Free-standing derivative receivables and payables(a)

	Gross derivative receivables				Gross derivative payables			
December 31, 2019 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables(b)	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables(b)
Trading assets and liabilities								
Interest rate	**$ 312,451**	**$ 843**	**$ 313,294**	**$ 27,421**	**$ 279,272**	**$ 1**	**$ 279,273**	**$ 8,603**
Credit	**14,876**	**–**	**14,876**	**701**	**15,121**	**–**	**15,121**	**1,652**
Foreign exchange	**138,179**	**308**	**138,487**	**9,005**	**144,125**	**983**	**145,108**	**13,158**
Equity	**45,727**	**–**	**45,727**	**6,477**	**52,741**	**–**	**52,741**	**12,537**
Commodity	**16,914**	**328**	**17,242**	**6,162**	**19,736**	**149**	**19,885**	**7,758**
Total fair value of trading assets and liabilities	**$ 528,147**	**$ 1,479**	**$ 529,626**	**$ 49,766**	**$ 510,995**	**$ 1,133**	**$ 512,128**	**$ 43,708**

	Gross derivative receivables				Gross derivative payables			
December 31, 2018 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables(b)	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables(b)
Trading assets and liabilities								
Interest rate	$ 267,871	$ 833	$ 268,704	$ 23,214	$ 242,782	$ –	$ 242,782	$ 7,784
Credit	20,095	–	20,095	612	20,276	–	20,276	1,667
Foreign exchange	167,057	628	167,685	13,450	164,392	825	165,217	12,785
Equity	49,285	–	49,285	9,946	51,195	–	51,195	10,161
Commodity	20,223	247	20,470	6,991	22,297	121	22,418	9,372
Total fair value of trading assets and liabilities	$ 524,531	$ 1,708	$ 526,239	$ 54,213	$ 500,942	$ 946	$ 501,888	$ 41,769

(a) Balances exclude structured notes for which the fair value option has been elected. Refer to Note 3 for further information.
(b) As permitted under U.S. GAAP, the Firm has elected to net derivative receivables and derivative payables and the related cash collateral receivables and payables when a legally enforceable master netting agreement exists.

Derivatives netting

The following tables present, as of December 31, 2019 and 2018, gross and net derivative receivables and payables by contract and settlement type. Derivative receivables and payables, as well as the related cash collateral from the same counterparty, have been netted on the Consolidated balance sheets where the Firm has obtained an appropriate legal opinion with respect to the master netting agreement. Where such a legal opinion has not been either sought or obtained, amounts are not eligible for netting on the Consolidated balance sheets, and those derivative receivables and payables are shown separately in the tables below.

In addition to the cash collateral received and transferred that is presented on a net basis with derivative receivables and payables, the Firm receives and transfers additional collateral (financial instruments and cash). These amounts mitigate counterparty credit risk associated with the Firm's derivative instruments, but are not eligible for net presentation:

- collateral that consists of non-cash financial instruments (generally U.S. government and agency securities and other G7 government securities) and cash collateral held at third-party custodians, which are shown separately as "Collateral not nettable on the Consolidated balance sheets" in the tables below, up to the fair value exposure amount;
- the amount of collateral held or transferred that exceeds the fair value exposure at the individual counterparty level, as of the date presented, which is excluded from the tables below; and
- collateral held or transferred that relates to derivative receivables or payables where an appropriate legal opinion has not been either sought or obtained with respect to the master netting agreement, which is excluded from the tables below.

	2019			2018		
December 31, (in millions)	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables
U.S. GAAP nettable derivative receivables						
Interest rate contracts:						
OTC	**$ 299,205**	**$ (276,255)**	**$ 22,950**	$ 258,227	$ (239,498)	$ 18,729
OTC–cleared	**9,442**	**(9,360)**	**82**	6,404	(5,856)	548
Exchange-traded[a]	**347**	**(258)**	**89**	322	(136)	186
Total interest rate contracts	**308,994**	**(285,873)**	**23,121**	264,953	(245,490)	19,463
Credit contracts:						
OTC	**10,743**	**(10,317)**	**426**	12,648	(12,261)	387
OTC–cleared	**3,864**	**(3,858)**	**6**	7,267	(7,222)	45
Total credit contracts	**14,607**	**(14,175)**	**432**	19,915	(19,483)	432
Foreign exchange contracts:						
OTC	**136,252**	**(129,324)**	**6,928**	163,862	(153,988)	9,874
OTC–cleared	**185**	**(152)**	**33**	235	(226)	9
Exchange-traded[a]	**10**	**(6)**	**4**	32	(21)	11
Total foreign exchange contracts	**136,447**	**(129,482)**	**6,965**	164,129	(154,235)	9,894
Equity contracts:						
OTC	**23,106**	**(20,820)**	**2,286**	26,178	(23,879)	2,299
Exchange-traded[a]	**19,654**	**(18,430)**	**1,224**	18,876	(15,460)	3,416
Total equity contracts	**42,760**	**(39,250)**	**3,510**	45,054	(39,339)	5,715
Commodity contracts:						
OTC	**7,093**	**(5,149)**	**1,944**	7,448	(5,261)	2,187
OTC–cleared	**28**	**(28)**	**—**	—	—	—
Exchange-traded[a]	**6,154**	**(5,903)**	**251**	8,815	(8,218)	597
Total commodity contracts	**13,275**	**(11,080)**	**2,195**	16,263	(13,479)	2,784
Derivative receivables with appropriate legal opinion	**516,083**	**(479,860)**	**36,223** [d]	510,314	(472,026)	38,288 [d]
Derivative receivables where an appropriate legal opinion has not been either sought or obtained	**13,543**		**13,543**	15,925		15,925
Total derivative receivables recognized on the Consolidated balance sheets	**$ 529,626**		**$ 49,766**	$ 526,239		$ 54,213
Collateral not nettable on the Consolidated balance sheets[b][c]			**(14,226)**			(13,046)
Net amounts			**$ 35,540**			$ 41,167

December 31, (in millions)	2019 Gross derivative payables	2019 Amounts netted on the Consolidated balance sheets	2019 Net derivative payables	2018 Gross derivative payables	2018 Amounts netted on the Consolidated balance sheets	2018 Net derivative payables
U.S. GAAP nettable derivative payables						
Interest rate contracts:						
OTC	**$ 267,311**	**$ (260,229)**	**$ 7,082**	$ 233,404	$ (228,369)	$ 5,035
OTC-cleared	**10,217**	**(10,138)**	**79**	7,163	(6,494)	669
Exchange-traded[(a)]	**365**	**(303)**	**62**	210	(135)	75
Total interest rate contracts	**277,893**	**(270,670)**	**7,223**	240,777	(234,998)	5,779
Credit contracts:						
OTC	**11,570**	**(10,080)**	**1,490**	13,412	(11,895)	1,517
OTC-cleared	**3,390**	**(3,389)**	**1**	6,716	(6,714)	2
Total credit contracts	**14,960**	**(13,469)**	**1,491**	20,128	(18,609)	1,519
Foreign exchange contracts:						
OTC	**142,360**	**(131,792)**	**10,568**	160,930	(152,161)	8,769
OTC-cleared	**186**	**(152)**	**34**	274	(268)	6
Exchange-traded[(a)]	**12**	**(6)**	**6**	16	(3)	13
Total foreign exchange contracts	**142,558**	**(131,950)**	**10,608**	161,220	(152,432)	8,788
Equity contracts:						
OTC	**27,594**	**(21,778)**	**5,816**	29,437	(25,544)	3,893
Exchange-traded[(a)]	**20,216**	**(18,426)**	**1,790**	16,285	(15,490)	795
Total equity contracts	**47,810**	**(40,204)**	**7,606**	45,722	(41,034)	4,688
Commodity contracts:						
OTC	**8,714**	**(6,235)**	**2,479**	8,930	(4,838)	4,092
OTC-cleared	**30**	**(30)**	**–**	–	–	–
Exchange-traded[(a)]	**6,012**	**(5,862)**	**150**	8,259	(8,208)	51
Total commodity contracts	**14,756**	**(12,127)**	**2,629**	17,189	(13,046)	4,143
Derivative payables with appropriate legal opinion	**497,977**	**(468,420)**	**29,557** [(d)]	485,036	(460,119)	24,917 [(d)]
Derivative payables where an appropriate legal opinion has not been either sought or obtained	**14,151**		**14,151**	16,852		16,852
Total derivative payables recognized on the Consolidated balance sheets	**$ 512,128**		**$ 43,708**	$ 501,888		$ 41,769
Collateral not nettable on the Consolidated balance sheets[(b)(c)]			**(7,896)**			(4,449)
Net amounts			**$ 35,812**			$ 37,320

(a) Exchange-traded derivative balances that relate to futures contracts are settled daily.

(b) Represents liquid security collateral as well as cash collateral held at third-party custodians related to derivative instruments where an appropriate legal opinion has been obtained. For some counterparties, the collateral amounts of financial instruments may exceed the derivative receivables and derivative payables balances. Where this is the case, the total amount reported is limited to the net derivative receivables and net derivative payables balances with that counterparty.

(c) Derivative collateral relates only to OTC and OTC-cleared derivative instruments.

(d) Net derivatives receivable included cash collateral netted of $65.9 billion and $55.2 billion at December 31, 2019 and 2018, respectively. Net derivatives payable included cash collateral netted of $54.4 billion and $43.3 billion at December 31, 2019 and 2018, respectively. Derivative cash collateral relates to OTC and OTC-cleared derivative instruments.

Liquidity risk and credit-related contingent features
In addition to the specific market risks introduced by each derivative contract type, derivatives expose JPMorgan Chase to credit risk — the risk that derivative counterparties may fail to meet their payment obligations under the derivative contracts and the collateral, if any, held by the Firm proves to be of insufficient value to cover the payment obligation. It is the policy of JPMorgan Chase to actively pursue, where possible, the use of legally enforceable master netting arrangements and collateral agreements to mitigate derivative counterparty credit risk inherent in derivative receivables.

While derivative receivables expose the Firm to credit risk, derivative payables expose the Firm to liquidity risk, as the derivative contracts typically require the Firm to post cash or securities collateral with counterparties as the fair value of the contracts moves in the counterparties' favor or upon specified downgrades in the Firm's and its subsidiaries' respective credit ratings. Certain derivative contracts also provide for termination of the contract, generally upon a downgrade of either the Firm or the counterparty, at the fair value of the derivative contracts. The following table shows the aggregate fair value of net derivative payables related to OTC and OTC-cleared derivatives that contain contingent collateral or termination features that may be triggered upon a ratings downgrade, and the associated collateral the Firm has posted in the normal course of business, at December 31, 2019 and 2018.

OTC and OTC-cleared derivative payables containing downgrade triggers

December 31, (in millions)	**2019**	2018
Aggregate fair value of net derivative payables	**$ 14,819**	$ 9,396
Collateral posted	**13,329**	8,907

The following table shows the impact of a single-notch and two-notch downgrade of the long-term issuer ratings of JPMorgan Chase & Co. and its subsidiaries, predominantly JPMorgan Chase Bank, N.A., at December 31, 2019 and 2018, related to OTC and OTC-cleared derivative contracts with contingent collateral or termination features that may be triggered upon a ratings downgrade. Derivatives contracts generally require additional collateral to be posted or terminations to be triggered when the predefined threshold rating is breached. A downgrade by a single rating agency that does not result in a rating lower than a preexisting corresponding rating provided by another major rating agency will generally not result in additional collateral (except in certain instances in which additional initial margin may be required upon a ratings downgrade), nor in termination payments requirements. The liquidity impact in the table is calculated based upon a downgrade below the lowest current rating of the rating agencies referred to in the derivative contract.

Liquidity impact of downgrade triggers on OTC and OTC-cleared derivatives

	2019		2018	
December 31, (in millions)	Single-notch downgrade	Two-notch downgrade	Single-notch downgrade	Two-notch downgrade
Amount of additional collateral to be posted upon downgrade[(a)]	**$ 189**	**$ 1,467**	$ 76	$ 947
Amount required to settle contracts with termination triggers upon downgrade[(b)]	**104**	**1,398**	172	764

(a) Includes the additional collateral to be posted for initial margin.
(b) Amounts represent fair values of derivative payables, and do not reflect collateral posted.

Derivatives executed in contemplation of a sale of the underlying financial asset
In certain instances the Firm enters into transactions in which it transfers financial assets but maintains the economic exposure to the transferred assets by entering into a derivative with the same counterparty in contemplation of the initial transfer. The Firm generally accounts for such transfers as collateralized financing transactions as described in Note 11, but in limited circumstances they may qualify to be accounted for as a sale and a derivative under U.S. GAAP. The amount of such transfers accounted for as a sale where the associated derivative was outstanding was not material at both December 31, 2019 and 2018.

Impact of derivatives on the Consolidated statements of income

The following tables provide information related to gains and losses recorded on derivatives based on their hedge accounting designation or purpose.

Fair value hedge gains and losses

The following tables present derivative instruments, by contract type, used in fair value hedge accounting relationships, as well as pre-tax gains/(losses) recorded on such derivatives and the related hedged items for the years ended December 31, 2019, 2018 and 2017, respectively. The Firm includes gains/(losses) on the hedging derivative in the same line item in the Consolidated statements of income as the related hedged item.

	Gains/(losses) recorded in income			Income statement impact of excluded components[f]		OCI impact
Year ended December 31, 2019 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[g]
Contract type						
Interest rate[a][b]	**$ 3,204**	**$ (2,373)**	**$ 831**	**$ –**	**$ 828**	**$ –**
Foreign exchange[c]	**154**	**328**	**482**	**(866)**	**482**	**39**
Commodity[d]	**(77)**	**148**	**71**	**–**	**63**	**–**
Total	**$ 3,281**	**$ (1,897)**	**$ 1,384**	**$ (866)**	**$ 1,373**	**$ 39**

	Gains/(losses) recorded in income			Income statement impact of excluded components[f]		OCI impact
Year ended December 31, 2018 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[g]
Contract type						
Interest rate[a][b]	$ (1,145)	$ 1,782	$ 637	$ –	$ 623	$ –
Foreign exchange[c]	1,092	(616)	476	(566)	476	(140)
Commodity[d]	789	(754)	35	–	26	–
Total	$ 736	$ 412	$ 1,148	$ (566)	$ 1,125	$ (140)

	Gains/(losses) recorded in income			Income statement impact due to:	
Year ended December 31, 2017 (in millions)	Derivatives	Hedged items	Income statement impact	Hedge ineffectiveness[e]	Excluded components[f]
Contract type					
Interest rate[a][b]	$ (481)	$ 1,359	$ 878	$ (18)	$ 896
Foreign exchange[c]	(3,509)	3,507	(2)	–	(2)
Commodity[d]	(1,275)	1,348	73	29	44
Total	$ (5,265)	$ 6,214	$ 949	$ 11	$ 938

(a) Primarily consists of hedges of the benchmark (e.g., London Interbank Offered Rate ("LIBOR")) interest rate risk of fixed-rate long-term debt and AFS securities. Gains and losses were recorded in net interest income.

(b) Excludes the amortization expense associated with the inception hedge accounting adjustment applied to the hedged item. This expense is recorded in net interest income and substantially offsets the income statement impact of the excluded components. Also excludes the accrual of interest on interest rate swaps and the related hedged items.

(c) Primarily consists of hedges of the foreign currency risk of long-term debt and AFS securities for changes in spot foreign currency rates. Gains and losses related to the derivatives and the hedged items due to changes in foreign currency rates and the income statement impact of excluded components were recorded primarily in principal transactions revenue and net interest income.

(d) Consists of overall fair value hedges of physical commodities inventories that are generally carried at the lower of cost or net realizable value (net realizable value approximates fair value). Gains and losses were recorded in principal transactions revenue.

(e) Hedge ineffectiveness is the amount by which the gain or loss on the designated derivative instrument does not exactly offset the gain or loss on the hedged item attributable to the hedged risk.

(f) The assessment of hedge effectiveness excludes certain components of the changes in fair values of the derivatives and hedged items such as forward points on foreign exchange forward contracts, time values and cross-currency basis spreads. Excluded components may impact earnings either through amortization of the initial amount over the life of the derivative or through fair value changes recognized in the current period.

(g) Represents the change in value of amounts excluded from the assessment of effectiveness under the amortization approach, predominantly cross-currency basis spreads. The amount excluded at inception of the hedge is recognized in earnings over the life of the derivative.

As of December 31, 2019, the following amounts were recorded on the Consolidated balance sheets related to certain cumulative fair value hedge basis adjustments that are expected to reverse through the income statement in future periods as an adjustment to yield.

December 31, 2019 (in millions)	Carrying amount of the hedged items[a][b]	Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
		Active hedging relationships	Discontinued hedging relationships[d]	Total
Assets				
Investment securities - AFS	$ 125,860 [c]	$ 2,110	$ 278	$ 2,388
Liabilities				
Long-term debt	$ 157,545	$ 6,719	$ 161	$ 6,880
Beneficial interests issued by consolidated VIEs	2,365	–	(8)	(8)

December 31, 2018 (in millions)	Carrying amount of the hedged items[a][b]	Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
		Active hedging relationships	Discontinued hedging relationships[d]	Total
Assets				
Investment securities - AFS	$ 55,313 [c]	$ (1,105)	$ 381	$ (724)
Liabilities				
Long-term debt	$ 139,915	$ 141	$ 8	$ 149
Beneficial interests issued by consolidated VIEs	6,987	–	(33)	(33)

(a) Excludes physical commodities with a carrying value of $6.5 billion and $6.8 billion at December 31, 2019 and 2018, respectively, to which the Firm applies fair value hedge accounting. As a result of the application of hedge accounting, these inventories are carried at fair value, thus recognizing unrealized gains and losses in current periods. Since the Firm exits these positions at fair value, there is no incremental impact to net income in future periods.
(b) Excludes hedged items where only foreign currency risk is the designated hedged risk, as basis adjustments related to foreign currency hedges will not reverse through the income statement in future periods. At December 31, 2019 and 2018, the carrying amount excluded for available-for-sale securities is $14.9 billion and $14.6 billion, respectively, and for long-term debt is $2.8 billion and $7.3 billion, respectively.
(c) Carrying amount represents the amortized cost.
(d) Represents hedged items no longer designated in qualifying fair value hedging relationships for which an associated basis adjustment exists at the balance sheet date.

Cash flow hedge gains and losses

The following tables present derivative instruments, by contract type, used in cash flow hedge accounting relationships, and the pre-tax gains/(losses) recorded on such derivatives, for the years ended December 31, 2019, 2018 and 2017, respectively. The Firm includes the gain/(loss) on the hedging derivative in the same line item in the Consolidated statements of income as the change in cash flows on the related hedged item.

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2019 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[(a)]	**$ (28)**	**$ (3)**	**$ 25**
Foreign exchange[(b)]	**(75)**	**125**	**200**
Total	**$ (103)**	**$ 122**	**$ 225**

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2018 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[(a)]	$ 44	$ (44)	$ (88)
Foreign exchange[(b)]	(26)	(201)	(175)
Total	$ 18	$ (245)	$ (263)

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2017 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI[(c)]	Total change in OCI for period
Contract type			
Interest rate[(a)]	$ (17)	$ 12	$ 29
Foreign exchange[(b)]	(117)	135	252
Total	$ (134)	$ 147	$ 281

(a) Primarily consists of hedges of LIBOR-indexed floating-rate assets and floating-rate liabilities. Gains and losses were recorded in net interest income.
(b) Primarily consists of hedges of the foreign currency risk of non-U.S. dollar-denominated revenue and expense. The income statement classification of gains and losses follows the hedged item – primarily noninterest revenue and compensation expense.
(c) Represents the effective portion of changes in value of the related hedging derivative. Hedge ineffectiveness is the amount by which the cumulative gain or loss on the designated derivative instrument exceeds the present value of the cumulative expected change in cash flows on the hedged item attributable to the hedged risk. The Firm did not recognize any ineffectiveness on cash flow hedges during 2017.

The Firm did not experience any forecasted transactions that failed to occur for the years ended 2019, 2018 and 2017.

Over the next 12 months, the Firm expects that approximately $(8) million (after-tax) of net losses recorded in AOCI at December 31, 2019, related to cash flow hedges will be recognized in income. For cash flow hedges that have been terminated, the maximum length of time over which the derivative results recorded in AOCI will be recognized in earnings is approximately five years, corresponding to the timing of the originally hedged forecasted cash flows. For open cash flow hedges, the maximum length of time over which forecasted transactions are hedged is approximately seven years. The Firm's longer-dated forecasted transactions relate to core lending and borrowing activities.

Net investment hedge gains and losses

The following table presents hedging instruments, by contract type, that were used in net investment hedge accounting relationships, and the pre-tax gains/(losses) recorded on such instruments for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions)	2019		2018		2017	
	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI[(c)]
Foreign exchange derivatives	**$72**	**$64**	$11	$1,219	$(152)	$(1,244)

(a) Certain components of hedging derivatives are permitted to be excluded from the assessment of hedge effectiveness, such as forward points on foreign exchange forward contracts. The Firm elects to record changes in fair value of these amounts directly in other income.

(b) Excludes amounts reclassified from AOCI to income on the sale or liquidation of hedged entities. The Firm reclassified net pre-tax gains/(losses) of $18 million to other income, $(17) million and $50 million to other expense related to the liquidation of certain legal entities during the years ended December 31, 2019, 2018 and 2017, respectively. Refer to Note 24 for further information.

(c) Represents the effective portion of changes in value of the related hedging derivative. The Firm did not recognize any ineffectiveness on net investment hedges directly in income during 2017.

Gains and losses on derivatives used for specified risk management purposes

The following table presents pre-tax gains/(losses) recorded on a limited number of derivatives, not designated in hedge accounting relationships, that are used to manage risks associated with certain specified assets and liabilities, including certain risks arising from mortgage commitments, warehouse loans, MSRs, wholesale lending exposures, and foreign currency denominated assets and liabilities.

Year ended December 31, (in millions)	Derivatives gains/(losses) recorded in income		
	2019	2018	2017
Contract type			
Interest rate[(a)]	**$ 1,491**	$ 79	$ 331
Credit[(b)]	**(30)**	(21)	(74)
Foreign exchange[(c)]	**(5)**	117	(107)
Total	**$ 1,456**	$ 175	$ 150

(a) Primarily represents interest rate derivatives used to hedge the interest rate risk inherent in mortgage commitments, warehouse loans and MSRs, as well as written commitments to originate warehouse loans. Gains and losses were recorded predominantly in mortgage fees and related income.

(b) Relates to credit derivatives used to mitigate credit risk associated with lending exposures in the Firm's wholesale businesses. These derivatives do not include credit derivatives used to mitigate counterparty credit risk arising from derivative receivables, which is included in gains and losses on derivatives related to market-making activities and other derivatives. Gains and losses were recorded in principal transactions revenue.

(c) Primarily relates to derivatives used to mitigate foreign exchange risk of specified foreign currency-denominated assets and liabilities. Gains and losses were recorded in principal transactions revenue.

Gains and losses on derivatives related to market-making activities and other derivatives

The Firm makes markets in derivatives in order to meet the needs of customers and uses derivatives to manage certain risks associated with net open risk positions from its market-making activities, including the counterparty credit risk arising from derivative receivables. All derivatives not included in the hedge accounting or specified risk management categories above are included in this category. Gains and losses on these derivatives are primarily recorded in principal transactions revenue. Refer to Note 6 for information on principal transactions revenue.

Credit derivatives

Credit derivatives are financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) and which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Credit derivatives expose the protection purchaser to the creditworthiness of the protection seller, as the protection seller is required to make payments under the contract when the reference entity experiences a credit event, such as a bankruptcy, a failure to pay its obligation or a restructuring. The seller of credit protection receives a premium for providing protection but has the risk that the underlying instrument referenced in the contract will be subject to a credit event.

The Firm is both a purchaser and seller of protection in the credit derivatives market and uses these derivatives for two primary purposes. First, in its capacity as a market-maker, the Firm actively manages a portfolio of credit derivatives by purchasing and selling credit protection, predominantly on corporate debt obligations, to meet the needs of customers. Second, as an end-user, the Firm uses credit derivatives to manage credit risk associated with lending exposures (loans and unfunded commitments) and derivatives counterparty exposures in the Firm's wholesale businesses, and to manage the credit risk arising from certain financial instruments in the Firm's market-making businesses. Following is a summary of various types of credit derivatives.

Credit default swaps

Credit derivatives may reference the credit of either a single reference entity ("single-name") or a broad-based index. The Firm purchases and sells protection on both single-name and index-reference obligations. Single-name CDS and index CDS contracts are either OTC or OTC-cleared derivative contracts. Single-name CDS are used to manage the default risk of a single reference entity, while index CDS contracts are used to manage the credit risk associated with the broader credit markets or credit market segments. Like the S&P 500 and other market indices, a CDS index consists of a portfolio of CDS across many reference entities. New series of CDS indices are periodically established with a new underlying portfolio of reference entities to reflect changes in the credit markets. If one of the reference entities in the index experiences a credit event, then the reference entity that defaulted is removed from the index. CDS can also be referenced against specific portfolios of reference names or against customized exposure levels based on specific client demands: for example, to provide protection against the first $1 million of realized credit losses in a $10 million portfolio of exposure. Such structures are commonly known as tranche CDS.

For both single-name CDS contracts and index CDS contracts, upon the occurrence of a credit event, under the terms of a CDS contract neither party to the CDS contract has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value of the reference obligation at settlement of the credit derivative contract, also known as the recovery value. The protection purchaser does not need to hold the debt instrument of the underlying reference entity in order to receive amounts due under the CDS contract when a credit event occurs.

Credit-related notes

A credit-related note is a funded credit derivative where the issuer of the credit-related note purchases from the note investor credit protection on a reference entity or an index. Under the contract, the investor pays the issuer the par value of the note at the inception of the transaction, and in return, the issuer pays periodic payments to the investor, based on the credit risk of the referenced entity. The issuer also repays the investor the par value of the note at maturity unless the reference entity (or one of the entities that makes up a reference index) experiences a specified credit event. If a credit event occurs, the issuer is not obligated to repay the par value of the note, but rather, the issuer pays the investor the difference between the par value of the note and the fair value of the defaulted reference obligation at the time of settlement. Neither party to the credit-related note has recourse to the defaulting reference entity.

The following tables present a summary of the notional amounts of credit derivatives and credit-related notes the Firm sold and purchased as of December 31, 2019 and 2018. Upon a credit event, the Firm as a seller of protection would typically pay out only a percentage of the full notional amount of net protection sold, as the amount actually required to be paid on the contracts takes into account the recovery value of the reference obligation at the time of settlement. The Firm manages the credit risk on contracts to sell protection by purchasing protection with identical or similar underlying reference entities. Other purchased protection referenced in the following tables includes credit derivatives bought on related, but not identical, reference positions (including indices, portfolio coverage and other reference points) as well as protection purchased through credit-related notes.

The Firm does not use notional amounts of credit derivatives as the primary measure of risk management for such derivatives, because the notional amount does not take into account the probability of the occurrence of a credit event, the recovery value of the reference obligation, or related cash instruments and economic hedges, each of which reduces, in the Firm's view, the risks associated with such derivatives.

Total credit derivatives and credit-related notes

	Maximum payout/Notional amount			
December 31, 2019 (in millions)	Protection sold	Protection purchased with identical underlyings[b]	Net protection (sold)/ purchased[c]	Other protection purchased[d]
Credit derivatives				
Credit default swaps	**$ (562,338)**	**$ 571,892**	**$ 9,554**	**$ 3,936**
Other credit derivatives[a]	**(44,929)**	**52,007**	**7,078**	**7,364**
Total credit derivatives	**(607,267)**	**623,899**	**16,632**	**11,300**
Credit-related notes	**–**	**–**	**–**	**9,606**
Total	**$ (607,267)**	**$ 623,899**	**$ 16,632**	**$ 20,906**

	Maximum payout/Notional amount			
December 31, 2018 (in millions)	Protection sold	Protection purchased with identical underlyings[b]	Net protection (sold)/ purchased[c]	Other protection purchased[d]
Credit derivatives				
Credit default swaps	$ (697,220)	$ 707,282	$ 10,062	$ 4,053
Other credit derivatives[a]	(41,244)	42,484	1,240	8,488
Total credit derivatives	(738,464)	749,766	11,302	12,541
Credit-related notes	–	–	–	8,425
Total	$ (738,464)	$ 749,766	$ 11,302	$ 20,966

(a) Other credit derivatives predominantly consist of credit swap options and total return swaps.
(b) Represents the total notional amount of protection purchased where the underlying reference instrument is identical to the reference instrument on protection sold; the notional amount of protection purchased for each individual identical underlying reference instrument may be greater or lower than the notional amount of protection sold.
(c) Does not take into account the fair value of the reference obligation at the time of settlement, which would generally reduce the amount the seller of protection pays to the buyer of protection in determining settlement value.
(d) Represents protection purchased by the Firm on referenced instruments (single-name, portfolio or index) where the Firm has not sold any protection on the identical reference instrument.

The following tables summarize the notional amounts by the ratings, maturity profile, and total fair value, of credit derivatives and credit-related notes as of December 31, 2019 and 2018, where JPMorgan Chase is the seller of protection. The maturity profile is based on the remaining contractual maturity of the credit derivative contracts. The ratings profile is based on the rating of the reference entity on which the credit derivative contract is based. The ratings and maturity profile of credit derivatives and credit-related notes where JPMorgan Chase is the purchaser of protection are comparable to the profile reflected below.

Protection sold – credit derivatives and credit-related notes ratings[(a)]/maturity profile

December 31, 2019 (in millions)	<1 year	1–5 years	>5 years	Total notional amount	Fair value of receivables[(b)]	Fair value of payables[(b)]	Net fair value
Risk rating of reference entity							
Investment-grade	**$ (114,460)**	**$ (311,407)**	**$ (42,129)**	**$ (467,996)**	**$ 6,153**	**$ (911)**	**$ 5,242**
Noninvestment-grade	**(41,661)**	**(87,769)**	**(9,841)**	**(139,271)**	**4,281**	**(2,882)**	**1,399**
Total	**$ (156,121)**	**$ (399,176)**	**$ (51,970)**	**$ (607,267)**	**$ 10,434**	**$ (3,793)**	**$ 6,641**

December 31, 2018 (in millions)	<1 year	1–5 years	>5 years	Total notional amount	Fair value of receivables[(b)]	Fair value of payables[(b)]	Net fair value
Risk rating of reference entity							
Investment-grade	$ (115,443)	$ (402,325)	$ (43,611)	$ (561,379)	$ 5,720	$ (2,791)	$ 2,929
Noninvestment-grade	(45,897)	(119,348)	(11,840)	(177,085)	4,719	(5,660)	(941)
Total	$ (161,340)	$ (521,673)	$ (55,451)	$ (738,464)	$ 10,439	$ (8,451)	$ 1,988

(a) The ratings scale is primarily based on external credit ratings defined by S&P and Moody's.
(b) Amounts are shown on a gross basis, before the benefit of legally enforceable master netting agreements and cash collateral received by the Firm.

Note 6 – Noninterest revenue and noninterest expense

Noninterest revenue

The Firm records noninterest revenue from certain contracts with customers in investment banking fees, deposit-related fees, asset management, administration, and commissions, and components of card income. The related contracts are often terminable on demand and the Firm has no remaining obligation to deliver future services. For arrangements with a fixed term, the Firm may commit to deliver services in the future. Revenue associated with these remaining performance obligations typically depends on the occurrence of future events or underlying asset values, and is not recognized until the outcome of those events or values are known.

Investment banking fees

This revenue category includes debt and equity underwriting and advisory fees. As an underwriter, the Firm helps clients raise capital via public offering and private placement of various types of debt and equity instruments. Underwriting fees are primarily based on the issuance price and quantity of the underlying instruments, and are recognized as revenue typically upon execution of the client's transaction. The Firm also manages and syndicates loan arrangements. Credit arrangement and syndication fees, included within debt underwriting fees, are recorded as revenue after satisfying certain retention, timing and yield criteria.

The Firm also provides advisory services, by assisting its clients with mergers and acquisitions, divestitures, restructuring and other complex transactions. Advisory fees are recognized as revenue typically upon execution of the client's transaction.

The following table presents the components of investment banking fees.

Year ended December 31, (in millions)	2019	2018	2017
Underwriting			
Equity	**$ 1,648**	$ 1,684	$ 1,466
Debt	**3,513**	3,347	3,802
Total underwriting	**5,161**	5,031	5,268
Advisory	**2,340**	2,519	2,144
Total investment banking fees	**$ 7,501**	$ 7,550	$ 7,412

Investment banking fees are earned primarily by CIB. Refer to Note 32 for segment results.

Principal transactions

Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Firm transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit risk and foreign exchange risk.

Refer to Note 5 for further information on the income statement classification of gains and losses from derivatives activities.

In the financial commodity markets, the Firm transacts in OTC derivatives (e.g., swaps, forwards, options) and ETD that reference a wide range of underlying commodities. In the physical commodity markets, the Firm primarily purchases and sells precious and base metals and may hold other commodities inventories under financing and other arrangements with clients.

The following table presents all realized and unrealized gains and losses recorded in principal transactions revenue. This table excludes interest income and interest expense on trading assets and liabilities, which are an integral part of the overall performance of the Firm's client-driven market-making activities in CIB and cash deployment activities in Treasury and CIO. Refer to Note 7 for further information on interest income and interest expense.

Trading revenue is presented primarily by instrument type. The Firm's client-driven market-making businesses generally utilize a variety of instrument types in connection with their market-making and related risk-management activities; accordingly, the trading revenue presented in the table below is not representative of the total revenue of any individual LOB.

Year ended December 31, (in millions)	2019	2018	2017
Trading revenue by instrument type			
Interest rate	$ 2,552	$ 1,961	$ 2,479
Credit	1,611	1,395	1,329
Foreign exchange	3,171	3,222	2,746
Equity	5,812	4,924	3,873
Commodity	1,122	906	661
Total trading revenue	14,268	12,408	11,088
Private equity gains/(losses)	(250)	(349)	259
Principal transactions	$ 14,018	$ 12,059	$ 11,347

Principal transactions revenue is earned primarily by CIB. Refer to Note 32 for segment results.

Lending- and deposit-related fees

Lending-related fees include fees earned from loan commitments, standby letters of credit, financial guarantees, and other loan-servicing activities. Deposit-related fees include fees earned in lieu of compensating balances, and fees earned from performing cash management activities and other deposit account services. Lending- and deposit-related fees in this revenue category are recognized over the period in which the related service is provided.

The following table presents the components of lending- and deposit-related fees.

Year ended December 31, (in millions)	2019	2018	2017
Lending-related fees	$ 1,184	$ 1,117	$ 1,110
Deposit-related fees	5,185	4,935	4,823
Total lending- and deposit-related fees	$ 6,369	$ 6,052	$ 5,933

Lending- and deposit-related fees are earned by CCB, CIB, CB, and AWM. Refer to Note 32 for segment results.

Asset management, administration and commissions

This revenue category includes fees from investment management and related services, custody, brokerage services and other products. The Firm manages assets on behalf of its clients, including investors in Firm-sponsored funds and owners of separately managed investment accounts. Management fees are typically based on the value of assets under management and are collected and recognized at the end of each period over which the management services are provided and the value of the managed assets is known. The Firm also receives performance-based management fees, which are earned based on exceeding certain benchmarks or other performance targets and are accrued and recognized when the probability of reversal is remote, typically at the end of the related billing period. The Firm has contractual arrangements with third parties to provide distribution and other services in connection with its asset management activities. Amounts paid to these third-party service providers are generally recorded in professional and outside services expense.

The following table presents the components of Firmwide asset management, administration and commissions.

Year ended December 31, (in millions)	2019	2018	2017
Asset management fees			
Investment management fees[(a)]	$ 10,865	$ 10,768	$ 10,434
All other asset management fees[(b)]	315	270	296
Total asset management fees	11,180	11,038	10,730
Total administration fees[(c)]	2,197	2,179	2,029
Commissions and other fees			
Brokerage commissions[(d)]	2,439	2,505	2,239
All other commissions and fees	1,349	1,396	1,289
Total commissions and fees	3,788	3,901	3,528
Total asset management, administration and commissions	$ 17,165	$ 17,118	$ 16,287

(a) Represents fees earned from managing assets on behalf of the Firm's clients, including investors in Firm-sponsored funds and owners of separately managed investment accounts.
(b) Represents fees for services that are ancillary to investment management services, such as commissions earned on the sales or distribution of mutual funds to clients. These fees are recorded as revenue at the time the service is rendered or, in the case of certain distribution fees based on the underlying fund's asset value and/or investor redemption, recorded over time as the investor remains in the fund or upon investor redemption.
(c) Predominantly includes fees for custody, securities lending, funds services and securities clearance. These fees are recorded as revenue over the period in which the related service is provided.
(d) Represents commissions earned when the Firm acts as a broker, by facilitating its clients' purchases and sales of securities and other financial instruments. Brokerage commissions are collected and recognized as revenue upon occurrence of the client transaction. The Firm reports certain costs paid to third-party clearing houses and exchanges net against commission revenue.

Asset management, administration and commissions are earned primarily by AWM, CIB, CCB, and CB. Refer to Note 32 for segment results.

Mortgage fees and related income

This revenue category primarily reflects CCB's Home Lending net production and net mortgage servicing revenue.

Net production revenue includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Net production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option.

Net mortgage servicing revenue includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Refer to Note 15 for further information on risk management activities and MSRs.

Net interest income from mortgage loans is recorded in interest income.

Card income

This revenue category includes interchange and other income from credit and debit card transactions, and fees earned from processing card transactions for merchants, both of which are recognized when purchases are made by a cardholder and presented net of certain transaction-related costs. Card income also includes account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

Certain Chase credit card products offer the cardholder the ability to earn points based on account activity, which the cardholder can choose to redeem for cash and non-cash rewards. The cost to the Firm related to these proprietary rewards programs varies based on multiple factors including the terms and conditions of the rewards programs, cardholder activity, cardholder reward redemption rates and cardholder reward selections. The Firm maintains a liability for its obligations under its rewards programs and reports the current-period cost as a reduction of card income.

Credit card revenue sharing agreements

The Firm has contractual agreements with numerous co-brand partners that grant the Firm exclusive rights to issue co-branded credit card products and market them to the customers of such partners. These partners endorse the co-brand credit card programs and provide their customer or member lists to the Firm. The partners may also conduct marketing activities and provide rewards redeemable under their own loyalty programs that the Firm will grant to co-brand credit cardholders based on account activity. The terms of these agreements generally range from five to ten years.

The Firm typically makes payments to the co-brand credit card partners based on the cost of partners' marketing activities and loyalty program rewards provided to credit cardholders, new account originations and sales volumes. Payments to partners based on marketing efforts undertaken by the partners are expensed by the Firm as incurred and reported as marketing expense. Payments for partner loyalty program rewards are reported as a reduction of card income when incurred. Payments to partners based on new credit card account originations are accounted for as direct loan origination costs and are deferred and recognized as a reduction of card income on a straight-line basis over a 12-month period. Payments to partners based on sales volumes are reported as a reduction of card income when the related interchange income is earned.

The following table presents the components of card income:

Year ended December 31, (in millions)	**2019**	2018	2017
Interchange and merchant processing income	**$ 20,370**	$ 18,808	$ 17,080
Reward costs and partner payments	**(14,312)**	(13,074) [b]	(10,820)
Other card income[a]	**(754)**	(745)	(1,827)
Total card income	**$ 5,304**	$ 4,989	$ 4,433

(a) Predominantly represents account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

(b) Includes an adjustment to the credit card rewards liability of approximately $330 million, recorded in the second quarter of 2018.

Card income is earned primarily by CCB and CB. Refer to Note 32 for segment results.

Refer to Note 18 for information on operating lease income included within other income.

Noninterest expense

Other expense

Other expense on the Firm's Consolidated statements of income included the following:

Year ended December 31, (in millions)	**2019**	2018	2017
Legal expense/(benefit)	**$ 239**	$ 72	$ (35)
FDIC-related expense	**457**	1,239	1,492

Note 7 – Interest income and Interest expense

Interest income and interest expense are recorded in the Consolidated statements of income and classified based on the nature of the underlying asset or liability.

The following table presents the components of interest income and interest expense:

Year ended December 31, (in millions)	2019	2018	2017
Interest income			
Loans[a]	**$ 50,375**	$ 47,620	$ 41,008
Taxable securities	**7,962**	5,653	5,534
Non-taxable securities[b]	**1,329**	1,595	1,848
Total investment securities[a]	**9,291**	7,248	7,382
Trading assets - debt instruments	**10,800**	8,703	7,610
Federal funds sold and securities purchased under resale agreements	**6,146**	3,819	2,327
Securities borrowed[c]	**1,574**	913	94
Deposits with banks	**3,887**	5,907	4,238
All other interest-earning assets[c][d]	**1,967**	1,890	1,312
Total interest income[c]	**$ 84,040**	$ 76,100	$ 63,971
Interest expense			
Interest bearing deposits	**$ 8,957**	$ 5,973	$ 2,857
Federal funds purchased and securities loaned or sold under repurchase agreements	**4,630**	3,066	1,611
Short-term borrowings[e]	**1,248**	1,144	481
Trading liabilities - debt and all other interest-bearing liabilities[c][f]	**2,585**	2,387	1,669
Long-term debt	**8,807**	7,978	6,753
Beneficial interest issued by consolidated VIEs	**568**	493	503
Total interest expense[c]	**$ 26,795**	$ 21,041	$ 13,874
Net interest income	**$ 57,245**	$ 55,059	$ 50,097
Provision for credit losses	**5,585**	4,871	5,290
Net interest income after provision for credit losses	**$ 51,660**	$ 50,188	$ 44,807

(a) Includes the amortization/accretion of unearned income (e.g., purchase premiums/discounts, net deferred fees/costs, etc.).
(b) Represents securities that are tax-exempt for U.S. federal income tax purposes.
(c) In the second quarter of 2019, the Firm implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were made to align the accounting treatment between the balance sheet and the related interest income or expense, primarily by offsetting interest income and expense for certain prime brokerage-related held-for-investment customer receivables and payables that are currently presented as a single margin account on the balance sheet. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.
(d) Includes interest earned on prime brokerage-related held-for-investment customer receivables, which are classified in accrued interest and accounts receivable, and all other interest-earning assets, which are classified in other assets on the Consolidated balance sheets.
(e) Includes commercial paper.
(f) Other interest-bearing liabilities includes interest expense on prime brokerage-related customer payables.

Interest income and interest expense includes the current-period interest accruals for financial instruments measured at fair value, except for derivatives and financial instruments containing embedded derivatives that would be separately accounted for in accordance with U.S. GAAP, absent the fair value option election; for those instruments, all changes in fair value including any interest elements, are reported in principal transactions revenue. For financial instruments that are not measured at fair value, the related interest is included within interest income or interest expense, as applicable. Refer to Notes 12, 10, 11 and 20, for further information on accounting for interest income and interest expense related to loans, investment securities, securities financing activities (i.e., securities purchased or sold under resale or repurchase agreements; securities borrowed; and securities loaned) and long-term debt, respectively.

Note 8 – Pension and other postretirement employee benefit plans

The Firm has various defined benefit pension plans and OPEB plans that provide benefits to its employees in the U.S. and certain non-U.S. locations. The Firm also provides a qualified defined contribution plan in the U.S. and maintains other similar arrangements in certain non-U.S. locations.

The principal defined benefit pension plan in the U.S. is a qualified noncontributory plan that provides benefits to substantially all U.S. employees. In connection with changes to the U.S. Retirement Savings Program during the fourth quarter of 2018, the Firm announced that it will freeze the U.S. defined benefit pension plan (the "Plan Freeze"). Commencing on January 1, 2020 (and January 1, 2019 for new hires), new pay credits are directed to the U.S. defined contribution plan. Interest credits on the U.S. defined benefit pension plan will continue to accrue. As a result, a curtailment was triggered and a remeasurement of the U.S. defined benefit pension obligation and plan assets occurred as of November 30, 2018. The plan design change did not have a material impact on the U.S. defined benefit pension plan or the Firm's Consolidated Financial Statements.

The Firm also has defined benefit pension plans that are offered in certain non-U.S. locations based on factors such as eligible compensation, age and/or years of service. It is the Firm's policy to fund the pension plans in amounts sufficient to meet the requirements under applicable laws. The Firm does not anticipate at this time making any contribution to the U.S. defined benefit pension plan in 2020. The 2020 contributions to the non-U.S. defined benefit pension plans are expected to be $49 million, of which $34 million are contractually required.

The Firm also has a number of nonqualified noncontributory defined benefit pension plans that are unfunded. These plans provide supplemental defined pension benefits to certain employees.

The Firm offers postretirement medical and life insurance benefits to certain U.S. retirees and postretirement medical benefits to certain qualifying U.S. and U.K. employees.

The Firm partially defrays the cost of its U.S. OPEB obligation through corporate-owned life insurance ("COLI") purchased on the lives of eligible employees and retirees. While the Firm owns the COLI policies, certain COLI proceeds (death benefits, withdrawals and other distributions) may be used only to reimburse the Firm for its net postretirement benefit claim payments and related administrative expense. The Firm has prefunded its U.S. postretirement benefit obligations. The U.K. OPEB plan is unfunded.

Pension and OPEB accounting guidance generally requires that the difference between plan assets at fair value and the benefit obligation be measured and recorded on the balance sheet. Plans that are overfunded (excess of plan assets over benefit obligation) are recorded in other assets and plans that are underfunded (excess benefit obligation over plan assets) are recorded in other liabilities. Gains or losses resulting from changes in the benefit obligation and the value of plan assets are recorded in OCI and recognized as part of the net periodic benefit cost over subsequent periods as discussed in the Gains and losses section of this Note. Additionally, benefits earned during the year are reported in compensation expense; all other components of net periodic defined benefit costs are reported in other expense in the Consolidated statements of income.

The following table presents the changes in benefit obligations, plan assets, the net funded status, and the pretax pension and OPEB amounts recorded in AOCI on the Consolidated balance sheets for the Firm's defined benefit pension and OPEB plans, and the weighted-average actuarial annualized assumptions for the projected and accumulated postretirement benefit obligations.

As of or for the year ended December 31,	Defined benefit pension plans		OPEB plans	
(in millions)	**2019**	2018	**2019**	2018
Change in benefit obligation				
Benefit obligation, beginning of year	**$ (15,512)**	$ (16,700)	**$ (612)**	$ (684)
Benefits earned during the year	**(356)**	(354)	**–**	–
Interest cost on benefit obligations	**(596)**	(556)	**(24)**	(24)
Plan amendments	**(5)**	(29)	**–**	–
Plan curtailment	**–**	123	**–**	–
Employee contributions	**(8)**	(7)	**(14)**	(15)
Net gain/(loss)	**(1,296)** (g)	938 (g)	**(51)**	40
Benefits paid	**820**	873	**67**	69
Plan settlements	**–**	15	**–**	–
Foreign exchange impact and other	**(116)**	185	**(2)**	2
Benefit obligation, end of year[(a)]	**$ (17,069)**	$ (15,512)	**$ (636)**	$ (612)
Change in plan assets				
Fair value of plan assets, beginning of year	**$ 18,052**	$ 19,603	**$ 2,633**	$ 2,757
Actual return on plan assets	**2,932**	(548)	**454**	(28)
Firm contributions	**80**	75	**2**	2
Employee contributions	**8**	7	**14**	15
Benefits paid	**(820)**	(873)	**(110)**	(113)
Plan settlements	**–**	(15)	**–**	–
Foreign exchange impact and other	**121**	(197)	**–**	–
Fair value of plan assets, end of year [(a)(b)]	**$ 20,373**	$ 18,052	**$ 2,993**	$ 2,633
Net funded status [(c)(d)]	**$ 3,304**	$ 2,540	**$ 2,357**	$ 2,021
Accumulated benefit obligation, end of year	**$ (17,047)**	$ (15,494)	**NA**	NA
Pretax pension and OPEB amounts recorded in AOCI				
Net gain/(loss)	**$ (2,260)**	$ (3,134)	**$ 470**	$ 184
Prior service credit/(cost)	**(26)**	(23)	**–**	–
Accumulated other comprehensive income/(loss), pretax, end of year	**$ (2,286)**	$ (3,157)	**$ 470**	$ 184
Weighted-average actuarial assumptions used to determine benefit obligations				
Discount rate [(e)]	**0.20 - 3.30%**	0.60 - 4.30 %	**3.20%**	4.20%
Rate of compensation increase [(e)]	**2.25 - 3.00**	2.25 - 3.00	**NA**	NA
Interest crediting rate[(e)]	**1.78 - 4.65%**	1.81 - 4.90%	**NA**	NA
Health care cost trend rate[(f)]				
Assumed for next year	**NA**	NA	**5.00**	5.00
Ultimate	**NA**	NA	**5.00**	5.00
Year when rate will reach ultimate	**NA**	NA	**2020**	2019

(a) At December 31, 2019 and 2018, included non-U.S. benefit obligations of $(3.8) billion and $(3.3) billion, and plan assets of $4.0 billion and $3.5 billion, respectively, predominantly in the U.K.

(b) At December 31, 2019 and 2018, defined benefit pension plan amounts that were not measured at fair value included $1.3 billion and $340 million, respectively, of accrued receivables, and $1.7 billion and $503 million, respectively, of accrued liabilities.

(c) Represents plans with an aggregate overfunded balance of $6.3 billion and $5.1 billion at December 31, 2019 and 2018, respectively, and plans with an aggregate underfunded balance of $618 million and $547 million at December 31, 2019 and 2018, respectively.

(d) For pension plans with a projected benefit obligation exceeding plan assets, the projected benefit obligation and fair value of plan assets was $1.5 billion and $885 million at December 31, 2019, respectively and $1.3 billion and $762 million at December 31, 2018, respectively. For pension plans with an accumulated benefit obligation exceeding plan assets, the accumulated benefit obligation and fair value of plan assets was $1.4 billion and $885 million at December 31, 2019, respectively, and $1.3 billion and $762 million at December 31, 2018, respectively. For OPEB plans with a projected benefit obligation exceeding plan assets, the projected benefit obligation was $43 million and $26 million at December 31, 2019 and 2018, respectively, and they had no plan assets.

(e) For the U.S. defined benefit pension plans, the discount rate assumption was 3.30% and 4.30%, and the interest crediting rate was 4.65% and 4.90%, for 2019 and 2018, respectively. The rate of compensation increase was not applicable to the U.S. plan in 2019 due to the Plan Freeze, and was 2.30% in 2018. The rate of compensation increase presented in the table for 2019 applies to the non-U.S. plans.

(f) Excludes participants whose benefits under the plan are capped.

(g) At December 31, 2019 and 2018, the gain/(loss) was primarily attributable to the change in the discount rate.

Gains and losses

For the Firm's defined benefit pension plans, fair value is used to determine the expected return on plan assets. Amortization of net gains and losses is included in annual net periodic benefit cost if, as of the beginning of the year, the net gain or loss exceeds 10% of the greater of the projected benefit obligation or the fair value of the plan assets. Any excess is amortized over the average future service period of defined benefit pension plan participants, which for the U.S. defined benefit pension plan is currently eight years and for the non-U.S. defined benefit pension plans is the period appropriate for the affected plan. As a result of the Plan Freeze, beginning in 2020, any excess for the U.S. defined benefit pension plan will be amortized over the average expected lifetime of plan participants which is currently 38 years. In addition, prior service costs are amortized over the average remaining service period of active employees expected to receive benefits under the plan when the prior service cost is first recognized.

For the Firm's OPEB plans, a calculated value that recognizes changes in fair value over a five-year period is used to determine the expected return on plan assets. This value is referred to as the market-related value of assets. Amortization of net gains and losses, adjusted for gains and losses not yet recognized, is included in annual net periodic benefit cost if, as of the beginning of the year, the net gain or loss exceeds 10% of the greater of the accumulated postretirement benefit obligation or the market-related value of assets. Any excess is amortized over the average expected lifetime of retired participants, which is currently eleven years.

The following table presents the components of net periodic benefit costs reported in the Consolidated statements of income for the Firm's U.S. and non-U.S. defined benefit pension, defined contribution and OPEB plans, and in other comprehensive income for the defined benefit pension and OPEB plans, and the weighted-average annualized actuarial assumptions for the net periodic benefit cost.

	Pension plans			OPEB plans		
Year ended December 31, (in millions)	**2019**	2018	2017	**2019**	2018	2017
Components of net periodic benefit cost						
Benefits earned during the year	**$ 356**	$ 354	$ 330	**$ –**	$ –	$ –
Interest cost on benefit obligations	**596**	556	598	**24**	24	28
Expected return on plan assets	**(915)**	(981)	(968)	**(112)**	(103)	(97)
Amortization:						
Net (gain)/loss	**167**	103	250	**–**	–	–
Prior service (credit)/cost	**3**	(23)	(36)	**–**	–	–
Curtailment (gain)/loss	**–**	21	–	**–**	–	–
Settlement (gain)/loss	**–**	2	2	**–**	–	–
Net periodic defined benefit cost[a]	**$ 207**	$ 32	$ 176	**$ (88)**	$ (79)	$ (69)
Other defined benefit pension plans[b]	**25**	20	24	**NA**	NA	NA
Total defined benefit plans	**$ 232**	$ 52	$ 200	**$ (88)**	$ (79)	$ (69)
Total defined contribution plans	**952**	872	814	**NA**	NA	NA
Total pension and OPEB cost included in noninterest expense	**$ 1,184**	$ 924	$ 1,014	**$ (88)**	$ (79)	$ (69)
Changes in plan assets and benefit obligations recognized in other comprehensive income						
Prior service (credit)/cost arising during the year	**5**	29	–	**–**	–	–
Net (gain)/loss arising during the year	**(719)**	467	(669)	**(286)**	91	(133)
Amortization of net loss	**(167)**	(103)	(250)	**–**	–	–
Amortization of prior service (cost)/credit	**(3)**	23	36	**–**	–	–
Curtailment gain/(loss)	**–**	(21)	–	**–**	–	–
Settlement gain/(loss)	**–**	(2)	(2)	**–**	–	–
Foreign exchange impact and other	**13**	(30)	54	**–**	(4)	–
Total recognized in other comprehensive income	**$ (871)**	$ 363	$ (831)	**$ (286)**	$ 87	$ (133)
Total recognized in net periodic benefit cost and other comprehensive income	**$ (664)**	$ 395	$ (655)	**$ (374)**	$ 8	$ (202)
Weighted-average assumptions used to determine net periodic benefit costs						
Discount rate[c]	**0.60 - 4.30%**	0.60 - 4.50 %	0.60 - 4.30 %	**4.20%**	3.70%	4.20%
Expected long-term rate of return on plan assets [c]	**0.00 - 5.50**	0.70 - 5.50	0.70 - 6.00	**4.30**	4.00	5.00
Rate of compensation increase [c]	**2.25 - 3.00**	2.25 - 3.00	2.25 - 3.00	**NA**	NA	NA
Interest crediting rate[c]	**1.81 - 4.90%**	1.81- 4.90%	1.81- 4.90%	**NA**	NA	NA
Health care cost trend rate[d]						
Assumed for next year	**NA**	NA	NA	**5.00**	5.00	5.00
Ultimate	**NA**	NA	NA	**5.00**	5.00	5.00
Year when rate will reach ultimate	**NA**	NA	NA	**2019**	2018	2017

(a) Benefits earned during the year are reported in compensation expense; all other components of net periodic defined benefit costs are reported within other expense in the Consolidated statements of income.
(b) Includes various defined benefit pension plans which are individually immaterial.
(c) The rate assumptions for the U.S. defined benefit pension plans are at the upper end of the range, except for the rate of compensation increase, which was 2.30% for 2019, 2018 and 2017, respectively.
(d) Excludes participants whose benefits under the plan are capped.

Plan assumptions

The Firm's expected long-term rate of return for defined benefit pension and OPEB plan assets is a blended weighted average, by asset allocation of the projected long-term returns for the various asset classes, taking into consideration local market conditions and the specific allocation of plan assets. Returns on asset classes are developed using a forward-looking approach and are not strictly based on historical returns. Consideration is also given to current market conditions and the short-term portfolio mix of each plan.

The discount rate used in determining the benefit obligation under the U.S. defined benefit pension and OPEB plans was provided by the Firm's actuaries. This rate was selected by reference to the yields on portfolios of bonds with maturity dates and coupons that closely match each of the plan's projected cash flows. The discount rate for the U.K. defined benefit pension plan represents a rate of appropriate duration from the analysis of yield curves provided by the Firm's actuaries.

At December 31, 2019, the Firm decreased the discount rates used to determine its benefit obligations for the U.S.

defined benefit pension and OPEB plans in light of current market interest rates, which is expected to decrease expense by approximately $69 million in 2020. The 2020 expected long-term rate of return on U.S. defined benefit pension plan assets and U.S. OPEB plan assets are 4.00% and 4.11%, respectively.

The following table represents the effect of a 25-basis point decline in the two listed rates below on estimated 2020 defined benefit pension and OPEB plan expense, as well as the effect on the postretirement benefit obligations.

(in millions)	Defined benefit pension and OPEB plan expense	Benefit obligation
Expected long-term rate of return	$ 57	NA
Discount rate	$ 6	$ 544

Investment strategy and asset allocation

The assets of the Firm's defined benefit pension plans are held in various trusts and are invested in well-diversified portfolios of equity and fixed income securities, cash and cash equivalents, and alternative investments. The trust-owned assets of the Firm's U.S. OPEB plan are invested primarily in fixed income securities. COLI policies used to partially defray the cost of the Firm's U.S. OPEB plan are invested in separate accounts of an insurance company and are allocated to investments intended to replicate equity and fixed income indices.

The investment policies for the assets of the Firm's defined benefit pension plans are to optimize the risk-return relationship as appropriate to the needs and goals of each plan using a global portfolio of various asset classes diversified by market segment, economic sector, and issuer. Assets are managed by a combination of internal and external investment managers. The Firm regularly reviews the asset allocations and asset managers, as well as other factors that impact the portfolios, which are rebalanced when deemed necessary.

Investments held by the plans include financial instruments which are exposed to various risks such as interest rate, market and credit risks. Exposure to a concentration of credit risk is mitigated by the broad diversification of both U.S. and non-U.S. investments. Additionally, the investments in each of the collective investment funds and/or registered investment companies are further diversified into various financial instruments. As of December 31, 2019, assets held by the Firm's defined benefit pension and OPEB plans do not include securities issued by JPMorgan Chase or its affiliates, except through indirect exposures through investments in ETFs, mutual funds and collective investment funds managed by third-parties. The plans hold investments that are sponsored or managed by affiliates of JPMorgan Chase in the amount of $3.1 billion and $3.7 billion, as of December 31, 2019 and 2018, respectively.

The following table presents the weighted-average asset allocation of the fair values of total plan assets at December 31 for the years indicated, as well as the respective approved asset allocation ranges by asset class.

	Defined benefit pension plans[a]			OPEB plan[d]		
	Asset	% of plan assets		Asset	% of plan assets	
December 31,	Allocation	**2019**	2018	Allocation	**2019**	2018
Asset class						
Debt securities[b]	42-100%	**74%**	48%	30-70%	**60%**	61%
Equity securities	0-40	**16**	37	30-70	**40**	39
Real estate	0-6	**1**	2	–	**–**	–
Alternatives [c]	0-24	**9**	13	–	**–**	–
Total	100%	**100%**	100%	100%	**100%**	100%

(a) Represents the U.S. defined benefit pension plan only, as that is the most significant plan.
(b) Debt securities primarily includes cash and cash equivalents, corporate debt, U.S. federal, state, local and non-U.S. government, asset-backed and mortgage-backed securities.
(c) Alternatives primarily include limited partnerships.
(d) Represents the U.S. OPEB plan only, as the U.K. OPEB plan is unfunded.

Fair value measurement of the plans' assets and liabilities

Refer to Note 2 for information on fair value measurements, including descriptions of level 1, 2, and 3 of the fair value hierarchy and the valuation methods employed by the Firm.

Pension and OPEB plan assets and liabilities measured at fair value

	Defined benefit pension plans							
	2019				2018			
December 31, (in millions)	Level 1	Level 2	Level 3	Total fair value	Level 1	Level 2	Level 3	Total fair value
Cash and cash equivalents	**$ 157**	**$ 1**	**$ –**	**$ 158**	$ 343	$ 1	$ –	$ 344
Equity securities	**3,240**	**184**	**2**	**3,426**	5,342	162	2	5,506
Collective investment funds[a]	**265**	**–**	**–**	**265**	161	–	–	161
Limited partnerships[b]	**187**	**–**	**–**	**187**	40	–	–	40
Corporate debt securities[c]	**–**	**7,090**	**2**	**7,092**	–	3,540	3	3,543
U.S. federal, state, local and non-U.S. government debt securities	**1,790**	**1,054**	**–**	**2,844**	1,191	743	–	1,934
Mortgage-backed securities	**314**	**701**	**4**	**1,019**	82	272	3	357
Derivative receivables	**–**	**337**	**–**	**337**	–	143	–	143
Other[d]	**785**	**132**	**250**	**1,167**	885	80	302	1,267
Total assets measured at fair value[e]	**$ 6,738**	**$ 9,499**	**$ 258**	**$ 16,495**	$ 8,044	$ 4,941	$ 310	$ 13,295
Derivative payables	**$ –**	**$ (118)**	**$ –**	**$ (118)**	$ –	$ (96)	$ –	$ (96)
Total liabilities measured at fair value[e]	**$ –**	**$ (118)**	**$ –**	**$ (118)**	$ –	$ (96)	$ –	$ (96)

(a) At December 31, 2019 and 2018, collective investment funds primarily included a mix of short-term investment funds, U.S. and non-U.S. equity investments (including index) and real estate funds.
(b) Unfunded commitments to purchase limited partnership investments for the plans were $451 million and $521 million for 2019 and 2018, respectively.
(c) Corporate debt securities include debt securities of U.S. and non-U.S. corporations.
(d) Other consists primarily of mutual funds, money market funds and participating annuity contracts. Mutual funds and money market funds are primarily classified within level 1 of the fair value hierarchy given they are valued using market observable prices. Participating annuity contracts are classified within level 3 of the fair value hierarchy due to a lack of market mechanisms for transferring each policy and surrender restrictions.
(e) At December 31, 2019 and 2018, excludes $4.4 billion and $5.0 billion of certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient, which are not required to be classified in the fair value hierarchy, $1.3 billion and $340 million of defined benefit pension plan receivables for investments sold and dividends and interest receivables, $1.7 billion and $479 million of defined benefit pension plan payables for investments purchased, and $25 million and $24 million of other liabilities, respectively.

At December 31, 2019 and 2018, the assets of the U.S. OPEB plan consisted of $562 million and $561 million, respectively, in cash and cash equivalents, corporate debt securities, U.S. federal, state, local and non-U.S. government debt securities and other assets classified in level 1 and level 2 of the valuation hierarchy and $2.4 billion and $2.1 billion, respectively, of COLI policies classified in level 3 of the valuation hierarchy.

Changes in level 3 fair value measurements using significant unobservable inputs

(in millions)	Fair value, Beginning balance	Actual return on plan assets: Realized gains/(losses)	Actual return on plan assets: Unrealized gains/(losses)[(b)]	Purchases, sales and settlements, net[(b)]	Transfers in and/or out of level 3	Fair value, Ending balance
Year ended December 31, 2019						
U.S. defined benefit pension plan						
Annuity contracts and other [(a)]	**$ 310**	**$ –**	**$ 31**	**$ (85)**	**$ 2**	**$ 258**
U.S. OPEB plan						
COLI policies	**$ 2,072**	**$ –**	**$ 401**	**$ (42)**	**$ –**	**$ 2,431**
Year ended December 31, 2018						
U.S. defined benefit pension plan						
Annuity contracts and other [(a)]	$ 310	$ –	$ –	$ (1)	$ 1	$ 310
U.S. OPEB plan						
COLI policies	$ 2,157	$ –	$ (42)	$ (43)	$ –	$ 2,072

(a) Substantially all are participating annuity contracts.
(b) The prior period amounts have been revised to conform with the current period presentation.

Estimated future benefit payments

The following table presents benefit payments expected to be paid, which include the effect of expected future service, for the years indicated. The OPEB medical and life insurance payments are net of expected retiree contributions.

Year ended December 31, (in millions)	Defined benefit pension plans	OPEB before Medicare Part D subsidy	Medicare Part D subsidy
2020	$ 1,030	$ 59	$ 1
2021	1,020	57	1
2022	1,020	54	–
2023	980	52	–
2024	970	50	–
Years 2025-2029	4,613	211	1

Note 9 – Employee share-based incentives

Employee share-based awards

In 2019, 2018 and 2017, JPMorgan Chase granted long-term share-based awards to certain employees under its LTIP, as amended and restated effective May 15, 2018. Under the terms of the LTIP, as of December 31, 2019, 75 million shares of common stock were available for issuance through May 2022. The LTIP is the only active plan under which the Firm is currently granting share-based incentive awards. In the following discussion, the LTIP, plus prior Firm plans and plans assumed as the result of acquisitions, are referred to collectively as the "LTI Plans," and such plans constitute the Firm's share-based incentive plans.

RSUs are awarded at no cost to the recipient upon their grant. Generally, RSUs are granted annually and vest at a rate of 50% after two years and 50% after three years and are converted into shares of common stock as of the vesting date. In addition, RSUs typically include full-career eligibility provisions, which allow employees to continue to vest upon voluntary termination based on age or service-related requirements, subject to post-employment and other restrictions. All RSU awards are subject to forfeiture until vested and contain clawback provisions that may result in cancellation under certain specified circumstances. Predominantly all RSUs entitle the recipient to receive cash payments equivalent to any dividends paid on the underlying common stock during the period the RSUs are outstanding.

Performance share units ("PSUs") are granted annually, and approved by the Firm's Board of Directors, to members of the Firm's Operating Committee under the variable compensation program. PSUs are subject to the Firm's achievement of specified performance criteria over a three-year period. The number of awards that vest can range from zero to 150% of the grant amount. In addition, dividends that accrue during the vesting period are reinvested in dividend equivalent share units. PSUs and the related dividend equivalent share units are converted into shares of common stock after vesting.

Once the PSUs and dividend equivalent share units have vested, the shares of common stock that are delivered, after applicable tax withholding, must be held for an additional two-year period, for a total combined vesting and holding period of approximately five to eight years from the grant date depending on regulations in certain countries.

Under the LTI Plans, stock appreciation rights ("SARs") and stock options have generally been granted with an exercise price equal to the fair value of JPMorgan Chase's common stock on the grant date. SARs and stock options generally expire ten years after the grant date. There were no material grants of employee SARs or stock options in 2019, 2018 and 2017.

The Firm separately recognizes compensation expense for each tranche of each award, net of estimated forfeitures, as if it were a separate award with its own vesting date. Generally, for each tranche granted, compensation expense is recognized on a straight-line basis from the grant date until the vesting date of the respective tranche, provided that the employees will not become full-career eligible during the vesting period. For awards with full-career eligibility provisions and awards granted with no future substantive service requirement, the Firm accrues the estimated value of awards expected to be awarded to employees as of the grant date without giving consideration to the impact of post-employment restrictions. For each tranche granted to employees who will become full-career eligible during the vesting period, compensation expense is recognized on a straight-line basis from the grant date until the earlier of the employee's full-career eligibility date or the vesting date of the respective tranche.

The Firm's policy for issuing shares upon settlement of employee share-based incentive awards is to issue either new shares of common stock or treasury shares. During 2019, 2018 and 2017, the Firm settled all of its employee share-based awards by issuing treasury shares.

Refer to Note 23 for further information on the classification of share-based awards for purposes of calculating earnings per share.

RSUs, PSUs, employee SARs and stock options activity

Generally, compensation expense for RSUs and PSUs is measured based on the number of units granted multiplied by the stock price at the grant date, and for employee SARs and stock options, is measured at the grant date using the Black-Scholes valuation model. Compensation expense for these awards is recognized in net income as described previously. The following table summarizes JPMorgan Chase's RSUs, PSUs, employee SARs and stock options activity for 2019.

Year ended December 31, 2019 (in thousands, except weighted-average data, and where otherwise stated)	RSUs/PSUs		SARs/Options			
	Number of units	Weighted-average grant date fair value	Number of awards	Weighted-average exercise price	Weighted-average remaining contractual life (in years)	Aggregate intrinsic value
Outstanding, January 1	**58,809**	**$ 85.04**	**12,463**	**$ 41.46**		
Granted	**23,811**	**99.79**	**18**	**111.01**		
Exercised or vested	**(28,754)**	**69.98**	**(6,923)**	**41.50**		
Forfeited	**(1,627)**	**98.58**	**–**	**–**		
Canceled	**NA**	**NA**	**(31)**	**89.71**		
Outstanding, December 31	**52,239**	**$ 99.62**	**5,527**	**$ 41.36**	**1.9**	**$ 539,071**
Exercisable, December 31	**NA**	**NA**	**5,522**	**41.29**	**1.9**	**538,971**

The total fair value of RSUs that vested during the years ended December 31, 2019, 2018 and 2017, was $2.9 billion, $3.6 billion and $2.9 billion, respectively. The total intrinsic value of options exercised during the years ended December 31, 2019, 2018 and 2017, was $503 million, $370 million and $651 million, respectively.

Compensation expense

The Firm recognized the following noncash compensation expense related to its various employee share-based incentive plans in its Consolidated statements of income.

Year ended December 31, (in millions)	**2019**	2018	2017
Cost of prior grants of RSUs, PSUs, SARs and employee stock options that are amortized over their applicable vesting periods	**$ 1,141**	$ 1,241	$ 1,125
Accrual of estimated costs of share-based awards to be granted in future periods including those to full-career eligible employees	**1,115**	1,081	945
Total noncash compensation expense related to employee share-based incentive plans	**$ 2,256**	$ 2,322	$ 2,070

At December 31, 2019, approximately $693 million (pretax) of compensation expense related to unvested awards had not yet been charged to net income. That cost is expected to be amortized into compensation expense over a weighted-average period of 1.6 years. The Firm does not capitalize any compensation expense related to share-based compensation awards to employees.

Tax benefits

Excess tax benefits (including tax benefits from dividends or dividend equivalents) on share-based payment awards are recognized within income tax expense in the Consolidated statements of income. Income tax benefits related to share-based incentive arrangements recognized in the Firm's Consolidated statements of income for the years ended December 31, 2019, 2018 and 2017, were $895 million, $1.1 billion and $1.0 billion, respectively.

Note 10 – Investment securities

Investment securities consist of debt securities that are classified as AFS or HTM. Debt securities classified as trading assets are discussed in Note 2. Predominantly all of the Firm's AFS and HTM securities are held by Treasury and CIO in connection with its asset-liability management activities. At December 31, 2019, the investment securities portfolio consisted of debt securities with an average credit rating of AA+ (based upon external ratings where available, and where not available, based primarily upon internal ratings). The Firm's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., PDs and LGDs) may differ as they reflect internal historical experiences and assumptions.

AFS securities are carried at fair value on the Consolidated balance sheets. Unrealized gains and losses, after any applicable hedge accounting adjustments, are reported as net increases or decreases to AOCI. The specific identification method is used to determine realized gains and losses on AFS securities, which are included in securities gains/(losses) on the Consolidated statements of income. HTM debt securities, which the Firm has the intent and ability to hold until maturity, are carried at amortized cost on the Consolidated balance sheets.

For both AFS and HTM debt securities, purchase discounts or premiums are generally amortized into interest income on a level-yield basis over the contractual life of the security. However, premiums on certain callable debt securities are amortized to the earliest call date.

During the fourth quarter of 2019, the Firm transferred $6.2 billion of collateralized loan obligations from AFS to HTM for capital management purposes. These securities were transferred at fair value in a non-cash transaction.

The amortized costs and estimated fair values of the investment securities portfolio were as follows for the dates indicated.

December 31, (in millions)	2019 Amortized cost	2019 Gross unrealized gains	2019 Gross unrealized losses	2019 Fair value	2018 Amortized cost	2018 Gross unrealized gains	2018 Gross unrealized losses	2018 Fair value
Available-for-sale securities								
Mortgage-backed securities:								
U.S. GSEs and government agencies[a]	**$ 107,811**	**$ 2,395**	**$ 89**	**$ 110,117**	$ 69,026	$ 594	$ 974	$ 68,646
Residential:								
U.S	**10,223**	**233**	**6**	**10,450**	5,877	79	31	5,925
Non-U.S.	**2,477**	**64**	**1**	**2,540**	2,529	72	6	2,595
Commercial	**5,137**	**64**	**13**	**5,188**	6,758	43	147	6,654
Total mortgage-backed securities	**125,648**	**2,756**	**109**	**128,295**	84,190	788	1,158	83,820
U.S. Treasury and government agencies	**139,162**	**449**	**175**	**139,436**	55,771	366	78	56,059
Obligations of U.S. states and municipalities	**27,693**	**2,118**	**1**	**29,810**	36,221	1,582	80	37,723
Certificates of deposit	**77**	**—**	**—**	**77**	75	—	—	75
Non-U.S. government debt securities	**21,427**	**377**	**17**	**21,787**	23,771	351	20	24,102
Corporate debt securities	**823**	**22**	**—**	**845**	1,904	23	9	1,918
Asset-backed securities:								
Collateralized loan obligations	**25,038**	**9**	**56**	**24,991**	19,612	1	176	19,437
Other	**5,438**	**40**	**20**	**5,458**	7,225	57	22	7,260
Total available-for-sale securities	**345,306**	**5,771**	**378**	**350,699**	228,769	3,168	1,543	230,394
Held-to-maturity securities								
Mortgage-backed securities:								
U.S. GSEs and government agencies[a]	**36,523**	**1,165**	**62**	**37,626**	26,610	134	200	26,544
Total mortgage-backed securities	**36,523**	**1,165**	**62**	**37,626**	26,610	134	200	26,544
U.S. Treasury and government agencies	**51**	**—**	**1**	**50**	—	—	—	—
Obligations of U.S. states and municipalities	**4,797**	**299**	**—**	**5,096**	4,824	105	15	4,914
Asset-backed securities:								
Collateralized loan obligations	**6,169**	**—**	**—**	**6,169**	—	—	—	—
Total held-to-maturity securities	**47,540**	**1,464**	**63**	**48,941**	31,434	239	215	31,458
Total investment securities	**$ 392,846**	**$ 7,235**	**$ 441**	**$ 399,640**	$ 260,203	$ 3,407	$ 1,758	$ 261,852

(a) Includes AFS U.S. GSE obligations with fair values of $78.5 billion and $50.7 billion, and HTM U.S. GSE obligations with amortized cost of $31.6 billion and $20.9 billion, at December 31, 2019 and 2018, respectively. As of December 31, 2019, mortgage-backed securities issued by Fannie Mae and Freddie Mac each exceeded 10% of JPMorgan Chase's total stockholders' equity; the amortized cost and fair value of such securities were $69.4 billion and $71.4 billion, and $38.7 billion and $39.6 billion, respectively.

Investment securities impairment

The following tables present the fair value and gross unrealized losses for investment securities by aging category at December 31, 2019 and 2018.

December 31, 2019 (in millions)	Investment securities with gross unrealized losses					
	Less than 12 months		12 months or more			
	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	$ 16,966	$ 53	$ 3,058	$ 36	$ 20,024	$ 89
Residential:						
U.S	1,072	3	423	3	1,495	6
Non-U.S.	13	—	420	1	433	1
Commercial	1,287	12	199	1	1,486	13
Total mortgage-backed securities	19,338	68	4,100	41	23,438	109
U.S. Treasury and government agencies	23,003	145	5,695	30	28,698	175
Obligations of U.S. states and municipalities	186	1	—	—	186	1
Certificates of deposit	77	—	—	—	77	—
Non-U.S. government debt securities	3,970	13	1,406	4	5,376	17
Corporate debt securities	—	—	—	—	—	—
Asset-backed securities:						
Collateralized loan obligations	10,364	11	7,756	45	18,120	56
Other	1,639	9	753	11	2,392	20
Total available-for-sale securities	58,577	247	19,710	131	78,287	378
Held-to-maturity securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	5,186	62	81	—	5,267	62
Total mortgage-backed securities	5,186	62	81	—	5,267	62
U.S. Treasury and government agencies	50	1	—	—	50	1
Obligations of U.S. states and municipalities	—	—	—	—	—	—
Asset-backed securities:						
Collateralized loan obligations	3,421	—	1,375	—	4,796	—
Total held-to-maturity securities	8,657	63	1,456	—	10,113	63
Total investment securities with gross unrealized losses	$ 67,234	$ 310	$ 21,166	$ 131	$ 88,400	$ 441

December 31, 2018 (in millions)	Investment securities with gross unrealized losses					
	Less than 12 months		12 months or more			
	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	17,656	318	22,728	656	40,384	974
Residential:						
U.S.	623	4	1,445	27	2,068	31
Non-U.S.	907	5	165	1	1,072	6
Commercial	974	6	3,172	141	4,146	147
Total mortgage-backed securities	20,160	333	27,510	825	47,670	1,158
U.S. Treasury and government agencies	4,792	7	2,391	71	7,183	78
Obligations of U.S. states and municipalities	1,808	15	2,477	65	4,285	80
Certificates of deposit	75	–	–	–	75	–
Non-U.S. government debt securities	3,123	5	1,937	15	5,060	20
Corporate debt securities	478	8	37	1	515	9
Asset-backed securities:						
Collateralized loan obligations	18,681	176	–	–	18,681	176
Other	1,208	6	2,354	16	3,562	22
Total available-for-sale securities	50,325	550	36,706	993	87,031	1,543
Held-to-maturity securities						
Mortgage-backed securities:						
U.S. GSEs and government agencies	4,385	23	7,082	177	11,467	200
Total mortgage-backed securities	4,385	23	7,082	177	11,467	200
Obligations of U.S. states and municipalities	12	–	1,114	15	1,126	15
Total held-to-maturity securities	4,397	23	8,196	192	12,593	215
Total investment securities with gross unrealized losses	54,722	573	44,902	1,185	99,624	1,758

Other-than-temporary impairment

AFS and HTM debt securities in unrealized loss positions are analyzed as part of the Firm's ongoing assessment of OTTI. The Firm considers a decline in fair value to be other-than-temporary when the Firm does not expect to recover the entire amortized cost basis of the security.

For AFS debt securities, the Firm recognizes OTTI losses in earnings if the Firm has the intent to sell the debt security, or if it is more likely than not that the Firm will be required to sell the debt security before recovery of its amortized cost basis. In these circumstances the impairment loss is equal to the full difference between the amortized cost basis and the fair value of the securities.

For debt securities in an unrealized loss position that the Firm has the intent and ability to hold, the securities are evaluated to determine if a credit loss exists. In the event of a credit loss, only the amount of impairment associated with the credit loss is recognized in income. Amounts relating to factors other than credit losses are recorded in OCI.

Factors considered in evaluating potential OTTI include adverse conditions specifically related to the industry, geographic area or financial condition of the issuer or underlying collateral of a security; payment structure of the security; changes to the rating of the security by a rating agency; the volatility of the fair value changes; and the Firm's intent and ability to hold the security until recovery.

The Firm's cash flow evaluations take into account the factors noted above and expectations of relevant market and economic data as of the end of the reporting period. When assessing securities issued in a securitization for OTTI, the Firm estimates cash flows considering underlying loan-level data and structural features of the securitization, such as subordination, excess spread, overcollateralization or other forms of credit enhancement, and compares the losses projected for the underlying collateral ("pool losses") against the level of credit enhancement in the securitization structure to determine whether these features are sufficient to absorb the pool losses, or whether a credit loss exists. The Firm also performs other analyses to support its cash flow projections, such as first-loss analyses or stress scenarios.

For beneficial interests in securitizations that are rated below "AA" at their acquisition, or that can be contractually prepaid or otherwise settled in such a way that the Firm would not recover substantially all of its recorded investment, the Firm considers an impairment to be other-than-temporary when there is an adverse change in expected cash flows.

The Firm recognizes unrealized losses on investment securities that it intends to sell as OTTI. The Firm does not intend to sell any of the remaining investment securities with an unrealized loss in AOCI as of December 31, 2019, and it is not likely that the Firm will be required to sell these securities before recovery of their amortized cost basis. Further, the Firm did not recognize any credit-related OTTI losses during the year ended December 31, 2019. Based on its assessment, the Firm believes that the investment securities with an unrealized loss in AOCI as of December 31, 2019, are not other-than-temporarily impaired.

Investment securities gains and losses

The following table presents realized gains and losses and OTTI from AFS securities that were recognized in income.

Year ended December 31, (in millions)	2019	2018	2017
Realized gains	**$ 650**	$ 211	$ 1,013
Realized losses	**(392)**	(606)	(1,072)
OTTI losses[a]	**–**	–	(7)
Net investment securities gains/ (losses)	**258**	(395)	(66)

(a) Represents OTTI losses recognized in income on investment securities the Firm intends to sell. Excludes realized losses on securities sold of $22 million and $6 million for the years ended December 31, 2018 and 2017, respectively, that had been previously reported as an OTTI loss due to the intention to sell the securities.

Changes in the credit loss component of credit-impaired debt securities

The cumulative credit loss component, including any changes therein, of OTTI losses that have been recognized in income related to AFS securities was not material as of and during the years ended December 31, 2019, 2018 and 2017.

Contractual maturities and yields

The following table presents the amortized cost and estimated fair value at December 31, 2019, of JPMorgan Chase's investment securities portfolio by contractual maturity.

By remaining maturity December 31, 2019 (in millions)	Due in one year or less	Due after one year through five years	Due after five years through 10 years	Due after 10 years[b]	Total
Available-for-sale securities					
Mortgage-backed securities					
Amortized cost	$ 1	$ 58	$ 11,073	$ 114,516	$ 125,648
Fair value	1	58	11,251	116,985	128,295
Average yield[a]	1.99%	2.78%	2.76%	3.40%	3.34%
U.S. Treasury and government agencies					
Amortized cost	$ 10,687	$ 92,805	$ 26,353	$ 9,317	$ 139,162
Fair value	10,700	93,039	26,446	9,251	139,436
Average yield[a]	1.82%	1.84%	1.90%	1.98%	1.86%
Obligations of U.S. states and municipalities					
Amortized cost	$ 123	$ 193	$ 825	$ 26,552	$ 27,693
Fair value	124	202	883	28,601	29,810
Average yield[a]	4.13%	4.68%	5.28%	4.86%	4.87%
Certificates of deposit					
Amortized cost	$ 77	$ –	$ –	$ –	$ 77
Fair value	77	–	–	–	77
Average yield[a]	0.50%	–%	–%	–%	0.50%
Non-U.S. government debt securities					
Amortized cost	$ 6,672	$ 11,544	$ 2,898	$ 313	$ 21,427
Fair value	6,682	11,791	3,001	313	21,787
Average yield[a]	2.17%	1.84%	1.29%	1.67%	1.87%
Corporate debt securities					
Amortized cost	$ 205	$ 206	$ 412	$ –	$ 823
Fair value	207	212	426	–	845
Average yield[a]	4.49%	4.14%	3.50%	–%	3.91%
Asset-backed securities					
Amortized cost	$ 17	$ 2,352	$ 7,184	$ 20,923	$ 30,476
Fair value	17	2,353	7,177	20,902	30,449
Average yield[a]	0.62%	2.78%	2.86%	2.77%	2.79%
Total available-for-sale securities					
Amortized cost	$ 17,782	$ 107,158	$ 48,745	$ 171,621	$ 345,306
Fair value	17,808	107,655	49,184	176,052	350,699
Average yield[a]	1.99%	1.87%	2.27%	3.47%	2.73%
Held-to-maturity securities					
Mortgage-backed securities					
Amortized Cost	$ –	$ –	$ 5,850	$ 30,673	$ 36,523
Fair value	–	–	6,114	31,512	37,626
Average yield[a]	–%	–%	3.06%	3.10%	3.10%
U.S. Treasury and government agencies					
Amortized cost	$ –	$ 51	$ –	$ –	$ 51
Fair value	–	50	–	–	50
Average yield[a]	–%	1.47%	–%	–%	1.47%
Obligations of U.S. states and municipalities					
Amortized cost	$ –	$ –	$ 99	$ 4,698	$ 4,797
Fair value	–	–	106	4,990	5,096
Average yield[a]	–%	–%	3.91%	4.04%	4.04%
Asset-backed securities					
Amortized cost	$ –	$ –	$ 5,296	$ 873	$ 6,169
Fair value	–	–	5,296	873	6,169
Average yield[a]	–%	–%	3.19%	3.11%	3.18%
Total held-to-maturity securities					
Amortized cost	$ –	$ 51	$ 11,245	$ 36,244	$ 47,540
Fair value	–	50	11,516	37,375	48,941
Average yield[a]	–%	1.47%	3.13%	3.23%	3.20%

(a) Average yield is computed using the effective yield of each security owned at the end of the period, weighted based on the amortized cost of each security. The effective yield considers the contractual coupon, amortization of premiums and accretion of discounts, and the effect of related hedging derivatives. Taxable-equivalent amounts are used where applicable. The effective yield excludes unscheduled principal prepayments; and accordingly, actual maturities of securities may differ from their contractual or expected maturities as certain securities may be prepaid.

(b) Substantially all of the Firm's U.S. residential MBS and collateralized mortgage obligations are due in 10 years or more, based on contractual maturity. The estimated weighted-average life, which reflects anticipated future prepayments, is approximately 6 years for agency residential MBS, 3 years for agency residential collateralized mortgage obligations and 3 years for nonagency residential collateralized mortgage obligations.

Note 11 – Securities financing activities

JPMorgan Chase enters into resale, repurchase, securities borrowed and securities loaned agreements (collectively, "securities financing agreements") primarily to finance the Firm's inventory positions, acquire securities to cover short sales, accommodate customers' financing needs, settle other securities obligations and to deploy the Firm's excess cash.

Securities financing agreements are treated as collateralized financings on the Firm's Consolidated balance sheets. Resale and repurchase agreements are generally carried at the amounts at which the securities will be subsequently sold or repurchased. Securities borrowed and securities loaned agreements are generally carried at the amount of cash collateral advanced or received. Where appropriate under applicable accounting guidance, securities financing agreements with the same counterparty are reported on a net basis. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. Fees received and paid in connection with securities financing agreements are recorded over the life of the agreement in interest income and interest expense on the Consolidated statements of income.

The Firm has elected the fair value option for certain securities financing agreements. Refer to Note 3 for further information regarding the fair value option. The securities financing agreements for which the fair value option has been elected are reported within securities purchased under resale agreements, securities loaned or sold under repurchase agreements, and securities borrowed on the Consolidated balance sheets. Generally, for agreements carried at fair value, current-period interest accruals are recorded within interest income and interest expense, with changes in fair value reported in principal transactions revenue. However, for financial instruments containing embedded derivatives that would be separately accounted for in accordance with accounting guidance for hybrid instruments, all changes in fair value, including any interest elements, are reported in principal transactions revenue.

Securities financing agreements expose the Firm primarily to credit and liquidity risk. To manage these risks, the Firm monitors the value of the underlying securities (predominantly high-quality securities collateral, including government-issued debt and U.S. GSEs and government agencies MBS) that it has received from or provided to its counterparties compared to the value of cash proceeds and exchanged collateral, and either requests additional collateral or returns securities or collateral when appropriate. Margin levels are initially established based upon the counterparty, the type of underlying securities, and the permissible collateral, and are monitored on an ongoing basis.

In resale and securities borrowed agreements, the Firm is exposed to credit risk to the extent that the value of the securities received is less than initial cash principal advanced and any collateral amounts exchanged. In repurchase and securities loaned agreements, credit risk exposure arises to the extent that the value of underlying securities advanced exceeds the value of the initial cash principal received, and any collateral amounts exchanged.

Additionally, the Firm typically enters into master netting agreements and other similar arrangements with its counterparties, which provide for the right to liquidate the underlying securities and any collateral amounts exchanged in the event of a counterparty default. It is also the Firm's policy to take possession, where possible, of the securities underlying resale and securities borrowed agreements. Refer to Note 29 for further information regarding assets pledged and collateral received in securities financing agreements.

As a result of the Firm's credit risk mitigation practices with respect to resale and securities borrowed agreements as described above, the Firm did not hold any reserves for credit impairment with respect to these agreements as of December 31, 2019 and 2018.

The table below summarizes the gross and net amounts of the Firm's securities financing agreements, as of December 31, 2019 and 2018. When the Firm has obtained an appropriate legal opinion with respect to a master netting agreement with a counterparty and where other relevant netting criteria under U.S. GAAP are met, the Firm nets, on the Consolidated balance sheets, the balances outstanding under its securities financing agreements with the same counterparty. In addition, the Firm exchanges securities and/or cash collateral with its counterparty to reduce the economic exposure with the counterparty, but such collateral is not eligible for net Consolidated balance sheet presentation. Where the Firm has obtained an appropriate legal opinion with respect to the counterparty master netting agreement, such collateral, along with securities financing balances that do not meet all these relevant netting criteria under U.S. GAAP, is presented in the table below as "Amounts not nettable on the Consolidated balance sheets," and reduces the "Net amounts" presented. Where a legal opinion has not been either sought or obtained, the securities financing balances are presented gross in the "Net amounts" below.

	2019				
December 31, (in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[b]	Net amounts[c]
Assets					
Securities purchased under resale agreements	**$ 628,609**	**$ (379,463)**	**$ 249,146**	**$ (233,818)**	**$ 15,328**
Securities borrowed	**166,718**	**(26,960)**	**139,758**	**(104,990)**	**34,768**
Liabilities					
Securities sold under repurchase agreements	**$ 555,172**	**$ (379,463)**	**$ 175,709**	**$ (151,566)**	**$ 24,143**
Securities loaned and other[a]	**36,649**	**(26,960)**	**9,689**	**(9,654)**	**35**

	2018				
December 31, (in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[b]	Net amounts[c]
Assets					
Securities purchased under resale agreements	$ 691,116	$ (369,612)	$ 321,504	$ (308,854)	$ 12,650
Securities borrowed	132,955	(20,960)	111,995	(79,747)	32,248
Liabilities					
Securities sold under repurchase agreements	$ 541,587	$ (369,612)	$ 171,975	$ (149,125)	$ 22,850
Securities loaned and other[a]	33,700	(20,960)	12,740	(12,358)	382

(a) Includes securities-for-securities lending agreements of $3.7 billion and $3.3 billion at December 31, 2019 and 2018, respectively, accounted for at fair value, where the Firm is acting as lender. In the Consolidated balance sheets, the Firm recognizes the securities received at fair value within other assets and the obligation to return those securities within accounts payable and other liabilities.

(b) In some cases, collateral exchanged with a counterparty exceeds the net asset or liability balance with that counterparty. In such cases, the amounts reported in this column are limited to the related net asset or liability with that counterparty.

(c) Includes securities financing agreements that provide collateral rights, but where an appropriate legal opinion with respect to the master netting agreement has not been either sought or obtained. At December 31, 2019 and 2018, included $11.0 billion and $7.9 billion, respectively, of securities purchased under resale agreements; $31.9 billion and $30.3 billion, respectively, of securities borrowed; $22.7 billion and $21.5 billion, respectively, of securities sold under repurchase agreements; and $7 million and $25 million, respectively, of securities loaned and other.

The tables below present as of December 31, 2019 and 2018 the types of financial assets pledged in securities financing agreements and the remaining contractual maturity of the securities financing agreements.

	Gross liability balance			
	2019		2018	
December 31, (in millions)	Securities sold under repurchase agreements	Securities loaned and other	Securities sold under repurchase agreements	Securities loaned and other
Mortgage-backed securities:				
U.S. GSEs and government agencies	**$ 34,119**	**$ –**	$ 34,311 (a)	$ –
Residential - nonagency	**1,239**	**–**	2,165	–
Commercial - nonagency	**1,612**	**–**	1,390	–
U.S. Treasury, GSEs and government agencies	**334,398**	**29**	317,578 (a)	69
Obligations of U.S. states and municipalities	**1,181**	**–**	1,150	–
Non-U.S. government debt	**145,548**	**1,528**	154,900	4,313
Corporate debt securities	**13,826**	**1,580**	13,898	428
Asset-backed securities	**1,794**	**–**	3,867	–
Equity securities	**21,455**	**33,512**	12,328	28,890
Total	**$ 555,172**	**$ 36,649**	$ 541,587	$ 33,700

(a) The prior period amounts have been revised to conform with the current period presentation.

	Remaining contractual maturity of the agreements				
2019 (in millions)	Overnight and continuous	Up to 30 days	30 – 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	**$ 225,134**	**$ 199,870**	**$ 57,305**	**$ 72,863**	**$ 555,172**
Total securities loaned and other	**32,028**	**1,706**	**937**	**1,978**	**36,649**

	Remaining contractual maturity of the agreements				
2018 (in millions)	Overnight and continuous	Up to 30 days	30 – 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	$ 247,579	$ 174,971	$ 71,637	$ 47,400	$ 541,587
Total securities loaned and other	28,402	997	2,132	2,169	33,700

Transfers not qualifying for sale accounting

At December 31, 2019 and 2018, the Firm held $743 million and $2.1 billion, respectively, of financial assets for which the rights have been transferred to third parties; however, the transfers did not qualify as a sale in accordance with U.S. GAAP. These transfers have been recognized as collateralized financing transactions. The transferred assets are recorded in trading assets and loans, and the corresponding liabilities are recorded predominantly in short-term borrowings on the Consolidated balance sheets. The prior period amount has been revised to conform with the current period presentation.

Note 12 – Loans

Loan accounting framework

The accounting for a loan depends on management's strategy for the loan, and on whether the loan was credit-impaired at the date of acquisition. The Firm accounts for loans based on the following categories:

- Originated or purchased loans held-for-investment (i.e., "retained"), other than PCI loans
- Loans held-for-sale
- Loans at fair value
- PCI loans held-for-investment

The following provides a detailed accounting discussion of these loan categories:

Loans held-for-investment (other than PCI loans)

Originated or purchased loans held-for-investment, other than PCI loans, are recorded at the principal amount outstanding, net of the following: charge-offs; interest applied to principal (for loans accounted for on the cost recovery method); unamortized discounts and premiums; and net deferred loan fees or costs. Credit card loans also include billed finance charges and fees net of an allowance for uncollectible amounts.

Interest income

Interest income on performing loans held-for-investment, other than PCI loans, is accrued and recognized as interest income at the contractual rate of interest. Purchase price discounts or premiums, as well as net deferred loan fees or costs, are amortized into interest income over the contractual life of the loan as an adjustment of yield.

Nonaccrual loans

Nonaccrual loans are those on which the accrual of interest has been suspended. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status and considered nonperforming when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest has been in default for a period of 90 days or more, unless the loan is both well-secured and in the process of collection. A loan is determined to be past due when the minimum payment is not received from the borrower by the contractually specified due date or for certain loans (e.g., residential real estate loans), when a monthly payment is due and unpaid for 30 days or more. Finally, collateral-dependent loans are typically maintained on nonaccrual status.

On the date a loan is placed on nonaccrual status, all interest accrued but not collected is reversed against interest income. In addition, the amortization of deferred amounts is suspended. Interest income on nonaccrual loans may be recognized as cash interest payments are received (i.e., on a cash basis) if the recorded loan balance is deemed fully collectible; however, if there is doubt regarding the ultimate collectibility of the recorded loan balance, all interest cash receipts are applied to reduce the carrying value of the loan (the cost recovery method). For consumer loans, application of this policy typically results in the Firm recognizing interest income on nonaccrual consumer loans on a cash basis.

A loan may be returned to accrual status when repayment is reasonably assured and there has been demonstrated performance under the terms of the loan or, if applicable, the terms of the restructured loan.

As permitted by regulatory guidance, credit card loans are generally exempt from being placed on nonaccrual status; accordingly, interest and fees related to credit card loans continue to accrue until the loan is charged off or paid in full. The Firm separately establishes an allowance, which reduces loans and is charged to interest income, for the estimated uncollectible portion of accrued and billed interest and fee income on credit card loans.

Allowance for loan losses

The allowance for loan losses represents the estimated probable credit losses inherent in the held-for-investment loan portfolio at the balance sheet date and is recognized on the balance sheet as a contra asset, which brings the recorded investment to the net carrying value. Changes in the allowance for loan losses are recorded in the provision for credit losses on the Firm's Consolidated statements of income. Refer to Note 13 for further information on the Firm's accounting policies for the allowance for loan losses.

Charge-offs

Consumer loans, other than risk-rated business banking and auto loans, and PCI loans, are generally charged off or charged down to the net realizable value of the underlying collateral (i.e., fair value less costs to sell), with an offset to the allowance for loan losses, upon reaching specified stages of delinquency in accordance with standards established by the FFIEC. Residential real estate loans and non-modified credit card loans are generally charged off no later than 180 days past due. Scored auto and modified credit card loans are charged off no later than 120 days past due.

Certain consumer loans will be charged off or charged down to their net realizable value earlier than the FFIEC charge-off standards in certain circumstances as follows:

- Loans modified in a TDR that are determined to be collateral-dependent.
- Loans to borrowers who have experienced an event that suggests a loss is either known or highly certain are subject to accelerated charge-off standards (e.g., residential real estate and auto loans are charged off within 60 days of receiving notification of a bankruptcy filing).
- Auto loans upon repossession of the automobile.

Other than in certain limited circumstances, the Firm typically does not recognize charge-offs on government-guaranteed loans.

Wholesale loans, risk-rated business banking loans and risk-rated auto loans are charged off when it is highly certain that a loss has been realized, including situations where a loan is determined to be both impaired and collateral-dependent. The determination of whether to recognize a charge-off includes many factors, including the prioritization of the Firm's claim in bankruptcy, expectations of the workout/restructuring of the loan and valuation of the borrower's equity or the loan collateral.

When a loan is charged down to the estimated net realizable value, the determination of the fair value of the collateral depends on the type of collateral (e.g., securities, real estate). In cases where the collateral is in the form of liquid securities, the fair value is based on quoted market prices or broker quotes. For illiquid securities or other financial assets, the fair value of the collateral is generally estimated using a discounted cash flow model.

For residential real estate loans, collateral values are based upon external valuation sources. When it becomes likely that a borrower is either unable or unwilling to pay, the Firm utilizes a broker's price opinion, appraisal and/or an automated valuation model of the home based on an exterior-only valuation ("exterior opinions"), which is then updated at least every twelve months, or more frequently depending on various market factors. As soon as practicable after the Firm receives the property in satisfaction of a debt (e.g., by taking legal title or physical possession), the Firm generally obtains an appraisal based on an inspection that includes the interior of the home ("interior appraisals"). Exterior opinions and interior appraisals are discounted based upon the Firm's experience with actual liquidation values as compared with the estimated values provided by exterior opinions and interior appraisals, considering state-specific factors.

For commercial real estate loans, collateral values are generally based on appraisals from internal and external valuation sources. Collateral values are typically updated every six to twelve months, either by obtaining a new appraisal or by performing an internal analysis, in accordance with the Firm's policies. The Firm also considers both borrower- and market-specific factors, which may result in obtaining appraisal updates or broker price opinions at more frequent intervals.

Loans held-for-sale

Loans held-for-sale are measured at the lower of cost or fair value, with valuation changes recorded in noninterest revenue. For consumer loans, the valuation is performed on a portfolio basis. For wholesale loans, the valuation is performed on an individual loan basis.

Interest income on loans held-for-sale is accrued and recognized based on the contractual rate of interest.

Loan origination fees or costs and purchase price discounts or premiums are deferred in a contra loan account until the related loan is sold. The deferred fees or costs and discounts or premiums are an adjustment to the basis of the loan and therefore are included in the periodic determination of the lower of cost or fair value adjustments and/or the gain or loss recognized at the time of sale.

Because these loans are recognized at the lower of cost or fair value, the Firm's allowance for loan losses and charge-off policies do not apply to these loans. However, loans held-for-sale are subject to the nonaccrual policies described above.

Loans at fair value

Loans used in a market-making strategy or risk managed on a fair value basis are measured at fair value, with changes in fair value recorded in noninterest revenue.

Interest income on these loans is accrued and recognized based on the contractual rate of interest. Changes in fair value are recognized in noninterest revenue. Loan origination fees are recognized upfront in noninterest revenue. Loan origination costs are recognized in the associated expense category as incurred.

Because these loans are recognized at fair value, the Firm's allowance for loan losses and charge-off policies do not apply to these loans. However, loans at fair value are subject to the nonaccrual policies described above.

Refer to Note 3 for further information on the Firm's elections of fair value accounting under the fair value option. Refer to Note 2 and Note 3 for further information on loans carried at fair value and classified as trading assets.

PCI loans

PCI loans held-for-investment are initially measured at fair value. PCI loans have evidence of credit deterioration since the loan's origination date and therefore it is probable, at acquisition, that all contractually required payments will not be collected. Because PCI loans are initially measured at fair value, which includes an estimate of future credit losses, no allowance for loan losses related to PCI loans is recorded at the acquisition date. Refer to page 229 of this Note for information on accounting for PCI loans subsequent to their acquisition.

Loan classification changes

Loans in the held-for-investment portfolio that management decides to sell are transferred to the held-for-sale portfolio at the lower of cost or fair value on the date of transfer. Credit-related losses are charged against the allowance for loan losses; non-credit related losses such as those due to changes in interest rates or foreign currency exchange rates are recognized in noninterest revenue.

In the event that management decides to retain a loan in the held-for-sale portfolio, the loan is transferred to the held-for-investment portfolio at the lower of cost or fair value on the date of transfer. These loans are subsequently assessed for impairment based on the Firm's allowance methodology. Refer to Note 13 for a further discussion of the methodologies used in establishing the Firm's allowance for loan losses.

Loan modifications

The Firm seeks to modify certain loans in conjunction with its loss-mitigation activities. Through the modification, JPMorgan Chase grants one or more concessions to a borrower who is experiencing financial difficulty in order to minimize the Firm's economic loss and avoid foreclosure or repossession of the collateral, and to ultimately maximize payments received by the Firm from the borrower. The concessions granted vary by program and by borrower-specific characteristics, and may include interest rate reductions, term extensions, payment deferrals, principal forgiveness, or the acceptance of equity or other assets in lieu of payments.

Such modifications are accounted for and reported as TDRs. A loan that has been modified in a TDR is generally considered to be impaired until it matures, is repaid, or is otherwise liquidated, regardless of whether the borrower performs under the modified terms. In certain limited cases, the effective interest rate applicable to the modified loan is at or above the current market rate at the time of the restructuring. In such circumstances, and assuming that the loan subsequently performs under its modified terms and the Firm expects to collect all contractual principal and interest cash flows, the loan is disclosed as impaired and as a TDR only during the year of the modification; in subsequent years, the loan is not disclosed as an impaired loan or as a TDR so long as repayment of the restructured loan under its modified terms is reasonably assured.

Loans, except for credit card loans, modified in a TDR are generally placed on nonaccrual status, although in many cases such loans were already on nonaccrual status prior to modification. These loans may be returned to performing status (the accrual of interest is resumed) if the following criteria are met: (i) the borrower has performed under the modified terms for a minimum of six months and/or six payments, and (ii) the Firm has an expectation that repayment of the modified loan is reasonably assured based on, for example, the borrower's debt capacity and level of future earnings, collateral values, LTV ratios, and other current market considerations. In certain limited and well-defined circumstances in which the loan is current at the modification date, such loans are not placed on nonaccrual status at the time of modification.

Because loans modified in TDRs are considered to be impaired, these loans are measured for impairment using the Firm's established asset-specific allowance methodology, which considers the expected re-default rates for the modified loans. A loan modified in a TDR generally remains subject to the asset-specific allowance methodology throughout its remaining life, regardless of whether the loan is performing and has been returned to accrual status and/or the loan has been removed from the impaired loans disclosures (i.e., loans restructured at market rates). Refer to Note 13 for further discussion of the methodology used to estimate the Firm's asset-specific allowance.

Foreclosed property

The Firm acquires property from borrowers through loan restructurings, workouts, and foreclosures. Property acquired may include real property (e.g., residential real estate, land, and buildings) and commercial and personal property (e.g., automobiles, aircraft, railcars, and ships).

The Firm recognizes foreclosed property upon receiving assets in satisfaction of a loan (e.g., by taking legal title or physical possession). For loans collateralized by real property, the Firm generally recognizes the asset received at foreclosure sale or upon the execution of a deed in lieu of foreclosure transaction with the borrower. Foreclosed assets are reported in other assets on the Consolidated balance sheets and initially recognized at fair value less costs to sell. Each quarter the fair value of the acquired property is reviewed and adjusted, if necessary, to the lower of cost or fair value. Subsequent adjustments to fair value are charged/credited to noninterest revenue. Operating expense, such as real estate taxes and maintenance, are charged to other expense.

Loan portfolio

The Firm's loan portfolio is divided into three portfolio segments, which are the same segments used by the Firm to determine the allowance for loan losses: Consumer, excluding credit card; Credit card; and Wholesale. Within each portfolio segment the Firm monitors and assesses the credit risk in the following classes of loans, based on the risk characteristics of each loan class.

Consumer, excluding credit card[(a)]	Credit card	Wholesale[(f)]
Residential real estate – excluding PCI • Residential mortgage[(b)] • Home equity[(c)] Other consumer loans[(d)] • Auto • Consumer & Business Banking[(e)] Residential real estate – PCI • Home equity • Prime mortgage • Subprime mortgage • Option ARMs	• Credit card loans	• Commercial and industrial • Real estate • Financial institutions • Governments & Agencies • Other[(g)]

(a) Includes loans held in CCB, scored prime mortgage and scored home equity loans held in AWM and scored prime mortgage loans held in Corporate.
(b) Predominantly includes prime loans (including option ARMs).
(c) Includes senior and junior lien home equity loans.
(d) Includes certain business banking and auto dealer risk-rated loans for which the wholesale methodology is applied for determining the allowance for loan losses; these loans are managed by CCB, and therefore, for consistency in presentation, are included with the other consumer loan classes.
(e) Predominantly includes Business Banking loans.
(f) Includes loans held in CIB, CB, AWM and Corporate. Excludes scored prime mortgage and scored home equity loans held in AWM and scored prime mortgage loans held in Corporate. Classes are internally defined and may not align with regulatory definitions.
(g) Includes loans to: individuals and individual entities (predominantly consists of Wealth Management clients within AWM and includes loans to personal investment companies and personal and testamentary trusts), SPEs and Private education and civic organizations. Refer to Note 14 for more information on SPEs.

The following tables summarize the Firm's loan balances by portfolio segment.

December 31, 2019 (in millions)	Consumer, excluding credit card	Credit card[(a)]	Wholesale	Total
Retained	**$ 332,038**	**$ 168,924**	**$ 444,639**	**$ 945,601** [(b)]
Held-for-sale	**3,002**	**–**	**4,062**	**7,064**
At fair value	**–**	**–**	**7,104**	**7,104**
Total	**$ 335,040**	**$ 168,924**	**$ 455,805**	**$ 959,769**

December 31, 2018 (in millions)	Consumer, excluding credit card	Credit card[(a)]	Wholesale	Total
Retained	$ 373,637	$ 156,616	$ 439,162	$ 969,415 [(b)]
Held-for-sale	95	16	11,877	11,988
At fair value	–	–	3,151	3,151
Total	$ 373,732	$ 156,632	$ 454,190	$ 984,554

(a) Includes accrued interest and fees net of an allowance for the uncollectible portion of accrued interest and fee income.
(b) Loans (other than PCI loans and those for which the fair value option has been elected) are presented net of unamortized discounts and premiums and net deferred loan fees or costs. These amounts were not material as of December 31, 2019 and 2018.

The following tables provide information about the carrying value of retained loans purchased, sold and reclassified to held-for-sale during the periods indicated. Reclassifications of loans to held-for sale are non-cash transactions. The Firm manages its exposure to credit risk on an ongoing basis. Selling loans is one way that the Firm reduces its credit exposures. Loans that were reclassified to held-for-sale and sold in a subsequent period are excluded from the sales line of this table.

Year ended December 31, (in millions)	**2019**			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	**$ 1,282** [a][b]	**$ –**	**$ 1,291**	**$ 2,573**
Sales	**30,484**	**–**	**23,435**	**53,919**
Retained loans reclassified to held-for-sale	**9,188**	**–**	**2,371**	**11,559**

Year ended December 31, (in millions)	2018			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	$ 2,543 [a][b]	$ –	$ 2,354	$ 4,897
Sales	9,984	–	16,741	26,725
Retained loans reclassified to held-for-sale	36	–	2,276	2,312

Year ended December 31, (in millions)	2017			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	$ 3,461 [a][b]	$ –	$ 1,799	$ 5,260
Sales	3,405	–	11,063	14,468
Retained loans reclassified to held-for-sale	6,340 [c]	–	1,229	7,569

(a) Purchases predominantly represent the Firm's voluntary repurchase of certain delinquent loans from loan pools as permitted by Government National Mortgage Association ("Ginnie Mae") guidelines. The Firm typically elects to repurchase these delinquent loans as it continues to service them and/or manage the foreclosure process in accordance with applicable requirements of Ginnie Mae, FHA, RHS, and/or VA.
(b) Excludes purchases of retained loans sourced through the correspondent origination channel and underwritten in accordance with the Firm's standards. Such purchases were $16.6 billion, $18.6 billion and $23.5 billion for the years ended December 31, 2019, 2018 and 2017, respectively.
(c) Includes the Firm's student loan portfolio which was sold in 2017.

Gains and losses on sales of loans

Net gains on sales of loans (including adjustments to record loans held-for-sale at the lower of cost or fair value) recognized in noninterest revenue was $394 million for the year ended December 31, 2019. Gains and losses on sales of loans were not material for the years ended December 31, 2018 and 2017. In addition, the sale of loans may also result in write downs, recoveries or changes in the allowance recognized in the provision for credit losses.

Consumer, excluding credit card, loan portfolio

Consumer loans, excluding credit card loans, consist primarily of residential mortgages, home equity loans and lines of credit, auto loans and consumer and business banking loans, with a focus on serving the prime consumer credit market. The portfolio also includes home equity loans secured by junior liens, prime mortgage loans with an interest-only payment period, and certain payment-option loans that may result in negative amortization.

The following table provides information about retained consumer loans, excluding credit card, by class.

December 31, (in millions)	2019	2018
Residential real estate – excluding PCI		
Residential mortgage	**$ 199,037**	$ 231,078
Home equity	**23,917**	28,340
Other consumer loans		
Auto	**61,522**	63,573
Consumer & Business Banking	**27,199**	26,612
Residential real estate – PCI		
Home equity	**7,377**	8,963
Prime mortgage	**3,965**	4,690
Subprime mortgage	**1,740**	1,945
Option ARMs	**7,281**	8,436
Total retained loans	**$ 332,038**	$ 373,637

Delinquency rates are a primary credit quality indicator for consumer loans. Loans that are more than 30 days past due provide an early warning of borrowers who may be experiencing financial difficulties and/or who may be unable or unwilling to repay the loan. As the loan continues to age, it becomes more clear whether the borrower is likely either unable or unwilling to pay. In the case of residential real estate loans, late-stage delinquencies (greater than 150 days past due) are a strong indicator of loans that will ultimately result in a foreclosure or similar liquidation transaction. In addition to delinquency rates, other credit quality indicators for consumer loans vary based on the class of loan, as follows:

- For residential real estate loans, including both non-PCI and PCI portfolios, the current estimated LTV ratio, or the combined LTV ratio in the case of junior lien loans, is an indicator of the potential loss severity in the event of default. Additionally, LTV or combined LTV ratios can provide insight into a borrower's continued willingness to pay, as the delinquency rate of high-LTV loans tends to be greater than that for loans where the borrower has equity in the collateral. The geographic distribution of the loan collateral also provides insight as to the credit quality of the portfolio, as factors such as the regional economy, home price changes and specific events such as natural disasters, will affect credit quality. The borrower's current or "refreshed" FICO score is a secondary credit quality indicator for certain loans, as FICO scores are an indication of the borrower's credit payment history. Thus, a loan to a borrower with a low FICO score (less than 660) is considered to be of higher risk than a loan to a borrower with a higher FICO score. Further, a loan to a borrower with a high LTV ratio and a low FICO score is at greater risk of default than a loan to a borrower that has both a high LTV ratio and a high FICO score.
- For scored auto and scored business banking loans, geographic distribution is an indicator of the credit performance of the portfolio. Similar to residential real estate loans, geographic distribution provides insights into the portfolio performance based on regional economic activity and events.
- Risk-rated business banking and auto loans are similar to wholesale loans in that the primary credit quality indicators are the internal risk ratings that are assigned to the loan and whether the loans are considered to be criticized and/or nonaccrual. Risk ratings are reviewed on a regular and ongoing basis by Credit Risk Management and are adjusted as necessary for updated information about borrowers' ability to fulfill their obligations. Refer to page 234 of this Note for further information about risk-rated wholesale loan credit quality indicators.

Residential real estate – excluding PCI loans

The following table provides information by class for retained residential real estate – excluding PCI loans.

Residential real estate – excluding PCI loans

December 31, (in millions, except ratios)	Residential mortgage		Home equity		Total residential real estate – excluding PCI	
	2019	2018	**2019**	2018	**2019**	2018
Loan delinquency[a]						
Current	**$ 198,024**	$ 225,899	**$ 23,385**	$ 27,611	**$ 221,409**	$ 253,510
30–149 days past due	**604**	2,763	**336**	453	**940**	3,216
150 or more days past due	**409**	2,416	**196**	276	**605**	2,692
Total retained loans	**$ 199,037**	$ 231,078	**$ 23,917**	$ 28,340	**$ 222,954**	$ 259,418
% of 30+ days past due to total retained loans[b]	**0.49%**	0.48%	**2.22%**	2.57%	**0.67%**	0.71%
90 or more days past due and government guaranteed[c]	**$ 38**	$ 2,541	**—**	—	**$ 38**	$ 2,541
Nonaccrual loans	**1,618**	1,765	**1,162**	1,323	**2,780**	3,088
Current estimated LTV ratios[d][e]						
Greater than 125% and refreshed FICO scores:						
Equal to or greater than 660	**$ 18**	$ 25	**$ 4**	$ 6	**$ 22**	$ 31
Less than 660	**8**	13	**1**	1	**9**	14
101% to 125% and refreshed FICO scores:						
Equal to or greater than 660	**31**	37	**56**	111	**87**	148
Less than 660	**35**	53	**19**	38	**54**	91
80% to 100% and refreshed FICO scores:						
Equal to or greater than 660	**5,013**	3,977	**606**	986	**5,619**	4,963
Less than 660	**207**	281	**191**	326	**398**	607
Less than 80% and refreshed FICO scores:						
Equal to or greater than 660	**186,972**	212,505	**19,597**	22,632	**206,569**	235,137
Less than 660	**6,001**	6,457	**2,776**	3,355	**8,777**	9,812
No FICO/LTV available	**689**	813	**667**	885	**1,356**	1,698
U.S. government-guaranteed	**63**	6,917	**–**	–	**63**	6,917
Total retained loans	**$ 199,037**	$ 231,078	**$ 23,917**	$ 28,340	**$ 222,954**	$ 259,418
Geographic region[f]						
California	**$ 66,278**	$ 74,759	**$ 4,831**	$ 5,695	**$ 71,109**	$ 80,454
New York	**25,706**	28,847	**4,885**	5,769	**30,591**	34,616
Illinois	**13,204**	15,249	**1,788**	2,131	**14,992**	17,380
Texas	**12,601**	13,769	**1,599**	1,819	**14,200**	15,588
Florida	**10,454**	10,704	**1,325**	1,575	**11,779**	12,279
Washington	**7,708**	8,304	**720**	869	**8,428**	9,173
Colorado	**7,777**	8,140	**444**	521	**8,221**	8,661
New Jersey	**5,792**	7,302	**1,394**	1,642	**7,186**	8,944
Massachusetts	**5,596**	6,574	**202**	236	**5,798**	6,810
Arizona	**3,929**	4,434	**932**	1,158	**4,861**	5,592
All other[g]	**39,992**	52,996	**5,797**	6,925	**45,789**	59,921
Total retained loans	**$ 199,037**	$ 231,078	**$ 23,917**	$ 28,340	**$ 222,954**	$ 259,418

(a) Individual delinquency classifications include mortgage loans insured by U.S. government agencies as follows: current included $17 million and $2.8 billion; 30-149 days past due included $20 million and $2.1 billion; and 150 or more days past due included $26 million and $2.0 billion at December 31, 2019 and 2018, respectively.
(b) At December 31, 2019 and 2018, residential mortgage loans excluded mortgage loans insured by U.S. government agencies of $46 million and $4.1 billion, respectively, that are 30 or more days past due. These amounts have been excluded based upon the government guarantee.
(c) These balances are excluded from nonaccrual loans as the loans are guaranteed by U.S government agencies. Typically the principal balance of the loans is insured and interest is guaranteed at a specified reimbursement rate subject to meeting agreed-upon servicing guidelines. At December 31, 2019 and 2018, these balances included $34 million and $999 million, respectively, of loans that are no longer accruing interest based on the agreed-upon servicing guidelines. For the remaining balance, interest is being accrued at the guaranteed reimbursement rate. There were no loans that were not guaranteed by U.S. government agencies that are 90 or more days past due and still accruing interest at December 31, 2019 and 2018.
(d) Represents the aggregate unpaid principal balance of loans divided by the estimated current property value. Current property values are estimated, at a minimum, quarterly, based on home valuation models using nationally recognized home price index valuation estimates incorporating actual data to the extent available and forecasted data where actual data is not available. These property values do not represent actual appraised loan level collateral values; as such, the resulting ratios are necessarily imprecise and should be viewed as estimates. Current estimated combined LTV for junior lien home equity loans considers all available lien positions, as well as unused lines, related to the property.
(e) Refreshed FICO scores represent each borrower's most recent credit score, which is obtained by the Firm on at least a quarterly basis.
(f) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.
(g) At December 31, 2019 and 2018, included mortgage loans insured by U.S. government agencies of $63 million and $6.9 billion, respectively. These amounts have been excluded from the geographic regions presented based upon the government guarantee.

Approximately 37% of the home equity portfolio are senior lien loans; the remaining balance are junior lien HELOANs or HELOCs. The following table provides the Firm's delinquency statistics for junior lien home equity loans and lines as of December 31, 2019 and 2018.

December 31, (in millions except ratios)	Total loans		Total 30+ day delinquency rate	
	2019	2018	**2019**	2018
HELOCs:[a]				
Within the revolving period[b]	**$ 5,488**	$ 5,608	**0.35%**	0.25%
Beyond the revolving period	**8,724**	11,286	**2.48**	2.80
HELOANs	**754**	1,030	**2.52**	2.82
Total	**$ 14,966**	$ 17,924	**1.70%**	2.00%

(a) These HELOCs are predominantly revolving loans for a 10-year period, after which time the HELOC converts to a loan with a 20-year amortization period, but also include HELOCs that allow interest-only payments beyond the revolving period.
(b) The Firm manages the risk of HELOCs during their revolving period by closing or reducing the undrawn line to the extent permitted by law when borrowers are experiencing financial difficulty.

HELOCs beyond the revolving period and HELOANs have higher delinquency rates than HELOCs within the revolving period. That is primarily because the fully-amortizing payment that is generally required for those products is higher than the minimum payment options available for HELOCs within the revolving period. The higher delinquency rates associated with amortizing HELOCs and HELOANs are factored into the Firm's allowance for loan losses.

Impaired loans

The table below provides information about the Firm's residential real estate impaired loans, excluding PCI loans. These loans are considered to be impaired as they have been modified in a TDR. All impaired loans are evaluated for an asset-specific allowance as described in Note 13.

December 31, (in millions)	Residential mortgage		Home equity		Total residential real estate – excluding PCI	
	2019	2018	**2019**	2018	**2019**	2018
Impaired loans						
With an allowance	**$ 2,851**	$ 3,381	**$ 1,042**	$ 1,151	**$ 3,893**	$ 4,532
Without an allowance[a]	**1,154**	1,184	**879**	907	**2,033**	2,091
Total impaired loans[b][c]	**$ 4,005**	$ 4,565	**$ 1,921**	$ 2,058	**$ 5,926**	$ 6,623
Allowance for loan losses related to impaired loans	**$ 52**	$ 88	**$ 13**	$ 45	**$ 65**	$ 133
Unpaid principal balance of impaired loans[d]	**5,438**	6,207	**3,301**	3,531	**8,739**	9,738
Impaired loans on nonaccrual status[e]	**1,367**	1,459	**965**	963	**2,332**	2,422

(a) Represents collateral-dependent residential real estate loans that are charged off to the fair value of the underlying collateral less costs to sell. The Firm reports, in accordance with regulatory guidance, residential real estate loans that have been discharged under Chapter 7 bankruptcy and not reaffirmed by the borrower ("Chapter 7 loans") as collateral-dependent nonaccrual TDRs, regardless of their delinquency status. At December 31, 2019, Chapter 7 residential real estate loans included approximately 9% of residential mortgages and approximately 7% of home equity that were 30 days or more past due.
(b) At December 31, 2019 and 2018, $14 million and $4.1 billion, respectively, of loans modified subsequent to repurchase from Ginnie Mae in accordance with the standards of the appropriate government agency (i.e., FHA, VA, RHS) are not included in the table above. When such loans perform subsequent to modification in accordance with Ginnie Mae guidelines, they are generally sold back into Ginnie Mae loan pools. Modified loans that do not re-perform become subject to foreclosure.
(c) Predominantly all impaired loans in the table above are in the U.S.
(d) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors including charge-offs, net deferred loan fees or costs, and unamortized discounts or premiums on purchased loans.
(e) As of December 31, 2019 and 2018, nonaccrual loans included $1.9 billion and $2.0 billion, respectively, of TDRs for which the borrowers were less than 90 days past due. Refer to the Loan accounting framework on pages 217-219 of this Note for additional information about loans modified in a TDR that are on nonaccrual status.

The following table presents average impaired loans and the related interest income reported by the Firm.

Year ended December 31, (in millions)	Average impaired loans			Interest income on impaired loans[(a)]			Interest income on impaired loans on a cash basis[(a)]		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Residential mortgage	**$ 4,307**	$ 5,082	$ 5,797	**$ 224**	$ 257	$ 287	**$ 68**	$ 75	$ 75
Home equity	**2,007**	2,123	2,222	**132**	131	127	**83**	84	80
Total residential real estate – excluding PCI	**$ 6,314**	$ 7,205	$ 8,019	**$ 356**	$ 388	$ 414	**$ 151**	$ 159	$ 155

(a) Generally, interest income on loans modified in TDRs is recognized on a cash basis until the borrower has made a minimum of six payments under the new terms, unless the loan is deemed to be collateral-dependent.

Loan modifications

Modifications of residential real estate loans, excluding PCI loans, are generally accounted for and reported as TDRs. There were no additional commitments to lend to borrowers whose residential real estate loans, excluding PCI loans, have been modified in TDRs.

The following table presents new TDRs reported by the Firm.

Year ended December 31, (in millions)	**2019**	2018	2017
Residential mortgage	**$ 234**	$ 401	$ 373
Home equity	**256**	335	383
Total residential real estate – excluding PCI	**$ 490**	$ 736	$ 756

Nature and extent of modifications

The Firm's proprietary modification programs as well as government programs, including U.S. GSEs, generally provide various concessions to financially troubled borrowers including, but not limited to, interest rate reductions, term or payment extensions and deferral of principal and/or interest payments that would otherwise have been required under the terms of the original agreement.

The following table provides information about how residential real estate loans, excluding PCI loans, were modified under the Firm's loss mitigation programs described above during the periods presented. This table excludes Chapter 7 loans where the sole concession granted is the discharge of debt.

Year ended December 31,	Residential mortgage			Home equity			Total residential real estate – excluding PCI		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Number of loans approved for a trial modification	**2,105**	2,570	1,283	**3,767**	4,605 (c)	5,765 (c)	**5,872**	7,175 (c)	7,048 (c)
Number of loans permanently modified	**1,448**	2,907	2,628	**3,470**	4,946	5,624	**4,918**	7,853	8,252
Concession granted:[(a)]									
Interest rate reduction	**66%**	40%	63%	**81%**	62%	59%	**77%**	54%	60%
Term or payment extension	**90**	55	72	**64**	66	69	**71**	62	70
Principal and/or interest deferred	**26**	44	15	**7**	20	10	**13**	29	12
Principal forgiveness	**6**	8	16	**5**	7	13	**5**	7	14
Other[(b)]	**45**	38	33	**70**	58	31	**63**	51	32

(a) Represents concessions granted in permanent modifications as a percentage of the number of loans permanently modified. The sum of the percentages exceeds 100% because predominantly all of the modifications include more than one type of concession. Concessions offered on trial modifications are generally consistent with those granted on permanent modifications.

(b) Includes variable interest rate to fixed interest rate modifications for the years ended December 31, 2019, 2018 and 2017. Also includes forbearances that meet the definition of a TDR for the years ended December 31, 2019 and 2018. Forbearances suspend or reduce monthly payments for a specific period of time to address a temporary hardship.

(c) The prior period amounts have been revised to conform with the current period presentation. This revision also impacted home equity impaired loans and new TDRs in this note, as well as loans by impairment methodology in Note 13.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the various concessions granted in modifications of residential real estate loans, excluding PCI, under the loss mitigation programs described above and about redefaults of certain loans modified in TDRs for the periods presented. The following table presents only the financial effects of permanent modifications and does not include temporary concessions offered through trial modifications. This table also excludes Chapter 7 loans where the sole concession granted is the discharge of debt.

Year ended December 31, (in millions, except weighted-average data)	Residential mortgage			Home equity			Total residential real estate – excluding PCI		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Weighted-average interest rate of loans with interest rate reductions – before TDR	**5.88%**	5.65%	5.15%	**5.53%**	5.39%	4.94%	**5.68%**	5.50%	5.06%
Weighted-average interest rate of loans with interest rate reductions – after TDR	**4.21**	3.80	2.99	**3.53**	3.46	2.64	**3.81**	3.60	2.83
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – before TDR	**21**	24	24	**19**	19	21	**20**	21	23
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – after TDR	**39**	38	38	**40**	39	39	**39**	38	38
Charge-offs recognized upon permanent modification	**$ 1**	$ 1	$ 2	**$ –**	$ 1	$ 1	**$ 1**	$ 2	$ 3
Principal deferred	**15**	21	12	**4**	9	10	**19**	30	22
Principal forgiven	**4**	10	20	**3**	7	13	**7**	17	33
Balance of loans that redefaulted within one year of permanent modification[(a)]	**$ 107**	$ 97	$ 124	**$ 59**	$ 64	$ 56	**$ 166**	$ 161	$ 180

(a) Represents loans permanently modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The dollar amounts presented represent the balance of such loans at the end of the reporting period in which such loans defaulted. For residential real estate loans modified in TDRs, payment default is deemed to occur when the loan becomes two contractual payments past due. In the event that a modified loan redefaults, it is probable that the loan will ultimately be liquidated through foreclosure or another similar type of liquidation transaction. Redefaults of loans modified within the last 12 months may not be representative of ultimate redefault levels.

At December 31, 2019, the weighted-average estimated remaining lives of residential real estate loans, excluding PCI loans, permanently modified in TDRs were 9 years for residential mortgage and 8 years for home equity. The estimated remaining lives of these loans reflect estimated prepayments, both voluntary and involuntary (i.e., foreclosures and other forced liquidations).

Active and suspended foreclosure

At December 31, 2019 and 2018, the Firm had non-PCI residential real estate loans, excluding those insured by U.S. government agencies, with a carrying value of $529 million and $653 million, respectively, that were not included in REO, but were in the process of active or suspended foreclosure.

Other consumer loans

The table below provides information for other consumer retained loan classes, including auto and business banking loans.

December 31, (in millions, except ratios)	Auto		Consumer & Business Banking		Total other consumer	
	2019	2018	**2019**	2018	**2019**	2018
Loan delinquency						
Current	**$ 60,944**	$ 62,984	**$ 26,842**	$ 26,249	**$ 87,786**	$ 89,233
30–119 days past due	**578**	589	**240**	252	**818**	841
120 or more days past due	**–**	–	**117**	111	**117**	111
Total retained loans	**$ 61,522**	$ 63,573	**$ 27,199**	$ 26,612	**$ 88,721**	$ 90,185
% of 30+ days past due to total retained loans	**0.94%**	0.93%	**1.31%**	1.36%	**1.05%**	1.06%
Nonaccrual loans[(a)]	**113**	128	**247**	245	**360**	373
Geographic region[(b)]						
California	**$ 8,081**	$ 8,330	**$ 5,902**	$ 5,520	**$ 13,983**	$ 13,850
Texas	**6,804**	6,531	**3,110**	2,993	**9,914**	9,524
New York	**3,639**	3,863	**4,432**	4,381	**8,071**	8,244
Illinois	**3,360**	3,716	**1,745**	2,046	**5,105**	5,762
Florida	**3,262**	3,256	**1,609**	1,502	**4,871**	4,758
Arizona	**2,024**	2,084	**1,276**	1,491	**3,300**	3,575
Ohio	**1,986**	1,973	**1,139**	1,305	**3,125**	3,278
New Jersey	**1,905**	1,981	**798**	723	**2,703**	2,704
Michigan	**1,215**	1,357	**1,253**	1,329	**2,468**	2,686
Louisiana	**1,617**	1,587	**741**	860	**2,358**	2,447
All other	**27,629**	28,895	**5,194**	4,462	**32,823**	33,357
Total retained loans	**$ 61,522**	$ 63,573	**$ 27,199**	$ 26,612	**$ 88,721**	$ 90,185
Loans by risk ratings[(c)]						
Noncriticized	**$ 14,178**	$ 15,749	**$ 19,156**	$ 18,743	**$ 33,334**	$ 34,492
Criticized performing	**360**	273	**727**	751	**1,087**	1,024
Criticized nonaccrual	**–**	–	**198**	191	**198**	191

(a) There were no loans that were 90 or more days past due and still accruing interest at December 31, 2019 and December 31, 2018.
(b) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.
(c) For risk-rated business banking and auto loans, the primary credit quality indicator is the internal risk rating of the loan, including whether the loans are considered to be criticized and/or nonaccrual.

Other consumer impaired loans and loan modifications

The following table provides information about the Firm's other consumer impaired loans, including risk-rated business banking and auto loans that have been placed on nonaccrual status, and loans that have been modified in TDRs.

December 31, (in millions)	2019	2018
Impaired loans		
With an allowance	**$ 227**	$ 222
Without an allowance[(a)]	**19**	29
Total impaired loans[(b)(c)]	**$ 246**	$ 251
Allowance for loan losses related to impaired loans	**$ 71**	$ 63
Unpaid principal balance of impaired loans[(d)]	**342**	355
Impaired loans on nonaccrual status	**224**	229

(a) When discounted cash flows, collateral value or market price equals or exceeds the recorded investment in the loan, the loan does not require an allowance. This typically occurs when the impaired loans have been partially charged off and/or there have been interest payments received and applied to the loan balance.
(b) Predominantly all other consumer impaired loans are in the U.S.
(c) Other consumer average impaired loans were $246 million, $275 million and $427 million for the years ended December 31, 2019, 2018 and 2017, respectively. The related interest income on impaired loans, including those on a cash basis, was not material for the years ended December 31, 2019, 2018 and 2017.
(d) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors, including charge-offs, interest payments received and applied to the principal balance, net deferred loan fees or costs and unamortized discounts or premiums on purchased loans.

Loan modifications

Certain other consumer loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. All of these TDRs are reported as impaired loans. At December 31, 2019 and 2018, other consumer loans modified in TDRs were $76 million and $79 million, respectively. The impact of these modifications, as well as new TDRs, were not material to the Firm for the years ended December 31, 2019, 2018 and 2017. Additional commitments to lend to borrowers whose loans have been modified in TDRs as of December 31, 2019 and 2018 were not material. TDRs on nonaccrual status were $54 million and $57 million at December 31, 2019 and 2018, respectively.

Purchased credit-impaired loans

PCI loans are initially recorded at fair value at acquisition. PCI loans acquired in the same fiscal quarter may be aggregated into one or more pools, provided that the loans have common risk characteristics. A pool is then accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows. All of the Firm's residential real estate PCI loans were acquired in the same fiscal quarter and aggregated into pools of loans with common risk characteristics.

On a quarterly basis, the Firm estimates the total cash flows (both principal and interest) expected to be collected over the remaining life of each pool. These estimates incorporate assumptions regarding default rates, loss severities, the amounts and timing of prepayments and other factors that reflect then-current market conditions. Probable decreases in expected cash flows (i.e., increased credit losses) trigger the recognition of impairment, which is then measured as the present value of the expected principal loss plus any related forgone interest cash flows, discounted at the pool's effective interest rate. Impairments are recognized through the provision for credit losses and an increase in the allowance for loan losses. Probable and significant increases in expected cash flows (e.g., decreased credit losses, the net benefit of modifications) would first reverse any previously recorded allowance for loan losses with any remaining increases recognized prospectively as a yield adjustment over the remaining estimated lives of the underlying loans. The impacts of (i) prepayments, (ii) changes in variable interest rates, and (iii) any other changes in the timing of expected cash flows are generally recognized prospectively as adjustments to interest income.

The Firm continues to modify certain PCI loans. The impact of these modifications is incorporated into the Firm's quarterly assessment of whether a probable and significant change in expected cash flows has occurred, and the loans continue to be accounted for and reported as PCI loans. In evaluating the effect of modifications on expected cash flows, the Firm incorporates the effect of any forgone interest and also considers the potential for redefault. The Firm develops product-specific probability of default estimates, which are used to compute expected credit losses. In developing these probabilities of default, the Firm considers the relationship between the credit quality characteristics of the underlying loans and certain assumptions about home prices and unemployment based upon industry-wide data. The Firm also considers its own historical loss experience to-date based on actual redefaulted modified PCI loans.

The excess of cash flows expected to be collected over the carrying value of the underlying loans is referred to as the accretable yield. This amount is not reported on the Firm's Consolidated balance sheets but is accreted into interest income at a level rate of return over the remaining estimated lives of the underlying pools of loans.

Since the timing and amounts of expected cash flows for the Firm's PCI consumer loan pools are reasonably estimable, interest is being accreted and the loan pools are being reported as performing loans. No interest would be accreted and the PCI loan pools would be reported as nonaccrual loans if the timing and/or amounts of expected cash flows on the loan pools were determined not to be reasonably estimable.

The liquidation of PCI loans, which may include sales of loans, receipt of payment in full from the borrower, or foreclosure, results in removal of the loans from the underlying PCI pool. When the amount of the liquidation proceeds (e.g., cash, real estate), if any, is less than the unpaid principal balance of the loan, the difference is first applied against the PCI pool's nonaccretable difference for principal losses (i.e., the lifetime credit loss estimate established as a purchase accounting adjustment at the acquisition date). When the nonaccretable difference for a particular loan pool has been fully depleted, any excess of the unpaid principal balance of the loan over the liquidation proceeds is written off against the PCI pool's allowance for loan losses. Write-offs of PCI loans also include other adjustments, primarily related to principal forgiveness modifications. Because the Firm's PCI loans are accounted for at a pool level, the Firm does not recognize charge-offs of PCI loans when they reach specified stages of delinquency (i.e., unlike non-PCI consumer loans, these loans are not charged off based on FFIEC standards).

The PCI portfolio affects the Firm's results of operations primarily through: (i) contribution to net interest margin; (ii) expense related to defaults and servicing resulting from the liquidation of the loans; and (iii) any provision for loan losses.

Residential real estate – PCI loans

The table below provides information about the Firm's consumer, excluding credit card, PCI loans.

December 31, (in millions, except ratios)	Home equity		Prime mortgage		Subprime mortgage		Option ARMs		Total PCI	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Carrying value[(a)]	**$ 7,377**	$ 8,963	**$ 3,965**	$ 4,690	**$ 1,740**	$ 1,945	**$ 7,281**	$ 8,436	**$ 20,363**	$ 24,034
Loan delinquency (based on unpaid principal balance)										
Current	**$ 7,203**	$ 8,624	**$ 3,593**	$ 4,226	**$ 1,864**	$ 2,033	**$ 6,606**	$ 7,592	**$ 19,266**	$ 22,475
30–149 days past due	**217**	278	**219**	259	**230**	286	**356**	398	**1,022**	1,221
150 or more days past due	**148**	242	**172**	223	**101**	123	**333**	457	**754**	1,045
Total loans	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$ 21,042**	$ 24,741
% of 30+ days past due to total loans	**4.82%**	5.69%	**9.81%**	10.24%	**15.08%**	16.75%	**9.44%**	10.12%	**8.44%**	9.16%
Current estimated LTV ratios (based on unpaid principal balance)[(b)(c)]										
Greater than 125% and refreshed FICO scores:										
Equal to or greater than 660	**$ 12**	$ 17	**$ 2**	$ 1	**$ —**	$ —	**$ 1**	$ 3	**$ 15**	$ 21
Less than 660	**9**	13	**6**	7	**7**	9	**7**	7	**29**	36
101% to 125% and refreshed FICO scores:										
Equal to or greater than 660	**86**	135	**3**	6	**6**	4	**14**	17	**109**	162
Less than 660	**39**	65	**17**	22	**20**	35	**18**	33	**94**	155
80% to 100% and refreshed FICO scores:										
Equal to or greater than 660	**588**	805	**47**	75	**47**	54	**85**	119	**767**	1,053
Less than 660	**261**	388	**65**	112	**100**	161	**113**	190	**539**	851
Lower than 80% and refreshed FICO scores:										
Equal to or greater than 660	**4,803**	5,548	**2,429**	2,689	**784**	739	**4,710**	5,111	**12,726**	14,087
Less than 660	**1,562**	1,908	**1,250**	1,568	**1,136**	1,327	**2,093**	2,622	**6,041**	7,425
No FICO/LTV available	**208**	265	**165**	228	**95**	113	**254**	345	**722**	951
Total unpaid principal balance	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$ 21,042**	$ 24,741
Geographic region (based on unpaid principal balance)[(d)]										
California	**$ 4,475**	$ 5,420	**$ 2,166**	$ 2,578	**$ 531**	$ 593	**$ 4,189**	$ 4,798	**$ 11,361**	$ 13,389
Florida	**833**	976	**288**	332	**212**	234	**604**	713	**1,937**	2,255
New York	**451**	525	**324**	365	**245**	268	**441**	502	**1,461**	1,660
Illinois	**200**	233	**134**	154	**113**	123	**175**	199	**622**	709
Washington	**326**	419	**80**	98	**37**	44	**143**	177	**586**	738
New Jersey	**174**	210	**112**	134	**78**	88	**219**	258	**583**	690
Massachusetts	**53**	65	**97**	113	**67**	73	**206**	240	**423**	491
Maryland	**40**	48	**86**	95	**87**	96	**157**	178	**370**	417
Virginia	**44**	54	**77**	91	**33**	37	**180**	211	**334**	393
Arizona	**130**	165	**57**	69	**37**	43	**93**	112	**317**	389
All other	**842**	1,029	**563**	679	**755**	843	**888**	1,059	**3,048**	3,610
Total unpaid principal balance	**$ 7,568**	$ 9,144	**$ 3,984**	$ 4,708	**$ 2,195**	$ 2,442	**$ 7,295**	$ 8,447	**$ 21,042**	$ 24,741

(a) Carrying value includes the effect of fair value adjustments that were applied to the consumer PCI portfolio at the date of acquisition.
(b) Represents the aggregate unpaid principal balance of loans divided by the estimated current property value. Current property values are estimated, at a minimum, quarterly, based on home valuation models using nationally recognized home price index valuation estimates incorporating actual data to the extent available and forecasted data where actual data is not available. These property values do not represent actual appraised loan level collateral values; as such, the resulting ratios are necessarily imprecise and should be viewed as estimates. Current estimated combined LTV for junior lien home equity loans considers all available lien positions, as well as unused lines, related to the property.
(c) Refreshed FICO scores represent each borrower's most recent credit score, which is obtained by the Firm on at least a quarterly basis.
(d) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.

Approximately 27% of the PCI home equity portfolio are senior lien loans; the remaining balance are junior lien HELOANs or HELOCs. The following table provides delinquency statistics for PCI junior lien home equity loans and lines of credit based on the unpaid principal balance as of December 31, 2019 and 2018.

December 31, (in millions, except ratios)	Total loans		Total 30+ day delinquency rate	
	2019	2018	**2019**	2018
HELOCs:[(a)(b)]	**$ 5,337**	$ 6,531	**3.52%**	4.00%
HELOANs	**220**	280	**3.64**	3.57
Total	**$ 5,557**	$ 6,811	**3.53%**	3.98%

(a) In general, these HELOCs are revolving loans for a 10-year period, after which time the HELOC converts to an interest-only loan with a balloon payment at the end of the loan's term. Substantially all HELOCs are beyond the revolving period.
(b) Includes loans modified into fixed rate amortizing loans.

The table below presents the accretable yield activity for the Firm's PCI consumer loans for the years ended December 31, 2019, 2018 and 2017, and represents the Firm's estimate of gross interest income expected to be earned over the remaining life of the PCI loan portfolios. The table excludes the cost to fund the PCI portfolios, and therefore the accretable yield does not represent net interest income expected to be earned on these portfolios.

Year ended December 31, (in millions, except ratios)	Total PCI		
	2019	2018	2017
Beginning balance	**$ 8,422**	$ 11,159	$ 11,768
Accretion into interest income	**(1,093)**	(1,249)	(1,396)
Changes in interest rates on variable-rate loans	**(575)**	(109)	503
Other changes in expected cash flows[(a)]	**(589)**	(1,379)	284
Balance at December 31	**$ 6,165**	$ 8,422	$ 11,159
Accretable yield percentage	**5.28%**	4.92%	4.53%

(a) Other changes in expected cash flows may vary from period to period as the Firm continues to refine its cash flow model, for example cash flows expected to be collected due to the impact of modifications and changes in prepayment assumptions.

Active and suspended foreclosure

At December 31, 2019 and 2018, the Firm had PCI residential real estate loans with an unpaid principal balance of $721 million and $964 million, respectively, that were not included in REO, but were in the process of active or suspended foreclosure.

Credit card loan portfolio

The credit card portfolio segment includes credit card loans originated and purchased by the Firm. Delinquency rates are the primary credit quality indicator for credit card loans as they provide an early warning that borrowers may be experiencing difficulties (30 days past due); information on those borrowers that have been delinquent for a longer period of time (90 days past due) is also considered. In addition to delinquency rates, the geographic distribution of the loans provides insight as to the credit quality of the portfolio based on the regional economy.

While the borrower's credit score is another general indicator of credit quality, the Firm does not view credit scores as a primary indicator of credit quality because the borrower's credit score tends to be a lagging indicator. The distribution of such scores provides a general indicator of credit quality trends within the portfolio; however, the score does not capture all factors that would be predictive of future credit performance. Refreshed FICO score information, which is obtained at least quarterly, for a statistically significant random sample of the credit card portfolio is indicated in the following table. FICO is considered to be the industry benchmark for credit scores.

The Firm generally originates new card accounts to prime consumer borrowers. However, certain cardholders' FICO scores may decrease over time, depending on the performance of the cardholder and changes in the credit score calculation.

The table below provides information about the Firm's credit card loans.

As of or for the year ended December 31, (in millions, except ratios)	2019	2018
Net charge-offs	**$ 4,848**	$ 4,518
Net charge-off rate	**3.10%**	3.10%
Loan delinquency		
Current and less than 30 days past due and still accruing	**$ 165,767**	$ 153,746
30-89 days past due and still accruing	**1,550**	1,426
90 or more days past due and still accruing	**1,607**	1,444
Total retained loans	**$ 168,924**	$ 156,616
Loan delinquency ratios		
% of 30+ days past due to total retained loans	**1.87%**	1.83%
% of 90+ days past due to total retained loans	**0.95**	0.92
Geographic region[(a)]		
California	**$ 25,783**	$ 23,757
Texas	**16,728**	15,085
New York	**14,544**	13,601
Florida	**10,830**	9,770
Illinois	**9,579**	8,938
New Jersey	**7,165**	6,739
Ohio	**5,406**	5,094
Pennsylvania	**5,245**	4,996
Colorado	**4,763**	4,309
Michigan	**4,164**	3,912
All other	**64,717**	60,415
Total retained loans	**$ 168,924**	$ 156,616
Percentage of portfolio based on carrying value with estimated refreshed FICO scores		
Equal to or greater than 660	**84.0%**	84.2%
Less than 660	**15.4**	15.0
No FICO available	**0.6**	0.8

(a) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2019.

Credit card impaired loans and loan modifications

The table below provides information about the Firm's impaired credit card loans. All of these loans are considered to be impaired as they have been modified in TDRs.

December 31, (in millions)	2019	2018
Impaired credit card loans with an allowance[(a)(b)(c)]	**$ 1,452**	$ 1,319
Allowance for loan losses related to impaired credit card loans	**477**	440

(a) The carrying value and the unpaid principal balance are the same for credit card impaired loans.
(b) There were no impaired loans without an allowance.
(c) Predominantly all impaired credit card loans are in the U.S.

The following table presents average balances of impaired credit card loans and interest income recognized on those loans.

Year ended December 31, (in millions)	2019	2018	2017
Average impaired credit card loans	**$ 1,389**	$ 1,260	$ 1,214
Interest income on impaired credit card loans	**72**	65	59

Loan modifications

The Firm may offer one of a number of loan modification programs to credit card borrowers who are experiencing financial difficulty. Most of the credit card loans have been modified under long-term programs for borrowers who are experiencing financial difficulties. These modifications involve placing the customer on a fixed payment plan, generally for 60 months, and typically include reducing the interest rate on the credit card. Substantially all modifications are considered to be TDRs.

If the cardholder does not comply with the modified payment terms, then the credit card loan continues to age and will ultimately be charged-off in accordance with the Firm's standard charge-off policy. In most cases, the Firm does not reinstate the borrower's line of credit.

New enrollments in these loan modification programs for the years ended December 31, 2019, 2018 and 2017, were $961 million, $866 million and $756 million, respectively. For all periods disclosed, new enrollments were less than 1% of total retained credit card loans.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the concessions granted on credit card loans modified in TDRs and redefaults for the periods presented.

Year ended December 31, (in millions, except weighted-average data)	2019	2018	2017
Weighted-average interest rate of loans – before TDR	**19.07%**	17.98%	16.58%
Weighted-average interest rate of loans – after TDR	**4.70**	5.16	4.88
Loans that redefaulted within one year of modification[(a)]	**$ 148**	$ 116	$ 93

(a) Represents loans modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The amounts presented represent the balance of such loans as of the end of the quarter in which they defaulted.

For credit card loans modified in TDRs, payment default is deemed to have occurred when the borrower misses two consecutive contractual payments. A substantial portion of these loans are expected to be charged-off in accordance with the Firm's standard charge-off policy. Based on historical experience, the estimated weighted-average default rate for modified credit card loans was expected to be 32.89%, 33.38% and 31.54% as of December 31, 2019, 2018 and 2017, respectively.

Wholesale loan portfolio

Wholesale loans include loans made to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals.

The primary credit quality indicator for wholesale loans is the internal risk rating assigned to each loan. Risk ratings are used to identify the credit quality of loans and differentiate risk within the portfolio. Risk ratings on loans consider the PD and the LGD. The PD is the likelihood that a loan will default. The LGD is the estimated loss on the loan that would be realized upon the default of the borrower and takes into consideration collateral and structural support for each credit facility.

Management considers several factors to determine an appropriate internal risk rating, including the obligor's debt capacity and financial flexibility, the level of the obligor's earnings, the amount and sources for repayment, the level and nature of contingencies, management strength, and the industry and geography in which the obligor operates. The Firm's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., PDs and LGDs) may differ as they reflect internal historical experiences and assumptions. The Firm considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade, and these ratings have a lower PD and/or lower LGD than non-investment grade ratings.

Noninvestment-grade ratings are further classified as noncriticized and criticized, and the criticized portion is further subdivided into performing and nonaccrual loans, representing management's assessment of the collectibility of principal and interest. Criticized loans have a higher PD than noncriticized loans. The Firm's definition of criticized aligns with the U.S. banking regulatory definition of criticized exposures, which consist of special mention, substandard and doubtful categories.

Risk ratings are reviewed on a regular and ongoing basis by Credit Risk Management and are adjusted as necessary for updated information affecting the obligor's ability to fulfill its obligations.

As noted above, the risk rating of a loan considers the industry in which the obligor conducts its operations. As part of the overall credit risk management framework, the Firm focuses on the management and diversification of its industry and client exposures, with particular attention paid to industries with actual or potential credit concern. Refer to Note 4 for further detail on industry concentrations.

The table below provides information by class of receivable for the retained loans in the Wholesale portfolio segment. Refer to Note 4 for additional information on industry concentrations.

As of or for the year ended December 31, (in millions, except ratios)	Commercial and industrial		Real estate		Financial institutions		Governments & Agencies		Other[d]		Total retained loans	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Loans by risk ratings												
Investment-grade	**$ 60,700**	$ 73,497	**$ 101,354**	$100,107	**$ 40,263**	$ 32,178	**$ 12,616**	$ 13,984	**$129,266**	$119,963	**$344,199**	$339,729
Noninvestment-grade:												
Noncriticized	**51,356**	51,720	**13,841**	14,876	**15,768**	15,316	**126**	201	**12,411**	11,478	**93,502**	93,591
Criticized performing	**4,071**	3,738	**1,001**	620	**574**	150	**–**	2	**449**	182	**6,095**	4,692
Criticized nonaccrual	**752**	851	**48**	134	**3**	4	**–**	–	**40**	161	**843**	1,150
Total noninvestment-grade	**56,179**	56,309	**14,890**	15,630	**16,345**	15,470	**126**	203	**12,900**	11,821	**100,440**	99,433
Total retained loans	**$116,879**	$129,806	**$ 116,244**	$115,737	**$ 56,608**	$ 47,648	**$ 12,742**	$ 14,187	**$142,166**	$131,784	**$444,639**	$439,162
% of total criticized to total retained loans	**4.13%**	3.54%	**0.90%**	0.65%	**1.02%**	0.32%	**–%**	0.01%	**0.34%**	0.26%	**1.56%**	1.33%
% of criticized nonaccrual to total retained loans	**0.64**	0.66	**0.04**	0.12	**0.01**	0.01	**–**	–	**0.03**	0.12	**0.19**	0.26
Loans by geographic distribution[a]												
Total non-U.S.	**$ 28,253**	$ 29,572	**$ 4,123**	$ 2,967	**$ 16,800**	$ 18,524	**$ 2,232**	$ 3,150	**$ 49,966**	$ 48,433	**$101,374**	$102,646
Total U.S.	**88,626**	100,234	**112,121**	112,770	**39,808**	29,124	**10,510**	11,037	**92,200**	83,351	**343,265**	336,516
Total retained loans	**$116,879**	$129,806	**$ 116,244**	$115,737	**$ 56,608**	$ 47,648	**$ 12,742**	$ 14,187	**$142,166**	$131,784	**$444,639**	$439,162
Net charge-offs/(recoveries)	**$ 329**	$ 165	**$ 12**	$ (20)	**$ –**	$ –	**$ –**	$ –	**$ 28**	$ 10	**$ 369**	$ 155
% of net charge-offs/(recoveries) to end-of-period retained loans	**0.28%**	0.13%	**0.01%**	(0.02)%	**–%**	–%	**–%**	–%	**0.02%**	0.01%	**0.08%**	0.04%
Loan delinquency[b]												
Current and less than 30 days past due and still accruing	**$115,753**	$128,678	**$ 116,098**	$115,533	**$ 56,583**	$ 47,622	**$ 12,713**	$ 14,165	**$141,739**	$130,918	**$442,886**	$436,916
30–89 days past due and still accruing	**339**	109	**94**	67	**20**	12	**28**	18	**387**	702	**868**	908
90 or more days past due and still accruing[c]	**35**	168	**4**	3	**2**	10	**1**	4	**–**	3	**42**	188
Criticized nonaccrual	**752**	851	**48**	134	**3**	4	**–**	–	**40**	161	**843**	1,150
Total retained loans	**$116,879**	$129,806	**$ 116,244**	$115,737	**$ 56,608**	$ 47,648	**$ 12,742**	$ 14,187	**$142,166**	$131,784	**$444,639**	$439,162

(a) The U.S. and non-U.S. distribution is determined based predominantly on the domicile of the borrower.

(b) The credit quality of wholesale loans is assessed primarily through ongoing review and monitoring of an obligor's ability to meet contractual obligations rather than relying on the past due status, which is generally a lagging indicator of credit quality.

(c) Represents loans that are considered well-collateralized and therefore still accruing interest.

(d) Other includes individuals and individual entities (predominantly consists of Wealth Management clients within AWM and includes loans to personal investment companies and personal and testamentary trusts), SPEs and Private education and civic organizations. Refer to Note 14 for more information on SPEs.

The following table presents additional information on the real estate class of loans within the Wholesale portfolio for the periods indicated, which consists primarily of secured commercial loans, of which multifamily is the largest segment. Multifamily lending finances acquisition, leasing and construction of apartment buildings, and includes loans to real estate investment trusts ("REITs"). Other commercial lending largely includes financing for acquisition, leasing and construction, largely for office, retail and industrial real estate, and includes loans to REITs. Included in real estate loans is $8.2 billion and $10.5 billion as of December 31, 2019 and 2018, respectively, of construction and development loans originally purposed for construction and development, general purpose loans for builders, as well as loans for land subdivision and pre-development.

December 31, (in millions, except ratios)	Multifamily		Other Commercial		Total real estate loans	
	2019	2018	**2019**	2018	**2019**	2018
Real estate retained loans	**$ 79,402**	$ 79,184	**$ 36,842**	$ 36,553	**$ 116,244**	$ 115,737
Criticized	**407**	388	**642**	366	**1,049**	754
% of total criticized to total real estate retained loans	**0.51%**	0.49%	**1.74%**	1.00%	**0.90%**	0.65%
Criticized nonaccrual	**$ 38**	$ 57	**$ 10**	$ 77	**$ 48**	$ 134
% of criticized nonaccrual loans to total real estate retained loans	**0.05%**	0.07%	**0.03%**	0.21%	**0.04%**	0.12%

Wholesale impaired retained loans and loan modifications

Wholesale impaired retained loans consist of loans that have been placed on nonaccrual status and/or that have been modified in a TDR. All impaired loans are evaluated for an asset-specific allowance as described in Note 13.

The table below sets forth information about the Firm's wholesale impaired retained loans.

December 31, (in millions)	Commercial and industrial		Real estate		Financial institutions		Other		Total retained loans	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018	**2019**	2018
Impaired loans										
With an allowance	**$ 637**	$ 807	**$ 49**	$ 107	**$ 3**	$ 4	**$ 42**	$ 152	**$ 731**	$ 1,070
Without an allowance[(a)]	**177**	140	**—**	27	**—**	—	**4**	13	**181**	180
Total impaired loans	**$ 814**	$ 947	**$ 49**	$ 134	**$ 3**	$ 4	**$ 46**	$ 165	**$ 912** [(c)]	$ 1,250 [(c)]
Allowance for loan losses related to impaired loans	**$ 221**	$ 252	**$ 9**	$ 25	**$ 1**	$ 1	**$ 3**	$ 19	**$ 234**	$ 297
Unpaid principal balance of impaired loans[(b)]	**974**	1,043	**72**	203	**4**	4	**54**	473	**1,104**	1,723

(a) When the discounted cash flows, collateral value or market price equals or exceeds the recorded investment in the loan, the loan does not require an allowance. This typically occurs when the impaired loans have been partially charged-off and/or there have been interest payments received and applied to the loan balance.
(b) Represents the contractual amount of principal owed at December 31, 2019 and 2018. The unpaid principal balance differs from the impaired loan balances due to various factors, including charge-offs; interest payments received and applied to the carrying value; net deferred loan fees or costs; and unamortized discount or premiums on purchased loans.
(c) Based upon the domicile of the borrower, largely consists of loans in the U.S.

The following table presents the Firm's average impaired retained loans for the years ended 2019, 2018 and 2017.

Year ended December 31, (in millions)	**2019**	2018	2017
Commercial and industrial	**$ 1,086**	$ 1,027	$ 1,256
Real estate	**94**	133	165
Financial institutions	**11**	57	48
Other	**168**	199	241
Total[(a)]	**$ 1,359**	$ 1,416	$ 1,710

(a) The related interest income on accruing impaired loans and interest income recognized on a cash basis were not material for the years ended December 31, 2019, 2018 and 2017.

Certain loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. All TDRs are reported as impaired loans in the tables above. TDRs were $460 million and $576 million as of December 31, 2019 and 2018, respectively. The impact of these modifications, as well as new TDRs, were not material to the Firm for the years ended December 31, 2019, 2018 and 2017.

Note 13 – Allowance for credit losses

JPMorgan Chase's allowance for loan losses represents management's estimate of probable credit losses inherent in the Firm's retained loan portfolio, which consists of the two consumer portfolio segments (primarily scored) and the wholesale portfolio segment (risk-rated). The allowance for loan losses includes a formula-based component, an asset-specific component, and a component related to PCI loans, as described below. Management also estimates an allowance for wholesale and certain consumer lending-related commitments using methodologies similar to those used to estimate the allowance on the underlying loans.

The Firm's policies used to determine its allowance for credit losses are described in the following paragraphs.

Determining the appropriateness of the allowance is complex and requires judgment by management about the effect of matters that are inherently uncertain. Subsequent evaluations of the loan portfolio, in light of the factors then prevailing, may result in significant changes in the allowances for loan losses and lending-related commitments in future periods. At least quarterly, the allowance for credit losses is reviewed by the CRO, the CFO and the Controller of the Firm. As of December 31, 2019, JPMorgan Chase deemed the allowance for credit losses to be appropriate and sufficient to absorb probable credit losses inherent in the portfolio.

Formula-based component

The formula-based component is based on a statistical calculation to provide for incurred credit losses in all consumer loans and performing risk-rated loans. All loans restructured in TDRs as well as any impaired risk-rated loans have an allowance assessed as part of the asset-specific component, while PCI loans have an allowance assessed as part of the PCI component. Refer to Note 12 for more information on TDRs, Impaired loans and PCI loans.

Formula-based component - Consumer loans and certain lending-related commitments

The formula-based allowance for credit losses for the consumer portfolio segments is calculated by applying statistical credit loss factors (estimated PD and loss severities) to the recorded investment balances or loan-equivalent amounts of pools of loan exposures with similar risk characteristics over a loss emergence period to arrive at an estimate of incurred credit losses. Estimated loss emergence periods may vary by product and may change over time; management applies judgment in estimating loss emergence periods, using available credit information and trends. In addition, management applies judgment to the statistical loss estimates for each loan portfolio category, using delinquency trends and other risk characteristics to estimate the total incurred credit losses in the portfolio. Management uses additional statistical methods and considers actual portfolio performance, including actual losses recognized on defaulted loans and collateral valuation trends, to review the appropriateness of the primary statistical loss estimate. The economic impact of potential modifications of residential real estate loans is not included in the statistical calculation because of the uncertainty regarding the type and results of such modifications.

The statistical calculation is then adjusted to take into consideration model imprecision, external factors and current economic events that have occurred but that are not yet reflected in the factors used to derive the statistical calculation; these adjustments are accomplished in part by analyzing the historical loss experience for each major product segment. However, it is difficult to predict whether historical loss experience is indicative of future loss levels. Management applies judgment in making this adjustment, taking into account uncertainties associated with current macroeconomic and political conditions, quality of underwriting standards, borrower behavior, and other relevant internal and external factors affecting the credit quality of the portfolio. In certain instances, the interrelationships between these factors create further uncertainties. The application of different inputs into the statistical calculation, and the assumptions used by management to adjust the statistical calculation, are subject to management judgment, and emphasizing one input or assumption over another, or considering other inputs or assumptions, could affect the estimate of the allowance for credit losses for the consumer credit portfolio.

Overall, the allowance for credit losses for consumer portfolios is sensitive to changes in the economic environment (e.g., unemployment rates), delinquency rates, the realizable value of collateral (e.g., housing prices), FICO scores, borrower behavior and other risk factors. While all of these factors are important determinants of overall allowance levels, changes in the various factors may not occur at the same time or at the same rate, or changes may be directionally inconsistent such that improvement in one factor may offset deterioration in another. In addition, changes in these factors would not necessarily be consistent across all geographies or product types. Finally, it is difficult to predict the extent to which changes in these factors would ultimately affect the frequency of losses, the severity of losses or both.

Formula-based component - Wholesale loans and lending-related commitments

The Firm's methodology for determining the allowance for loan losses and the allowance for lending-related commitments involves the early identification of credits that are deteriorating. The formula-based component of the allowance for wholesale loans and lending-related commitments is calculated by applying statistical credit loss factors (estimated PD and LGD) to the recorded investment balances or loan-equivalent over a loss emergence period to arrive at an estimate of incurred credit losses in the portfolio. Estimated loss emergence periods may vary by the funded versus unfunded status of the instrument and may change over time.

The Firm assesses the credit quality of a borrower or counterparty and assigns an internal risk rating. Risk ratings are assigned at origination or acquisition, and if necessary, adjusted for changes in credit quality over the life of the exposure. In assessing the risk rating of a particular loan or lending-related commitment, among the factors considered are the obligor's debt capacity and financial flexibility, the level of the obligor's earnings, the amount and sources for repayment, the level and nature of contingencies, management strength, and the industry and geography in which the obligor operates. These factors are based on an evaluation of historical and current information and involve subjective assessment and interpretation. Determining risk ratings involves significant judgment; emphasizing one factor over another or considering additional factors could affect the risk rating assigned by the Firm.

A PD estimate is determined based on the Firm's history of defaults over more than one credit cycle.

LGD estimate is a judgment-based estimate assigned to each loan or lending-related commitment. The estimate represents the amount of economic loss if the obligor were to default. The type of obligor, quality of collateral, and the seniority of the Firm's lending exposure in the obligor's capital structure affect LGD.

The Firm applies judgment in estimating PD, LGD, loss emergence period and loan-equivalent used in calculating the allowance for credit losses. Estimates of PD, LGD, loss emergence period and loan-equivalent used are subject to periodic refinement based on any changes to underlying external or Firm-specific historical data. Changes to the time period used for PD and LGD estimates could also affect the allowance for credit losses. The use of different inputs, estimates or methodologies could change the amount of the allowance for credit losses determined appropriate by the Firm.

In addition to the statistical credit loss estimates applied to the wholesale portfolio, management applies its judgment to adjust the statistical estimates for wholesale loans and lending-related commitments, taking into consideration model imprecision, external factors and economic events that have occurred but are not yet reflected in the loss factors. Historical experience of both LGD and PD are considered when estimating these adjustments. Factors related to concentrated and deteriorating industries also are incorporated where relevant. These estimates are based on management's view of uncertainties that relate to current macroeconomic conditions, quality of underwriting standards and other relevant internal and external factors affecting the credit quality of the current portfolio.

Asset-specific component

The asset-specific component of the allowance relates to loans considered to be impaired, which includes loans that have been modified in TDRs as well as risk-rated loans that have been placed on nonaccrual status. To determine the asset-specific component of the allowance, larger risk-rated loans (primarily loans in the wholesale portfolio segment) are evaluated individually, while smaller loans (both risk-rated and scored) are evaluated as pools using historical loss experience for the respective class of assets.

The Firm generally measures the asset-specific allowance as the difference between the recorded investment in the loan and the present value of the cash flows expected to be collected, discounted at the loan's original effective interest rate. Subsequent changes in impairment are reported as an adjustment to the allowance for loan losses. In certain cases, the asset-specific allowance is determined using an observable market price, and the allowance is measured as the difference between the recorded investment in the loan and the loan's fair value. Collateral-dependent loans are charged down to the fair value of collateral less costs to sell. For any of these impaired loans, the amount of the asset-specific allowance required to be recorded, if any, is dependent upon the recorded investment in the loan (including prior charge-offs), and either the expected cash flows or fair value of collateral. Refer to Note 12 for more information about charge-offs and collateral-dependent loans.

The asset-specific component of the allowance for impaired loans that have been modified in TDRs (including forgone interest, principal forgiveness, as well as other concessions) incorporates the effect of the modification on the loan's expected cash flows, which considers the potential for redefault. For residential real estate loans modified in TDRs, the Firm develops product-specific probability of default estimates, which are applied at a loan level to compute expected losses. In developing these probabilities of default, the Firm considers the relationship between the credit quality characteristics of the underlying loans and certain assumptions about home prices and unemployment, based upon industry-wide data. The Firm also considers its own historical loss experience to-date based on actual redefaulted modified loans. For credit card loans modified in TDRs, expected losses incorporate projected redefaults based on the Firm's historical experience by type of modification program. For wholesale loans modified in TDRs, expected losses incorporate management's expectation of the borrower's ability to repay under the modified terms.

Estimating the timing and amounts of future cash flows is highly judgmental as these cash flow projections rely upon estimates such as loss severities, asset valuations, default rates (including redefault rates on modified loans), the amounts and timing of interest or principal payments (including any expected prepayments) or other factors that are reflective of current and expected market conditions. These estimates are, in turn, dependent on factors such as the duration of current overall economic conditions, industry-, portfolio-, or borrower-specific factors, the expected outcome of insolvency proceedings as well as, in certain circumstances, other economic factors, including the level of future home prices. All of these estimates and assumptions require significant management judgment and certain assumptions are highly subjective.

PCI loans

In connection with the acquisition of certain PCI loans, which are accounted for as described in Note 12, the allowance for loan losses for the PCI portfolio is based on quarterly estimates of the amount of principal and interest cash flows expected to be collected over the estimated remaining lives of the loans.

These cash flow projections are based on estimates regarding default rates (including redefault rates on modified loans), loss severities, the amounts and timing of prepayments and other factors that are reflective of current and expected future market conditions. These estimates are dependent on assumptions regarding the level of future home prices, and the duration of current overall economic conditions, among other factors. These estimates and assumptions require significant management judgment and certain assumptions are highly subjective.

Allowance for credit losses and related information

The table below summarizes information about the allowances for loan losses and lending-relating commitments, and includes a breakdown of loans and lending-related commitments by impairment methodology.

(Table continued on next page)

Year ended December 31, (in millions)	2019			
	Consumer, excluding credit card	Credit card	Wholesale	Total
Allowance for loan losses				
Beginning balance at January 1,	$ 4,146	$ 5,184	$ 4,115	$ 13,445
Gross charge-offs	963	5,436	411	6,810
Gross recoveries	(551)	(588)	(42)	(1,181)
Net charge-offs	412	4,848	369	5,629
Write-offs of PCI loans[a]	151	–	–	151
Provision for loan losses	(383)	5,348	484	5,449
Other	(1)	(1)	11	9
Ending balance at December 31,	$ 3,199	$ 5,683	$ 4,241	$ 13,123
Allowance for loan losses by impairment methodology				
Asset-specific[b]	$ 136	$ 477 [c]	$ 234	$ 847
Formula-based	2,076	5,206	4,007	11,289
PCI	987	–	–	987
Total allowance for loan losses	$ 3,199	$ 5,683	$ 4,241	$ 13,123
Loans by impairment methodology				
Asset-specific	$ 6,172	$ 1,452	$ 912	$ 8,536
Formula-based	305,503	167,472	443,727	916,702
PCI	20,363	–	–	20,363
Total retained loans	$ 332,038	$ 168,924	$ 444,639	$ 945,601
Impaired collateral-dependent loans				
Net charge-offs	$ 57	$ –	$ 25	$ 82
Loans measured at fair value of collateral less cost to sell	2,059	–	81	2,140
Allowance for lending-related commitments				
Beginning balance at January 1,	$ 33	$ –	$ 1,022	$ 1,055
Provision for lending-related commitments	–	–	136	136
Other	–	–	–	–
Ending balance at December 31,	$ 33	$ –	$ 1,158	$ 1,191
Allowance for lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 102	$ 102
Formula-based	33	–	1,056	1,089
Total allowance for lending-related commitments	$ 33	$ –	$ 1,158	$ 1,191
Lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 474	$ 474
Formula-based	51,412	650,720	403,641	1,105,773
Total lending-related commitments	$ 51,412	$ 650,720	$ 404,115	$ 1,106,247

(a) Write-offs of PCI loans are recorded against the allowance for loan losses when actual losses for a pool exceed estimated losses that were recorded as purchase accounting adjustments at the time of acquisition. A write-off of a PCI loan is recognized when the underlying loan is removed from a pool.
(b) Includes risk-rated loans that have been placed on nonaccrual status and loans that have been modified in a TDR.
(c) The asset-specific credit card allowance for loan losses is related to loans that have been modified in a TDR; such allowance is calculated based on the loans' original contractual interest rates and does not consider any incremental penalty rates.

(table continued from previous page)

2018				2017			
Consumer, excluding credit card	Credit card	Wholesale	Total	Consumer, excluding credit card	Credit card	Wholesale	Total
$ 4,579	$ 4,884	$ 4,141	$ 13,604	$ 5,198	$ 4,034	$ 4,544	$ 13,776
1,025	5,011	313	6,349	1,779	4,521	212	6,512
(842)	(493)	(158)	(1,493)	(634)	(398)	(93)	(1,125)
183	4,518	155	4,856	1,145	4,123	119	5,387
187	–	–	187	86	–	–	86
(63)	4,818	130	4,885	613	4,973	(286)	5,300
–	–	(1)	(1)	(1)	–	2	1
$ 4,146	$ 5,184	$ 4,115	$ 13,445	$ 4,579	$ 4,884	$ 4,141	$ 13,604
$ 196	$ 440 [(c)]	$ 297	$ 933	$ 246	$ 383 [(c)]	$ 461	$ 1,090
2,162	4,744	3,818	10,724	2,108	4,501	3,680	10,289
1,788	–	–	1,788	2,225	–	–	2,225
$ 4,146	$ 5,184	$ 4,115	$ 13,445	$ 4,579	$ 4,884	$ 4,141	$ 13,604
$ 6,874	$ 1,319	$ 1,250	$ 9,443	$ 8,078	$ 1,215	$ 1,867	$ 11,160
342,729	155,297	437,909	935,935	333,899	148,172	401,028	883,099
24,034	–	3	24,037	30,576	–	3	30,579
$ 373,637	$ 156,616	$ 439,162	$ 969,415	$ 372,553	$ 149,387	$ 402,898	$ 924,838
$ 24	$ –	$ 21	$ 45	$ 64	$ –	$ 31	$ 95
2,080	–	202	2,282	2,133	–	233	2,366
$ 33	$ –	$ 1,035	$ 1,068	$ 26	$ –	$ 1,052	$ 1,078
–	–	(14)	(14)	7	–	(17)	(10)
–	–	1	1	–	–	–	–
$ 33	$ –	$ 1,022	$ 1,055	$ 33	$ –	$ 1,035	$ 1,068
$ –	$ –	$ 99	$ 99	$ –	$ –	$ 187	$ 187
33	–	923	956	33	–	848	881
$ 33	$ –	$ 1,022	$ 1,055	$ 33	$ –	$ 1,035	$ 1,068
$ –	$ –	$ 469	$ 469	$ –	$ –	$ 731	$ 731
46,066	605,379	387,344	1,038,789	48,553	572,831	369,367	990,751
$ 46,066	$ 605,379	$ 387,813	$ 1,039,258	$ 48,553	$ 572,831	$ 370,098	$ 991,482

Note 14 – Variable interest entities

Refer to Note 1 on page 151 for a further description of JPMorgan Chase's accounting policies regarding consolidation of VIEs.

The following table summarizes the most significant types of Firm-sponsored VIEs by business segment. The Firm considers a "sponsored" VIE to include any entity where: (1) JPMorgan Chase is the primary beneficiary of the structure; (2) the VIE is used by JPMorgan Chase to securitize Firm assets; (3) the VIE issues financial instruments with the JPMorgan Chase name; or (4) the entity is a JPMorgan Chase–administered asset-backed commercial paper conduit.

Line of Business	*Transaction Type*	*Activity*	*2019 Form 10-K page references*
CCB	Credit card securitization trusts	Securitization of originated credit card receivables	242–243
	Mortgage securitization trusts	Servicing and securitization of both originated and purchased residential mortgages	243–245
CIB	Mortgage and other securitization trusts	Securitization of both originated and purchased residential and commercial mortgages, and other consumer loans	243–245
	Multi-seller conduits	Assist clients in accessing the financial markets in a cost-efficient manner and structures transactions to meet investor needs	245
	Municipal bond vehicles	Financing of municipal bond investments	245–246

The Firm's other business segments are also involved with VIEs (both third-party and Firm-sponsored), but to a lesser extent, as follows:

- Asset & Wealth Management: AWM sponsors and manages certain funds that are deemed VIEs. As asset manager of the funds, AWM earns a fee based on assets managed; the fee varies with each fund's investment objective and is competitively priced. For fund entities that qualify as VIEs, AWM's interests are, in certain cases, considered to be significant variable interests that result in consolidation of the financial results of these entities.
- Commercial Banking: CB provides financing and lending-related services to a wide spectrum of clients, including certain third-party-sponsored entities that may meet the definition of a VIE. CB does not control the activities of these entities and does not consolidate these entities. CB's maximum loss exposure, regardless of whether the entity is a VIE, is generally limited to loans and lending-related commitments which are reported and disclosed in the same manner as any other third-party transaction.
- Corporate: Corporate is involved with entities that may meet the definition of VIEs; however these entities are generally subject to specialized investment company accounting, which does not require the consolidation of investments, including VIEs. In addition, Treasury and CIO invest in securities generally issued by third parties which may meet the definition of VIEs (e.g., issuers of asset-backed securities). In general, the Firm does not have the power to direct the significant activities of these entities and therefore does not consolidate these entities. Refer to Note 10 for further information on the Firm's investment securities portfolio.

In addition, CIB also invests in and provides financing and other services to VIEs sponsored by third parties. Refer to page 247 of this Note for more information on the VIEs sponsored by third parties.

Significant Firm-sponsored variable interest entities

Credit card securitizations

CCB's Card business may securitize originated credit card loans, primarily through the Chase Issuance Trust (the "Trust"). The Firm's continuing involvement in credit card securitizations includes servicing the receivables, retaining an undivided seller's interest in the receivables, retaining certain senior and subordinated securities and maintaining escrow accounts.

The Firm is considered to be the primary beneficiary of these Firm-sponsored credit card securitization trusts based on the Firm's ability to direct the activities of these VIEs through its servicing responsibilities and other duties, including making decisions as to the receivables that are transferred into those trusts and as to any related modifications and workouts. Additionally, the nature and extent of the Firm's other continuing involvement with the trusts, as indicated above, obligates the Firm to absorb losses and gives the Firm the right to receive certain benefits from these VIEs that could potentially be significant.

The underlying securitized credit card receivables and other assets of the securitization trusts are available only for payment of the beneficial interests issued by the securitization trusts; they are not available to pay the Firm's other obligations or the claims of the Firm's creditors.

The agreements with the credit card securitization trusts require the Firm to maintain a minimum undivided interest in the credit card trusts (generally 5%). As of December 31, 2019 and 2018, the Firm held undivided interests in Firm-sponsored credit card securitization trusts of $5.3 billion and $15.1 billion, respectively. The Firm maintained an average undivided interest in principal receivables owned by those trusts of approximately 50% and 37% for the years ended December 31, 2019 and 2018. The Firm did

not retain any senior securities and retained $3.0 billion of subordinated securities in certain of its credit card securitization trusts as of both December 31, 2019 and 2018, respectively. The Firm's undivided interests in the credit card trusts and securities retained are eliminated in consolidation.

Firm-sponsored mortgage and other securitization trusts

The Firm securitizes (or has securitized) originated and purchased residential mortgages, commercial mortgages and other consumer loans primarily in its CCB and CIB businesses. Depending on the particular transaction, as well as the respective business involved, the Firm may act as the servicer of the loans and/or retain certain beneficial interests in the securitization trusts.

The following table presents the total unpaid principal amount of assets held in Firm-sponsored private-label securitization entities, including those in which the Firm has continuing involvement, and those that are consolidated by the Firm. Continuing involvement includes servicing the loans, holding senior interests or subordinated interests (including amounts required to be held pursuant to credit risk retention rules), recourse or guarantee arrangements, and derivative contracts. In certain instances, the Firm's only continuing involvement is servicing the loans. The Firm's maximum loss exposure from retained and purchased interests is the carrying value of these interests. Refer to Securitization activity on page 248 of this Note for further information regarding the Firm's cash flows associated with and interests retained in nonconsolidated VIEs, and pages 248–249 of this Note for information on the Firm's loan sales and securitization activity related to U.S. GSEs and government agencies.

	Principal amount outstanding			JPMorgan Chase interest in securitized assets in nonconsolidated VIEs[c][d][e]			
December 31, 2019 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by JPMorgan Chase
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	**$ 60,348**	**$ 2,796**	**$ 48,734**	**$ 535**	**$ 625**	**$ –**	**$ 1,160**
Subprime	**14,661**	**–**	**13,490**	**7**	**–**	**–**	**7**
Commercial and other[b]	**111,903**	**–**	**80,878**	**785**	**773**	**241**	**1,799**
Total	**$ 186,912**	**$ 2,796**	**$ 143,102**	**$ 1,327**	**$ 1,398**	**$ 241**	**$ 2,966**

	Principal amount outstanding			JPMorgan Chase interest in securitized assets in nonconsolidated VIEs[c][d][e]			
December 31, 2018 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by JPMorgan Chase
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	$ 63,350	$ 3,237	$ 50,679	$ 623	$ 647	$ –	$ 1,270
Subprime	16,729	32	15,434	53	–	–	53
Commercial and other[b]	102,961	–	79,387	783	801	210	1,794
Total	$ 183,040	$ 3,269	$ 145,500	$ 1,459	$ 1,448	$ 210	$ 3,117

(a) Excludes U.S. GSEs and government agency securitizations and re-securitizations, which are not Firm-sponsored. Refer to pages 248–249 of this Note for information on the Firm's loan sales and securitization activity related to U.S. GSEs and government agencies.
(b) Consists of securities backed by commercial real estate loans and non-mortgage-related consumer receivables purchased from third parties.
(c) Excludes the following: retained servicing (refer to Note 15 for a discussion of MSRs); securities retained from loan sales and securitization activity related to U.S. GSEs and government agencies; interest rate and foreign exchange derivatives primarily used to manage interest rate and foreign exchange risks of securitization entities (refer to Note 5 for further information on derivatives); senior and subordinated securities of $106 million and $94 million, respectively, at December 31, 2019, and $87 million and $28 million, respectively, at December 31, 2018, which the Firm purchased in connection with CIB's secondary market-making activities.
(d) Includes interests held in re-securitization transactions.
(e) As of December 31, 2019 and 2018, 63% and 60%, respectively, of the Firm's retained securitization interests, which are predominantly carried at fair value and include amounts required to be held pursuant to credit risk retention rules, were risk-rated "A" or better, on an S&P-equivalent basis. The retained interests in prime residential mortgages consisted of $1.1 billion and $1.3 billion of investment-grade, and $72 million and $16 million of noninvestment-grade at December 31, 2019 and 2018, respectively. The retained interests in commercial and other securitizations trusts consisted of $1.2 billion of investment-grade for both periods, and $575 million and $623 million of noninvestment-grade retained interests at December 31, 2019 and 2018, respectively.

Residential mortgage
The Firm securitizes residential mortgage loans originated by CCB, as well as residential mortgage loans purchased from third parties by either CCB or CIB. CCB generally retains servicing for all residential mortgage loans it originated or purchased, and for certain mortgage loans purchased by CIB. For securitizations of loans serviced by CCB, the Firm has the power to direct the significant activities of the VIE because it is responsible for decisions related to loan modifications and workouts. CCB may also retain an interest upon securitization.

In addition, CIB engages in underwriting and trading activities involving securities issued by Firm-sponsored securitization trusts. As a result, CIB at times retains senior and/or subordinated interests (including residual interests and amounts required to be held pursuant to credit risk retention rules) in residential mortgage securitizations at the time of securitization, and/or reacquires positions in the secondary market in the normal course of business. In certain instances, as a result of the positions retained or reacquired by CIB or held by CCB, when considered together with the servicing arrangements entered into by CCB, the Firm is deemed to be the primary beneficiary of certain securitization trusts. Refer to the table on page 246 of this Note for more information on consolidated residential mortgage securitizations.

The Firm does not consolidate residential mortgage securitizations (Firm-sponsored or third-party-sponsored) when it is not the servicer (and therefore does not have the power to direct the most significant activities of the trust) or does not hold a beneficial interest in the trust that could potentially be significant to the trust. Refer to the table on page 246 of this Note for more information on the consolidated residential mortgage securitizations, and the table on the previous page of this Note for further information on interests held in nonconsolidated residential mortgage securitizations.

Commercial mortgages and other consumer securitizations
CIB originates and securitizes commercial mortgage loans, and engages in underwriting and trading activities involving the securities issued by securitization trusts. CIB may retain unsold senior and/or subordinated interests (including amounts required to be held pursuant to credit risk retention rules) in commercial mortgage securitizations at the time of securitization but, generally, the Firm does not service commercial loan securitizations. For commercial mortgage securitizations the power to direct the significant activities of the VIE generally is held by the servicer or investors in a specified class of securities (“controlling class”). The Firm generally does not retain an interest in the controlling class in its sponsored commercial mortgage securitization transactions. Refer to the table on page 246 of this Note for more information on the consolidated commercial mortgage securitizations, and the table on the previous page of this Note for further information on interests held in nonconsolidated securitizations.

Re-securitizations
The Firm engages in certain re-securitization transactions in which debt securities are transferred to a VIE in exchange for new beneficial interests. These transfers occur in connection with both U.S. GSEs and government agency sponsored VIEs, which are backed by residential mortgages. The Firm’s consolidation analysis is largely dependent on the Firm’s role and interest in the re-securitization trusts.

The following table presents the principal amount of securities transferred to re-securitization VIEs.

Year ended December 31, (in millions)	**2019**	2018	2017
Transfers of securities to VIEs			
U.S. GSEs and government agencies	**25,852**	15,532	12,617

Most re-securitizations with which the Firm is involved are client-driven transactions in which a specific client or group of clients is seeking a specific return or risk profile. For these transactions, the Firm has concluded that the decision-making power of the entity is shared between the Firm and its clients, considering the joint effort and decisions in establishing the re-securitization trust and its assets, as well as the significant economic interest the client holds in the re-securitization trust; therefore the Firm does not consolidate the re-securitization VIE.

The Firm did not transfer any private label securities to re-securitization VIEs during 2019, 2018 and 2017, respectively, and retained interests in any such Firm-sponsored VIEs as of December 31, 2019 and 2018 were immaterial.

Additionally, the Firm may invest in beneficial interests of third-party-sponsored re-securitizations and generally purchases these interests in the secondary market. In these circumstances, the Firm does not have the unilateral ability to direct the most significant activities of the re-securitization trust, either because it was not involved in the initial design of the trust, or the Firm is involved with an independent third-party sponsor and demonstrates shared power over the creation of the trust; therefore, the Firm does not consolidate the re-securitization VIE.

The following table presents information on nonconsolidated re-securitization VIEs.

December 31, (in millions)	Nonconsolidated re-securitization VIEs	
	2019	2018
U.S. GSEs and government agencies		
Interest in VIEs	**2,928**	3,058

As of December 31, 2019 and 2018, the Firm did not consolidate any U.S. GSE and government agency re-securitization VIEs or any Firm-sponsored private-label re-securitization VIEs.

Multi-seller conduits

Multi-seller conduit entities are separate bankruptcy remote entities that provide secured financing, collateralized by pools of receivables and other financial assets, to customers of the Firm. The conduits fund their financing facilities through the issuance of highly rated commercial paper. The primary source of repayment of the commercial paper is the cash flows from the pools of assets. In most instances, the assets are structured with deal-specific credit enhancements provided to the conduits by the customers (i.e., sellers) or other third parties. Deal-specific credit enhancements are generally structured to cover a multiple of historical losses expected on the pool of assets, and are typically in the form of overcollateralization provided by the seller. The deal-specific credit enhancements mitigate the Firm's potential losses on its agreements with the conduits.

To ensure timely repayment of the commercial paper, and to provide the conduits with funding to provide financing to customers in the event that the conduits do not obtain funding in the commercial paper market, each asset pool financed by the conduits has a minimum 100% deal-specific liquidity facility associated with it provided by JPMorgan Chase Bank, N.A. JPMorgan Chase Bank, N.A. also provides the multi-seller conduit vehicles with uncommitted program-wide liquidity facilities and program-wide credit enhancement in the form of standby letters of credit. The amount of program-wide credit enhancement required is based upon commercial paper issuance and approximates 10% of the outstanding balance of commercial paper.

The Firm consolidates its Firm-administered multi-seller conduits, as the Firm has both the power to direct the significant activities of the conduits and a potentially significant economic interest in the conduits. As administrative agent and in its role in structuring transactions, the Firm makes decisions regarding asset types and credit quality, and manages the commercial paper funding needs of the conduits. The Firm's interests that could potentially be significant to the VIEs include the fees received as administrative agent and liquidity and program-wide credit enhancement provider, as well as the potential exposure created by the liquidity and credit enhancement facilities provided to the conduits. Refer to page 246 of this Note for further information on consolidated VIE assets and liabilities.

In the normal course of business, JPMorgan Chase makes markets in and invests in commercial paper issued by the Firm-administered multi-seller conduits. The Firm held $16.3 billion and $20.1 billion of the commercial paper issued by the Firm-administered multi-seller conduits at December 31, 2019 and 2018, respectively, which have been eliminated in consolidation. The Firm's investments reflect the Firm's funding needs and capacity and were not driven by market illiquidity. Other than the amounts required to be held pursuant to credit risk retention rules, the Firm is not obligated under any agreement to purchase the commercial paper issued by the Firm-administered multi-seller conduits.

Deal-specific liquidity facilities, program-wide liquidity and credit enhancement provided by the Firm have been eliminated in consolidation. The Firm or the Firm-administered multi-seller conduits provide lending-related commitments to certain clients of the Firm-administered multi-seller conduits. The unfunded commitments were $8.9 billion and $8.0 billion at December 31, 2019 and 2018, respectively, and are reported as off-balance sheet lending-related commitments in other unfunded commitments to extend credit. Refer to Note 28 for more information on off-balance sheet lending-related commitments.

Municipal bond vehicles

Municipal bond vehicles or tender option bond ("TOB") trusts allow institutions to finance their municipal bond investments at short-term rates. In a typical TOB transaction, the trust purchases highly rated municipal bond(s) of a single issuer and funds the purchase by issuing two types of securities: (1) puttable floating-rate certificates ("floaters") and (2) inverse floating-rate residual interests ("residuals"). The floaters are typically purchased by money market funds or other short-term investors and may be tendered, with requisite notice, to the TOB trust. The residuals are retained by the investor seeking to finance its municipal bond investment. TOB transactions where the residual is held by a third-party investor are typically known as customer TOB trusts, and non-customer TOB trusts are transactions where the Residual is retained by the Firm. Customer TOB trusts are sponsored by a third party; refer to page 247 of this Note for further information. The Firm serves as sponsor for all non-customer TOB transactions. The Firm may provide various services to a TOB trust, including remarketing agent, liquidity or tender option provider, and/or sponsor.

J.P. Morgan Securities LLC may serve as a remarketing agent on the floaters for TOB trusts. The remarketing agent is responsible for establishing the periodic variable rate on the floaters, conducting the initial placement and remarketing tendered floaters. The remarketing agent may, but is not obligated to, make markets in floaters. Floaters held by the Firm were not material during 2019 and 2018.

JPMorgan Chase Bank, N.A. or J.P. Morgan Securities LLC often serves as the sole liquidity or tender option provider for the TOB trusts. The liquidity provider's obligation to

perform is conditional and is limited by certain events ("Termination Events"), which include bankruptcy or failure to pay by the municipal bond issuer or credit enhancement provider, an event of taxability on the municipal bonds or the immediate downgrade of the municipal bond to below investment grade. In addition, the liquidity provider's exposure is typically further limited by the high credit quality of the underlying municipal bonds, the excess collateralization in the vehicle, or, in certain transactions, the reimbursement agreements with the Residual holders.

Holders of the floaters may "put," or tender, their floaters to the TOB trust. If the remarketing agent cannot successfully remarket the floaters to another investor, the liquidity provider either provides a loan to the TOB trust for the TOB trust's purchase of the floaters, or it directly purchases the tendered floaters.

TOB trusts are considered to be variable interest entities. The Firm consolidates non-customer TOB trusts because as the Residual holder, the Firm has the right to make decisions that significantly impact the economic performance of the municipal bond vehicle, and it has the right to receive benefits and bear losses that could potentially be significant to the municipal bond vehicle.

Consolidated VIE assets and liabilities

The following table presents information on assets and liabilities related to VIEs consolidated by the Firm as of December 31, 2019 and 2018.

	Assets				Liabilities		
December 31, 2019 (in millions)	Trading assets	Loans	Other[b]	Total assets[c]	Beneficial interests in VIE assets[d]	Other[e]	Total liabilities
VIE program type							
Firm-sponsored credit card trusts	**$ –**	**$ 14,986**	**$ 266**	**$ 15,252**	**$ 6,461**	**$ 6**	**$ 6,467**
Firm-administered multi-seller conduits	**1**	**25,183**	**355**	**25,539**	**9,223**	**36**	**9,259**
Municipal bond vehicles	**1,903**	**–**	**4**	**1,907**	**1,881**	**3**	**1,884**
Mortgage securitization entities[a]	**66**	**2,762**	**64**	**2,892**	**276**	**130**	**406**
Other	**663**	**–**	**192**	**855**	**–**	**272**	**272**
Total	**$ 2,633**	**$ 42,931**	**$ 881**	**$ 46,445**	**$ 17,841**	**$ 447**	**$ 18,288**

	Assets				Liabilities		
December 31, 2018 (in millions)	Trading assets	Loans	Other[b]	Total assets[c]	Beneficial interests in VIE assets[d]	Other[e]	Total liabilities
VIE program type							
Firm-sponsored credit card trusts	$ –	$ 31,760	$ 491	$ 32,251	$ 13,404	$ 12	$ 13,416
Firm-administered multi-seller conduits	–	24,411	300	24,711	4,842	33	4,875
Municipal bond vehicles	1,779	–	4	1,783	1,685	3	1,688
Mortgage securitization entities[a]	53	3,285	40	3,378	308	161	469
Other	134	–	178	312	2	103	105
Total	$ 1,966	$ 59,456	$ 1,013	$ 62,435	$ 20,241	$ 312	$ 20,553

(a) Includes residential and commercial mortgage securitizations.
(b) Includes assets classified as cash and other assets on the Consolidated balance sheets.
(c) The assets of the consolidated VIEs included in the program types above are used to settle the liabilities of those entities. The assets and liabilities include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation.
(d) The interest-bearing beneficial interest liabilities issued by consolidated VIEs are classified in the line item on the Consolidated balance sheets titled, "Beneficial interests issued by consolidated variable interest entities." The holders of these beneficial interests generally do not have recourse to the general credit of JPMorgan Chase. Included in beneficial interests in VIE assets are long-term beneficial interests of $6.7 billion and $13.7 billion at December 31, 2019 and 2018, respectively. Refer to Note 20 for additional information on interest-bearing long-term beneficial interests.
(e) Includes liabilities classified as accounts payable and other liabilities on the Consolidated balance sheets.

VIEs sponsored by third parties

The Firm enters into transactions with VIEs structured by other parties. These include, for example, acting as a derivative counterparty, liquidity provider, investor, underwriter, placement agent, remarketing agent, trustee or custodian. These transactions are conducted at arm's-length, and individual credit decisions are based on the analysis of the specific VIE, taking into consideration the quality of the underlying assets. Where the Firm does not have the power to direct the activities of the VIE that most significantly impact the VIE's economic performance, or a variable interest that could potentially be significant, the Firm generally does not consolidate the VIE, but it records and reports these positions on its Consolidated balance sheets in the same manner it would record and report positions in respect of any other third-party transaction.

Tax credit vehicles

The Firm holds investments in unconsolidated tax credit vehicles, which are limited partnerships and similar entities that own and operate affordable housing, energy, and other projects. These entities are primarily considered VIEs. A third party is typically the general partner or managing member and has control over the significant activities of the tax credit vehicles, and accordingly the Firm does not consolidate tax credit vehicles. The Firm generally invests in these partnerships as a limited partner and earns a return primarily through the receipt of tax credits allocated to the projects. The maximum loss exposure, represented by equity investments and funding commitments, was $19.1 billion and $16.5 billion, of which $5.5 billion and $4.0 billion was unfunded at December 31, 2019 and 2018, respectively. In order to reduce the risk of loss, the Firm assesses each project and withholds varying amounts of its capital investment until the project qualifies for tax credits. Refer to Note 25 for further information on affordable housing tax credits. Refer to Note 28 for more information on off-balance sheet lending-related commitments.

Customer municipal bond vehicles (TOB trusts)

The Firm may provide various services to customer TOB trusts, including remarketing agent, liquidity or tender option provider. In certain customer TOB transactions, the Firm, as liquidity provider, has entered into a reimbursement agreement with the Residual holder. In those transactions, upon the termination of the vehicle, the Firm has recourse to the third-party Residual holders for any shortfall. The Firm does not have any intent to protect Residual holders from potential losses on any of the underlying municipal bonds. The Firm does not consolidate customer TOB trusts, since the Firm does not have the power to make decisions that significantly impact the economic performance of the municipal bond vehicle. The Firm's maximum exposure as a liquidity provider to customer TOB trusts at December 31, 2019 and 2018, was $5.5 billion and $4.8 billion, respectively. The fair value of assets held by such VIEs at December 31, 2019 and 2018 was $8.6 billion and $7.7 billion, respectively. Refer to Note 28 for more information on off-balance sheet lending-related commitments.

Loan securitizations

The Firm has securitized and sold a variety of loans, including residential mortgage, credit card, and commercial mortgage. The purposes of these securitization transactions were to satisfy investor demand and to generate liquidity for the Firm.

For loan securitizations in which the Firm is not required to consolidate the trust, the Firm records the transfer of the loan receivable to the trust as a sale when all of the following accounting criteria for a sale are met: (1) the transferred financial assets are legally isolated from the Firm's creditors; (2) the transferee or beneficial interest holder can pledge or exchange the transferred financial assets; and (3) the Firm does not maintain effective control over the transferred financial assets (e.g., the Firm cannot repurchase the transferred assets before their maturity and it does not have the ability to unilaterally cause the holder to return the transferred assets).

For loan securitizations accounted for as a sale, the Firm recognizes a gain or loss based on the difference between the value of proceeds received (including cash, beneficial interests, or servicing assets received) and the carrying value of the assets sold. Gains and losses on securitizations are reported in noninterest revenue.

Securitization activity

The following table provides information related to the Firm's securitization activities for the years ended December 31, 2019, 2018 and 2017, related to assets held in Firm-sponsored securitization entities that were not consolidated by the Firm, and where sale accounting was achieved at the time of the securitization.

Year ended December 31, (in millions)	2019 Residential mortgage[e]	2019 Commercial and other[f]	2018 Residential mortgage[e]	2018 Commercial and other[f]	2017 Residential mortgage[e]	2017 Commercial and other[f]
Principal securitized	**$ 9,957**	**$ 9,390**	$ 6,431	$ 10,159	$ 5,532	$ 10,252
All cash flows during the period:[a]						
Proceeds received from loan sales as financial instruments[b][c]	**$ 10,238**	**$ 9,544**	$ 6,449	$ 10,218	$ 5,661	$ 10,340
Servicing fees collected[d]	**287**	**2**	319	2	338	3
Cash flows received on interests	**507**	**237**	411	301	463	918

(a) Excludes re-securitization transactions.
(b) Predominantly includes Level 2 assets.
(c) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale.
(d) The prior period amounts have been revised to conform with the current period presentation.
(e) Includes prime mortgages only. Excludes loan securitization activity related to U.S. GSEs and government agencies.
(f) Includes commercial mortgage and other consumer loans.

Key assumptions used to value retained interests originated during the year are shown in the table below.

Year ended December 31,	2019	2018	2017
Residential mortgage retained interest:			
Weighted-average life (in years)	**4.8**	7.6	4.8
Weighted-average discount rate	**7.4%**	3.6%	2.9%
Commercial mortgage retained interest:			
Weighted-average life (in years)	**6.4**	5.3	7.1
Weighted-average discount rate	**4.1%**	4.0%	4.4%

Loans and excess MSRs sold to U.S. government-sponsored enterprises and loans in securitization transactions pursuant to Ginnie Mae guidelines

In addition to the amounts reported in the securitization activity tables above, the Firm, in the normal course of business, sells originated and purchased mortgage loans and certain originated excess MSRs on a nonrecourse basis, predominantly to U.S. GSEs. These loans and excess MSRs are sold primarily for the purpose of securitization by the U.S. GSEs, who provide certain guarantee provisions (e.g., credit enhancement of the loans). The Firm also sells loans into securitization transactions pursuant to Ginnie Mae guidelines; these loans are typically insured or guaranteed by another U.S. government agency. The Firm does not consolidate the securitization vehicles underlying these transactions as it is not the primary beneficiary. For a limited number of loan sales, the Firm is obligated to share a portion of the credit risk associated with the sold loans with the purchaser. Refer to Note 28 for additional information about the Firm's loan sales- and securitization-related indemnifications. Refer to Note 15 for additional information about the impact of the Firm's sale of certain excess MSRs.

The following table summarizes the activities related to loans sold to the U.S. GSEs, and loans in securitization transactions pursuant to Ginnie Mae guidelines.

Year ended December 31, (in millions)	2019	2018	2017
Carrying value of loans sold	$ 92,349	$ 44,609	$ 64,542
Proceeds received from loan sales as cash	$ 73	$ 9	$ 117
Proceeds from loan sales as securities[(a)(b)]	91,422	43,671	63,542
Total proceeds received from loan sales[(c)]	$ 91,495	$ 43,680	$ 63,659
Gains/(losses) on loan sales[(d)(e)]	$ 499	$ (93)	$ 163

(a) Includes securities from U.S. GSEs and Ginnie Mae that are generally sold shortly after receipt or retained as part of the Firm's investment securities portfolio.
(b) Included in level 2 assets.
(c) Excludes the value of MSRs retained upon the sale of loans.
(d) Gains/(losses) on loan sales include the value of MSRs.
(e) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale.

Options to repurchase delinquent loans

In addition to the Firm's obligation to repurchase certain loans due to material breaches of representations and warranties as discussed in Note 28, the Firm also has the option to repurchase delinquent loans that it services for Ginnie Mae loan pools, as well as for other U.S. government agencies under certain arrangements. The Firm typically elects to repurchase delinquent loans from Ginnie Mae loan pools as it continues to service them and/or manage the foreclosure process in accordance with the applicable requirements, and such loans continue to be insured or guaranteed. When the Firm's repurchase option becomes exercisable, such loans must be reported on the Consolidated balance sheets as a loan with a corresponding liability. Refer to Note 12 for additional information.

The following table presents loans the Firm repurchased or had an option to repurchase, real estate owned, and foreclosed government-guaranteed residential mortgage loans recognized on the Firm's Consolidated balance sheets as of December 31, 2019 and 2018. Substantially all of these loans and real estate are insured or guaranteed by U.S. government agencies.

December 31, (in millions)	2019	2018
Loans repurchased or option to repurchase[(a)]	$ 2,941	$ 7,021
Real estate owned	41	75
Foreclosed government-guaranteed residential mortgage loans[(b)]	198	361

(a) Predominantly all of these amounts relate to loans that have been repurchased from Ginnie Mae loan pools.
(b) Relates to voluntary repurchases of loans, which are included in accrued interest and accounts receivable.

Loan delinquencies and liquidation losses

The table below includes information about components of nonconsolidated securitized financial assets held in Firm-sponsored private-label securitization entities, in which the Firm has continuing involvement, and delinquencies as of December 31, 2019 and 2018.

	Securitized assets		90 days past due		Net liquidation losses[(a)]	
As of or for the year ended December 31, (in millions)	2019	2018	2019	2018	2019	2018
Securitized loans						
Residential mortgage:						
Prime/ Alt-A & option ARMs	$ 48,734	$ 50,679	$ 2,449	$ 3,354	$ 579	$ 610
Subprime	13,490	15,434	1,813	2,478	532	(169)
Commercial and other	80,878	79,387	187	225	445	280
Total loans securitized	$ 143,102	$ 145,500	$ 4,449	$ 6,057	$ 1,556	$ 721

(a) Includes liquidation gains as a result of private label mortgage settlement payments during the first quarter of 2018, which were reflected as asset recoveries by trustees.

Note 15 – Goodwill and Mortgage servicing rights

Goodwill

Goodwill is recorded upon completion of a business combination as the difference between the purchase price and the fair value of the net assets acquired. Subsequent to initial recognition, goodwill is not amortized but is tested for impairment during the fourth quarter of each fiscal year, or more often if events or circumstances, such as adverse changes in the business climate, indicate there may be impairment.

The goodwill associated with each business combination is allocated to the related reporting units, which are determined based on how the Firm's businesses are managed and how they are reviewed by the Firm's Operating Committee. The following table presents goodwill attributed to the business segments.

December 31, (in millions)	2019	2018	2017
Consumer & Community Banking	**$ 31,041**	$ 30,984	$ 31,013
Corporate & Investment Bank	**6,942**	6,770	6,776
Commercial Banking	**2,982**	2,860	2,860
Asset & Wealth Management	**6,858**	6,857	6,858
Total goodwill	**$ 47,823**	$ 47,471	$ 47,507

The following table presents changes in the carrying amount of goodwill.

Year ended December 31, (in millions)	2019	2018	2017
Balance at beginning of period	**$ 47,471**	$ 47,507	$ 47,288
Changes during the period from:			
Business combinations[(a)]	**349**	–	199
Other[(b)]	**3**	(36)	20
Balance at December 31,	**$ 47,823**	$ 47,471	$ 47,507

(a) For 2019, represents goodwill associated with the acquisition of InstaMed. This goodwill was allocated to CIB, CB and CCB. For 2017, represents CCB goodwill in connection with an acquisition.
(b) Primarily relates to foreign currency adjustments.

Goodwill impairment testing

The Firm's goodwill was not impaired at December 31, 2019, 2018, and 2017.

The goodwill impairment test is performed in two steps. In the first step, the current fair value of each reporting unit is compared with its carrying value. If the fair value is in excess of the carrying value, then the reporting unit's goodwill is considered not to be impaired. If the fair value is less than the carrying value, then a second step is performed. In the second step, the implied current fair value of the reporting unit's goodwill is determined by comparing the fair value of the reporting unit (as determined in step one) to the fair value of the net assets of the reporting unit, as if the reporting unit were being acquired in a business combination. The resulting implied current fair value of goodwill is then compared with the carrying value of the reporting unit's goodwill. If the carrying value of the goodwill exceeds its implied current fair value, then an impairment charge is recognized for the excess. If the carrying value of goodwill is less than its implied current fair value, then no goodwill impairment is recognized.

The Firm uses the reporting units' allocated capital plus goodwill and other intangible assets as a proxy for the carrying values of equity for the reporting units in the goodwill impairment testing. Reporting unit equity is determined on a similar basis as the allocation of capital to the LOBs which takes into consideration a variety of factors including capital levels of similarly rated peers and applicable regulatory capital requirements. Proposed LOB equity levels are incorporated into the Firm's annual budget process, which is reviewed by the Firm's Board of Directors. Allocated capital is further reviewed periodically and updated as needed.

The primary method the Firm uses to estimate the fair value of its reporting units is the income approach. This approach projects cash flows for the forecast period and uses the perpetuity growth method to calculate terminal values. These cash flows and terminal values are then discounted using an appropriate discount rate. Projections of cash flows are based on the reporting units' earnings forecasts which are reviewed with senior management of the Firm. The discount rate used for each reporting unit represents an estimate of the cost of equity for that reporting unit and is determined considering the Firm's overall estimated cost of equity (estimated using the Capital Asset Pricing Model), as adjusted for the risk characteristics specific to each reporting unit (for example, for higher levels of risk or uncertainty associated with the business or management's forecasts and assumptions). To assess the reasonableness of the discount rates used for each reporting unit management compares the discount rate to the estimated cost of equity for publicly traded institutions with similar businesses and risk characteristics. In addition, the weighted average cost of equity (aggregating the various reporting units) is compared with the Firm's overall estimated cost of equity to ensure reasonableness.

The valuations derived from the discounted cash flow analysis are then compared with market-based trading and transaction multiples for relevant competitors. Trading and transaction comparables are used as general indicators to assess the general reasonableness of the estimated fair values, although precise conclusions generally cannot be drawn due to the differences that naturally exist between the Firm's businesses and competitor institutions. Management also takes into consideration a comparison between the aggregate fair values of the Firm's reporting units and JPMorgan Chase's market capitalization. In evaluating this comparison, management considers several factors, including (i) a control premium that would exist in a market transaction, (ii) factors related to the level of execution risk that would exist at the firmwide level that do not exist at the reporting unit level and (iii) short-term market volatility and other factors that do not directly affect the value of individual reporting units.

Declines in business performance, increases in credit losses, increases in capital requirements, as well as deterioration in economic or market conditions, adverse regulatory or legislative changes or increases in the estimated market cost of equity, could cause the estimated fair values of the Firm's reporting units or their associated goodwill to decline in the future, which could result in a material impairment charge to earnings in a future period related to some portion of the associated goodwill.

Mortgage servicing rights

MSRs represent the fair value of expected future cash flows for performing servicing activities for others. The fair value considers estimated future servicing fees and ancillary revenue, offset by estimated costs to service the loans, and generally declines over time as net servicing cash flows are received, effectively amortizing the MSR asset against contractual servicing and ancillary fee income. MSRs are either purchased from third parties or recognized upon sale or securitization of mortgage loans if servicing is retained.

As permitted by U.S. GAAP, the Firm has elected to account for its MSRs at fair value. The Firm treats its MSRs as a single class of servicing assets based on the availability of market inputs used to measure the fair value of its MSR asset and its treatment of MSRs as one aggregate pool for risk management purposes. The Firm estimates the fair value of MSRs using an option-adjusted spread ("OAS") model, which projects MSR cash flows over multiple interest rate scenarios in conjunction with the Firm's prepayment model, and then discounts these cash flows at risk-adjusted rates. The model considers portfolio characteristics, contractually specified servicing fees, prepayment assumptions, delinquency rates, costs to service, late charges and other ancillary revenue, and other economic factors. The Firm compares fair value estimates and assumptions to observable market data where available, and also considers recent market activity and actual portfolio experience.

The fair value of MSRs is sensitive to changes in interest rates, including their effect on prepayment speeds. MSRs typically decrease in value when interest rates decline because declining interest rates tend to increase prepayments and therefore reduce the expected life of the net servicing cash flows that comprise the MSR asset. Conversely, securities (e.g., mortgage-backed securities), principal-only certificates and certain derivatives (i.e., those for which the Firm receives fixed-rate interest payments) increase in value when interest rates decline. JPMorgan Chase uses combinations of derivatives and securities to manage the risk of changes in the fair value of MSRs. The intent is to offset any interest-rate related changes in the fair value of MSRs with changes in the fair value of the related risk management instruments.

The following table summarizes MSR activity for the years ended December 31, 2019, 2018 and 2017.

As of or for the year ended December 31, (in millions, except where otherwise noted)	**2019**	2018	2017
Fair value at beginning of period	**$ 6,130**	$ 6,030	$ 6,096
MSR activity:			
Originations of MSRs	**1,384**	931	1,103
Purchase of MSRs	**105**	315	–
Disposition of MSRs[a]	**(789)**	(636)	(140)
Net additions	**700**	610	963
Changes due to collection/realization of expected cash flows	**(951)**	(740)	(797)
Changes in valuation due to inputs and assumptions:			
Changes due to market interest rates and other[b]	**(893)**	300	(202)
Changes in valuation due to other inputs and assumptions:			
Projected cash flows (e.g., cost to service)	**(333)** [e]	15	(102)
Discount rates	**153**	24	(19)
Prepayment model changes and other[c]	**(107)**	(109)	91
Total changes in valuation due to other inputs and assumptions	**(287)**	(70)	(30)
Total changes in valuation due to inputs and assumptions	**(1,180)**	230	(232)
Fair value at December 31,	**$ 4,699**	$ 6,130	$ 6,030
Change in unrealized gains/(losses) included in income related to MSRs held at December 31,	**$ (1,180)**	$ 230	$ (232)
Contractual service fees, late fees and other ancillary fees included in income	**1,639**	1,778	1,886
Third-party mortgage loans serviced at December 31, (in billions)	**522.0**	521.0	555.0
Servicer advances, net of an allowance for uncollectible amounts, at December 31, (in billions)[d]	**2.0**	3.0	4.0

(a) Includes excess MSRs transferred to agency-sponsored trusts in exchange for stripped mortgage backed securities (“SMBS”). In each transaction, a portion of the SMBS was acquired by third parties at the transaction date; the Firm acquired the remaining balance of those SMBS as trading securities.
(b) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.
(c) Represents changes in prepayments other than those attributable to changes in market interest rates.
(d) Represents amounts the Firm pays as the servicer (e.g., scheduled principal and interest, taxes and insurance), which will generally be reimbursed within a short period of time after the advance from future cash flows from the trust or the underlying loans. The Firm’s credit risk associated with these servicer advances is minimal because reimbursement of the advances is typically senior to all cash payments to investors. In addition, the Firm maintains the right to stop payment to investors if the collateral is insufficient to cover the advance. However, certain of these servicer advances may not be recoverable if they were not made in accordance with applicable rules and agreements.
(e) The decrease in projected cash flows was largely related to default servicing assumption updates.

The following table presents the components of mortgage fees and related income (including the impact of MSR risk management activities) for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions)	2019	2018	2017
CCB mortgage fees and related income			
Net production revenue	**$ 1,618**	$ 268	$ 636
Net mortgage servicing revenue:			
Operating revenue:			
Loan servicing revenue	**1,533**	1,835	2,014
Changes in MSR asset fair value due to collection/realization of expected cash flows	**(951)**	(740)	(795)
Total operating revenue	**582**	1,095	1,219
Risk management:			
Changes in MSR asset fair value due to market interest rates and other[a]	**(893)**	300	(202)
Other changes in MSR asset fair value due to other inputs and assumptions in model[b]	**(287)**	(70)	(30)
Change in derivative fair value and other	**1,015**	(341)	(10)
Total risk management	**(165)**	(111)	(242)
Total net mortgage servicing revenue	**417**	984	977
Total CCB mortgage fees and related income	**2,035**	1,252	1,613
All other	**1**	2	3
Mortgage fees and related income	**$ 2,036**	$ 1,254	$ 1,616

(a) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.
(b) Represents the aggregate impact of changes in model inputs and assumptions such as projected cash flows (e.g., cost to service), discount rates and changes in prepayments other than those attributable to changes in market interest rates (e.g., changes in prepayments due to changes in home prices).

The table below outlines the key economic assumptions used to determine the fair value of the Firm's MSRs at December 31, 2019 and 2018, and outlines the sensitivities of those fair values to immediate adverse changes in those assumptions, as defined below.

December 31, (in millions, except rates)	2019	2018
Weighted-average prepayment speed assumption (constant prepayment rate)	**11.67%**	8.78%
Impact on fair value of 10% adverse change	**$ (200)**	$ (205)
Impact on fair value of 20% adverse change	**(384)**	(397)
Weighted-average option adjusted spread[a][b]	**7.93%**	7.87%
Impact on fair value of 100 basis points adverse change	**$ (169)**	$ (235)
Impact on fair value of 200 basis points adverse change	**(326)**	(452)

(a) Includes the impact of operational risk and regulatory capital.
(b) The prior period amount has been revised to conform with the current period presentation.

Changes in fair value based on variations in assumptions generally cannot be easily extrapolated, because the relationship of the change in the assumptions to the change in fair value are often highly interrelated and may not be linear. In this table, the effect that a change in a particular assumption may have on the fair value is calculated without changing any other assumption. In reality, changes in one factor may result in changes in another, which would either magnify or counteract the impact of the initial change.

Note 16 – Premises and equipment

Premises and equipment, including leasehold improvements, are carried at cost less accumulated depreciation and amortization. JPMorgan Chase computes depreciation using the straight-line method over the estimated useful life of an asset. For leasehold improvements, the Firm uses the straight-line method computed over the lesser of the remaining term of the leased facility or the estimated useful life of the leased asset.

JPMorgan Chase capitalizes certain costs associated with the acquisition or development of internal-use software. Once the software is ready for its intended use, these costs are amortized on a straight-line basis over the software's expected useful life and reviewed for impairment on an ongoing basis.

Note 17 – Deposits

At December 31, 2019 and 2018, noninterest-bearing and interest-bearing deposits were as follows.

December 31, (in millions)	2019	2018
U.S. offices		
Noninterest-bearing (included **$22,637** and $17,204 at fair value)[a][b]	**$ 395,667**	$ 386,709
Interest-bearing (included **$2,534** and $2,487 at fair value)[a][b]	**876,156**	813,881
Total deposits in U.S. offices	**1,271,823**	1,200,590
Non-U.S. offices		
Noninterest-bearing (included **$1,980** and $2,367 at fair value)[a][b]	**20,087**	21,459
Interest-bearing (included **$1,438** and $1,159 at fair value)[a][b]	**270,521**	248,617
Total deposits in non-U.S. offices	**290,608**	270,076
Total deposits	**$ 1,562,431**	$1,470,666

(a) Includes structured notes classified as deposits for which the fair value option has been elected. Refer to Note 3 for further discussion.
(b) In the second quarter of 2019, the Firm reclassified balances related to certain structured notes from interest-bearing to noninterest-bearing deposits as the associated returns are recorded in principal transactions revenue and not in net interest income. This change was applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

At December 31, 2019 and 2018, time deposits in denominations of $250,000 or more were as follows.

December 31, (in millions)	2019	2018
U.S. offices	**$ 44,127**	$ 25,119
Non-U.S. offices	**50,840**	41,661
Total	**$ 94,967**	$ 66,780

At December 31, 2019, the maturities of interest-bearing time deposits were as follows.

December 31, 2019 (in millions)	U.S.	Non-U.S.	Total
2020	$ 60,614	$ 49,443	$ 110,057
2021	3,700	123	3,823
2022	709	89	798
2023	175	13	188
2024	534	357	891
After 5 years	301	39	340
Total	$ 66,033	$ 50,064	$ 116,097

Note 18 - Leases

Lease commitments

Effective January 1, 2019, the Firm adopted new guidance that requires lessees to recognize on the Consolidated balance sheets all leases with lease terms greater than twelve months as a lease liability with a corresponding right-of-use ("ROU") asset. Accordingly, the Firm recognized operating lease liabilities and ROU assets of $8.2 billion and $8.1 billion, respectively. The adoption of the new lease guidance did not have a material impact on the Firm's Consolidated statements of income. The change in accounting due to the adoption of the new lease guidance did not result in a material change to the future net minimum rental payments/receivables or to the net rental expense when compared to December 31, 2018.

Firm as lessee

At December 31, 2019, JPMorgan Chase and its subsidiaries were obligated under a number of noncancelable leases, predominantly operating leases for premises and equipment used primarily for business purposes. These leases generally have terms of 20 years or less, determined based on the contractual maturity of the lease, and include periods covered by options to extend or terminate the lease when the Firm is reasonably certain that it will exercise those options. None of these lease agreements impose restrictions on the Firm's ability to pay dividends, engage in debt or equity financing transactions or enter into further lease agreements. Certain of these leases contain escalation clauses that will increase rental payments based on maintenance, utility and tax increases, which are non-lease components. The Firm elected not to separate lease and non-lease components of a contract for its real estate leases. As such, real estate lease payments represent payments on both lease and non-lease components.

Operating lease liabilities and ROU assets are recognized at the lease commencement date based on the present value of the future minimum lease payments over the lease term. The future lease payments are discounted at a rate that represents the Firm's collateralized borrowing rate for financing instruments of a similar term and are included in accounts payable and other liabilities. The operating lease ROU asset, included in premises and equipment, also includes any lease prepayments made, plus initial direct costs incurred, less any lease incentives received. Rental expense associated with operating leases is recognized on a straight-line basis over the lease term, and generally included in occupancy expense in the Consolidated statements of income. The following tables provide information related to the Firm's operating leases:

December 31, (in millions, except where otherwise noted)	2019
Right-of-use assets	$ 8,190
Lease liabilities	8,505
Weighted average remaining lease term (in years)	8.8
Weighted average discount rate	3.68%
Supplemental cash flow information	
Cash paid for amounts included in the measurement of lease liabilities - operating cash flows	$ 1,572
Supplemental non-cash information	
Right-of-use assets obtained in exchange for operating lease obligations	$ 1,413

Year ended December 31, (in millions)	2019
Rental expense	
Gross rental expense	$ 2,057
Sublease rental income	(184)
Net rental expense	$ 1,873

The following table presents future payments under operating leases as of December 31, 2019:

Year ended December 31, (in millions)	
2020	$ 1,604
2021	1,447
2022	1,257
2023	1,081
2024	944
After 2024	3,757
Total future minimum lease payments	10,090
Less: Imputed interest	(1,585)
Total	$ 8,505

In addition to the table above, as of December 31, 2019, the Firm had additional future operating lease commitments of $1.2 billion that were signed but had not yet commenced. These operating leases will commence between 2020 and 2022 with lease terms up to 25 years.

Firm as lessor

The Firm provides auto and equipment lease financing to its customers through lease arrangements with lease terms that may contain renewal, termination and/or purchase options. Generally, the Firm's lease financings are operating leases. These assets are recognized in other assets on the Firm's Consolidated balance sheets and are depreciated on a straight-line basis over the lease term to reduce the asset to its estimated residual value. Depreciation expense is included in technology, communications and equipment expense in the Consolidated statements of income. The Firm's lease income is generally recognized on a straight-line basis over the lease term and is included in other income in the Consolidated statements of income.

On a periodic basis, the Firm assesses leased assets for impairment, and if the carrying amount of the leased asset exceeds the undiscounted cash flows from the lease payments and the estimated residual value upon disposition of the leased asset, an impairment loss is recognized.

The risk of loss on auto and equipment leased assets relating to the residual value of the leased assets is monitored through projections of the asset residual values at lease origination and periodic review of residual values, and is mitigated through arrangements with certain manufacturers or lessees.

The following table presents the carrying value of assets subject to leases reported on the Consolidated balance sheets:

December 31, (in millions)	2019	2018
Carrying value of assets subject to operating leases, net of accumulated depreciation	**$ 23,587**	$ 21,428
Accumulated depreciation	**6,121**	5,303

The following table presents the Firm's operating lease income and the related depreciation expense on the Consolidated statements of income:

Year ended December 31, (in millions)	2019	2018	2017
Operating lease income	**$ 5,455**	$ 4,540	$ 3,611
Depreciation expense	**4,157**	3,522	2,808

The following table presents future receipts under operating leases as of December 31, 2019:

Year ended December 31, (in millions)	
2020	$ 4,168
2021	2,733
2022	1,025
2023	86
2024	37
After 2024	52
Total future minimum lease receipts	$ 8,101

Note 19 – Accounts payable and other liabilities

Accounts payable and other liabilities consist of brokerage payables, which includes payables to customers, dealers and clearing organizations, and payables from security purchases that did not settle; accrued expenses, including income tax payables and credit card rewards liability; and all other liabilities, including obligations to return securities received as collateral and litigation reserves.

The following table details the components of accounts payable and other liabilities.

December 31, (in millions)	2019	2018
Brokerage payables	**$ 118,375**	$ 114,794
Other payables and liabilities[(a)]	**92,032**	81,916
Total accounts payable and other liabilities	**$ 210,407**	$ 196,710

(a) Includes credit card rewards liability of $6.4 billion and $5.8 billion at December 31, 2019 and 2018, respectively.

Note 20 – Long-term debt

JPMorgan Chase issues long-term debt denominated in various currencies, predominantly U.S. dollars, with both fixed and variable interest rates. Included in senior and subordinated debt below are various equity-linked or other indexed instruments, which the Firm has elected to measure at fair value. Changes in fair value are recorded in principal transactions revenue in the Consolidated statements of income, except for unrealized gains/(losses) due to DVA which are recorded in OCI. The following table is a summary of long-term debt carrying values (including unamortized premiums and discounts, issuance costs, valuation adjustments and fair value adjustments, where applicable) by remaining contractual maturity as of December 31, 2019.

By remaining maturity at December 31, (in millions, except rates)		2019				2018
		Under 1 year	1-5 years	After 5 years	**Total**	Total
Parent company						
Senior debt:	Fixed rate	**$ 13,580**	**$ 51,982**	**$ 95,636**	**$ 161,198**	$ 145,820
	Variable rate	**2,788**	**12,708**	**3,119**	**18,615**	22,978
	Interest rates[a]	**0.15-4.95%**	**0.50-4.63%**	**0.45-6.40%**	**0.15-6.40%**	0.17-6.40%
Subordinated debt:	Fixed rate	**$ –**	**$ 5,109**	**$ 10,046**	**$ 15,155**	$ 14,308
	Variable rate	**–**	**–**	**9**	**9**	9
	Interest rates[a]	**–%**	**3.38-3.88%**	**3.63-8.00%**	**3.38-8.00%**	3.38-8.53%
	Subtotal	**$ 16,368**	**$ 69,799**	**$ 108,810**	**$ 194,977**	$ 183,115
Subsidiaries						
Federal Home Loan Banks advances:	Fixed rate	**$ 4**	**$ 35**	**$ 96**	**$ 135**	$ 155
	Variable rate	**9,500**	**19,000**	**–**	**28,500**	44,300
	Interest rates[a]	**1.88-2.18%**	**1.67-2.24%**	**–%**	**1.67-2.24%**	2.36-2.96%
Senior debt:	Fixed rate	**$ 761**	**$ 6,955**	**$ 11,881**	**$ 19,597**	$ 16,434
	Variable rate	**11,650**	**24,938**	**9,273**	**45,861**	35,601
	Interest rates[a]	**7.50%**	**2.15-9.43%**	**1.00-7.50%**	**1.00-9.43%**	1.00-7.50%
Subordinated debt:	Fixed rate	**$ –**	**$ 305**	**$ –**	**$ 305**	$ 301
	Variable rate	**–**	**–**	**–**	**–**	–
	Interest rates[a]	**–%**	**8.25%**	**–%**	**8.25%**	8.25%
	Subtotal	**$ 21,915**	**$ 51,233**	**$ 21,250**	**$ 94,398**	$ 96,791
Junior subordinated debt:	Fixed rate	**$ –**	**$ –**	**$ 693**	**$ 693**	$ 659
	Variable rate	**–**	**–**	**1,430**	**1,430**	1,466
	Interest rates[a]	**–%**	**–%**	**2.41-8.75%**	**2.41-8.75%**	3.04-8.75%
	Subtotal	**$ –**	**$ –**	**$ 2,123**	**$ 2,123**	$ 2,125
Total long-term debt[b][c][d]		**$ 38,283**	**$ 121,032**	**$ 132,183**	**$ 291,498** [f][g]	$ 282,031
Long-term beneficial interests:	Fixed rate	**$ 1,621**	**$ 1,369**	**$ –**	**$ 2,990**	$ 7,611
	Variable rate	**900**	**2,572**	**276**	**3,748**	6,103
	Interest rates	**1.49-2.19%**	**0.00-2.77%**	**0.84-4.06%**	**0.00-4.06%**	0.00-4.62%
Total long-term beneficial interests[e]		**$ 2,521**	**$ 3,941**	**$ 276**	**$ 6,738**	$ 13,714

(a) The interest rates shown are the range of contractual rates in effect at December 31, 2019 and 2018, respectively, including non-U.S. dollar fixed- and variable-rate issuances, which excludes the effects of the associated derivative instruments used in hedge accounting relationships, if applicable. The use of these derivative instruments modifies the Firm's exposure to the contractual interest rates disclosed in the table above. Including the effects of the hedge accounting derivatives, the range of modified rates in effect at December 31, 2019, for total long-term debt was (0.02)% to 9.43%, versus the contractual range of 0.15% to 9.43% presented in the table above. The interest rate ranges shown exclude structured notes accounted for at fair value.
(b) Included long-term debt of $32.0 billion and $47.7 billion secured by assets totaling $186.1 billion and $207.0 billion at December 31, 2019 and 2018, respectively. The amount of long-term debt secured by assets does not include amounts related to hybrid instruments.
(c) Included $75.7 billion and $54.9 billion of long-term debt accounted for at fair value at December 31, 2019 and 2018, respectively.
(d) Included $13.6 billion and $11.2 billion of outstanding zero-coupon notes at December 31, 2019 and 2018, respectively. The aggregate principal amount of these notes at their respective maturities is $39.3 billion and $37.4 billion, respectively. The aggregate principal amount reflects the contractual principal payment at maturity, which may exceed the contractual principal payment at the Firm's next call date, if applicable.
(e) Included on the Consolidated balance sheets in beneficial interests issued by consolidated VIEs. Also included $36 million and $28 million accounted for at fair value at December 31, 2019 and 2018, respectively. Excluded short-term commercial paper and other short-term beneficial interests of $11.1 billion and $6.5 billion at December 31, 2019 and 2018, respectively.
(f) At December 31, 2019, long-term debt in the aggregate of $141.3 billion was redeemable at the option of JPMorgan Chase, in whole or in part, prior to maturity, based on the terms specified in the respective instruments.
(g) The aggregate carrying values of debt that matures in each of the five years subsequent to 2019 is $38.3 billion in 2020, $45.8 billion in 2021, $19.6 billion in 2022, $29.7 billion in 2023 and $25.9 billion in 2024.

The weighted-average contractual interest rates for total long-term debt excluding structured notes accounted for at fair value were 3.13% and 3.28% as of December 31, 2019 and 2018, respectively. In order to modify exposure to interest rate and currency exchange rate movements, JPMorgan Chase utilizes derivative instruments, primarily interest rate and cross-currency interest rate swaps, in conjunction with some of its debt issuances. The use of these instruments modifies the Firm's interest expense on the associated debt. The modified weighted-average interest rates for total long-term debt, including the effects of related derivative instruments, were 3.19% and 3.64% as of December 31, 2019 and 2018, respectively.

JPMorgan Chase & Co. has guaranteed certain long-term debt of its subsidiaries, including both long-term debt and structured notes. These guarantees rank on parity with the Firm's other unsecured and unsubordinated indebtedness. The amount of such guaranteed long-term debt and structured notes was $14.4 billion and $10.9 billion at December 31, 2019 and 2018, respectively.

The Firm's unsecured debt does not contain requirements that would call for an acceleration of payments, maturities or changes in the structure of the existing debt, provide any limitations on future borrowings or require additional collateral, based on unfavorable changes in the Firm's credit ratings, financial ratios, earnings or stock price.

Note 21 – Preferred stock

At December 31, 2019 and 2018, JPMorgan Chase was authorized to issue 200 million shares of preferred stock, in one or more series, with a par value of $1 per share.

In the event of a liquidation or dissolution of the Firm, JPMorgan Chase's preferred stock then outstanding takes precedence over the Firm's common stock with respect to the payment of dividends and the distribution of assets.

The following is a summary of JPMorgan Chase's non-cumulative preferred stock outstanding as of December 31, 2019 and 2018.

	Shares[a]		Carrying value (in millions)					Floating annualized rate of three-month LIBOR/Term SOFR plus:	Dividend declared per share[c]			
	December 31,		December 31,			Contractual rate in effect at December 31, 2019	Earliest redemption date[b]		Year ended December 31,			
	2019	2018	2019	2018	Issue date				2019	2018	2017	
Fixed-rate:												
Series P	–	90,000	$ –	$ 900	2/5/2013	–%	3/1/2018	NA	$545.00	$545.00	$545.00	
Series T	–	92,500	–	925	1/30/2014	–	3/1/2019	NA	167.50	670.00	670.00	
Series W	–	88,000	–	880	6/23/2014	–	9/1/2019	NA	472.50	630.00	630.00	
Series Y	**143,000**	143,000	**1,430**	1,430	2/12/2015	**6.125**	3/1/2020	NA	612.52	612.52	612.52	
Series AA	**142,500**	142,500	**1,425**	1,425	6/4/2015	**6.100**	9/1/2020	NA	610.00	610.00	610.00	
Series BB	**115,000**	115,000	**1,150**	1,150	7/29/2015	**6.150**	9/1/2020	NA	615.00	615.00	615.00	
Series DD	**169,625**	169,625	**1,696**	1,696	9/21/2018	**5.750**	12/1/2023	NA	575.00	111.81	–	
Series EE	**185,000**	–	**1,850**	–	1/24/2019	**6.000**	3/1/2024	NA	511.67	–	–	(d)
Series GG	**90,000**	–	**900**	–	11/7/2019	**4.750**	12/1/2024	NA	–	–	–	(e)
Fixed-to-floating-rate:												
Series I	**293,375**	430,375	**2,934**	4,304	4/23/2008	**LIBOR + 3.47%**	4/30/2018	LIBOR + 3.47%	$593.23	$646.38	$790.00	(f)
Series Q	**150,000**	150,000	**1,500**	1,500	4/23/2013	**5.150**	5/1/2023	LIBOR + 3.25	515.00	515.00	515.00	
Series R	**150,000**	150,000	**1,500**	1,500	7/29/2013	**6.000**	8/1/2023	LIBOR + 3.30	600.00	600.00	600.00	
Series S	**200,000**	200,000	**2,000**	2,000	1/22/2014	**6.750**	2/1/2024	LIBOR + 3.78	675.00	675.00	675.00	
Series U	**100,000**	100,000	**1,000**	1,000	3/10/2014	**6.125**	4/30/2024	LIBOR + 3.33	612.50	612.50	612.50	
Series V	**250,000**	250,000	**2,500**	2,500	6/9/2014	**LIBOR + 3.32%**	7/1/2019	LIBOR + 3.32	534.09	500.00	500.00	(g)
Series X	**160,000**	160,000	**1,600**	1,600	9/23/2014	**6.100**	10/1/2024	LIBOR + 3.33	610.00	610.00	610.00	
Series Z	**200,000**	200,000	**2,000**	2,000	4/21/2015	**5.300**	5/1/2020	LIBOR + 3.80	530.00	530.00	530.00	
Series CC	**125,750**	125,750	**1,258**	1,258	10/20/2017	**4.625**	11/1/2022	LIBOR + 2.58	462.50	462.50	129.76	
Series FF	**225,000**	–	**2,250**	–	7/31/2019	**5.000**	8/1/2024	SOFR + 3.38	251.39	–	–	(h)
Total preferred stock	**2,699,250**	2,606,750	**$ 26,993**	$ 26,068								

(a) Represented by depositary shares.
(b) Fixed-to-floating rate notes convert to a floating rate at the earliest redemption date.
(c) Dividends are declared quarterly. Dividends are payable quarterly on fixed-rate preferred stock. Dividends are payable semiannually on fixed-to-floating-rate preferred stock while at a fixed rate, and payable quarterly after converting to a floating rate.
(d) Dividends in the amount of $211.67 per share were declared on April 12, 2019 and include dividends from the original issue date of January 24, 2019 through May 31, 2019. Dividends in the amount of $150.00 per share were declared thereafter on July 10, 2019 and October 9, 2019.
(e) No dividends were declared for Series GG from the original issue date of November 7, 2019 through December 31, 2019.
(f) The dividend rate for Series I preferred stock became floating and payable quarterly starting on April 30, 2018; prior to which the dividend rate was fixed at 7.90% or $395.00 per share payable semi annually.
(g) The dividend rate for Series V preferred stock became floating and payable quarterly starting on July 1, 2019; prior to which the dividend rate was fixed at 5% or $250.00 per share payable semi annually. The Firm declared a dividend of $144.11 and $139.98 per share on outstanding Series V preferred stock on August 15, 2019 and November 15, 2019, respectively.
(h) Dividends in the amount of $126.39 per share were declared on September 9, 2019 and include dividends from the original issue date of July 31, 2019 through October 31, 2019. Dividends in the amount of $125.00 per share were declared thereafter on December 10, 2019.

Each series of preferred stock has a liquidation value and redemption price per share of $10,000, plus accrued but unpaid dividends. The aggregate liquidation value was $27.3 billion at December 31, 2019.

On February 24, 2020, the Firm issued $1.5 billion of fixed-to- floating rate non-cumulative preferred stock, Series II.

On January 31, 2020, the Firm announced that it will redeem all $1.43 billion of its 6.125% non-cumulative preferred stock, Series Y on March 1, 2020.

On January 23, 2020, the Firm issued $3.0 billion of fixed-to-floating rate non-cumulative preferred stock, Series HH.

On December 1, 2019, the Firm redeemed all $900 million of its 5.45% non-cumulative preferred stock, Series P.

On November 7, 2019, the Firm issued $900 million of 4.75% non-cumulative preferred stock, Series GG.

On October 30, 2019, the Firm redeemed $1.37 billion of its fixed-to-floating rate non-cumulative perpetual preferred stock, Series I.

On September 1, 2019, the Firm redeemed all $880 million of its 6.30% non-cumulative preferred stock, Series W.

On July 31, 2019, the Firm issued $2.25 billion of fixed-to-floating rate non-cumulative preferred stock, Series FF.

On March 1, 2019, the Firm redeemed $925 million of its 6.70% non-cumulative preferred stock, Series T.

On January 24, 2019, the Firm issued $1.85 billion of 6.00% non-cumulative preferred stock, Series EE.

On October 30, 2018, the Firm redeemed $1.7 billion of its fixed-to-floating rate non-cumulative perpetual preferred stock, Series I.

On September 21, 2018, the Firm issued $1.7 billion of 5.75% non-cumulative preferred stock, Series DD.

Dividends in the amount of $550.00 per share were declared for series O from January 1, 2017 through redemption on December 1, 2017.

Redemption rights

Each series of the Firm's preferred stock may be redeemed on any dividend payment date on or after the earliest redemption date for that series. All outstanding preferred stock series except Series I may also be redeemed following a "capital treatment event," as described in the terms of each series. Any redemption of the Firm's preferred stock is subject to non-objection from the Board of Governors of the Federal Reserve System (the "Federal Reserve").

Note 22 – Common stock

At December 31, 2019 and 2018, JPMorgan Chase was authorized to issue 9.0 billion shares of common stock with a par value of $1 per share.

Common shares issued (newly issued or reissuance from treasury) by JPMorgan Chase during the years ended December 31, 2019, 2018 and 2017 were as follows.

Year ended December 31, (in millions)	2019	2018	2017
Total issued – balance at January 1	**4,104.9**	4,104.9	4,104.9
Treasury – balance at January 1	**(829.1)**	(679.6)	(543.7)
Repurchase	**(213.0)**	(181.5)	(166.6)
Reissuance:			
Employee benefits and compensation plans	**20.4**	21.7	24.5
Warrant exercise	**–**	9.4	5.4
Employee stock purchase plans	**0.8**	0.9	0.8
Total reissuance	**21.2**	32.0	30.7
Total treasury – balance at December 31	**(1,020.9)**	(829.1)	(679.6)
Outstanding at December 31	**3,084.0**	3,275.8	3,425.3

There were no warrants to purchase shares of common stock ("Warrants") outstanding at December 31, 2019, as any Warrants that were not exercised on or before October 29, 2018, have expired. At December 31, 2017, the Firm had 15.0 million Warrants outstanding.

On June 27, 2019, in conjunction with the Federal Reserve's release of its 2019 CCAR results, the Firm's Board of Directors authorized a $29.4 billion common equity repurchase program. As of December 31, 2019, $15.6 billion of authorized repurchase capacity remained under the program. This authorization includes shares repurchased to offset issuances under the Firm's share-based compensation plans.

The following table sets forth the Firm's repurchases of common equity for the years ended December 31, 2019, 2018 and 2017. There were no Warrants repurchased during any of the years.

Year ended December 31, (in millions)	2019	2018	2017
Total number of shares of common stock repurchased	**213.0**	181.5	166.6
Aggregate purchase price of common stock repurchases	**$24,121**	$19,983	$15,410

The Firm from time to time enters into written trading plans under Rule 10b5-1 of the Securities Exchange Act of 1934 to facilitate repurchases in accordance with the common equity repurchase program. A Rule 10b5-1 repurchase plan allows the Firm to repurchase its equity during periods when it would not otherwise be repurchasing common equity — for example, during internal trading "blackout periods." All purchases under a Rule 10b5-1 plan must be made according to a predefined plan established when the Firm is not aware of material nonpublic information. Refer to Part II, Item 5: Market for registrant's common equity, related stockholder matters and issuer purchases of equity securities, on page 30 for additional information regarding repurchases of the Firm's equity securities.

As of December 31, 2019, approximately 70.5 million shares of common stock were reserved for issuance under various employee incentive, compensation, option and stock purchase plans, and directors' compensation plans.

Note 23 – Earnings per share

Basic earnings per share ("EPS") is calculated using the two-class method. Under the two-class method, all earnings (distributed and undistributed) are allocated to common stock and participating securities. JPMorgan Chase grants RSUs under its share-based compensation programs, predominantly all of which entitle recipients to receive nonforfeitable dividends during the vesting period on a basis equivalent to dividends paid to holders of the Firm's common stock. These unvested RSUs meet the definition of participating securities based on their respective rights to receive nonforfeitable dividends, and they are treated as a separate class of securities in computing basic EPS. Participating securities are not included as incremental shares in computing diluted EPS; refer to Note 9 for additional information.

Diluted EPS incorporates the potential impact of contingently issuable shares, including awards which require future service as a condition of delivery of the underlying common stock. Diluted EPS is calculated under both the two-class and treasury stock methods, and the more dilutive amount is reported. For each of the periods presented in the table below, diluted EPS calculated under the two-class method was more dilutive.

The following table presents the calculation of net income applicable to common stockholders and basic and diluted EPS for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions, except per share amounts)	**2019**	2018	2017
Basic earnings per share			
Net income	**$ 36,431**	$ 32,474	$ 24,441
Less: Preferred stock dividends	**1,587**	1,551	1,663
Net income applicable to common equity	**34,844**	30,923	22,778
Less: Dividends and undistributed earnings allocated to participating securities	**202**	214	211
Net income applicable to common stockholders	**$ 34,642**	$ 30,709	$ 22,567
Total weighted-average basic shares outstanding	**3,221.5**	3,396.4	3,551.6
Net income per share	**$ 10.75**	$ 9.04	$ 6.35
Diluted earnings per share			
Net income applicable to common stockholders	**$ 34,642**	$ 30,709	$ 22,567
Total weighted-average basic shares outstanding	**3,221.5**	3,396.4	3,551.6
Add: Dilutive impact of SARs and employee stock options, unvested PSUs and non-dividend-earning RSUs, and warrants	**8.9**	17.6	25.2
Total weighted-average diluted shares outstanding	**3,230.4**	3,414.0	3,576.8
Net income per share	**$ 10.72**	$ 9.00	$ 6.31

Note 24 – Accumulated other comprehensive income/(loss)

AOCI includes the after-tax change in unrealized gains and losses on investment securities, foreign currency translation adjustments (including the impact of related derivatives), fair value changes of excluded components on fair value hedges, cash flow hedging activities, net loss and prior service costs/(credit) related to the Firm's defined benefit pension and OPEB plans, and fair value option-elected liabilities arising from changes in the Firm's own credit risk (DVA).

Year ended December 31, (in millions)	Unrealized gains/(losses) on investment securities	Translation adjustments, net of hedges	Fair value hedges	Cash flow hedges	Defined benefit pension and OPEB plans	DVA on fair value option elected liabilities	Accumulated other comprehensive income/(loss)
Balance at December 31, 2016	$ 1,524	$ (164)	NA	$ (100)	$ (2,259)	$ (176)	$ (1,175)
Net change	640	(306)	NA	176	738	(192)	1,056
Balance at December 31, 2017	$ 2,164	$ (470)	$ –	$ 76	$ (1,521)	$ (368)	$ (119)
Cumulative effect of changes in accounting principles:[a]	896	(277)	(54)	16	(414)	(79)	88
Net change	(1,858)	20	(107)	(201)	(373)	1,043	(1,476)
Balance at December 31, 2018	$ 1,202	$ (727)	$ (161)	$ (109)	$ (2,308)	$ 596	$ (1,507)
Net change	**2,855**	**20**	**30**	**172**	**964**	**(965)**	**3,076**
Balance at December 31, 2019	**$ 4,057**	**$ (707)**	**$ (131)**	**$ 63**	**$ (1,344)**	**$ (369)**	**$ 1,569**

(a) Represents the adjustment to AOCI as a result of the accounting standards adopted in the first quarter of 2018. Refer to Note 1 for additional information.

The following table presents the pre-tax and after-tax changes in the components of OCI.

Year ended December 31, (in millions)	2019 Pre-tax	2019 Tax effect	2019 After-tax	2018 Pre-tax	2018 Tax effect	2018 After-tax	2017 Pre-tax	2017 Tax effect	2017 After-tax
Unrealized gains/(losses) on investment securities:									
Net unrealized gains/(losses) arising during the period	**$ 4,025**	**$ (974)**	**$ 3,051**	$ (2,825)	$ 665	$ (2,160)	$ 944	$ (346)	$ 598
Reclassification adjustment for realized (gains)/losses included in net income[(a)]	**(258)**	**62**	**(196)**	395	(93)	302	66	(24)	42
Net change	**3,767**	**(912)**	**2,855**	(2,430)	572	(1,858)	1,010	(370)	640
Translation adjustments[(b)]:									
Translation	**(49)**	**33**	**(16)**	(1,078)	156	(922)	1,313	(801)	512
Hedges	**46**	**(10)**	**36**	1,236	(294)	942	(1,294)	476	(818)
Net change	**(3)**	**23**	**20**	158	(138)	20	19	(325)	(306)
Fair value hedges, net change[(c)]:	**39**	**(9)**	**30**	(140)	33	(107)	NA	NA	NA
Cash flow hedges:									
Net unrealized gains/(losses) arising during the period	**122**	**(28)**	**94**	(245)	58	(187)	147	(55)	92
Reclassification adjustment for realized (gains)/losses included in net income[(d)]	**103**	**(25)**	**78**	(18)	4	(14)	134	(50)	84
Net change	**225**	**(53)**	**172**	(263)	62	(201)	281	(105)	176
Defined benefit pension and OPEB plans:									
Prior service credit/(cost) arising during the period	**(5)**	**1**	**(4)**	(29)	7	(22)	–	–	–
Net gain/(loss) arising during the period	**1,005**	**(169)**	**836**	(558)	102	(456)	802	(160)	642
Reclassification adjustments included in net income[(e)]:									
Amortization of net loss	**167**	**(36)**	**131**	103	(24)	79	250	(90)	160
Amortization of prior service cost/(credit)	**3**	**(1)**	**2**	(23)	6	(17)	(36)	13	(23)
Curtailment (gain)/loss	**—**	**—**	**—**	21	(5)	16	–	–	–
Settlement (gain)/loss	**—**	**—**	**—**	2	–	2	2	(1)	1
Foreign exchange and other	**(13)**	**12**	**(1)**	34	(9)	25	(54)	12	(42)
Net change	**1,157**	**(193)**	**964**	(450)	77	(373)	964	(226)	738
DVA on fair value option elected liabilities, net change:	**$ (1,264)**	**$ 299**	**$ (965)**	$ 1,364	$ (321)	$ 1,043	$ (303)	$ 111	$ (192)
Total other comprehensive income/(loss)	**$ 3,921**	**$ (845)**	**$ 3,076**	$ (1,761)	$ 285	$ (1,476)	$ 1,971	$ (915)	$ 1,056

(a) The pre-tax amount is reported in investment securities gains/(losses) in the Consolidated statements of income.
(b) Reclassifications of pre-tax realized gains/(losses) on translation adjustments and related hedges are reported in other income/expense in the Consolidated statements of income. During the year ended December 31, 2019, the Firm reclassified net pre-tax gains of $7 million to other income and $1 million to other expense, respectively. These amounts, which related to the liquidation of certain legal entities, are comprised of $18 million related to net investment hedge gains and$10 million related to cumulative translation adjustments. During the year ended December 31, 2018, the Firm reclassified a net pre-tax loss of $168 million to other expense related to the liquidation of certain legal entities, $17 million related to net investment hedge losses and $151 million related to cumulative translation adjustments. During the year ended December 31, 2017, the Firm reclassified a net pre-tax loss of $25 million to other expense related to the liquidation of a legal entity, $50 million related to net investment hedge gains and $75 million related to cumulative translation adjustments.
(c) Represents changes in fair value of cross-currency swaps attributable to changes in cross-currency basis spreads, which are excluded from the assessment of hedge effectiveness and recorded in other comprehensive income. The initial cost of cross-currency basis spreads is recognized in earnings as part of the accrual of interest on the cross-currency swap.
(d) The pre-tax amounts are primarily recorded in noninterest revenue, net interest income and compensation expense in the Consolidated statements of income.
(e) The pre-tax amount is reported in other expense in the Consolidated statements of income.

Note 25 – Income taxes

JPMorgan Chase and its eligible subsidiaries file a consolidated U.S. federal income tax return. JPMorgan Chase uses the asset and liability method to provide income taxes on all transactions recorded in the Consolidated Financial Statements. This method requires that income taxes reflect the expected future tax consequences of temporary differences between the carrying amounts of assets or liabilities for book and tax purposes. Accordingly, a deferred tax asset or liability for each temporary difference is determined based on the tax rates that the Firm expects to be in effect when the underlying items of income and expense are realized. JPMorgan Chase's expense for income taxes includes the current and deferred portions of that expense. A valuation allowance is established to reduce deferred tax assets to the amount the Firm expects to realize.

Due to the inherent complexities arising from the nature of the Firm's businesses, and from conducting business and being taxed in a substantial number of jurisdictions, significant judgments and estimates are required to be made. Agreement of tax liabilities between JPMorgan Chase and the many tax jurisdictions in which the Firm files tax returns may not be finalized for several years. Thus, the Firm's final tax-related assets and liabilities may ultimately be different from those currently reported.

Effective tax rate and expense

The following table presents a reconciliation of the applicable statutory U.S. federal income tax rate to the effective tax rate.

Effective tax rate

Year ended December 31,	**2019**	2018	2017
Statutory U.S. federal tax rate	**21.0%**	21.0%	35.0%
Increase/(decrease) in tax rate resulting from:			
U.S. state and local income taxes, net of U.S. federal income tax benefit	**3.5**	4.0	2.2
Tax-exempt income	**(1.4)**	(1.5)	(3.3)
Non-U.S. earnings	**1.8**	0.6	(3.1) (a)
Business tax credits	**(4.4)**	(3.5)	(4.2)
Tax audit resolutions	**(2.3)**	(0.1)	(0.3)
Impact of the TCJA	**–**	(0.7)	5.4
Other, net	**–**	0.5	0.2
Effective tax rate	**18.2%**	20.3%	31.9%

(a) Predominantly includes earnings of U.K. subsidiaries that were deemed to be reinvested indefinitely through December 31, 2017.

Impact of the TCJA

2018

The Firm's effective tax rate decreased in 2018 due to the TCJA, including the reduction in the U.S. federal statutory income tax rate as well as a $302 million net tax benefit recorded in 2018 resulting from changes in the estimates related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings. The change in estimate was recorded under SEC Staff Accounting Bulletin No. 118 ("SAB 118") and the accounting under SAB 118 is complete.

2017

The Firm's effective tax rate increased in 2017 driven by a $1.9 billion income tax expense representing the estimated impact of the enactment of the TCJA. The $1.9 billion tax expense was predominantly driven by a deemed repatriation of the Firm's unremitted non-U.S. earnings and adjustments to the value of certain tax-oriented investments partially offset by a benefit from the revaluation of the Firm's net deferred tax liability.

The deemed repatriation of the Firm's unremitted non-U.S. earnings is based on the post-1986 earnings and profits of each controlled foreign corporation. The calculation resulted in an estimated income tax expense of $3.7 billion. Furthermore, accounting for income taxes requires the remeasurement of certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future. The Firm remeasured its deferred tax asset and liability balances in the fourth quarter of 2017 to the new statutory U.S. federal income tax rate of 21% as well as any federal benefit associated with state and local deferred income taxes. The remeasurement resulted in an estimated income tax benefit of $2.1 billion.

Adjustments were also recorded in 2017 to income tax expense for certain tax-oriented investments. These adjustments were driven by changes to affordable housing proportional amortization resulting from the reduction of the federal income tax rate under the TCJA. SAB 118 did not apply to these adjustments.

The following table reflects the components of income tax expense/(benefit) included in the Consolidated statements of income.

Income tax expense/(benefit)

Year ended December 31, (in millions)	2019	2018	2017
Current income tax expense/(benefit)			
U.S. federal	**$ 3,284**	$ 2,854	$ 5,718
Non-U.S.	**2,103**	2,077	2,400
U.S. state and local	**1,778**	1,638	1,029
Total current income tax expense/(benefit)	**7,165**	6,569	9,147
Deferred income tax expense/(benefit)			
U.S. federal	**709**	1,359	2,174
Non-U.S.	**20**	(93)	(144)
U.S. state and local	**220**	455	282
Total deferred income tax expense/(benefit)	**949**	1,721	2,312
Total income tax expense	**$ 8,114**	$ 8,290	$ 11,459

Total income tax expense includes $1.1 billion, $54 million and $252 million of tax benefits recorded in 2019, 2018, and 2017, respectively, resulting from the resolution of tax audits.

Tax effect of items recorded in stockholders' equity
The preceding table does not reflect the tax effect of certain items that are recorded each period directly in stockholders' equity. The tax effect of all items recorded directly to stockholders' equity resulted in a decrease of $862 million in 2019, an increase of $172 million in 2018, and a decrease of $915 million in 2017.

Results from Non-U.S. earnings

The following table presents the U.S. and non-U.S. components of income before income tax expense.

Year ended December 31, (in millions)	2019	2018	2017
U.S.	**$ 36,670**	$ 33,052	$ 27,103
Non-U.S.[a]	**7,875**	7,712	8,797
Income before income tax expense	**$ 44,545**	$ 40,764	$ 35,900

(a) For purposes of this table, non-U.S. income is defined as income generated from operations located outside the U.S.

Prior to December 31, 2017, U.S. federal income taxes had not been provided on the undistributed earnings of certain non-U.S. subsidiaries, to the extent that such earnings had been reinvested abroad for an indefinite period of time. The Firm is no longer maintaining the indefinite reinvestment assertion on the undistributed earnings of those non-U.S. subsidiaries in light of the enactment of the TCJA. The U.S. federal and state and local income taxes associated with the undistributed and previously untaxed earnings of those non-U.S. subsidiaries was included in the deemed repatriation charge recorded as of December 31, 2017. The Firm will recognize any taxes it may incur on global intangible low tax income as income tax expense in the period in which the tax is incurred.

Affordable housing tax credits

The Firm recognized $1.5 billion, $1.5 billion and $1.7 billion of tax credits and other tax benefits associated with investments in affordable housing projects within income tax expense for the years 2019, 2018 and 2017, respectively. The amount of amortization of such investments reported in income tax expense was $1.1 billion, $1.2 billion and $1.7 billion, respectively. The carrying value of these investments, which are reported in other assets on the Firm's Consolidated balance sheets, was $8.6 billion and $7.9 billion at December 31, 2019 and 2018, respectively. The amount of commitments related to these investments, which are reported in accounts payable and other liabilities on the Firm's Consolidated balance sheets, was $2.8 billion and $2.3 billion at December 31, 2019 and 2018, respectively.

Deferred taxes

Deferred income tax expense/(benefit) results from differences between assets and liabilities measured for financial reporting purposes versus income tax return purposes. Deferred tax assets are recognized if, in management's judgment, their realizability is determined to be more likely than not. If a deferred tax asset is determined to be unrealizable, a valuation allowance is established. The significant components of deferred tax assets and liabilities are reflected in the following table.

December 31, (in millions)	2019	2018
Deferred tax assets		
Allowance for loan losses	**$ 3,400**	$ 3,433
Employee benefits	**1,039**	1,129
Accrued expenses and other	**2,767**	2,701
Non-U.S. operations	**949**	629
Tax attribute carryforwards	**605**	163
Gross deferred tax assets	**8,760**	8,055
Valuation allowance	**(557)**	(89)
Deferred tax assets, net of valuation allowance	**$ 8,203**	$ 7,966
Deferred tax liabilities		
Depreciation and amortization	**$ 2,852**	$ 2,533
Mortgage servicing rights, net of hedges	**2,354**	2,586
Leasing transactions	**5,598**	4,719
Other, net	**4,683**	3,713
Gross deferred tax liabilities	**15,487**	13,551
Net deferred tax (liabilities)/assets	**$ (7,284)**	$ (5,585)

JPMorgan Chase has recorded deferred tax assets of $605 million at December 31, 2019, in connection with U.S. federal and non-U.S. NOL carryforwards, foreign tax credit ("FTC") carryforwards, and state and local capital loss carryforwards. At December 31, 2019, total U.S. federal NOL carryforwards were $1.0 billion, non-U.S. NOL carryforwards were $80 million, FTC carryforwards were $329 million, and state and local capital loss carryforwards were $1.1 billion. If not utilized, a portion of the U.S. federal NOL carryforwards will expire between 2022 and 2036 whereas others have an unlimited carryforward period. Similarly, certain non-U.S. NOL carryforwards will expire between 2029 and 2037 whereas others have an unlimited carryforward period. The FTC carryforwards will expire in 2029 and the state and local capital loss carryforwards will expire between 2020 and 2022.

The valuation allowance at December 31, 2019, was due to the state and local capital loss carryforwards, FTC carryforwards, and certain non-U.S. deferred tax assets, including NOL carryforwards.

Unrecognized tax benefits

At December 31, 2019, 2018 and 2017, JPMorgan Chase's unrecognized tax benefits, excluding related interest expense and penalties, were $4.0 billion, $4.9 billion and $4.7 billion, respectively, of which $2.8 billion, $3.8 billion and $3.5 billion, respectively, if recognized, would reduce the annual effective tax rate. Included in the amount of unrecognized tax benefits are certain items that would not affect the effective tax rate if they were recognized in the Consolidated statements of income. These unrecognized items include the tax effect of certain temporary differences, the portion of gross state and local unrecognized tax benefits that would be offset by the benefit from associated U.S. federal income tax deductions, and the portion of gross non-U.S. unrecognized tax benefits that would have offsets in other jurisdictions. JPMorgan Chase is presently under audit by a number of taxing authorities, most notably by the Internal Revenue Service as summarized in the Tax examination status table below. As JPMorgan Chase is presently under audit by a number of taxing authorities, it is reasonably possible that over the next 12 months the resolution of these examinations may increase or decrease the gross balance of unrecognized tax benefits by as much as $0.5 billion. Upon settlement of an audit, the change in the unrecognized tax benefit would result from payment or income statement recognition.

The following table presents a reconciliation of the beginning and ending amount of unrecognized tax benefits.

Year ended December 31, (in millions)	2019	2018	2017
Balance at January 1,	**$ 4,861**	$ 4,747	$ 3,450
Increases based on tax positions related to the current period	**871**	980	1,355
Increases based on tax positions related to prior periods	**10**	649	626
Decreases based on tax positions related to prior periods	**(706)**	(1,249)	(350)
Decreases related to cash settlements with taxing authorities	**(1,012)**	(266)	(334)
Balance at December 31,	**$ 4,024**	$ 4,861	$ 4,747

After-tax interest expense/(benefit) and penalties related to income tax liabilities recognized in income tax expense were $(52) million, $192 million and $102 million in 2019, 2018 and 2017, respectively.

At December 31, 2019 and 2018, in addition to the liability for unrecognized tax benefits, the Firm had accrued $817 million and $887 million, respectively, for income tax-related interest and penalties.

Tax examination status

JPMorgan Chase is continually under examination by the Internal Revenue Service, by taxing authorities throughout the world, and by many state and local jurisdictions throughout the U.S. The following table summarizes the status of significant income tax examinations of JPMorgan Chase and its consolidated subsidiaries as of December 31, 2019.

	Periods under examination	Status
JPMorgan Chase – U.S.	2011 – 2013	Field Examination completed; JPMorgan Chase intends to file amended returns
JPMorgan Chase – U.S.	2014 - 2016	Field Examination
JPMorgan Chase – New York State	2012 - 2014	Field Examination
JPMorgan Chase – New York City	2012 - 2014	Field Examination
JPMorgan Chase – California	2011 – 2012	Field Examination
JPMorgan Chase – U.K.	2006 – 2017	Field examination of certain select entities

Note 26 – Restricted cash, other restricted assets and intercompany funds transfers

Restricted cash and other restricted assets

Certain of the Firm's cash and other assets are restricted as to withdrawal or usage. These restrictions are imposed by various regulatory authorities based on the particular activities of the Firm's subsidiaries.

The business of JPMorgan Chase Bank, N.A. is subject to examination and regulation by the OCC. The Bank is a member of the U.S. Federal Reserve System, and its deposits in the U.S. are insured by the FDIC, subject to applicable limits.

The Federal Reserve requires depository institutions to maintain cash reserves with a Federal Reserve Bank. The average required amount of reserve balances is deposited by the Firm's bank subsidiaries. In addition, the Firm is required to maintain cash reserves at certain non-US central banks.

The Firm is also subject to rules and regulations established by other U.S. and non U.S. regulators. As part of its compliance with the respective regulatory requirements, the Firm's broker-dealers (principally J.P. Morgan Securities LLC in the U.S and J.P. Morgan Securities plc in the U.K.) are subject to certain restrictions on cash and other assets.

The following table presents the components of the Firm's restricted cash:

December 31, (in billions)		2019		2018
Cash reserves – Federal Reserve Banks	$	**26.6**	$	22.1
Segregated for the benefit of securities and cleared derivative customers		**16.0**		14.6
Cash reserves at non-U.S. central banks and held for other general purposes		**3.9**		4.1
Total restricted cash[(a)]	$	**46.5**	$	40.8

(a) Comprises $45.3 billion and $39.6 billion in deposits with banks as of December 31, 2019 and 2018, respectively, and $1.2 billion in cash and due from banks as of December 31, 2019 and 2018, on the Consolidated balance sheets.

Also, as of December 31, 2019 and 2018, the Firm had the following other restricted assets:

- Cash and securities pledged with clearing organizations for the benefit of customers of $24.7 billion and $20.6 billion, respectively.
- Securities with a fair value of $8.8 billion and $9.7 billion, respectively, were also restricted in relation to customer activity.

Intercompany funds transfers

Restrictions imposed by U.S. federal law prohibit JPMorgan Chase & Co. ("Parent Company") and certain of its affiliates from borrowing from banking subsidiaries unless the loans are secured in specified amounts. Such secured loans provided by any banking subsidiary to the Parent Company or to any particular affiliate, together with certain other transactions with such affiliate (collectively referred to as "covered transactions"), are generally limited to 10% of the banking subsidiary's total capital, as determined by the risk-based capital guidelines; the aggregate amount of covered transactions between any banking subsidiary and all of its affiliates is limited to 20% of the banking subsidiary's total capital.

The Parent Company's two principal subsidiaries are JPMorgan Chase Bank, N.A. and JPMorgan Chase Holdings LLC, an intermediate holding company (the "IHC"). The IHC holds the stock of substantially all of JPMorgan Chase's subsidiaries other than JPMorgan Chase Bank, N.A. and its subsidiaries. The IHC also owns other assets and owes intercompany indebtedness to the holding company. The Parent Company is obligated to contribute to the IHC substantially all the net proceeds received from securities issuances (including issuances of senior and subordinated debt securities and of preferred and common stock).

The principal sources of income and funding for the Parent Company are dividends from JPMorgan Chase Bank, N.A. and dividends and extensions of credit from the IHC. In addition to dividend restrictions set forth in statutes and regulations, the Federal Reserve, the OCC and the FDIC have authority under the Financial Institutions Supervisory Act to prohibit or to limit the payment of dividends by the banking organizations they supervise, including the Parent Company and its subsidiaries that are banks or bank holding companies, if, in the banking regulator's opinion, payment of a dividend would constitute an unsafe or unsound practice in light of the financial condition of the banking organization. The IHC is prohibited from paying dividends or extending credit to the Parent Company if certain capital or liquidity "thresholds" are breached or if limits are otherwise imposed by the Parent Company's management or Board of Directors.

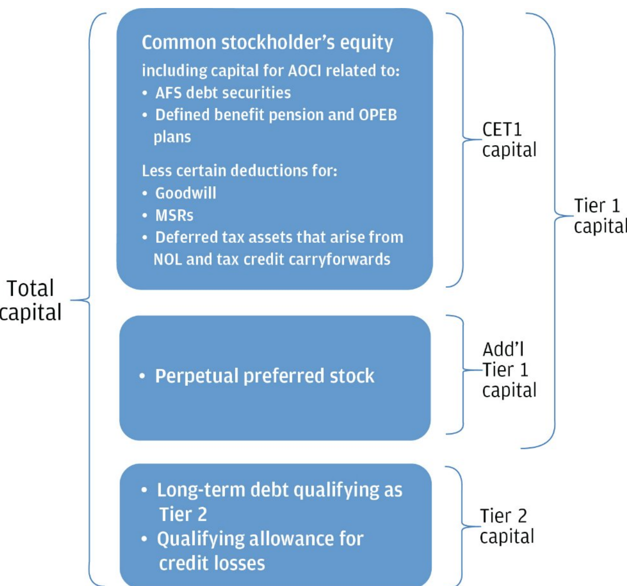
At January 1, 2020, the Parent Company's banking subsidiaries could pay, in the aggregate, approximately $9 billion in dividends to their respective bank holding companies without the prior approval of their relevant banking regulators. The capacity to pay dividends in 2020 will be supplemented by the banking subsidiaries' earnings during the year.

Note 27 – Regulatory capital

The Federal Reserve establishes capital requirements, including well-capitalized standards, for the consolidated financial holding company. The OCC establishes similar minimum capital requirements and standards for the Firm's IDI subsidiaries, including JPMorgan Chase Bank, N.A.

The capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for large and internationally active U.S. bank holding companies and banks, including the Firm and its IDI subsidiaries, including JPMorgan Chase Bank, N.A. Two comprehensive approaches are prescribed for calculating RWA: a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). Effective January 1, 2019, the capital adequacy of the Firm and JPMorgan Chase Bank, N.A. is evaluated against the fully phased-in measures under Basel III that represents the lower of the Standardized or Advanced approaches. During 2018, the required capital measures were subject to the transitional rules and as of December 31, 2018 were the same on a fully phased-in and on a transitional basis.

The three components of regulatory capital under the Basel III rules are as illustrated below:



Under the risk-based capital and leverage-based guidelines of the Federal Reserve, JPMorgan Chase is required to maintain minimum ratios for CET1, Tier 1, Total, Tier 1 leverage and the SLR. Failure to meet these minimum requirements could cause the Federal Reserve to take action. IDI subsidiaries are also subject to these capital requirements by their respective primary regulators.

The following table presents the minimum and well-capitalized ratios to which the Firm and its IDI subsidiaries were subject as of December 31, 2019.

	Minimum capital ratios		Well-capitalized ratios	
	BHC[(a)(e)(f)]	IDI[(b)(e)(f)]	BHC[(c)]	IDI[(d)]
Capital ratios				
CET1	10.5%	7.0%	N/A	6.5%
Tier 1	12.0	8.5	6.0	8.0
Total	14.0	10.5	10.0	10.0
Tier 1 leverage	4.0	4.0	N/A	5.0
SLR	5.0	6.0	N/A	6.0

Note: The table above is as defined by the regulations issued by the Federal Reserve, OCC and FDIC and to which the Firm and its IDI subsidiaries are subject.

(a) Represents the minimum capital ratios applicable to the Firm under Basel III. The CET1 minimum capital ratio includes a capital conservation buffer of 2.5% and GSIB surcharge of 3.5% as calculated under Method 2.
(b) Represents requirements for JPMorgan Chase's IDI subsidiaries. The CET1 minimum capital ratio includes a capital conservation buffer of 2.5% that is applicable to the IDI subsidiaries. The IDI subsidiaries are not subject to the GSIB surcharge.
(c) Represents requirements for bank holding companies pursuant to regulations issued by the Federal Reserve.
(d) Represents requirements for IDI subsidiaries pursuant to regulations issued under the FDIC Improvement Act.
(e) For the period ended December 31, 2018, the CET1, Tier 1, Total and Tier 1 leverage minimum capital ratios applicable to the Firm were 9.0%, 10.5%, 12.5%, and 4.0% and the CET1, Tier 1, Total and Tier 1 leverage minimum capital ratios applicable to the Firm's IDI subsidiaries were 6.375%, 7.875%, 9.875%, and 4.0%, respectively.
(f) Represents minimum SLR requirement of 3.0%, as well as, supplementary leverage buffers of 2.0% and 3.0% for BHC and IDI, respectively.

The following tables present the risk-based and leverage-based capital metrics for JPMorgan Chase and JPMorgan Chase Bank, N.A. under both the Basel III Standardized and Basel III Advanced Approaches. As of December 31, 2019 and 2018, JPMorgan Chase and JPMorgan Chase Bank, N.A. were well-capitalized and met all capital requirements to which each was subject.

December 31, 2019 (in millions, except ratios)	Basel III Standardized Fully Phased-In		Basel III Advanced Fully Phased-In	
	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.
Regulatory capital				
CET1 capital	**$ 187,753**	**$ 206,848**	**$ 187,753**	**$ 206,848**
Tier 1 capital	**214,432**	**206,851**	**214,432**	**206,851**
Total capital	**242,589**	**224,390**	**232,112**	**214,091**
Assets				
Risk-weighted	**1,515,869**	**1,457,689**	**1,397,878**	**1,269,991**
Adjusted average[(a)]	**2,730,239**	**2,353,432**	**2,730,239**	**2,353,432**
Capital ratios[(b)]				
CET1	**12.4%**	**14.2%**	**13.4%**	**16.3%**
Tier 1	**14.1**	**14.2**	**15.3**	**16.3**
Total	**16.0**	**15.4**	**16.6**	**16.9**
Tier 1 leverage[(c)]	**7.9**	**8.8**	**7.9**	**8.8**

December 31, 2018 (in millions, except ratios)	Basel III Standardized Transitional		Basel III Advanced Transitional	
	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.[(d)]	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.[(d)]
Regulatory capital				
CET1 capital	$ 183,474	$ 211,671	$ 183,474	$ 211,671
Tier 1 capital	209,093	211,671	209,093	211,671
Total capital	237,511	229,952	227,435	220,025
Assets				
Risk-weighted	1,528,916	1,446,529	1,421,205	1,283,146
Adjusted average[(a)]	2,589,887	2,250,480	2,589,887	2,250,480
Capital ratios[(b)]				
CET1	12.0%	14.6%	12.9%	16.5%
Tier 1	13.7	14.6	14.7	16.5
Total	15.5	15.9	16.0	17.1
Tier 1 leverage[(c)]	8.1	9.4	8.1	9.4

(a) Adjusted average assets, for purposes of calculating the Tier 1 leverage ratio, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) For each of the risk-based capital ratios, the capital adequacy of the Firm and JPMorgan Chase Bank, N.A. is evaluated against the lower of the two ratios as calculated under Basel III approaches (Standardized or Advanced).
(c) The Tier 1 leverage ratio is not a risk-based measure of capital.
(d) On May 18, 2019, Chase Bank USA, N.A. merged with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A as the surviving entity. The December 31, 2018 amounts reported for JPMorgan Chase Bank, N.A. retrospectively reflect the impact of the merger.

	December 31, 2019		December 31, 2018	
	Basel III Advanced Fully Phased-In		Basel III Advanced Fully Phased-In	
(in millions, except ratios)	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.[(a)]
Total leverage exposure	**3,423,431**	**$ 3,044,509**	$ 3,269,988	$ 2,915,541
SLR	**6.3%**	**6.8%**	6.4%	7.3%

(a) On May 18, 2019, Chase Bank USA, N.A. merged with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A as the surviving entity. The December 31, 2018 amounts reported for JPMorgan Chase Bank, N.A. retrospectively reflect the impact of the merger.

Note 28 – Off-balance sheet lending-related financial instruments, guarantees, and other commitments

JPMorgan Chase provides lending-related financial instruments (e.g., commitments and guarantees) to address the financing needs of its customers and clients. The contractual amount of these financial instruments represents the maximum possible credit risk to the Firm should the customer or client draw upon the commitment or the Firm be required to fulfill its obligation under the guarantee, and should the customer or client subsequently fail to perform according to the terms of the contract. Most of these commitments and guarantees are refinanced, extended, cancelled, or expire without being drawn or a default occurring. As a result, the total contractual amount of these instruments is not, in the Firm's view, representative of its expected future credit exposure or funding requirements.

To provide for probable credit losses inherent in wholesale and certain consumer lending-commitments, an allowance for credit losses on lending-related commitments is maintained. Refer to Note 13 for further information regarding the allowance for credit losses on lending-related commitments. The following table summarizes the contractual amounts and carrying values of off-balance sheet lending-related financial instruments, guarantees and other commitments at December 31, 2019 and 2018. The amounts in the table below for credit card and home equity lending-related commitments represent the total available credit for these products. The Firm has not experienced, and does not anticipate, that all available lines of credit for these products will be utilized at the same time. The Firm can reduce or cancel credit card lines of credit by providing the borrower notice or, in some cases as permitted by law, without notice. In addition, the Firm typically closes credit card lines when the borrower is 60 days or more past due. The Firm may reduce or close HELOCs when there are significant decreases in the value of the underlying property, or when there has been a demonstrable decline in the creditworthiness of the borrower.

Off-balance sheet lending-related financial instruments, guarantees and other commitments

By remaining maturity at December 31, (in millions)	Contractual amount						Carrying value[g]	
	2019					2018	2019	2018
	Expires in 1 year or less	Expires after 1 year through 3 years	Expires after 3 years through 5 years	Expires after 5 years	Total	Total		
Lending-related								
Consumer, excluding credit card:								
Home equity	$ 680	$ 1,187	$ 2,548	$ 16,704	$ 21,119	$ 20,901	$ 12	$ 12
Residential mortgage[a]	9,086	–	–	12	9,098	5,481	–	–
Auto	8,296	600	197	195	9,288	8,011	2	2
Consumer & Business Banking	9,994	646	105	1,162	11,907	11,673	19	19
Total consumer, excluding credit card	28,056	2,433	2,850	18,073	51,412	46,066	33	33
Credit card	650,720	–	–	–	650,720	605,379	–	–
Total consumer[b]	678,776	2,433	2,850	18,073	702,132	651,445	33	33
Wholesale:								
Other unfunded commitments to extend credit[c]	58,645	129,414	168,400	10,791	367,250	351,490	938	852
Standby letters of credit and other financial guarantees[c]	15,919	11,127	5,117	1,745	33,908	33,498	618	521
Other letters of credit[c]	2,734	183	40	–	2,957	2,825	4	3
Total wholesale[b]	77,298	140,724	173,557	12,536	404,115	387,813	1,560	1,376
Total lending-related	$ 756,074	$ 143,157	$ 176,407	$ 30,609	$ 1,106,247	$1,039,258	$ 1,593	$ 1,409
Other guarantees and commitments								
Securities lending indemnification agreements and guarantees[d]	$ 204,827	$ –	$ –	$ –	$ 204,827	$ 186,077	$ –	$ –
Derivatives qualifying as guarantees	1,403	144	11,299	40,243	53,089	55,271	159	367
Unsettled resale and securities borrowed agreements	117,203	748	–	–	117,951	102,008	–	–
Unsettled repurchase and securities loaned agreements	72,790	561	–	–	73,351	57,732	–	–
Loan sale and securitization-related indemnifications:								
Mortgage repurchase liability	NA	NA	NA	NA	NA	NA	59	89
Loans sold with recourse	NA	NA	NA	NA	944	1,019	27	30
Exchange & clearing house guarantees and commitments[e]	206,432	–	–	–	206,432	58,960	–	–
Other guarantees and commitments [f]	2,684	841	293	3,399	7,217	8,183	(73)	(73)

(a) Includes certain commitments to purchase loans from correspondents.
(b) Predominantly all consumer and wholesale lending-related commitments are in the U.S.
(c) At December 31, 2019 and 2018, reflected the contractual amount net of risk participations totaling $76 million and $282 million, respectively, for other unfunded commitments to extend credit; $9.8 billion and $10.4 billion, respectively, for standby letters of credit and other financial guarantees; and $546 million and $385 million, respectively, for other letters of credit. In regulatory filings with the Federal Reserve these commitments are shown gross of risk participations.
(d) At December 31, 2019 and 2018, collateral held by the Firm in support of securities lending indemnification agreements was $216.2 billion and $195.6 billion, respectively. Securities lending collateral primarily consists of cash, G7 government securities, and securities issued by U.S. GSEs and government agencies.
(e) At December 31, 2019 and 2018, includes guarantees to the Fixed Income Clearing Corporation under the sponsored member repo program and commitments and guarantees associated with the Firm's membership in certain clearing houses.
(f) At December 31, 2019 and 2018, primarily includes letters of credit hedged by derivative transactions and managed on a market risk basis, and unfunded commitments related to institutional lending. Additionally, includes unfunded commitments predominantly related to certain tax-oriented equity investments.
(g) For lending-related products, the carrying value represents the allowance for lending-related commitments and the guarantee liability; for derivative-related products, the carrying value represents the fair value.

Other unfunded commitments to extend credit

Other unfunded commitments to extend credit generally consist of commitments for working capital and general corporate purposes, extensions of credit to support commercial paper facilities and bond financings in the event that those obligations cannot be remarketed to new investors, as well as committed liquidity facilities to clearing organizations. The Firm also issues commitments under multipurpose facilities which could be drawn upon in several forms, including the issuance of a standby letter of credit.

Guarantees

U.S. GAAP requires that a guarantor recognize, at the inception of a guarantee, a liability in an amount equal to the fair value of the obligation undertaken in issuing the guarantee. U.S. GAAP defines a guarantee as a contract that contingently requires the guarantor to pay a guaranteed party based upon: (a) changes in an underlying asset, liability or equity security of the guaranteed party; or (b) a third party's failure to perform under a specified agreement. The Firm considers the following off-balance sheet arrangements to be guarantees under U.S. GAAP: standby letters of credit and other financial guarantees, securities lending indemnifications, certain indemnification agreements included within third-party contractual arrangements, certain derivative contracts and the guarantees under the sponsored member repo program.

As required by U.S. GAAP, the Firm initially records guarantees at the inception date fair value of the obligation assumed (e.g., the amount of consideration received or the net present value of the premium receivable). For certain types of guarantees, the Firm records this fair value amount in other liabilities with an offsetting entry recorded in cash (for premiums received), or other assets (for premiums receivable). Any premium receivable recorded in other assets is reduced as cash is received under the contract, and the fair value of the liability recorded at inception is amortized into income as lending and deposit-related fees over the life of the guarantee contract. For indemnifications provided in sales agreements, a portion of the sale proceeds is allocated to the guarantee, which adjusts the gain or loss that would otherwise result from the transaction. For these indemnifications, the initial liability is amortized to income as the Firm's risk is reduced (i.e., over time or when the indemnification expires). Any contingent liability that exists as a result of issuing the guarantee or indemnification is recognized when it becomes probable and reasonably estimable. The contingent portion of the liability is not recognized if the estimated amount is less than the carrying amount of the liability recognized at inception (adjusted for any amortization). The contractual amount and carrying value of guarantees and indemnifications are included in the table on page 273. For additional information on the guarantees, see below.

Standby letters of credit and other financial guarantees

Standby letters of credit and other financial guarantees are conditional lending commitments issued by the Firm to guarantee the performance of a client or customer to a third party under certain arrangements, such as commercial paper facilities, bond financings, acquisition financings, trade and similar transactions.

The following table summarizes the contractual amount and carrying value of standby letters of credit and other financial guarantees and other letters of credit arrangements as of December 31, 2019 and 2018.

Standby letters of credit, other financial guarantees and other letters of credit

	2019		2018	
December 31, (in millions)	Standby letters of credit and other financial guarantees	Other letters of credit	Standby letters of credit and other financial guarantees	Other letters of credit
Investment-grade[(a)]	**$ 26,647**	**$ 2,136**	$ 26,420	$ 2,079
Noninvestment-grade[(a)]	**7,261**	**821**	7,078	746
Total contractual amount	**$ 33,908**	**$ 2,957**	$ 33,498	$ 2,825
Allowance for lending-related commitments	**$ 216**	**$ 4**	$ 167	$ 3
Guarantee liability	**402**	**–**	354	–
Total carrying value	**$ 618**	**$ 4**	$ 521	$ 3
Commitments with collateral	**$ 17,582**	**$ 726**	$ 17,400	$ 583

(a) The ratings scale is based on the Firm's internal risk ratings. Refer to Note 12 for further information on internal risk ratings.

Securities lending indemnifications

Through the Firm's securities lending program, counterparties' securities, via custodial and non-custodial arrangements, may be lent to third parties. As part of this program, the Firm provides an indemnification in the lending agreements which protects the lender against the failure of the borrower to return the lent securities. To minimize its liability under these indemnification agreements, the Firm obtains cash or other highly liquid collateral with a market value exceeding 100% of the value of the securities on loan from the borrower. Collateral is marked to market daily to help assure that collateralization is adequate. Additional collateral is called from the borrower if a shortfall exists, or collateral may be released to the borrower in the event of overcollateralization. If a borrower defaults, the Firm would use the collateral held to purchase replacement securities in the market or to credit the lending client or counterparty with the cash equivalent thereof.

The cash collateral held by the Firm may be invested on behalf of the client in indemnified resale agreements, whereby the Firm indemnifies the client against the loss of principal invested. To minimize its liability under these agreements, the Firm obtains collateral with a market value exceeding 100% of the principal invested.

Derivatives qualifying as guarantees

The Firm transacts in certain derivative contracts that have the characteristics of a guarantee under U.S. GAAP. These contracts include written put options that require the Firm to purchase assets upon exercise by the option holder at a specified price by a specified date in the future. The Firm may enter into written put option contracts in order to meet client needs, or for other trading purposes. The terms of written put options are typically five years or less.

Derivatives deemed to be guarantees also includes stable value contracts, commonly referred to as "stable value products", that require the Firm to make a payment of the difference between the market value and the book value of a counterparty's reference portfolio of assets in the event that market value is less than book value and certain other conditions have been met. Stable value products are transacted in order to allow investors to realize investment returns with less volatility than an unprotected portfolio. These contracts are typically longer-term or may have no stated maturity, but allow the Firm to elect to terminate the contract under certain conditions.

The notional value of derivatives guarantees generally represents the Firm's maximum exposure. However, exposure to certain stable value products is contractually limited to a substantially lower percentage of the notional amount.

The fair value of derivative guarantees reflects the probability, in the Firm's view, of whether the Firm will be required to perform under the contract. The Firm reduces exposures to these contracts by entering into offsetting transactions, or by entering into contracts that hedge the market risk related to the derivative guarantees.

The following table summarizes the derivatives qualifying as guarantees as of December 31, 2019 and 2018.

(in millions)	**December 31, 2019**	December 31, 2018
Notional amounts		
Derivative guarantees	**$ 53,089**	$ 55,271
Stable value contracts with contractually limited exposure	**28,877**	28,637
Maximum exposure of stable value contracts with contractually limited exposure	**2,967**	2,963
Fair value		
Derivative payables	**159**	367

In addition to derivative contracts that meet the characteristics of a guarantee, the Firm is both a purchaser and seller of credit protection in the credit derivatives market. Refer to Note 5 for a further discussion of credit derivatives.

Unsettled securities financing agreements

In the normal course of business, the Firm enters into resale and securities borrowed agreements. At settlement, these commitments result in the Firm advancing cash to and receiving securities collateral from the counterparty. The Firm also enters into repurchase and securities loaned agreements. At settlement, these commitments result in the Firm receiving cash from and providing securities collateral to the counterparty. Such agreements settle at a future date. These agreements generally do not meet the definition of a derivative, and therefore, are not recorded on the Consolidated balance sheets until settlement date. These agreements predominantly have regular-way settlement terms. Refer to Note 11 for a further discussion of securities financing agreements.

Loan sales- and securitization-related indemnifications

Mortgage repurchase liability

In connection with the Firm's mortgage loan sale and securitization activities with U.S. GSEs the Firm has made representations and warranties that the loans sold meet certain requirements, and that may require the Firm to repurchase mortgage loans and/or indemnify the loan purchaser if such representations and warranties are breached by the Firm. Further, although the Firm's securitizations are predominantly nonrecourse, the Firm does provide recourse servicing in certain limited cases where it agrees to share credit risk with the owner of the mortgage loans. To the extent that repurchase demands that are received relate to loans that the Firm purchased from third parties that remain viable, the Firm typically will have the right to seek a recovery of related repurchase losses from the third party. Generally, the maximum amount of future payments the Firm would be required to make for breaches of these representations and warranties would be equal to the unpaid principal balance of such loans that are deemed to have defects that were sold to purchasers (including securitization-related SPEs) plus, in certain circumstances, accrued interest on such loans and certain expenses.

Private label securitizations
The liability related to repurchase demands associated with private label securitizations is separately evaluated by the Firm in establishing its litigation reserves.

Refer to Note 30 for additional information regarding litigation.

Loans sold with recourse
The Firm provides servicing for mortgages and certain commercial lending products on both a recourse and nonrecourse basis. In nonrecourse servicing, the principal credit risk to the Firm is the cost of temporary servicing advances of funds (i.e., normal servicing advances). In recourse servicing, the servicer agrees to share credit risk with the owner of the mortgage loans, such as Fannie Mae or Freddie Mac or a private investor, insurer or guarantor. Losses on recourse servicing predominantly occur when foreclosure sales proceeds of the property underlying a defaulted loan are less than the sum of the outstanding principal balance, plus accrued interest on the loan and the cost of holding and disposing of the underlying property. The Firm's securitizations are predominantly nonrecourse, thereby effectively transferring the risk of future credit losses to the purchaser of the mortgage-backed securities issued by the trust. At December 31, 2019 and 2018, the unpaid principal balance of loans sold with recourse totaled $944 million and $1.0 billion, respectively. The carrying value of the related liability that the Firm has recorded in accounts payable and other liabilities on the Consolidated balance sheets, which is representative of the Firm's view of the likelihood it will have to perform under its recourse obligations, was $27 million and $30 million at December 31, 2019 and 2018, respectively.

Other off-balance sheet arrangements

Indemnification agreements – general
In connection with issuing securities to investors outside the U.S., the Firm may agree to pay additional amounts to the holders of the securities in the event that, due to a change in tax law, certain types of withholding taxes are imposed on payments on the securities. The terms of the securities may also give the Firm the right to redeem the securities if such additional amounts are payable. The Firm may also enter into indemnification clauses in connection with the licensing of software to clients ("software licensees") or when it sells a business or assets to a third party ("third-party purchasers"), pursuant to which it indemnifies software licensees for claims of liability or damages that may occur subsequent to the licensing of the software, or third-party purchasers for losses they may incur due to actions taken by the Firm prior to the sale of the business or assets. It is difficult to estimate the Firm's maximum exposure under these indemnification arrangements, since this would require an assessment of future changes in tax law and future claims that may be made against the Firm that have not yet occurred. However, based on historical experience, management expects the risk of loss to be remote.

Merchant charge-backs
Under the rules of payment networks, the Firm, in its role as a merchant acquirer, retains a contingent liability for disputed processed credit and debit card transactions that result in a charge-back to the merchant. If a dispute is resolved in the cardholder's favor, Merchant Services will (through the cardholder's issuing bank) credit or refund the amount to the cardholder and will charge back the transaction to the merchant. If Merchant Services is unable to collect the amount from the merchant, Merchant Services will bear the loss for the amount credited or refunded to the cardholder. Merchant Services mitigates this risk by withholding future settlements, retaining cash reserve accounts or obtaining other collateral. In addition, Merchant Services recognizes a valuation allowance that covers the payment or performance risk to the Firm related to charge-backs.

For the years ended December 31, 2019, 2018 and 2017, Merchant Services processed an aggregate volume of $1,511.5 billion, $1,366.1 billion, and $1,191.7 billion, respectively, and the related losses from merchant charge-backs were not material.

Clearing Services – Client Credit Risk
The Firm provides clearing services for clients by entering into securities purchases and sales and derivative contracts with CCPs, including ETDs such as futures and options, as well as OTC-cleared derivative contracts. As a clearing member, the Firm stands behind the performance of its clients, collects cash and securities collateral (margin) as well as any settlement amounts due from or to clients, and remits them to the relevant CCP or client in whole or part. There are two types of margin: variation margin is posted on a daily basis based on the value of clients' derivative contracts and initial margin is posted at inception of a derivative contract, generally on the basis of the potential changes in the variation margin requirement for the contract.

As a clearing member, the Firm is exposed to the risk of nonperformance by its clients, but is not liable to clients for the performance of the CCPs. Where possible, the Firm seeks to mitigate its risk to the client through the collection of appropriate amounts of margin at inception and throughout the life of the transactions. The Firm can also cease providing clearing services if clients do not adhere to their obligations under the clearing agreement. In the event of nonperformance by a client, the Firm would close out the client's positions and access available margin. The CCP would utilize any margin it holds to make itself whole, with any remaining shortfalls required to be paid by the Firm as a clearing member.

The Firm reflects its exposure to nonperformance risk of the client through the recognition of margin receivables from clients and margin payables to CCPs; the clients' underlying securities or derivative contracts are not reflected in the Firm's Consolidated Financial Statements.

It is difficult to estimate the Firm's maximum possible exposure through its role as a clearing member, as this would require an assessment of transactions that clients may execute in the future. However, based upon historical experience, and the credit risk mitigants available to the Firm, management believes it is unlikely that the Firm will have to make any material payments under these arrangements and the risk of loss is expected to be remote.

Refer to Note 5 for information on the derivatives that the Firm executes for its own account and records in its Consolidated Financial Statements.

Exchange & Clearing House Memberships
The Firm is a member of several securities and derivative exchanges and clearing houses, both in the U.S. and other countries, and it provides clearing services to its clients. Membership in some of these organizations requires the Firm to pay a pro rata share of the losses incurred by the organization as a result of the default of another member. Such obligations vary with different organizations. These obligations may be limited to the amount (or a multiple of the amount) of the Firm's contribution to the guarantee fund maintained by a clearing house or exchange as part of the resources available to cover any losses in the event of a member default. Alternatively, these obligations may also include a pro rata share of the residual losses after applying the guarantee fund. Additionally, certain clearing houses require the Firm as a member to pay a pro rata share of losses that may result from the clearing house's investment of guarantee fund contributions and initial margin, unrelated to and independent of the default of another member. Generally a payment would only be required should such losses exceed the resources of the clearing house or exchange that are contractually required to absorb the losses in the first instance. In certain cases, it is difficult to estimate the Firm's maximum possible exposure under these membership agreements, since this would require an assessment of future claims that may be made against the Firm that have not yet occurred. However, based on historical experience, management expects the risk of loss to the Firm to be remote. Where the Firm's maximum possible exposure can be estimated, the amount is disclosed in the table on page 273, in the Exchange & clearing house guarantees and commitments line.

Sponsored member repo program
In 2018 the Firm commenced the sponsored member repo program, wherein the Firm acts as a sponsoring member to clear eligible overnight resale and repurchase agreements through the Government Securities Division of the Fixed Income Clearing Corporation ("FICC") on behalf of clients that become sponsored members under the FICC's rules. The Firm also guarantees to the FICC the prompt and full payment and performance of its sponsored member clients' respective obligations under the FICC's rules. The Firm minimizes its liability under these overnight guarantees by obtaining a security interest in the cash or high-quality securities collateral that the clients place with the clearing house; therefore, the Firm expects the risk of loss to be remote. The Firm's maximum possible exposure, without taking into consideration the associated collateral, is included in the Exchange & clearing house guarantees and commitments line on page 273. Refer to Note 11 for additional information on credit risk mitigation practices on resale agreements and the types of collateral pledged under repurchase agreements.

Guarantees of subsidiaries
In the normal course of business, the Parent Company may provide counterparties with guarantees of certain of the trading and other obligations of its subsidiaries on a contract-by-contract basis, as negotiated with the Firm's counterparties. The obligations of the subsidiaries are included on the Firm's Consolidated balance sheets or are reflected as off-balance sheet commitments; therefore, the Parent Company has not recognized a separate liability for these guarantees. The Firm believes that the occurrence of any event that would trigger payments by the Parent Company under these guarantees is remote.

The Parent Company has guaranteed certain long-term debt and structured notes of its subsidiaries, including JPMorgan Chase Financial Company LLC ("JPMFC"), a 100%-owned finance subsidiary. All securities issued by JPMFC are fully and unconditionally guaranteed by the Parent Company. These guarantees, which rank on a parity with the Firm's unsecured and unsubordinated indebtedness, are not included in the table on page 273 of this Note. Refer to Note 20 for additional information.

Note 29 – Pledged assets and collateral

Pledged assets

The Firm pledges financial assets that it owns to maintain potential borrowing capacity at discount windows with Federal Reserve banks, various other central banks and FHLBs. Additionally, the Firm pledges assets for other purposes, including to collateralize repurchase and other securities financing agreements, to cover short sales and to collateralize derivative contracts and deposits. Certain of these pledged assets may be sold or repledged or otherwise used by the secured parties and are parenthetically identified on the Consolidated balance sheets as assets pledged.

The following table presents the Firm's pledged assets.

December 31, (in billions)	2019	2018
Assets that may be sold or repledged or otherwise used by secured parties	**$ 125.2**	$ 104.0
Assets that may not be sold or repledged or otherwise used by secured parties	**80.2**	83.7
Assets pledged at Federal Reserve banks and FHLBs	**478.9**	475.3
Total pledged assets	**$ 684.3**	$ 663.0

Total pledged assets do not include assets of consolidated VIEs; these assets are used to settle the liabilities of those entities. Refer to Note 14 for additional information on assets and liabilities of consolidated VIEs. Refer to Note 11 for additional information on the Firm's securities financing activities. Refer to Note 20 for additional information on the Firm's long-term debt. The significant components of the Firm's pledged assets were as follows.

December 31, (in billions)	2019	2018
Investment securities	**$ 35.9**	$ 59.5
Loans	**460.4**	440.1
Trading assets and other	**188.0**	163.4
Total pledged assets	**$ 684.3**	$ 663.0

Collateral

The Firm accepts financial assets as collateral that it is permitted to sell or repledge, deliver or otherwise use. This collateral is generally obtained under resale and other securities financing agreements, prime brokerage-related held-for-investment customer receivables and derivative contracts. Collateral is generally used under repurchase and other securities financing agreements, to cover short sales, and to collateralize derivative contracts and deposits.

The following table presents the fair value of collateral accepted.

December 31, (in billions)	2019	2018
Collateral permitted to be sold or repledged, delivered, or otherwise used	**$ 1,282.5**	$ 1,245.3
Collateral sold, repledged, delivered or otherwise used	**1,000.5**	998.3

Note 30 – Litigation

Contingencies

As of December 31, 2019, the Firm and its subsidiaries and affiliates are defendants, putative defendants or respondents in numerous legal proceedings, including private, civil litigations and regulatory/government investigations. The litigations range from individual actions involving a single plaintiff to class action lawsuits with potentially millions of class members. Investigations involve both formal and informal proceedings, by both governmental agencies and self-regulatory organizations. These legal proceedings are at varying stages of adjudication, arbitration or investigation, and involve each of the Firm's lines of business and several geographies and a wide variety of claims (including common law tort and contract claims and statutory antitrust, securities and consumer protection claims), some of which present novel legal theories.

The Firm believes the estimate of the aggregate range of reasonably possible losses, in excess of reserves established, for its legal proceedings is from $0 to approximately $1.3 billion at December 31, 2019. This estimated aggregate range of reasonably possible losses was based upon information available as of that date for those proceedings in which the Firm believes that an estimate of reasonably possible loss can be made. For certain matters, the Firm does not believe that such an estimate can be made, as of that date. The Firm's estimate of the aggregate range of reasonably possible losses involves significant judgment, given:

- the number, variety and varying stages of the proceedings, including the fact that many are in preliminary stages,
- the existence in many such proceedings of multiple defendants, including the Firm, whose share of liability (if any) has yet to be determined,
- the numerous yet-unresolved issues in many of the proceedings, including issues regarding class certification and the scope of many of the claims, and
- the attendant uncertainty of the various potential outcomes of such proceedings, including where the Firm has made assumptions concerning future rulings by the court or other adjudicator, or about the behavior or incentives of adverse parties or regulatory authorities, and those assumptions prove to be incorrect.

In addition, the outcome of a particular proceeding may be a result which the Firm did not take into account in its estimate because the Firm had deemed the likelihood of that outcome to be remote. Accordingly, the Firm's estimate of the aggregate range of reasonably possible losses will change from time to time, and actual losses may vary significantly.

Set forth below are descriptions of the Firm's material legal proceedings.

Federal Republic of Nigeria Litigation. JPMorgan Chase Bank, N.A. operated an escrow and depository account for the Federal Government of Nigeria ("FGN") and two major international oil companies. The account held approximately $1.1 billion in connection with a dispute among the clients over rights to an oil field. Following the settlement of the dispute, JPMorgan Chase Bank, N.A. paid out the monies in the account in 2011 and 2013 in accordance with directions received from its clients. In November 2017, the Federal Republic of Nigeria ("FRN") commenced a claim in the English High Court for approximately $875 million in payments made out of the accounts. The FRN, claiming to be the same entity as the FGN, alleges that the payments were instructed as part of a complex fraud not involving JPMorgan Chase Bank, N.A., but that JPMorgan Chase Bank, N.A. was or should have been on notice that the payments may be fraudulent. JPMorgan Chase Bank, N.A. applied for summary judgment and was unsuccessful. The claim is ongoing and no trial date has been set.

Foreign Exchange Investigations and Litigation. The Firm previously reported settlements with certain government authorities relating to its foreign exchange ("FX") sales and trading activities and controls related to those activities. FX-related investigations and inquiries by government authorities, including competition authorities, are ongoing, and the Firm is cooperating with and working to resolve those matters. In May 2015, the Firm pleaded guilty to a single violation of federal antitrust law. In January 2017, the Firm was sentenced, with judgment entered thereafter and a term of probation ending in January 2020. The term of probation has concluded, with the Firm remaining in good standing throughout the probation period. The Department of Labor has granted the Firm a five-year exemption of disqualification that allows the Firm and its affiliates to continue to rely on the Qualified Professional Asset Manager exemption under the Employee Retirement Income Security Act ("ERISA") until January 2023. The Firm will need to reapply in due course for a further exemption to cover the remainder of the ten-year disqualification period. In addition, the Firm has paid fines totaling approximately $265 million in connection with the settlement of FX-related investigations conducted by the European Commission and the Swiss Competition Commission which were announced in May 2019 and June 2019, respectively. Separately, in February 2017 the South Africa Competition Commission referred its FX investigation of the Firm and other banks to the South Africa Competition Tribunal, which is conducting civil proceedings concerning that matter.

In August 2018, the United States District Court for the Southern District of New York granted final approval to the Firm's settlement of a consolidated class action brought by U.S.-based plaintiffs, which principally alleged violations of federal antitrust laws based on an alleged conspiracy to manipulate foreign exchange rates and also sought damages on behalf of persons who transacted in FX futures and options on futures. Certain members of the settlement class filed requests to the Court to be excluded from the class, and certain of them filed a complaint against the Firm and a number of other foreign exchange dealers in November 2018. A number of these actions remain pending. Further, putative class actions have been filed against the Firm and a number of other foreign exchange dealers on behalf of certain consumers who purchased foreign currencies at allegedly inflated rates and purported indirect purchasers of FX instruments; these actions also remain pending in the District Court. In addition, some FX-related individual and putative class actions based on similar alleged underlying conduct have been filed outside the U.S., including in the U.K., Israel and Australia.

Interchange Litigation. Groups of merchants and retail associations filed a series of class action complaints alleging that Visa and Mastercard, as well as certain banks, conspired to set the price of credit and debit card interchange fees and enacted related rules in violation of antitrust laws. In 2012, the parties initially settled the cases for a cash payment, a temporary reduction of credit card interchange, and modifications to certain credit card network rules. In 2017, after the approval of that settlement was reversed on appeal, the case was remanded to the District Court for further proceedings consistent with the appellate decision.

The original class action was divided into two separate actions, one seeking primarily monetary relief and the other seeking primarily injunctive relief. In September 2018, the parties to the class action seeking monetary relief finalized an agreement which amends and supersedes the prior settlement agreement. Pursuant to this settlement, the defendants collectively contributed an additional $900 million to the approximately $5.3 billion previously held in escrow from the original settlement. In December 2019, the amended agreement was approved by the District Court. Certain merchants filed notices of appeal of the District Court's approval order. Based on the percentage of merchants that opted out of the amended class settlement, $700 million has been returned to the defendants from the settlement escrow in accordance with the settlement agreement. The class action seeking primarily injunctive relief continues separately.

In addition, certain merchants have filed individual actions raising similar allegations against Visa and Mastercard, as well as against the Firm and other banks, and those actions are proceeding.

LIBOR and Other Benchmark Rate Investigations and Litigation. JPMorgan Chase has responded to inquiries from various governmental agencies and entities around the world relating primarily to the British Bankers Association's London Interbank Offered Rate ("LIBOR") for various currencies and the European Banking Federation's Euro Interbank Offered Rate ("EURIBOR"). The Swiss Competition Commission's investigation relating to EURIBOR, to which the Firm and other banks are subject, continues. In December 2016, the European Commission issued a decision against the Firm and other banks finding an infringement of European antitrust rules relating to EURIBOR. The Firm has filed an appeal of that decision with the European General Court, and that appeal is pending.

In addition, the Firm has been named as a defendant along with other banks in a series of individual and putative class actions related to benchmarks, including U.S. dollar LIBOR during the period that it was administered by the BBA and, in a separate consolidated putative class action, during the period that it was administered by ICE Benchmark Administration. These actions have been filed, or consolidated for pre-trial purposes, in the United States District Court for the Southern District of New York. In these actions, plaintiffs make varying allegations that in various periods, starting in 2000 or later, defendants either individually or collectively manipulated various benchmark rates by submitting rates that were artificially low or high. Plaintiffs allege that they transacted in loans, derivatives or other financial instruments whose values are affected by changes in these rates and assert a variety of claims including antitrust claims seeking treble damages. These actions are in various stages of litigation.

In actions related to U.S. dollar LIBOR during the period that it was administered by the BBA, the District Court dismissed certain claims, including antitrust claims brought by some plaintiffs whom the District Court found did not have standing to assert such claims, and permitted certain claims to proceed, including antitrust, Commodity Exchange Act, Section 10(b) of the Securities Exchange Act and common law claims. The plaintiffs whose antitrust claims were dismissed for lack of standing have filed an appeal. The District Court granted class certification of antitrust claims related to bonds and interest rate swaps sold directly by the defendants and denied class certification motions filed by other plaintiffs. The Firm's settlements of putative class actions related to Swiss franc LIBOR, the Singapore Interbank Offered Rate and the Singapore Swap Offer Rate ("SIBOR"), the Australian Bank Bill Swap Reference Rate, and certain of the putative class actions related to U.S. dollar LIBOR remain subject to court approval. In the class actions related to SIBOR and Swiss franc LIBOR, the District Court concluded that the Court lacked subject matter jurisdiction, and plaintiffs' appeals of those decisions are pending.

Metals and U.S. Treasuries Investigations and Litigation and Related Inquiries. Various authorities, including the Department of Justice's Criminal Division, are conducting investigations relating to trading practices in the metals markets and related conduct. The Firm also is responding to

related requests concerning similar trading-practices issues in markets for other financial instruments, such as U.S. Treasuries. The Firm continues to cooperate with these investigations and is currently engaged in discussions with various regulators about resolving their respective investigations. There is no assurance that such discussions will result in settlements. Several putative class action complaints have been filed in the United States District Court for the Southern District of New York against the Firm and certain former employees, alleging a precious metals futures and options price manipulation scheme in violation of the Commodity Exchange Act. Some of the complaints also allege unjust enrichment and deceptive acts or practices under the General Business Law of the State of New York. The Court consolidated these putative class actions in February 2019. The Firm is also a defendant in a consolidated action filed in the United States District Court for the Southern District of New York alleging monopolization of silver futures in violation of the Sherman Act.

Wendel. Since 2012, the French criminal authorities have been investigating a series of transactions entered into by senior managers of Wendel Investissement ("Wendel") during the period from 2004 through 2007 to restructure their shareholdings in Wendel. JPMorgan Chase Bank, N.A., Paris branch provided financing for the transactions to a number of managers of Wendel in 2007. JPMorgan Chase has cooperated with the investigation. The investigating judges issued an *ordonnance de renvoi* in November 2016, referring JPMorgan Chase Bank, N.A. to the French *tribunal correctionnel* for alleged complicity in tax fraud. No date for trial has been set by the court. In January 2018, the Paris Court of Appeal issued a decision cancelling the *mise en examen* of JPMorgan Chase Bank, N.A. The Court of Cassation, France's highest court, ruled in September 2018 that a *mise en examen* is a prerequisite for an *ordonnance de renvoi* and in January 2020 ordered the annulment of the *ordonnance de renvoi* referring JPMorgan Chase Bank, N.A. to the French *tribunal correctionnel*. In addition, a number of the managers have commenced civil proceedings against JPMorgan Chase Bank, N.A. The claims are separate, involve different allegations and are at various stages of proceedings.

* * *

In addition to the various legal proceedings discussed above, JPMorgan Chase and its subsidiaries are named as defendants or are otherwise involved in a substantial number of other legal proceedings. The Firm believes it has meritorious defenses to the claims asserted against it in its currently outstanding legal proceedings and it intends to defend itself vigorously. Additional legal proceedings may be initiated from time to time in the future.

The Firm has established reserves for several hundred of its currently outstanding legal proceedings. In accordance with the provisions of U.S. GAAP for contingencies, the Firm accrues for a litigation-related liability when it is probable that such a liability has been incurred and the amount of the loss can be reasonably estimated. The Firm evaluates its outstanding legal proceedings each quarter to assess its litigation reserves, and makes adjustments in such reserves, upwards or downward, as appropriate, based on management's best judgment after consultation with counsel. The Firm's legal expense/(benefit) was $239 million, $72 million and $(35) million for the years ended December 31, 2019, 2018 and 2017, respectively. There is no assurance that the Firm's litigation reserves will not need to be adjusted in the future.

In view of the inherent difficulty of predicting the outcome of legal proceedings, particularly where the claimants seek very large or indeterminate damages, or where the matters present novel legal theories, involve a large number of parties or are in early stages of discovery, the Firm cannot state with confidence what will be the eventual outcomes of the currently pending matters, the timing of their ultimate resolution or the eventual losses, fines, penalties or consequences related to those matters. JPMorgan Chase believes, based upon its current knowledge and after consultation with counsel, consideration of the material legal proceedings described above and after taking into account its current litigation reserves and its estimated aggregate range of possible losses, that the other legal proceedings currently pending against it should not have a material adverse effect on the Firm's consolidated financial condition. The Firm notes, however, that in light of the uncertainties involved in such proceedings, there is no assurance that the ultimate resolution of these matters will not significantly exceed the reserves it has currently accrued or that a matter will not have material reputational consequences. As a result, the outcome of a particular matter may be material to JPMorgan Chase's operating results for a particular period, depending on, among other factors, the size of the loss or liability imposed and the level of JPMorgan Chase's income for that period.

Note 31 – International operations

The following table presents income statement and balance sheet-related information for JPMorgan Chase by major international geographic area. The Firm defines international activities for purposes of this footnote presentation as business transactions that involve clients residing outside of the U.S., and the information presented below is based predominantly on the domicile of the client, the location from which the client relationship is managed, booking location or the location of the trading desk. However, many of the Firm's U.S. operations serve international businesses.

As the Firm's operations are highly integrated, estimates and subjective assumptions have been made to apportion revenue and expense between U.S. and international operations. These estimates and assumptions are consistent with the allocations used for the Firm's segment reporting as set forth in Note 32.

The Firm's long-lived assets for the periods presented are not considered by management to be significant in relation to total assets. The majority of the Firm's long-lived assets are located in the U.S.

As of or for the year ended December 31, (in millions)	Revenue[c]	Expense[d]	Income before income tax expense	Net income	Total assets	
2019						
Europe/Middle East/Africa	**$ 15,902**	**$ 9,977**	**$ 5,925**	**$ 4,084**	**$ 388,353**	(e)
Asia-Pacific	**7,270**	**5,014**	**2,256**	**1,511**	**183,408**	
Latin America/Caribbean	**2,411**	**1,561**	**850**	**613**	**47,836**	
Total international	**25,583**	**16,552**	**9,031**	**6,208**	**619,597**	
North America[a]	**90,044**	**54,530**	**35,514**	**30,223**	**2,067,782**	
Total	**$ 115,627**	**$ 71,082**	**$ 44,545**	**$ 36,431**	**$ 2,687,379**	
2018[b]						
Europe/Middle East/Africa	$ 16,468	$ 10,033	$ 6,435	$ 4,583	$ 426,129	(e)
Asia-Pacific	6,997	4,877	2,120	1,491	171,637	
Latin America/Caribbean	2,365	1,301	1,064	745	43,870	
Total international	25,830	16,211	9,619	6,819	641,636	
North America[a]	83,199	52,054	31,145	25,655	1,980,896	
Total	$ 109,029	$ 68,265	$ 40,764	$ 32,474	$ 2,622,532	
2017[b]						
Europe/Middle East/Africa	$ 15,505	$ 9,235	$ 6,270	$ 4,320	$ 409,204	(e)
Asia-Pacific	5,835	4,523	1,312	725	163,823	
Latin America/Caribbean	1,959	1,527	432	274	42,403	
Total international	23,299	15,285	8,014	5,319	615,430	
North America[a]	77,406	49,520	27,886	19,122	1,918,170	
Total	$ 100,705	$ 64,805	$ 35,900	$ 24,441	$ 2,533,600	

(a) Substantially reflects the U.S.
(b) The prior period amounts have been revised to conform with the current period presentation.
(c) Revenue is composed of net interest income and noninterest revenue.
(d) Expense is composed of noninterest expense and the provision for credit losses.
(e) Total assets for the U.K. were approximately $305 billion, $297 billion, and $310 billion at December 31, 2019, 2018 and 2017, respectively.

Note 32 – Business segments

The Firm is managed on an LOB basis. There are four major reportable business segments – Consumer & Community Banking, Corporate & Investment Bank, Commercial Banking and Asset & Wealth Management. In addition, there is a Corporate segment. The business segments are determined based on the products and services provided, or the type of customer served, and they reflect the manner in which financial information is currently evaluated by the Firm's Operating Committee. Segment results are presented on a managed basis. Refer to Segment results of this footnote for a further discussion of JPMorgan Chase's business segments.

The following is a description of each of the Firm's business segments, and the products and services they provide to their respective client bases.

Consumer & Community Banking

Consumer & Community Banking offers services to consumers and businesses through bank branches, ATMs, digital (including mobile and online) and telephone banking. CCB is organized into Consumer & Business Banking (including Consumer Banking/Chase Wealth Management and Business Banking), Home Lending (including Home Lending Production, Home Lending Servicing and Real Estate Portfolios) and Card, Merchant Services & Auto. Consumer & Business Banking offers deposit and investment products and services to consumers, and lending, deposit, and cash management and payment solutions to small businesses. Home Lending includes mortgage origination and servicing activities, as well as portfolios consisting of residential mortgages and home equity loans. Card, Merchant Services & Auto issues credit cards to consumers and small businesses, offers payment processing services to merchants, and originates and services auto loans and leases.

Corporate & Investment Bank

The Corporate & Investment Bank, which consists of Banking and Markets & Securities Services, offers a broad suite of investment banking, market-making, prime brokerage, and treasury and securities products and services to a global client base of corporations, investors, financial institutions, government and municipal entities. Banking offers a full range of investment banking products and services in all major capital markets, including advising on corporate strategy and structure, capital-raising in equity and debt markets, as well as loan origination and syndication. Banking also includes Treasury Services, which provides transaction services, consisting of cash management and liquidity solutions. Markets & Securities Services is a global market-maker in cash securities and derivative instruments, and also offers sophisticated risk management solutions, prime brokerage, and research. Markets & Securities Services also includes Securities Services, a leading global custodian which provides custody, fund accounting and administration, and securities lending products principally for asset managers, insurance companies and public and private investment funds.

Commercial Banking

Commercial Banking provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management products across three primary client segments: Middle Market Banking, Corporate Client Banking and Commercial Real Estate Banking. Other includes amounts not aligned with a primary client segment.

Middle Market Banking covers small business and midsized corporations, local governments and nonprofit clients.

Corporate Client Banking covers large corporations.

Commercial Real Estate Banking covers investors, developers, and owners of multifamily, office, retail, industrial and affordable housing properties.

Asset & Wealth Management

Asset & Wealth Management, with client assets of $3.2 trillion, is a global leader in investment and wealth management. AWM clients include institutions, high-net-worth individuals and retail investors in major markets throughout the world. AWM offers investment management across most major asset classes including equities, fixed income, alternatives and money market funds. AWM also offers multi-asset investment management, providing solutions for a broad range of clients' investment needs. For Wealth Management clients, AWM also provides retirement products and services, brokerage and banking services including trusts and estates, loans, mortgages and deposits. The majority of AWM's client assets are in actively managed portfolios.

Corporate

The Corporate segment consists of Treasury and Chief Investment Office and Other Corporate, which includes corporate staff functions and expense that is centrally managed. Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks. The major Other Corporate functions include Real Estate, Technology, Legal, Corporate Finance, Human Resources, Internal Audit, Risk Management, Compliance, Control Management, Corporate Responsibility and various Other Corporate groups.

Segment results

The following table provides a summary of the Firm's segment results as of or for the years ended December 31, 2019, 2018 and 2017, on a managed basis. The Firm's definition of managed basis starts with the reported U.S. GAAP results and includes certain reclassifications to present total net revenue for the Firm (and each of the reportable business segments) on an FTE basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in the managed results on a basis comparable to taxable investments and securities. This allows management to assess the comparability of revenue from year-to-year arising from both taxable and tax-exempt sources. The corresponding income tax impact related to tax-exempt items is recorded within income tax expense/(benefit). These adjustments have no impact on net income as reported by the Firm as a whole or by the LOBs.

Business segment capital allocation

Each business segment is allocated capital by taking into consideration a variety of factors including capital levels of similarly rated peers and applicable regulatory capital requirements. ROE is measured and internal targets for expected returns are established as key measures of a business segment's performance.

The Firm's allocation methodology incorporates Basel III Standardized RWA, Basel III Advanced RWA, leverage, the GSIB surcharge, and a simulation of capital in a severe stress environment. Periodically, the assumptions and methodologies used to allocate capital are assessed and as a result, the capital allocated to the LOBs may change.

Segment results and reconciliation

(Table continued on next page)

As of or for the year ended December 31, (in millions, except ratios)	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking			Asset & Wealth Management		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Noninterest revenue	**$ 18,642**	$ 16,260	$ 14,710	**$ 29,142**	$ 26,968	$ 24,539	**$ 2,430**	$ 2,343	$ 2,522	**$ 10,816**	$ 10,539	$ 10,456
Net interest income	**37,241**	35,819	31,775	**9,156**	9,480	10,118	**6,554**	6,716	6,083	**3,500**	3,537	3,379
Total net revenue	**55,883**	52,079	46,485	**38,298**	36,448	34,657	**8,984**	9,059	8,605	**14,316**	14,076	13,835
Provision for credit losses	**4,952**	4,753	5,572	**277**	(60)	(45)	**296**	129	(276)	**61**	53	39
Noninterest expense	**28,896**	27,835	26,062	**21,519**	20,918	19,407	**3,500**	3,386	3,327	**10,515**	10,353	10,218
Income/(loss) before income tax expense/(benefit)	**22,035**	19,491	14,851	**16,502**	15,590	15,295	**5,188**	5,544	5,554	**3,740**	3,670	3,578
Income tax expense/(benefit)	**5,394**	4,639	5,456	**4,580**	3,817	4,482	**1,264**	1,307	2,015	**907**	817	1,241
Net income/(loss)	**$ 16,641**	$ 14,852	$ 9,395	**$ 11,922**	$ 11,773	$ 10,813	**$ 3,924**	$ 4,237	$ 3,539	**$ 2,833**	$ 2,853	$ 2,337
Average equity	**$ 52,000**	$ 51,000	$ 51,000	**$ 80,000**	$ 70,000	$ 70,000	**$ 22,000**	$ 20,000	$ 20,000	**$ 10,500**	$ 9,000	$ 9,000
Total assets	**539,090**	557,441	552,601	**908,153**	903,051	826,384	**220,514**	220,229	221,228	**182,004**	170,024	151,909
Return on equity	**31%**	28%	17%	**14%**	16%	14%	**17%**	20%	17%	**26%**	31%	25%
Overhead ratio	**52**	53	56	**56**	57	56	**39**	37	39	**73**	74	74

(Table continued from previous page)

As of or for the year ended December 31, (in millions, except ratios)	Corporate			Reconciling Items[a]			Total		
	2019	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Noninterest revenue	**$ (114)**	$ (263)	$ 1,085	**$ (2,534)**	$ (1,877)	$ (2,704) [b]	**$ 58,382**	$ 53,970	$ 50,608
Net interest income	**1,325**	135	55	**(531)**	(628)	(1,313)	**57,245**	55,059	50,097
Total net revenue	**1,211**	(128)	1,140	**(3,065)**	(2,505)	(4,017)	**115,627**	109,029	100,705
Provision for credit losses	**(1)**	(4)	–	**–**	–	–	**5,585**	4,871	5,290
Noninterest expense	**1,067**	902	501	**–**	–	–	**65,497**	63,394	59,515
Income/(loss) before income tax expense/(benefit)	**145**	(1,026)	639	**(3,065)**	(2,505)	(4,017)	**44,545**	40,764	35,900
Income tax expense/(benefit)	**(966)**	215	2,282	**(3,065)**	(2,505)	(4,017) [b]	**8,114**	8,290	11,459
Net income/(loss)	**$ 1,111**	$ (1,241)	$ (1,643)	**$ –**	$ –	$ –	**$ 36,431**	$ 32,474	$ 24,441
Average equity	**$ 68,407**	$ 79,222	$ 80,350	**$ –**	$ –	$ –	**$ 232,907**	$ 229,222	$ 230,350
Total assets	**837,618**	771,787	781,478	**NA**	NA	NA	**2,687,379**	2,622,532	2,533,600
Return on equity	**NM**	NM	NM	**NM**	NM	NM	**15%**	13%	10%
Overhead ratio	**NM**	NM	NM	**NM**	NM	NM	**57**	58	59

(a) Segment results on a managed basis reflect revenue on a FTE basis with the corresponding income tax impact recorded within income tax expense/(benefit). These adjustments are eliminated in reconciling items to arrive at the Firm's reported U.S. GAAP results.
(b) Included $375 million related to tax-oriented investments as a result of the enactment of the TCJA.

Note 33 – Parent Company

The following tables present Parent Company-only financial statements.

Statements of income and comprehensive income

Year ended December 31, (in millions)	2019	2018	2017
Income			
Dividends from subsidiaries and affiliates:			
Bank and bank holding company	$ 26,000	$ 32,501	$ 13,000
Non-bank[(a)]	–	2	540
Interest income from subsidiaries	223	216	72
Other interest income	–	–	41
Other income from subsidiaries:			
Bank and bank holding company	2,738	515	1,553
Non-bank	197	(444)	(88)
Other income	(1,731)	888	(623)
Total income	27,427	33,678	14,495
Expense			
Interest expense to subsidiaries and affiliates[(a)]	(5,303)	2,291	400
Other interest expense	13,246	4,581	5,202
Noninterest expense	1,992	1,793	(1,897)
Total expense	9,935	8,665	3,705
Income before income tax benefit and undistributed net income of subsidiaries	17,492	25,013	10,790
Income tax benefit	2,033	1,838	1,007
Equity in undistributed net income of subsidiaries	16,906	5,623	12,644
Net income	$ 36,431	$ 32,474	$ 24,441
Other comprehensive income, net	3,076	(1,476)	1,056
Comprehensive income	$ 39,507	$ 30,998	$ 25,497

Balance sheets

December 31, (in millions)	2019	2018
Assets		
Cash and due from banks	$ 32	$ 55
Deposits with banking subsidiaries	5,309	5,315
Trading assets	3,011	3,304
Advances to, and receivables from, subsidiaries:		
Bank and bank holding company	2,358	3,334
Non-bank	84	74
Investments (at equity) in subsidiaries and affiliates:		
Bank and bank holding company	471,207	449,628
Non-bank	1,044	1,077
Other assets	10,699	10,478
Total assets	$ 493,744	$ 473,265
Liabilities and stockholders' equity		
Borrowings from, and payables to, subsidiaries and affiliates[(a)]	$ 23,410	$ 20,017
Short-term borrowings	2,616	2,672
Other liabilities	9,288	8,821
Long-term debt[(b)(c)]	197,100	185,240
Total liabilities[(c)]	232,414	216,750
Total stockholders' equity	261,330	256,515
Total liabilities and stockholders' equity	$ 493,744	$ 473,265

Statements of cash flows

Year ended December 31, (in millions)	2019	2018	2017
Operating activities			
Net income	$ 36,431	$ 32,474	$ 24,441
Less: Net income of subsidiaries and affiliates[(a)]	42,906	38,125	26,185
Parent company net loss	(6,475)	(5,651)	(1,744)
Cash dividends from subsidiaries and affiliates[(a)]	26,000	32,501	13,540
Other operating adjustments	9,862	(4,400)	4,635
Net cash provided by/(used in) operating activities	29,387	22,450	16,431
Investing activities			
Net change in:			
Other changes in loans, net	–	–	78
Advances to and investments in subsidiaries and affiliates, net	(6) [(e)]	8,036	(280)
All other investing activities, net	71	63	49
Net cash provided by/(used in) investing activities	65	8,099	(153)
Financing activities			
Net change in:			
Borrowings from subsidiaries and affiliates[(a)]	2,941	(2,273)	13,862
Short-term borrowings	(56)	(678)	(481)
Proceeds from long-term borrowings	25,569	25,845	25,855
Payments of long-term borrowings	(21,226)	(21,956)	(29,812)
Proceeds from issuance of preferred stock	5,000	1,696	1,258
Redemption of preferred stock	(4,075)	(1,696)	(1,258)
Treasury stock repurchased	(24,001)	(19,983)	(15,410)
Dividends paid	(12,343)	(10,109)	(8,993)
All other financing activities, net	(1,290)	(1,526)	(1,361)
Net cash used in financing activities	(29,481)	(30,680)	(16,340)
Net decrease in cash and due from banks and deposits with banking subsidiaries	(29)	(131)	(62)
Cash and due from banks and deposits with banking subsidiaries at the beginning of the year	5,370	5,501	5,563
Cash and due from banks and deposits with banking subsidiaries at the end of the year	$ 5,341	$ 5,370	$ 5,501
Cash interest paid	$ 7,957	$ 6,911	$ 5,426
Cash income taxes paid, net[(d)]	3,910	1,782	1,775

(a) Affiliates include trusts that issued guaranteed capital debt securities ("issuer trusts").

(b) At December 31, 2019, long-term debt that contractually matures in 2020 through 2024 totaled $16.4 billion, $20.4 billion, $12.7 billion, $18.6 billion, and $18.2 billion, respectively.

(c) Refer to Notes 20 and 28 for information regarding the Parent Company's guarantees of its subsidiaries' obligations.

(d) Represents payments, net of refunds, made by the Parent Company to various taxing authorities and includes taxes paid on behalf of certain of its subsidiaries that are subsequently reimbursed. The reimbursements were $6.4 billion, $1.2 billion, and $4.1 billion for the years ended December 31, 2019, 2018, and 2017, respectively.

(e) As a result of the merger of Chase Bank USA, N.A. with and into JPMorgan Chase Bank, N.A., JPMorgan Chase Bank, N.A. distributed $13.5 billion to the Parent company as a return of capital, which the Parent company contributed to the IHC.

Selected quarterly financial data (unaudited)

As of or for the period ended (in millions, except per share, ratio, headcount data and where otherwise noted)	2019 4th quarter	2019 3rd quarter	2019 2nd quarter	2019 1st quarter	2018 4th quarter	2018 3rd quarter	2018 2nd quarter	2018 1st quarter
Selected income statement data								
Total net revenue	$ 28,331	$ 29,341	$ 28,832	$ 29,123	$ 26,109	$ 27,260	$ 27,753	$ 27,907
Total noninterest expense	16,339	16,422	16,341	16,395	15,720	15,623	15,971	16,080
Pre-provision profit	11,992	12,919	12,491	12,728	10,389	11,637	11,782	11,827
Provision for credit losses	1,427	1,514	1,149	1,495	1,548	948	1,210	1,165
Income before income tax expense	10,565	11,405	11,342	11,233	8,841	10,689	10,572	10,662
Income tax expense	2,045	2,325	1,690	2,054	1,775	2,309	2,256	1,950
Net income	$ 8,520	$ 9,080	$ 9,652	$ 9,179	$ 7,066	$ 8,380	$ 8,316	$ 8,712
Earnings per share data								
Net income: Basic	$ 2.58	$ 2.69	$ 2.83	$ 2.65	$ 1.99	$ 2.35	$ 2.31	$ 2.38
Diluted	2.57	2.68	2.82	2.65	1.98	2.34	2.29	2.37
Average shares: Basic	3,140.7	3,198.5	3,250.6	3,298.0	3,335.8	3,376.1	3,415.2	3,458.3
Diluted	3,148.5	3,207.2	3,259.7	3,308.2	3,347.3	3,394.3	3,434.7	3,479.5
Market and per common share data								
Market capitalization	$ 429,913	$ 369,133	$ 357,479	$ 328,387	$ 319,780	$ 375,239	$ 350,204	$ 374,423
Common shares at period-end	3,084.0	3,136.5	3,197.5	3,244.0	3,275.8	3,325.4	3,360.9	3,404.8
Book value per share	75.98	75.24	73.88	71.78	70.35	69.52	68.85	67.59
TBVPS[(a)]	60.98	60.48	59.52	57.62	56.33	55.68	55.14	54.05
Cash dividends declared per share	0.90	0.90	0.80	0.80	0.80	0.80	0.56	0.56
Selected ratios and metrics								
ROE[(b)]	14%	15%	16%	16%	12%	14%	14%	15%
ROTCE[(a)(b)]	17	18	20	19	14	17	17	19
ROA[(b)]	1.22	1.30	1.41	1.39	1.06	1.28	1.28	1.37
Overhead ratio	58	56	57	56	60	57	58	58
Loans-to-deposits ratio	61	62	63	64	67	65	65	63
LCR (average)[(c)]	116	115	113	111	113	115	115	115
CET1 capital ratio[(d)]	12.4	12.3	12.2	12.1	12.0	12.0	12.0	11.8
Tier 1 capital ratio[(d)]	14.1	14.1	14.0	13.8	13.7	13.6	13.6	13.5
Total capital ratio[(d)]	16.0	15.9	15.8	15.7	15.5	15.4	15.5	15.3
Tier 1 leverage ratio[(d)]	7.9	7.9	8.0	8.1	8.1	8.2	8.2	8.2
SLR[(e)]	6.3	6.3	6.4	6.4	6.4	6.5	6.5	6.5
Selected balance sheet data (period-end)								
Trading assets	$ 411,103	$ 495,875	$ 523,373	$ 533,402	$ 413,714	$ 419,827	$ 418,799	$ 412,282
Investment Securities	398,239	394,251	307,264	267,365	$ 261,828	231,398	233,015	238,188
Loans	959,769	945,218	956,889	956,245	$ 984,554	954,318	948,414	934,424
Core loans	916,144	899,572	908,971	905,943	931,856	899,006	889,433	870,536
Average core loans	903,707	900,567	905,786	916,567	907,271	894,279	877,640	861,089
Total assets	2,687,379	2,764,661	2,727,379	2,737,188	2,622,532	2,615,183	2,590,050	2,609,785
Deposits	1,562,431	1,525,261	1,524,361	1,493,441	1,470,666	1,458,762	1,452,122	1,486,961
Long-term debt	291,498	296,472	288,869	290,893	282,031	270,124	273,114	274,449
Common stockholders' equity	234,337	235,985	236,222	232,844	230,447	231,192	231,390	230,133
Total stockholders' equity	261,330	264,348	263,215	259,837	256,515	258,956	257,458	256,201
Headcount	256,981	257,444	254,983	255,998	256,105	255,313	252,942	253,707
Credit quality metrics								
Allowance for credit losses	$ 14,314	$ 14,400	$ 14,295	$ 14,591	$ 14,500	$ 14,225	$ 14,367	$ 14,482
Allowance for loan losses to total retained loans	1.39%	1.42%	1.39%	1.43%	1.39%	1.39%	1.41%	1.44%
Allowance for loan losses to retained loans excluding purchased credit-impaired loans[(f)]	1.31	1.32	1.28	1.28	1.23	1.23	1.22	1.25
Nonperforming assets	$ 4,497	$ 5,343	$ 5,260	$ 5,616	$ 5,190	$ 5,034	$ 5,767	$ 6,364
Net charge-offs	1,494	1,371	1,403	1,361	1,236	1,033	1,252	1,335
Net charge-off rate	0.63%	0.58%	0.60%	0.58%	0.52%	0.43%	0.54%	0.59%

(a) TBVPS and ROTCE are non-GAAP financial measures. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57-59 for further discussion of these measures.
(b) Quarterly ratios are based upon annualized amounts.
(c) The percentage represents the Firm's reported average LCR.
(d) The Basel III capital rules became fully phased-in effective January 1, 2019. Prior to this date, the required capital measures were subject to the transitional rules which, as of December 31, 2018 and September 30, 2018, were the same on a fully phased-in and transitional basis. Refer to Capital Risk Management on pages 85-92 for additional information on these measures.
(e) The Basel III rule for the SLR became fully phased-in effective January 1, 2018. Refer to Capital Risk Management on pages 85-92 for additional information on these measures.
(f) This ratio is a non-GAAP financial measure as it excludes the impact of residential real estate PCI loans. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57-59, and the Allowance for credit losses on pages 116-117 for further discussion of this measure.

Distribution of assets, liabilities and stockholders' equity; interest rates and interest differentials

Consolidated average balance sheets, interest and rates

Provided below is a summary of JPMorgan Chase's consolidated average balances, interest and rates on a taxable-equivalent basis for the years 2017 through 2019. Income computed on a taxable-equivalent basis is the income reported in the Consolidated statements of income, adjusted to present interest income and rates earned on assets exempt from income taxes (i.e., federal taxes) on a basis comparable with other taxable investments. The incremental tax rate used for calculating the taxable-equivalent adjustment was approximately 24% in both 2019 and 2018, and 37% in 2017.

(Table continued on next page)

(Unaudited)	2019		
Year ended December 31, (Taxable-equivalent interest and rates; in millions, except rates)	Average balance	Interest[h]	Rate
Assets			
Deposits with banks	$ 280,004	$ 3,887	1.39%
Federal funds sold and securities purchased under resale agreements	275,429	6,146	2.23
Securities borrowed[a]	131,291	1,574	1.20
Trading assets – debt instruments[a]	334,269	10,848	3.25
Taxable securities	284,127	7,962	2.80
Non-taxable securities[b]	35,748	1,655	4.63
Total investment securities	319,875	9,617	3.01 [j]
Loans	954,539	50,532 [i]	5.29
All other interest-earning assets[a][c]	50,084	1,967	3.93
Total interest-earning assets[a]	2,345,491	84,571	3.61
Allowance for loan losses	(13,331)		
Cash and due from banks	20,645		
Trading assets – equity and other instruments[a]	114,323		
Trading assets – derivative receivables	53,786		
Goodwill, MSRs and other intangible assets	53,683		
All other noninterest-earning assets	167,244		
Total assets	$ 2,741,841		
Liabilities			
Interest-bearing deposits[a]	$ 1,115,848	$ 8,957	0.80%
Federal funds purchased and securities loaned or sold under repurchase agreements	227,994	4,630	2.03
Short-term borrowings[a][d]	52,426	1,248	2.38
Trading liabilities – debt and all other interest-bearing liabilities[a][e][f]	182,105	2,585	1.42
Beneficial interests issued by consolidated VIEs	22,501	568	2.52
Long-term debt[a]	247,968	8,807	3.55
Total interest-bearing liabilities[a]	1,848,842	26,795	1.45
Noninterest-bearing deposits[a]	407,219		
Trading liabilities – equity and other instruments[a][f]	31,085		
Trading liabilities – derivative payables	42,560		
All other liabilities, including the allowance for lending-related commitments[a]	151,717		
Total liabilities	2,481,423		
Stockholders' equity			
Preferred stock	27,511		
Common stockholders' equity	232,907		
Total stockholders' equity	260,418 [g]		
Total liabilities and stockholders' equity	$ 2,741,841		
Interest rate spread[a]			2.16%
Net interest income and net yield on interest-earning assets[a]		$ 57,776	2.46

(a) In the second quarter of 2019, the Firm implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were made to align the accounting treatment between the balance sheet and the related interest income or expense, primarily by offsetting interest income and expense for certain prime brokerage-related held-for-investment customer receivables and payables that are currently presented as a single margin account on the balance sheet. In addition, the Firm reclassified balances related to certain instruments and structured notes from interest-earning/bearing to noninterest-earning/bearing assets and liabilities as the associated returns are recorded in principal transactions revenue and not in net interest income. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.
(b) Represents securities that are tax-exempt for U.S. federal income tax purposes.
(c) Includes prime brokerage-related held-for-investment customer receivables, which are classified in accrued interest and accounts receivable, and all other interest-earning assets, which are classified in other assets on the Consolidated Balance Sheets.
(d) Includes commercial paper.
(e) All other interest-bearing liabilities include prime brokerage-related customer payables.

Within the Consolidated average balance sheets, interest and rates summary, the principal amounts of nonaccrual loans have been included in the average loan balances used to determine the average interest rate earned on loans. Refer to Note 12 for additional information on nonaccrual loans, including interest accrued.

(Table continued from previous page)

2018			2017		
Average balance	Interest[h]	Rate	Average balance	Interest[h]	Rate
$ 405,514	$ 5,907	1.46%	$ 439,663	$ 4,238	0.96%
217,150	3,819	1.76	191,820	2,327	1.21
115,082	913	0.79	95,324	94	0.10
244,771	8,763	3.58	227,588	7,714	3.39
194,232	5,653	2.91	223,592	5,534	2.48
42,456	1,987	4.68	45,086	2,769	6.14
236,688	7,640	3.23 [j]	268,678	8,303	3.09 [j]
944,885	47,796 [i]	5.06	906,397	41,296 [i]	4.56
48,818	1,890	3.87	41,504	1,312	3.16
2,212,908	76,728	3.47	2,170,974	65,284	3.01
(13,269)			(13,453)		
21,694			20,432		
118,152			125,530		
60,734			59,588		
54,669			53,999		
154,010			138,992		
$ 2,608,898			$ 2,556,062		
$ 1,045,037	$ 5,973	0.57%	$ 1,006,184	$ 2,857	0.28%
189,282	3,066	1.62	187,386	1,611	0.86
54,993	1,144	2.08	38,095	481	1.26
177,788	2,387	1.34	171,731	1,669	0.97
21,079	493	2.34	32,457	503	1.55
243,246	7,978	3.28	263,928	6,753	2.56
1,731,425	21,041	1.22	1,699,781	13,874	0.82
411,424			411,202		
34,667			21,104		
43,075			44,122		
132,836			123,291		
2,353,427			2,299,500		
26,249			26,212		
229,222			230,350		
255,471 [g]			256,562 [g]		
$ 2,608,898			$ 2,556,062		
		2.25%			2.19%
	$ 55,687	2.52		$ 51,410	2.37

(f) The combined balance of trading liabilities – debt and equity instruments was $101.0 billion, $107.0 billion and $90.7 billion for the years ended December 31, 2019, 2018 and 2017, respectively.
(g) The ratio of average stockholders' equity to average assets was 9.5%, 9.8% and 10.0% for the years ended December 31, 2019, 2018 and 2017, respectively. The return on average stockholders' equity, based on net income, was 14.0%, 12.7% and 9.5% for the years ended December 31, 2019, 2018 and 2017, respectively.
(h) Interest includes the effect of related hedging derivatives. Taxable-equivalent amounts are used where applicable.
(i) Fees and commissions on loans included in loan interest amounted to $1.2 billion each for the years ended December 31, 2019 and 2018, and $1.0 billion for 2017.
(j) The annualized rate for securities based on amortized cost was 3.05%, 3.25% and 3.13% for the years ended December 31, 2019, 2018 and 2017, respectively, and does not give effect to changes in fair value that are reflected in AOCI.

Interest rates and interest differential analysis of net interest income – U.S. and non-U.S.

Presented below is a summary of interest and rates segregated between U.S. and non-U.S. operations for the years 2017 through 2019. The segregation of U.S. and non-U.S. components is based on the location of the office recording the transaction. Intercompany funding generally consists of dollar-denominated deposits originated in various locations that are centrally managed by Treasury and CIO.

(Table continued on next page)

(Unaudited) Year ended December 31, (Taxable-equivalent interest and rates; in millions, except rates)	2019		
	Average balance	Interest	Rate
Interest-earning assets			
Deposits with banks:			
U.S.	$ 165,066	$ 3,588	2.17%
Non-U.S.	114,938	299	0.26
Federal funds sold and securities purchased under resale agreements:			
U.S.	150,205	4,068	2.71
Non-U.S.	125,224	2,078	1.66
Securities borrowed:[(a)]			
U.S.	92,625	1,423	1.54
Non-U.S.	38,666	151	0.39
Trading assets – debt instruments:			
U.S.	223,270	7,125	3.19
Non-U.S.	110,999	3,723	3.35
Investment securities:			
U.S.	287,961	8,963	3.11
Non-U.S.	31,914	654	2.05
Loans:			
U.S.	875,869	48,097	5.49
Non-U.S.	78,670	2,435	3.10
All other interest-earning assets, predominantly U.S.[(a)]	50,084	1,967	3.93
Total interest-earning assets[(a)]	2,345,491	84,571	3.61
Interest-bearing liabilities			
Interest-bearing deposits:			
U.S.	850,493	6,896	0.81
Non-U.S.	265,355	2,061	0.78
Federal funds purchased and securities loaned or sold under repurchase agreements:			
U.S.	164,284	3,989	2.43
Non-U.S.	63,710	641	1.01
Trading liabilities – debt, short-term and all other interest-bearing liabilities:[(a)(b)]			
U.S.	147,247	2,574	1.75
Non-U.S.	87,284	1,259	1.44
Beneficial interests issued by consolidated VIEs, predominantly U.S.	22,501	568	2.52
Long-term debt:			
U.S.	241,914	8,766	3.62
Non-U.S.	6,054	41	0.68
Intercompany funding:			
U.S.	(42,947)	(1,414)	–
Non-U.S.	42,947	1,414	–
Total interest-bearing liabilities[(a)]	1,848,842	26,795	1.45
Noninterest-bearing liabilities[(c)]	496,649		
Total investable funds	$ 2,345,491	$ 26,795	1.14%
Net interest income and net yield:		$ 57,776	2.46%
U.S.		52,217	2.86
Non-U.S.		5,559	1.07
Percentage of total assets and liabilities attributable to non-U.S. operations:			
Assets			24.5
Liabilities			22.1

(a) In the second quarter of 2019, the Firm implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were made to align the accounting treatment between the balance sheet and the related interest income or expense, primarily by offsetting interest income and expense for certain prime brokerage-related held-for-investment customer receivables and payables that are currently presented as a single margin account on the balance sheet. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.
(b) Includes commercial paper.
(c) Represents the amount of noninterest-bearing liabilities funding interest-earning assets.

Refer to the “Net interest income” discussion in Consolidated Results of Operations on pages 48-51 for further information.

(Table continued from previous page)

2018			2017		
Average balance	Interest	Rate	Average balance	Interest	Rate
$ 305,117	$ 5,703	1.87%	$ 366,814	$ 4,093	1.12%
100,397	204	0.20	72,849	145	0.20
102,144	2,427	2.38	90,879	1,360	1.50
115,006	1,392	1.21	100,941	967	0.96
77,027	825	1.07	68,110	65	0.11
38,055	88	0.23	27,214	29	0.11
140,221	5,068	3.61	128,157	4,186	3.27
104,550	3,695	3.53	99,431	3,528	3.55
200,883	6,943	3.46	223,140	7,490	3.36
35,805	697	1.95	45,538	813	1.79
864,149	45,395	5.25	832,608	39,439	4.74
80,736	2,401	2.97	73,789	1,857	2.52
48,818	1,890	3.87	41,504	1,312	3.16
2,212,908	76,728	3.47	2,170,974	65,284	3.01
802,786	4,562	0.57	769,596	2,223	0.29
242,251	1,411	0.58	236,588	634	0.27
117,754	2,562	2.18	115,574	1,349	1.17
71,528	504	0.70	71,812	262	0.37
147,512	2,225	1.51	134,826	927	0.69
85,269	1,306	1.53	75,000	1,223	1.63
21,079	493	2.34	32,457	503	1.55
239,718	7,954	3.32	262,817	6,745	2.57
3,528	24	0.68	1,111	8	0.72
(51,933)	(746)	–	(2,874)	(25)	–
51,933	746	–	2,874	25	–
1,731,425	21,041	1.22	1,699,781	13,874	0.82
481,483			471,193		
$ 2,212,908	$ 21,041	0.95%	$ 2,170,974	$ 13,874	0.64%
	$ 55,687	2.52%		$ 51,410	2.37%
	50,236	2.95		46,059	2.69
	5,451	1.05		5,351	1.16
		24.7			22.5
		22.3			21.1

Changes in net interest income, volume and rate analysis

The table below presents an attribution of net interest income between volume and rate. The attribution between volume and rate is calculated using annual average balances for each category of assets and liabilities shown in the table and the corresponding annual rates (refer to pages 288-292 for more information on average balances and rates). In this analysis, when the change cannot be isolated to either volume or rate, it has been allocated to volume. The annual rates include the impact of changes in market rates, as well as the impact of any change in composition of the various products within each category of asset or liability. This analysis is calculated separately for each category without consideration of the relationship between categories (for example, the net spread between the rates earned on assets and the rates paid on liabilities that fund those assets). As a result, changes in the granularity or groupings considered in this analysis would produce a different attribution result, and due to the complexities involved, precise allocation of changes in interest rates between volume and rates is inherently complex and judgmental.

(Unaudited)	**2019 versus 2018**			2018 versus 2017		
	Increase/(decrease) due to change in:			Increase/(decrease) due to change in:		
Year ended December 31, (On a taxable-equivalent basis; in millions)	Volume	Rate	Net change	Volume	Rate	Net change
Interest-earning assets						
Deposits with banks:						
U.S.	**$ (3,030)**	**$ 915**	**$ (2,115)**	$ (1,141)	$ 2,751	$ 1,610
Non-U.S.	**35**	**60**	**95**	59	–	59
Federal funds sold and securities purchased under resale agreements:						
U.S.	**1,304**	**337**	**1,641**	267	800	1,067
Non-U.S.	**168**	**518**	**686**	173	252	425
Securities borrowed:[a]						
U.S.	**236**	**362**	**598**	106	654	760
Non-U.S.	**2**	**61**	**63**	26	33	59
Trading assets – debt instruments:						
U.S.	**2,646**	**(589)**	**2,057**	446	436	882
Non-U.S.	**216**	**(188)**	**28**	187	(20)	167
Investment securities:						
U.S.	**2,723**	**(703)**	**2,020**	(770)	223	(547)
Non-U.S.	**(79)**	**36**	**(43)**	(189)	73	(116)
Loans:						
U.S.	**628**	**2,074**	**2,702**	1,710	4,246	5,956
Non-U.S.	**(71)**	**105**	**34**	212	332	544
All other interest-earning assets, predominantly U.S.[a]	**48**	**29**	**77**	283	295	578
Change in interest income[a]	**4,826**	**3,017**	**7,843**	1,369	10,075	11,444
Interest-bearing liabilities						
Interest-bearing deposits:						
U.S.	**407**	**1,927**	**2,334**	184	2,155	2,339
Non-U.S.	**165**	**485**	**650**	44	733	777
Federal funds purchased and securities loaned or sold under repurchase agreements:						
U.S.	**1,133**	**294**	**1,427**	46	1,167	1,213
Non-U.S.	**(85)**	**222**	**137**	5	237	242
Trading liabilities – debt, short-term and all other interest-bearing liabilities: [a][b]						
U.S.	**(5)**	**354**	**349**	203	1,095	1,298
Non-U.S.	**30**	**(77)**	**(47)**	158	(75)	83
Beneficial interests issued by consolidated VIEs, predominantly U.S.	**37**	**38**	**75**	(266)	256	(10)
Long-term debt:						
U.S.	**93**	**719**	**812**	(762)	1,971	1,209
Non-U.S.	**17**	**–**	**17**	16	–	16
Intercompany funding:						
U.S.	**293**	**(961)**	**(668)**	(704)	(17)	(721)
Non-U.S.	**(293)**	**961**	**668**	704	17	721
Change in interest expense[a]	**1,792**	**3,962**	**5,754**	(372)	7,539	7,167
Change in net interest income	**$ 3,034**	**$ (945)**	**$ 2,089**	$ 1,741	$ 2,536	$ 4,277

(a) In the second quarter of 2019, the Firm implemented certain presentation changes that impacted interest income and interest expense, but had no effect on net interest income. These changes were made to align the accounting treatment between the balance sheet and the related interest income or expense, primarily by offsetting interest income and expense for certain prime brokerage-related held-for-investment customer receivables and payables that are currently presented as a single margin account on the balance sheet. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

(b) Includes commercial paper.

Glossary of Terms and Acronyms

2019 Form 10-K: Annual report on Form 10-K for year ended December 31, 2019, filed with the U.S. Securities and Exchange Commission.

ABS: Asset-backed securities

AFS: Available-for-sale

ALCO: Asset Liability Committee

AWM: Asset & Wealth Management

AOCI: Accumulated other comprehensive income/(loss)

ARM: Adjustable rate mortgage(s)

AUC: Assets under custody

AUM: "Assets under management": Represent assets managed by AWM on behalf of its Private Banking, Institutional and Retail clients. Includes "Committed capital not Called."

Auto loan and lease origination volume: Dollar amount of auto loans and leases originated.

Beneficial interests issued by consolidated VIEs: Represents the interest of third-party holders of debt, equity securities, or other obligations, issued by VIEs that JPMorgan Chase consolidates.

Benefit obligation: Refers to the projected benefit obligation for pension plans and the accumulated postretirement benefit obligation for OPEB plans.

BHC: Bank holding company

Card Services includes the Credit Card and Merchant Services businesses.

CB: Commercial Banking

CBB: Consumer & Business Banking

CCAR: Comprehensive Capital Analysis and Review

CCB: Consumer & Community Banking

CCO: Chief Compliance Officer

CCP: "Central counterparty" is a clearing house that interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the future performance of open contracts. A CCP becomes a counterparty to trades with market participants through novation, an open offer system, or another legally binding arrangement.

CDS: Credit default swaps

CECL: Current Expected Credit Losses

CEO: Chief Executive Officer

CET1 Capital: Common equity Tier 1 capital

CFTC: Commodity Futures Trading Commission

CFO: Chief Financial Officer

CFP: Contingency funding plan

Chase Bank USA, N.A.: Chase Bank USA, National Association

CIB: Corporate & Investment Bank

CIO: Chief Investment Office

Client assets: Represent assets under management as well as custody, brokerage, administration and deposit accounts.

Client deposits and other third-party liabilities: Deposits, as well as deposits that are swept to on-balance sheet liabilities (e.g., commercial paper, federal funds purchased and securities loaned or sold under repurchase agreements) as part of client cash management programs.

CLO: Collateralized loan obligations

CLTV: Combined loan-to-value

Collateral-dependent: A loan is considered to be collateral-dependent when repayment of the loan is expected to be provided solely by the underlying collateral, rather than by cash flows from the borrower's operations, income or other resources.

Commercial Card: provides a wide range of payment services to corporate and public sector clients worldwide through the commercial card products. Services include procurement, corporate travel and entertainment, expense management services, and business-to-business payment solutions.

Core loans: Represents loans central to the Firm's ongoing businesses; core loans exclude loans classified as trading assets, runoff portfolios, discontinued portfolios and portfolios the Firm has an intent to exit.

Credit cycle: A period of time over which credit quality improves, deteriorates and then improves again (or vice versa). The duration of a credit cycle can vary from a couple of years to several years.

Credit derivatives: Financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Upon the occurrence of a credit event by the reference entity, which may include, among other events, the bankruptcy or failure to pay its obligations, or certain restructurings of the debt of the reference entity, neither party has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value at the time of settling the credit derivative contract. The determination as to whether a credit event has occurred is generally made by the relevant International Swaps and Derivatives Association ("ISDA") Determinations Committee.

Criticized: Criticized loans, lending-related commitments and derivative receivables that are classified as special

mention, substandard and doubtful categories for regulatory purposes.

CRO: Chief Risk Officer

CRSC: Conduct Risk Steering Committee

CTC: CIO, Treasury and Corporate

CVA: Credit valuation adjustment

Debit and credit card sales volume: Dollar amount of card member purchases, net of returns.

Deposit margin/deposit spread: Represents net interest income expressed as a percentage of average deposits.

Distributed denial-of-service attack: The use of a large number of remote computer systems to electronically send a high volume of traffic to a target website to create a service outage at the target. This is a form of cyberattack.

Dodd-Frank Act: Wall Street Reform and Consumer Protection Act

DVA: Debit valuation adjustment

EC: European Commission

Eligible LTD: Long-term debt satisfying certain eligibility criteria

Embedded derivatives: are implicit or explicit terms or features of a financial instrument that affect some or all of the cash flows or the value of the instrument in a manner similar to a derivative. An instrument containing such terms or features is referred to as a "hybrid." The component of the hybrid that is the non-derivative instrument is referred to as the "host." For example, callable debt is a hybrid instrument that contains a plain vanilla debt instrument (i.e., the host) and an embedded option that allows the issuer to redeem the debt issue at a specified date for a specified amount (i.e., the embedded derivative). However, a floating rate instrument is not a hybrid composed of a fixed-rate instrument and an interest rate swap.

ERISA: Employee Retirement Income Security Act of 1974

EPS: Earnings per share

ETD: "Exchange-traded derivatives": Derivative contracts that are executed on an exchange and settled via a central clearing house.

EU: European Union

Fannie Mae: Federal National Mortgage Association

FASB: Financial Accounting Standards Board

FCA: Financial Conduct Authority

FCC: Firmwide Control Committee

FDIA: Federal Depository Insurance Act

FDIC: Federal Deposit Insurance Corporation

Federal Reserve: The Board of the Governors of the Federal Reserve System

FFIEC: Federal Financial Institutions Examination Council

FHA: Federal Housing Administration

FHLB: Federal Home Loan Bank

FICC: The Fixed Income Clearing Corporation

FICO score: A measure of consumer credit risk provided by credit bureaus, typically produced from statistical models by Fair Isaac Corporation utilizing data collected by the credit bureaus.

Firm: JPMorgan Chase & Co.

Forward points: Represents the interest rate differential between two currencies, which is either added to or subtracted from the current exchange rate (i.e., "spot rate") to determine the forward exchange rate.

FRC: Firmwide Risk Committee

Freddie Mac: Federal Home Loan Mortgage Corporation

Free standing derivatives: a derivative contract entered into either separate and apart from any of the Firm's other financial instruments or equity transactions. Or, in conjunction with some other transaction and is legally detachable and separately exercisable.

FSB: Financial Stability Board

FTE: Fully taxable equivalent

FVA: Funding valuation adjustment

FX: Foreign exchange

G7: Group of Seven nations: Countries in the G7 are Canada, France, Germany, Italy, Japan, the U.K. and the U.S.

G7 government bonds: Bonds issued by the government of one of the G7 nations.

Ginnie Mae: Government National Mortgage Association

GSIB: Global systemically important banks

Headcount-related expense: Includes salary and benefits (excluding performance-based incentives), and other noncompensation costs related to employees.

HELOAN: Home equity loan

HELOC: Home equity line of credit

Home equity – senior lien: Represents loans and commitments where JPMorgan Chase holds the first security interest on the property.

Home equity – junior lien: Represents loans and commitments where JPMorgan Chase holds a security interest that is subordinate in rank to other liens.

Households: A household is a collection of individuals or entities aggregated together by name, address, tax identifier and phone number.

HQLA: High-quality liquid assets

HTM: Held-to-maturity

IBOR: Interbank Offered Rate

ICAAP: Internal capital adequacy assessment process

IDI: Insured depository institutions

IHC: JPMorgan Chase Holdings LLC, an intermediate holding company

Impaired loan: Impaired loans are loans measured at amortized cost, for which it is probable that the Firm will be unable to collect all amounts due, including principal and interest, according to the contractual terms of the agreement. Impaired loans include the following:

- All wholesale nonaccrual loans
- All TDRs (both wholesale and consumer), including ones that have returned to accrual status

Investment-grade: An indication of credit quality based on JPMorgan Chase's internal risk assessment. The Firm considers ratings of BBB-/Baa3 or higher as investment-grade.

IPO: Initial public offering

ISDA: International Swaps and Derivatives Association

JPMorgan Chase: JPMorgan Chase & Co.

JPMorgan Chase Bank, N.A.: JPMorgan Chase Bank, National Association

JPMorgan Securities: J.P. Morgan Securities LLC

Loan-equivalent: Represents the portion of the unused commitment or other contingent exposure that is expected, based on historical portfolio experience, to become drawn prior to an event of a default by an obligor.

LCR: Liquidity coverage ratio

LDA: Loss Distribution Approach

LGD: Loss given default

LIBOR: London Interbank Offered Rate

LLC: Limited Liability Company

LOB: Line of business

LOB CROs: Line of Business and CTC Chief Risk Officers

Loss emergence period: Represents the time period between the date at which the loss is estimated to have been incurred and the ultimate realization of that loss.

LTIP: Long-term incentive plan

LTV: "Loan-to-value": For residential real estate loans, the relationship, expressed as a percentage, between the principal amount of a loan and the appraised value of the collateral (i.e., residential real estate) securing the loan.

Origination date LTV ratio
The LTV ratio at the origination date of the loan. Origination date LTV ratios are calculated based on the actual appraised values of collateral (i.e., loan-level data) at the origination date.

Current estimated LTV ratio
An estimate of the LTV as of a certain date. The current estimated LTV ratios are calculated using estimated collateral values derived from a nationally recognized home price index measured at the metropolitan statistical area ("MSA") level. These MSA-level home price indices consist of actual data to the extent available and forecasted data where actual data is not available. As a result, the estimated collateral values used to calculate these ratios do not represent actual appraised loan-level collateral values; as such, the resulting LTV ratios are necessarily imprecise and should therefore be viewed as estimates.

Combined LTV ratio
The LTV ratio considering all available lien positions, as well as unused lines, related to the property. Combined LTV ratios are used for junior lien home equity products.

Managed basis: A non-GAAP presentation of Firmwide financial results that includes reclassifications to present revenue on a fully taxable-equivalent basis. Management also uses this financial measure at the segment level, because it believes this provides information to enable investors to understand the underlying operational performance and trends of the particular business segment and facilitates a comparison of the business segment with the performance of competitors.

Master netting agreement: A single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due).

Measurement alternative: Measures equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer.

MBS: Mortgage-backed securities

MD&A: Management's discussion and analysis

Merchant Services: is a business that primarily processes transactions for merchants.

Moody's: Moody's Investor Services

Mortgage origination channels:

Retail – Borrowers who buy or refinance a home through direct contact with a mortgage banker employed by the Firm using a branch office, the Internet or by phone. Borrowers are frequently referred to a mortgage banker by a banker in a Chase branch, real estate brokers, home builders or other third parties.

Correspondent – Banks, thrifts, other mortgage banks and other financial institutions that sell closed loans to the Firm.

Mortgage product types:

Alt-A
Alt-A loans are generally higher in credit quality than subprime loans but have characteristics that would disqualify the borrower from a traditional prime loan. Alt-A lending characteristics may include one or more of the following: (i) limited documentation; (ii) a high CLTV ratio; (iii) loans secured by non-owner occupied properties; or (iv) a debt-to-income ratio above normal limits. A substantial proportion of the Firm's Alt-A loans are those where a borrower does not provide complete documentation of his or her assets or the amount or source of his or her income.

Option ARMs
The option ARM real estate loan product is an adjustable-rate mortgage loan that provides the borrower with the option each month to make a fully amortizing, interest-only or minimum payment. The minimum payment on an option ARM loan is based on the interest rate charged during the introductory period. This introductory rate is usually significantly below the fully indexed rate. The fully indexed rate is calculated using an index rate plus a margin. Once the introductory period ends, the contractual interest rate charged on the loan increases to the fully indexed rate and adjusts monthly to reflect movements in the index. The minimum payment is typically insufficient to cover interest accrued in the prior month, and any unpaid interest is deferred and added to the principal balance of the loan. Option ARM loans are subject to payment recast, which converts the loan to a variable-rate fully amortizing loan upon meeting specified loan balance and anniversary date triggers.

Prime
Prime mortgage loans are made to borrowers with good credit records who meet specific underwriting requirements, including prescriptive requirements related to income and overall debt levels. New prime mortgage borrowers provide full documentation and generally have reliable payment histories.

Subprime
Subprime loans are loans that, prior to mid-2008, were offered to certain customers with one or more high risk characteristics, including but not limited to: (i) unreliable or poor payment histories; (ii) a high LTV ratio of greater than 80% (without borrower-paid mortgage insurance); (iii) a high debt-to-income ratio; (iv) an occupancy type for the loan is other than the borrower's primary residence; or (v) a history of delinquencies or late payments on the loan.

MSA: Metropolitan statistical areas

MSR: Mortgage servicing rights

Multi-asset: Any fund or account that allocates assets under management to more than one asset class.

NA: Data is not applicable or available for the period presented.

NAV: Net Asset Value

Net Capital Rule: Rule 15c3-1 under the Securities Exchange Act of 1934.

Net charge-off/(recovery) rate: Represents net charge-offs/(recoveries) (annualized) divided by average retained loans for the reporting period.

Net interchange income includes the following components:

- **Interchange income**: Fees earned by credit and debit card issuers on sales transactions.
- **Reward costs**: The cost to the Firm for points earned by cardholders enrolled in credit card rewards programs.
- **Partner payments**: Payments to co-brand credit card partners based on the cost of loyalty program rewards earned by cardholders on credit card transactions.

Net mortgage servicing revenue: Includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Net production revenue: Includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Net production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option.

Net revenue rate: Represents Card Services net revenue (annualized) expressed as a percentage of average loans for the period.

Net yield on interest-earning assets: The average rate for interest-earning assets less the average rate paid for all sources of funds.

NM: Not meaningful

NOL: Net operating loss

Nonaccrual loans: Loans for which interest income is not recognized on an accrual basis. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest have been in default for a period of 90 days or more unless the loan is both well-secured and in the process of collection. Collateral-dependent loans are typically maintained on nonaccrual status.

Nonperforming assets: Nonperforming assets include nonaccrual loans, nonperforming derivatives and certain assets acquired in loan satisfaction, predominantly real estate owned and other commercial and personal property.

NOW: Negotiable Order of Withdrawal

OAS: Option-adjusted spread

OCC: Office of the Comptroller of the Currency

OCI: Other comprehensive income/(loss)

OPEB: Other postretirement employee benefit

OTTI: Other-than-temporary impairment

Over-the-counter ("OTC") derivatives: Derivative contracts that are negotiated, executed and settled bilaterally between two derivative counterparties, where one or both counterparties is a derivatives dealer.

Over-the-counter cleared ("OTC-cleared") derivatives: Derivative contracts that are negotiated and executed bilaterally, but subsequently settled via a central clearing house, such that each derivative counterparty is only exposed to the default of that clearing house.

Overhead ratio: Noninterest expense as a percentage of total net revenue.

Parent Company: JPMorgan Chase & Co.

Participating securities: Represents unvested share-based compensation awards containing nonforfeitable rights to dividends or dividend equivalents (collectively, "dividends"), which are included in the earnings per share calculation using the two-class method. JPMorgan Chase grants RSUs to certain employees under its share-based compensation programs, which entitle the recipients to receive nonforfeitable dividends during the vesting period on a basis equivalent to the dividends paid to holders of common stock. These unvested awards meet the definition of participating securities. Under the two-class method, all earnings (distributed and undistributed) are allocated to each class of common stock and participating securities, based on their respective rights to receive dividends.

PCA: Prompt corrective action

PCI: "Purchased credit-impaired" loans represents certain loans that were acquired and deemed to be credit-impaired on the acquisition date in accordance with the guidance of the FASB. The guidance allows purchasers to aggregate credit-impaired loans acquired in the same fiscal quarter into one or more pools, provided that the loans have common risk characteristics(e.g., product type, LTV ratios, FICO scores, past due status, geographic location). A pool is then accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows.

PD: Probability of default

PRA: Prudential Regulation Authority

Pre-provision profit/(loss): Represents total net revenue less noninterest expense. The Firm believes that this financial measure is useful in assessing the ability of a lending institution to generate income in excess of its provision for credit losses.

Pretax margin: Represents income before income tax expense divided by total net revenue, which is, in management's view, a comprehensive measure of pretax performance derived by measuring earnings after all costs are taken into consideration. It is one basis upon which management evaluates the performance of AWM against the performance of their respective competitors.

Principal transactions revenue: Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Firm transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit risk and foreign exchange risk.

PSUs: Performance share units

REIT: "Real estate investment trust": A special purpose investment vehicle that provides investors with the ability to participate directly in the ownership or financing of real-estate related assets by pooling their capital to purchase and manage income property (i.e., equity REIT) and/or mortgage loans (i.e., mortgage REIT). REITs can be publicly or privately held and they also qualify for certain favorable tax considerations.

Regulatory VaR: Daily aggregated VaR calculated in accordance with regulatory rules.

REO: Real estate owned

Reported basis: Financial statements prepared under U.S.

GAAP, which excludes the impact of taxable-equivalent adjustments.

Retained loans: Loans that are held-for-investment (i.e., excludes loans held-for-sale and loans at fair value).

Revenue wallet: Proportion of fee revenue based on estimates of investment banking fees generated across the industry (i.e., the revenue wallet) from investment banking transactions in M&A, equity and debt underwriting, and loan syndications. Source: Dealogic, a third-party provider of investment banking competitive analysis and volume-based league tables for the above noted industry products.

RHS: Rural Housing Service of the U.S. Department of Agriculture

Risk-rated portfolio: Credit loss estimates are based on estimates of the probability of default ("PD") and loss severity given a default. The probability of default is the likelihood that a borrower will default on its obligation; the loss given default ("LGD") is the estimated loss on the loan that would be realized upon the default and takes into consideration collateral and structural support for each credit facility.

ROA: Return on assets

ROE: Return on equity

ROTCE: Return on tangible common equity

ROU assets: Right-of-use assets

RSU(s): Restricted stock units

RWA: "Risk-weighted assets": Basel III establishes two comprehensive approaches for calculating RWA (a Standardized approach and an Advanced approach) which include capital requirements for credit risk, market risk, and in the case of Basel III Advanced, also operational risk. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced.

S&P: Standard and Poor's 500 Index

SAR(s): Stock appreciation rights

Scored portfolio: The scored portfolio predominantly includes residential real estate loans, credit card loans and certain auto and business banking loans where credit loss estimates are based on statistical analysis of credit losses over discrete periods of time. The statistical analysis uses portfolio modeling, credit scoring and decision-support tools.

SEC: Securities and Exchange Commission

Securities financing agreements: Include resale, repurchase, securities borrowed and securities loaned agreements

Seed capital: Initial JPMorgan capital invested in products, such as mutual funds, with the intention of ensuring the fund is of sufficient size to represent a viable offering to clients, enabling pricing of its shares, and allowing the manager to develop a track record. After these goals are achieved, the intent is to remove the Firm's capital from the investment.

Shelf Deals: Shelf offerings are SEC provisions that allow issuers to register for new securities without selling the entire issuance at once. Since these issuances are filed with the SEC but are not yet priced in the market, they are not included in the league tables until the actual securities are issued.

Single-name: Single reference-entities

SLR: Supplementary leverage ratio

SMBS: Stripped mortgage-backed securities

SOFR: Secured Overnight Financing Rate

SPEs: Special purpose entities

Structural interest rate risk: Represents interest rate risk of the non-trading assets and liabilities of the Firm.

Structured notes: Structured notes are financial instruments whose cash flows are linked to the movement in one or more indexes, interest rates, foreign exchange rates, commodities prices, prepayment rates, or other market variables. The notes typically contain embedded (but not separable or detachable) derivatives. Contractual cash flows for principal, interest, or both can vary in amount and timing throughout the life of the note based on non-traditional indexes or non-traditional uses of traditional interest rates or indexes.

Taxable-equivalent basis: In presenting results on a managed basis, the total net revenue for each of the business segments and the Firm is presented on a tax-equivalent basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in managed basis results on a level comparable to taxable investments and securities; the corresponding income tax impact related to tax-exempt items is recorded within income tax expense.

TBVPS: Tangible book value per share

TCE: Tangible common equity

TDR: "Troubled debt restructuring" is deemed to occur when the Firm modifies the original terms of a loan agreement by granting a concession to a borrower that is experiencing financial difficulty.

TLAC: Total loss-absorbing capacity

U.K.: United Kingdom

Unaudited: Financial statements and information that have

not been subjected to auditing procedures sufficient to permit an independent certified public accountant to express an opinion.

U.S.: United States of America

U.S. government agencies: U.S. government agencies include, but are not limited to, agencies such as Ginnie Mae and FHA, and do not include Fannie Mae and Freddie Mac which are U.S. government-sponsored enterprises ("U.S. GSEs"). In general, obligations of U.S. government agencies are fully and explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government in the event of a default.

U.S. GAAP: Accounting principles generally accepted in the U.S.

U.S. GSE(s): "U.S. government-sponsored enterprises" are quasi-governmental, privately-held entities established or chartered by the U.S. government to serve public purposes as specified by the U.S. Congress to improve the flow of credit to specific sectors of the economy and provide certain essential services to the public. U.S. GSEs include Fannie Mae and Freddie Mac, but do not include Ginnie Mae or FHA. U.S. GSE obligations are not explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government.

U.S. LCR: Liquidity coverage ratio under the final U.S. rule.

U.S. Treasury: U.S. Department of the Treasury

VA: U.S. Department of Veterans Affairs

VaR: "Value-at-risk" is a measure of the dollar amount of potential loss from adverse market moves in an ordinary market environment.

VCG: Valuation Control Group

VGF: Valuation Governance Forum

VIEs: Variable interest entities

Warehouse loans: Consist of prime mortgages originated with the intent to sell that are accounted for at fair value and classified as trading assets.

Board of Directors

Linda B. Bammann[4]
Retired Deputy Head of Risk Management
JPMorgan Chase & Co.
(Financial services)

James A. Bell[1]
Retired Executive Vice President
The Boeing Company
(Aerospace)

Stephen B. Burke[2, 3]
Chairman
NBCUniversal, LLC
(Television and entertainment)

Todd A. Combs[2, 3, 5]
Investment Officer
Berkshire Hathaway Inc.
(Conglomerate)

James S. Crown[4]
Chairman and
Chief Executive Officer
Henry Crown and Company
(Diversified investments)

James Dimon
Chairman and
Chief Executive Officer
JPMorgan Chase & Co.
(Financial services)

Timothy P. Flynn[1, 5]
Retired Chairman and
Chief Executive Officer
KPMG
(Professional services)

Mellody Hobson[4, 5]
Co-CEO and President
Ariel Investments, LLC
(Investment management)

Laban P. Jackson, Jr.[1]
Chairman and Chief Executive Officer
Clear Creek Properties, Inc.
(Real estate development)

Michael A. Neal[4]
Retired Vice Chairman
General Electric Company;
Retired Chairman and
Chief Executive Officer
GE Capital
(Industrial and financial services)

Lee R. Raymond[2, 3]
Lead Independent Director
JPMorgan Chase & Co.;
Retired Chairman and
Chief Executive Officer
Exxon Mobil Corporation
(Oil and gas)

Member of:
1 Audit Committee
2 Compensation & Management Development Committee
3 Corporate Governance & Nominating Committee
4 Risk Committee
5 Public Responsibility Committee

Operating Committee

James Dimon
Chairman and
Chief Executive Officer

Daniel E. Pinto
Co-President and
Chief Operating Officer;
CEO, Corporate & Investment Bank

Gordon A. Smith
Co-President and
Chief Operating Officer;
CEO, Consumer & Community Banking

Ashley Bacon
Chief Risk Officer

Lori A. Beer
Chief Information Officer

Mary Callahan Erdoes
CEO, Asset & Wealth Management

Stacey Friedman
General Counsel

Marianne Lake
CEO, Consumer Lending

Robin Leopold
Head of Human Resources

Douglas B. Petno
CEO, Commercial Banking

Jennifer A. Piepszak
Chief Financial Officer

Peter L. Scher
Head of Corporate Responsibility;
Chairman of the Mid-Atlantic Region

Other Corporate Officers

Molly Carpenter
Secretary

Joseph M. Evangelisti
Corporate Communications

Nicole Giles
Firmwide Controller

Lou Rauchenberger
General Auditor

Jason R. Scott
Investor Relations

Regional Chief Executive Officers

Asia Pacific

Filippo Gori

Europe/Middle East/Africa

Viswas Raghavan

Latin America/Canada

Martin G. Marrón

Senior Country Officers and Location Heads

Asia Pacific

Australia and New Zealand
Robert Bedwell

China
Mark Leung

Hong Kong
Filippo Gori

Japan
Steve Teru Rinoie

Korea
Tae Jin Park

South and South East Asia
Kalpana Morparia

- Indonesia
  Haryanto T. Budiman
- Malaysia
  Steve R. Clayton
- Philippines
  Carlos Ma. G Mendoza
- Singapore
  Edmund Y. Lee
- Thailand
  M.L. Chayotid Kridakon

Taiwan
Carl K. Chien

Vietnam
Van Bich Phan

Europe/Middle East/Africa

Austria
Anton J. Ulmer

Bahrain, Egypt and Lebanon
Ali Moosa

Belgium
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Khaled Hobballah
Karim Tannir

The Netherlands
Cassander Verwey

Russia and Kazakhstan
Yan Tavrovsky

Saudi Arabia
Bader Alamoudi

Sub-Saharan Africa
Kevin Latter

Switzerland
Nick Bossart

Turkey
Mustafa Bagriacik

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Andean, Caribbean and Central America
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Group Chief Executive Officer
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Tokyo, Japan

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Former Chairman and Chief Executive Officer, Board of Management
AkzoNobel
Amsterdam, The Netherlands

Jaime Augusto Zobel de Ayala
Chairman and Chief Executive Officer
Ayala Corporation
Makati City, Philippines

*Ex-officio

JPMorgan Chase & Co.

Corporate headquarters

383 Madison Avenue
New York, NY 10179-0001
Telephone: 212-270-6000
jpmorganchase.com

Annual Report on Form 10-K

The Annual Report on Form 10-K of JPMorgan Chase & Co. as filed with the U.S. Securities and Exchange Commission will be made available without charge upon request to:

Office of the Secretary
JPMorgan Chase & Co.
4 New York Plaza
New York, NY 10004-2413

Stock listing

New York Stock Exchange

The New York Stock Exchange ticker symbol for the common stock of JPMorgan Chase & Co. is JPM.

Financial information about JPMorgan Chase & Co. can be accessed by visiting the Investor Relations website at jpmorganchase.com. Additional questions should be addressed to:

Investor Relations
JPMorgan Chase & Co.
277 Park Avenue
New York, NY 10172-0003
Telephone: 212-270-2479
JPMCinvestorrelations@jpmchase.com

Directors

To contact any of the Board members or committee chairs, the Lead Independent Director or the non-management directors as a group, please mail correspondence to:

JPMorgan Chase & Co.
Attention (Board member(s))
Office of the Secretary
4 New York Plaza
New York, NY 10004-2413

The Corporate Governance Principles, the charters of the principal standing Board committees, the Code of Conduct, the Code of Ethics for Finance Professionals and other governance information can be accessed by visiting our website at jpmorganchase.com and clicking on "Governance" under the "About us" tab.

Transfer agent and registrar

Computershare
462 South 4th Street
Suite 1600
Louisville, KY 40202
United States
Telephone: 800-758-4651
www.computershare.com/investor

Investor Services Program

JPMorgan Chase & Co.'s Investor Services Program offers a variety of convenient, low-cost services to make it easier to reinvest dividends and buy and sell shares of JPMorgan Chase & Co. common stock. A brochure and enrollment materials may be obtained by contacting the Program Administrator, Computershare, by calling 800-758-4651, by writing to the address indicated above or by visiting its website at www-us.computershare.com/investor.

Direct deposit of dividends

For information about direct deposit of dividends, please contact Computershare.

Stockholder inquiries

Contact Computershare:

By telephone:

Within the United States, Canada and Puerto Rico: 800-758-4651 (toll free)

From all other locations: 201-680-6862 (collect)

TDD service for the hearing impaired within the United States, Canada and Puerto Rico: 800-231-5469 (toll free)

All other locations: 201-680-6610 (collect)

By regular mail:

Computershare
P.O. Box 505000
Louisville, KY 40233
United States

By overnight delivery:

Computershare
462 South 4th Street
Suite 1600
Louisville, KY 40202
United States

Duplicate mailings

If you receive duplicate mailings because you have more than one account listing and you wish to consolidate your accounts, please write to Computershare at the address above.

Independent registered public accounting firm

PricewaterhouseCoopers LLP
300 Madison Avenue
New York, NY 10017

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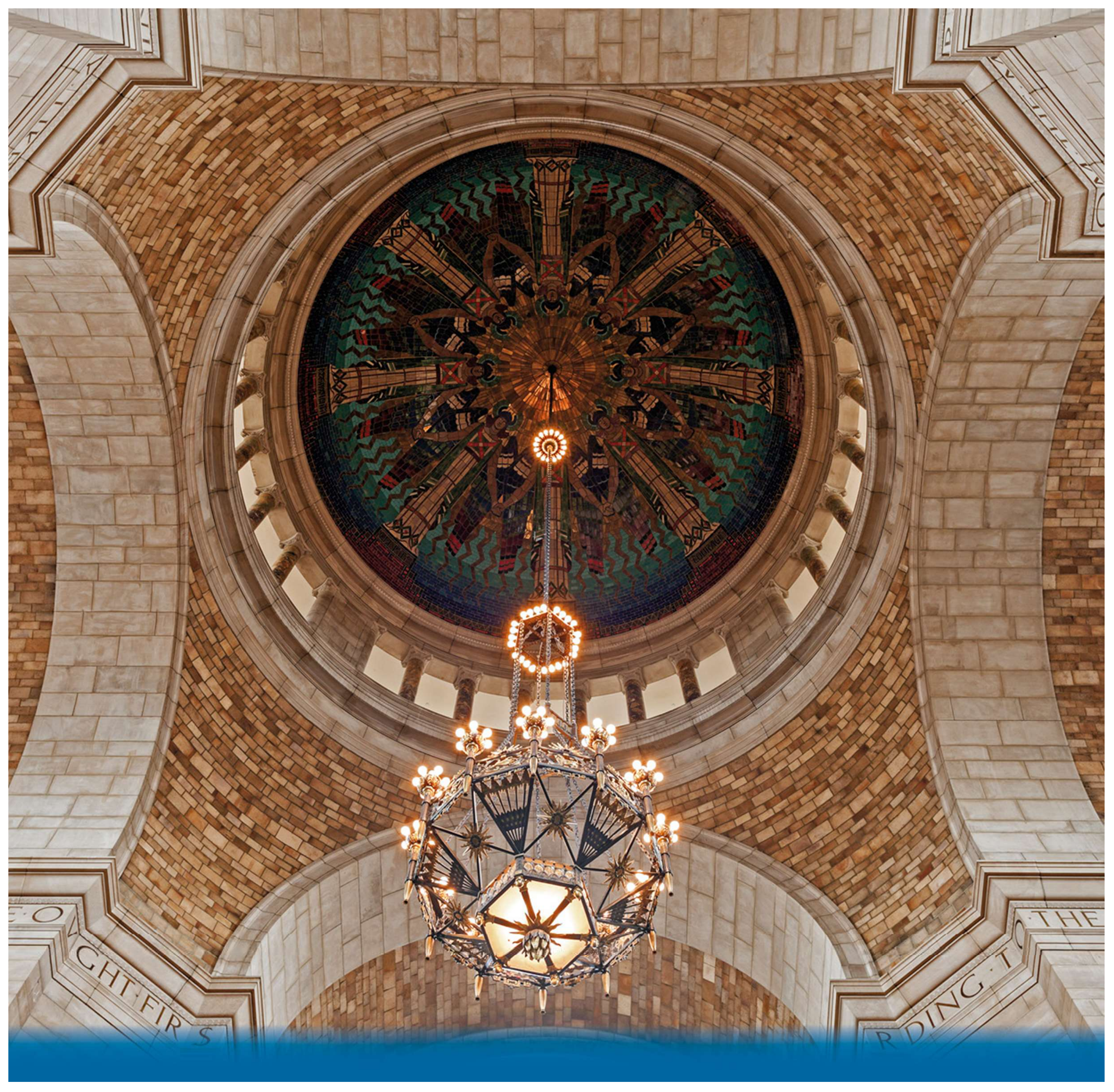

J.P.Morgan

Access Online Technical Requirements

J.P. Morgan Access technical requirements (as of May 23, 2020)

	Windows 7, 8.1 and 10			Windows 10	Apple mac OS 10.15	Apple mac OS 10.15
Application [1]	Internet Explorer 11	Chrome v77, 78, 79, 80, 81, 83 (Beta)	Firefox v72, 73, 74, 75, 76, 77 (Beta)	Microsoft Edge v41, 44, 80, 81 (Beta)	Safari v13	Microsoft Edge v81 (Beta)
Administration	X	X	X	X	X	X
Analytics	X	X	X	X	X	X
Checks	X	X (v80)	X (v75)	X	X [2]	
eServe	X	X (v81)	X (v75)			
Home	X	X	X	X	X	X
Insight	X	X (v81) [3]	X (v75) [4]			
Liquidity Solutions	X	X	X	X	X	X
Mobile Setup		X (v83)	X (v73)	X (v41)	X [2]	
Payments	X	X	X	X	X	X
Portal Log on	X	X	X	X	X	X
Reports	X	X	X	X	X	X
Statements	X	X	X	X	X	X
Support	X	X	X	X)	X	X
Virtual Assistant	X	X (v81)	X (v75)	X (v41)	X	
Virtual Branch	X	X	X	X	X	X

(1) For Applications launched from Access Online “Home page”, recommended: Microsoft Edge and Windows 10

(2) Also re-certified on Safari v12 on Apple® macOS®10.14 only

(3) Also re-certified on Chrome v76

(4) Also re-certified on Firefox v70, 71

NOTE: For certain applications, specific browser certification is listed. All other applications are certified for browsers listed in header row.

	Windows 7, 8.1 and 10			Windows 10	Apple mac OS 10.15	Apple mac OS 10.15
Application launched from 'More Services' (1)	**Internet Explorer 11**	**Chrome v77, 78, 79, 80, 81, 83 (Beta)**	**Firefox v v72, 73, 74, 75, 76, 77 (Beta)**	**Microsoft Edge v41, 44, 80, 81 (Beta)**	**Safari v13**	**Microsoft Edge v81 (Beta)**
ACH File Warehouse	X	X (v81)	X (v75)	X (v41)	X	
ACH Services U.S.	X	X (v81)	X (v75)	X (v41)	X	
Digital Payments	X	X (v81)	X (v75)	X (v41)	X	
Electronic Specialty Account Portal	X	X (v80)	X (v73)	X (v44)	X (2)	
Host-to-Host	X	X	X	X	X	X
Receivables Online and Remote Capture	X	X (v80) (3)	X (v73) (4)	X (v78) (2)		

(1) Recommended: Microsoft Edge and Windows 10

(2) Certification as of March 2020

(3) Also re-certified on Chrome v76

(4) Also re-certified on Firefox v70, 71

(5) Certification as of December 2019

NOTE: For certain applications, specific browser certification is listed. All other applications are certified for browsers listed in header row.

Additional technical requirements and recommendations

Browsers	As of March 2018, outdated browser versions of Chrome (v43 & older), Firefox (v37 & older), and Safari (v8 & older) are no longer supported for use with J.P. Morgan Access Online. Beginning in 4th Quarter 2020, Microsoft Internet Explorer 11 browser will no longer be supported by J.P. Morgan Access. Please work with your company's IT department to ensure all J.P. Morgan Access Online users are using an approved browser. Please refer to page 1 of this document for the current list of supported browsers and operating systems. This document is always available on J.P. Morgan Access Support> Help > Tools & Settings > J.P. Morgan Access Online Technology Checklist.
Cookies	The browser must allow cookies to be created and retained on the workstation. If your browser does not allow cookies to be retained on the workstation, you may be required to register your machine each time you log on. Please work with your IT department to make the necessary adjustments.
Other Software	• Adobe Reader: Acrobat Document Cloud (DC) 2015.016.20039 is recommended but not required. Version 11 and DC 2015.010.20056 are also supported. • Adobe Flash Player: Version 22 is recommended, but not required. • Compression software (e.g., WinZip, SecureZIP for Windows) may be required to export reports and files. • Microsoft Excel 2013 for export of reports data using "CSV Unicode" format is recommended, including for Access Insight. • J.P. Morgan Access and J.P. Morgan Insight are not currently compatible with Microsoft Office 365. Note: Adobe Reader and Flash are available on the respective vendor page.

Workstation	• Memory: 4 GB RAM or higher is recommended, 2 GB RAM minimum. • Disk Space: Recommended 10GB free space available. • Monitor: 1280x1024 resolution or higher, 16-bit color or higher is recommended. • Best Practices: Use a workstation dedicated to Internet banking (not for email or web browsing). DO NOT use a workstation shared by public, such as at a library or Internet café. • We strongly recommend that user workstations be regularly updated with operating system and browser security updates. Regular virus scans should be completed, as well.
J.P. Morgan Access Mobile	Cash Reports, Checks, Remote Deposit Capture, File Status,, Alerts, Payments (Account Transfer, Book, Wire) Approval & Release and/or Trade: • Apple iPhone, iPad and iPod touch mobile devices, iOS 10.0 and greater. Android smartphones and tablets, Android 7.0 and greater.
Email Filtering	Bank email domains should not be blocked: @chase.com, @jpmchase.com, @jpmorgan.com.
Network Proxy	The following settings typically apply to network-based proxy solutions and are not required to be configured on the user's browser settings. To enable connectivity to J.P. Morgan Access, please configure your network proxy solution to allow access to the following domains: *.jpmorgan.com, *.jpmorganaccess.com, *.acctmanagement.com, *.jpmacontent.com.
Transport Layer Security	Please speak with your IT department on how to ensure your browser supports Transport Layer Security protocol v1.2 (TLS 1.2), which is the required security protocol version. If you do not upgrade to TLS 1.2, you may experience connectivity issues when logging on to J.P. Morgan Access Online.
Contact Support	From the J.P. Morgan Access Online Portal Log On page, please click on "Regional Help Desk Phone Numbers" link for Local Help Desk Numbers.

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PREARRANGED PAYMENT AND DEPOSIT RECORD LAYOUT

SHORT NAME ORIGINATED RECORDS - FOR PPD ENTRY

FILE HEADER

	RECORD TYPE	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE	TRANSMISSION TIME	FILE ID MODIFIER	RECORD SIZE	BLOCKING FACTOR	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
	'1'				YY MM DD	HH MM		'094'	'10'				
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE	SERVICE CLASS CODE	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE'	EFFECTIVE ENTRY DATE'	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
	'5'	'200'				'PPD'			YY MM DD		'1'		
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER'	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR	TRACE NUMBER
	'6'										
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA (OPTIONAL)

	RECORD TYPE	ADDENDA TYPE	PAYMENT RELATED INFORMATION (ANSI X12.4 STRUCTURE}	ADDENDA RECORD INDICATOR	TRACE NUMBER
	'7'	'05'			
LENGTH	1	2	80	1	15
POSITION	01-01	02-03	04-83	79-79	80-94

COMPANY BATCH CONTROL

	RECORD TYPE	SERVICE CLASS CODE	ENTRY/ADDENAD COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER'	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	TRACE NUMBER
	'8'										
LENGTH	1	3	6	10	12	12	10	19	6	8	15
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	80-94

FILE CONTROL

	RECORD TYPE	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
	'9'							
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

PREARRANGED PAYMENT AND DEPOSIT RECORD LAYOUT

RETURN RECORDS - FOR PPD ENTRY

FILE HEADER

	RECORD TYPE	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE	TRANSMISSION TIME	FILE ID MODIFIER	RECORD SIZE	BLOCKING FACTOR	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
	'1'				YY MM DD	HH MM		'094'	'10'				
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE	SERVICE CLASS CODE	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE'	EFFECTIVE ENTRY DATE'	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
	'5'	'200'				'PPD'			YY MM DD		'1'		
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER'	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR	TRACE NUMBER
	'6'									'1'	
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA

	RECORD TYPE	ADDENDA TYPE	RETURN REASON CODE	ORIGINAL TRACE NUMBER	DATE OF DEATH	ORIGINAL ROUTING NUMBER	ADDENDA INFORMATION (RETURN DESCRIPTION)	RETURN ITEM CONTROL NUMBER	DFI ACCOUNT NUMBER OVERFLOW	PAPER OR ELECTRONIC MEDIA CODE	RESERVED	TRACE SEQUENCE NUMBER
	'7'	'99'										
LENGTH	1	2	3	15	6	8	35	9	2	1	5	7
POSITION	01-01	02-03	04-06	07-21	22-27	28-35	36-70	71-79	80-81	82-82	83-87	88-94

COMPANY BATCH CONTROL

	RECORD TYPE	SERVICE CLASS CODE	ENTRY/ADDENA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	TRACE NUMBER
	'8'	'200'									
LENGTH	1	3	6	10	12	12	10	19	6	8	15
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	80-94

FILE CONTROL

	RECORD TYPE	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
	'9'							
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

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PREARRANGED PAYMENT AND DEPOSIT RECORD LAYOUT

NOTIFICATION OF CHANGE (COR) RETURN RECORDS - FOR PPD ENTRY

FILE HEADER

	RECORD TYPE '1'	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE YY MM DD	TRANSMISSION TIME HH MM	FILE ID MODIFIER	RECORD SIZE '094'	BLOCKING FACTOR '10'	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE '5'	SERVICE CLASS CODE '200'	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS 'COR'	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE'	EFFECTIVE ENTRY DATE' YY MM DD	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE '1'	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE '6'	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER'	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR '1'	TRACE NUMBER
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA

	RECORD TYPE '7'	ADDENDA TYPE '98'	RETURN REASON CODE	ORIGINAL TRACE NUMBER	RESERVED	ORIGINAL ROUTING NUMBER	ADDENDA INFORMATION (CHANGE INFORMATION) IN FIXED POSITIONS	RETURN ITEM CONTROL NUMBER	DFI ACCOUNT NUMBER OVERFLOW	PAPER OR ELECTRONIC MEDIA CODE	RESERVED	TRACE SEQUENCE NUMBER
LENGTH	1	2	3	15	6	8	35	9	2	1	5	7
POSITION	01-01	02-03	04-06	07-21	22-27	28-35	36-70	71-79	80-81	82-82	83-87	88-94

COMPANY BATCH CONTROL

	RECORD TYPE '8'	SERVICE CLASS CODE '200'	ENTRY/ADDENA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	TRACE NUMBER
LENGTH	1	3	6	10	12	12	10	19	6	8	15
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	80-94

FILE CONTROL

	RECORD TYPE '9'	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

CASH CONCENTRATION OR DISBURSEMENT RECORD LAYOUT

CUSTOMER ORIGINATED RECORDS - FOR CCD ENTRY

FILE HEADER

	RECORD TYPE	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE	TRANSMISSION TIME	FILE ID MODIFIER	RECORD SIZE	BLOCKING FACTOR	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
	'1'				YY MM DD	HH MM		'094'	'10'				
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE	SERVICE CLASS CODE	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE	EFFECTIVE ENTRY DATE	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
	'5'	'200'				'CCD'			YY MM DD		'1'		
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR	TRACE NUMBER
	'6'										
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA (OPTIONAL)

	RECORD TYPE	ADDENDA TYPE	PAYMENT RELATED INFORMATION (ANSI X12.4 STRUCTURE}	SPECIAL ADDENDA SEQUENCE NUMBER	TRACE SEQUENCE NUMBER
	'7'	'05'			
LENGTH	1	2	80	4	7
POSITION	01-01	02-03	04-83	84-87	88-94

COMPANY BATCH CONTROL

	RECORD TYPE	SERVICE CLASS CODE	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	BATCH NUMBER
	'8'	'200'									
LENGTH	1	3	6	10	12	12	10	19	6	8	7
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	88-94

FILE CONTROL

	RECORD TYPE	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
	'9'							
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

CASH CONCENTRATION OR DISBURSEMENT RECORD LAYOUT

RETURN RECORDS - FOR CCD ENTRY

FILE HEADER

	RECORD TYPE '1'	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE YY MM DD	TRANSMISSION TIME HH MM	FILE ID MODIFIER	RECORD SIZE '094'	BLOCKING FACTOR '10'	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE '5'	SERVICE CLASS CODE '200'	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS 'CCD'	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE	EFFECTIVE ENTRY DATE YY MM DD	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE '1'	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE '6'	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR '1'	TRACE NUMBER
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA

	RECORD TYPE '7'	ADDENDA TYPE '99'	RETURN REASON CODE	ORIGINAL TRACE NUMBER	RESERVED	ORIGINAL ROUTING NUMBER	ADDENDA INFORMATION (RETURN DESCRIPTION)	RETURN ITEM CONTROL NUMBER	RESERVED	PAPER OR ELECTRONIC MEDIA CODE	RESERVED	TRACE SEQUENCE NUMBER
LENGTH	1	2	3	15	6	8	35	9	2	1	5	7
POSITION	01-01	02-03	04-06	07-21	22-27	28-35	36-70	71-79	80-81	82-82	83-87	88-94

COMPANY BATCH CONTROL

	RECORD TYPE '8'	SERVICE CLASS CODE '200'	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	BATCH NUMBER
LENGTH	1	3	6	10	12	12	10	19	6	8	7
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	88-94

FILE CONTROL

	RECORD TYPE '9'	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

CASH CONCENTRATION OR DISBURSEMENT RECORD LAYOUT

NOTIFICATION OF CHANGE (COR) RETURN RECORDS - FOR CCD ENTRY

FILE HEADER

	RECORD TYPE	PRIORITY CODE	IMMEDIATE DESTINATION	IMMEDIATE ORIGIN	TRANSMISSION DATE	TRANSMISSION TIME	FILE ID MODIFIER	RECORD SIZE	BLOCKING FACTOR	FORMAT CODE	DESTINATION NAME	ORIGIN NAME	REFERENCE CODE
	'1'				YY MM DD	HH MM		'094'	'10'				
LENGTH	1	2	10	10	6	4	1	3	2	1	23	23	8
POSITION	01-01	02-03	04-13	14-23	24-29	30-33	34-34	35-37	38-39	40-40	41-63	64-86	87-94

COMPANY BATCH HEADER

	RECORD TYPE	SERVICE CLASS CODE	COMPANY NAME	COMPANY DISCRE-TIONARY NUMBER	COMPANY IDENTIFI-CATION	STANDARD ENTRY CLASS	COMPANY ENTRY DESCRIPTION	COMPANY DESCRIPTIVE DATE	EFFECTIVE ENTRY DATE	SETTLEMENT DATE (JULIAN)	ORIGINATOR STATUS CODE	ORIGINATING DFI IDENTIFICATION	BATCH NUMBER
	'5'	'200'				'COR'			YY MM DD		'1'		
LENGTH	1	3	16	20	10	3	10	6	6	3	1	8	7
POSITION	01-01	02-04	05-20	21-40	41-50	51-53	54-63	64-69	70-75	76-78	79-79	80-87	88-94

ENTRY DETAIL

	RECORD TYPE	TRANSACTION CODE	RECEIVING DFI ROUTING NUMBER	ROUTING CHECK DIGIT	DFI ACCOUNT NUMBER	AMOUNT	INDIVIDUAL IDENTIFICATION NUMBER	INDIVIDUAL NAME	DISCRETIONARY DATA	ADDENDA RECORD INDICATOR	TRACE NUMBER
	'6'									'1'	
LENGTH	1	2	8	1	17	10	15	22	2	1	15
POSITION	01-01	02-03	04-11	12-12	13-29	30-39	40-54	55-76	77-78	79-79	80-94

ENTRY DETAIL ADDENDA

	RECORD TYPE	ADDENDA TYPE	RETURN REASON CODE	ORIGINAL TRACE NUMBER	RESERVED	ORIGINAL ROUTING NUMBER	ADDENDA INFORMATION (CHANGE INFORMATION IN FIXED POSITIONS)	RETURN ITEM CONTROL NUMBER	RESERVED	PAPER OR ELECTRONIC MEDIA CODE	RESERVED	TRACE SEQUENCE NUMBER
	'7'	'98'										
LENGTH	1	2	3	15	6	8	35	9	2	1	5	7
POSITION	01-01	02-03	04-06	07-21	22-27	28-35	36-70	71-79	80-81	82-82	83-87	88-94

COMPANY BATCH CONTROL

	RECORD TYPE	SERVICE CLASS CODE	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	COMPANY IDENTIFICATION NUMBER	RESERVED	RESERVED	ORIGINATING IDENTIFICATION NUMBER	BATCH NUMBER
	'8'	'200'									
LENGTH	1	3	6	10	12	12	10	19	6	8	7
POSITION	01-01	02-04	05-10	11-20	21-32	33-44	45-54	55-73	74-79	80-87	88-94

FILE CONTROL

	RECORD TYPE	BATCH COUNT	BLOCK COUNT	ENTRY/ADDENDA COUNT	ENTRY HASH	TOTAL DEBIT AMOUNT	TOTAL CREDIT AMOUNT	RESERVED
	'9'							
LENGTH	1	6	6	8	10	12	12	39
POSITION	01-01	02-07	08-13	14-21	22-31	32-43	44-55	56-94

ID	Task Name	Duration	% Complete	Start	Finish	Resource Names
1	**State of Nebraska - Implementation Project Plan**	**133 days**	**0%**	**Tue 9/1/20**	**Fri 3/12/21**	
2	**Initiation Phase**	**3 days**	**0%**	**Tue 9/1/20**	**Thu 9/3/20**	
3	Accept Implementation Request Submitted from Sales	1 day	0%	Tue 9/1/20	Tue 9/1/20	JPM OS
4	Send Welcome Email	1 day	0%	Wed 9/2/20	Wed 9/2/20	JPM OS
5	Call Client to Introduce Yourself and Schedule Kick-Off Call	1 day	0%	Thu 9/3/20	Thu 9/3/20	JPM OS
6	**Requirements and Planning Phase**	**4 days**	**0%**	**Fri 9/4/20**	**Thu 9/10/20**	
7	**Client Engagement Documents**	**3 days**	**0%**	**Fri 9/4/20**	**Wed 9/9/20**	
13	Hold Implementation Kick-off Meeting with Client and Review Client Engagement Documents	3 days	0%	Fri 9/4/20	Wed 9/9/20	Client,Sales TEam,JPM OS
17	Confirm Product Specific Product Due Diligence (PDD) are In Process (if applicable)	1 day	0%	Thu 9/10/20	Thu 9/10/20	KYC,Sales,JPM OS
18	Confirm Credit Lines are In Process	1 day	0%	Thu 9/10/20	Thu 9/10/20	Sales,JPM OS
19	Confirm Product Eligibility Checklists are In Process (if applicable)	1 day	0%	Thu 9/10/20	Thu 9/10/20	Sales,JPM OS
20	Review Draft Project Plan with Client	1 day	0%	Thu 9/10/20	Thu 9/10/20	Client,JPM OS
21	**Requirements and Planning Phase Completed**	**0 days**	**0%**	**Thu 9/10/20**	**Thu 9/10/20**	
130	**Product & Service Setup Phase**	**65 days**	**0%**	**Thu 9/10/20**	**Fri 12/11/20**	
256	**US**	**65 days**	**0%**	**Thu 9/10/20**	**Fri 12/11/20**	
257	**JPMorgan ACCESS**	**21 days**	**0%**	**Thu 9/10/20**	**Thu 10/8/20**	
266	**JPMorgan ACCESS (Existing ACCESS Profile) - Reporting, Wires, Statements, Account Transfer (ACH if applicable) -Client Entitles**	**8 days**	**0%**	**Thu 9/10/20**	**Mon 9/21/20**	
267	Review JPMorgan ACCESS Requirements	1 day	0%	Thu 9/10/20	Thu 9/10/20	
268	Submit Request to Operations	1 day	0%	Fri 9/11/20	Fri 9/11/20	JPM OS
269	Operations Completes Setup	4 days	0%	Mon 9/14/20	Thu 9/17/20	
270	Notify Client Setup Complete	1 day	0%	Fri 9/18/20	Fri 9/18/20	
271	Send ACCESS Confirmation Email (if applicable)	1 day	0%	Mon 9/21/20	Mon 9/21/20	
272	ACCESS Bundle Setup Completed	0 days	0%	Fri 9/18/20	Fri 9/18/20	
301	**JPMorgan ACCESS H2H Direct Transmission - (Current/Prior Day Reporting) - NEW Product**	**21 days**	**0%**	**Thu 9/10/20**	**Thu 10/8/20**	
302	Review JPMorgan ACCESS Direct Transmission Business Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
303	Submit Request to Operations	2 days	0%	Fri 9/18/20	Mon 9/21/20	JPM OS
304	Login into Client's ACCESS Profile to Add accounts or Create New File Locators	1 day	0%	Tue 9/22/20	Tue 9/22/20	JPM OS
305	Approve New File Locators	1 day	0%	Wed 9/23/20	Wed 9/23/20	JPM OS
306	Select Operations Request Queue and Search on OR # and Complete Setup	0 days	0%	Wed 9/23/20	Wed 9/23/20	JPM OS
307	If New File Locators, Secure Technical Implementation Resource(s)	2 days	0%	Thu 9/24/20	Fri 9/25/20	JPM OS
308	Create and Review Requirements Document	3 days	0%	Mon 9/28/20	Wed 9/30/20	JPM TIM,Client
309	Secure Connectivity Resources	6 days	0%	Thu 10/1/20	Thu 10/8/20	JPM TIM
339	**JPMorgan ACCESS ACH**	**10 days**	**0%**	**Thu 9/10/20**	**Wed 9/23/20**	

For illustrative purposes only

ID	Task Name	Duration	% Complete	Start	Finish	Resource Names
340	Review JPMorgan ACH Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
341	Confirm ACH Credit is in place	1 day	0%	Mon 9/14/20	Mon 9/14/20	Sales,JPM OS
342	Confirm ACH Product Due Diligence is on file (if applicable)	1 day	0%	Mon 9/14/20	Mon 9/14/20	KYC,JPM OS
343	Submit to Operations	1 day	0%	Tue 9/15/20	Tue 9/15/20	JPM OS
344	Operations Completes Setup	5 days	0%	Wed 9/16/20	Tue 9/22/20	JPM Ops
345	Send ACCESS Confirmation Email	1 day	0%	Wed 9/23/20	Wed 9/23/20	
364	**Cash Concentration**	**5 days**	**0%**	**Thu 9/10/20**	**Wed 9/16/20**	
365	**Physical Cash Concentration**	**5 days**	**0%**	**Thu 9/10/20**	**Wed 9/16/20**	
366	Review ADT Business Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
367	If Multiple Legal Entities, confirm Credit in in place	1 day	0%	Mon 9/14/20	Mon 9/14/20	JPM OS
368	Submit Request to Operations	1 day	0%	Mon 9/14/20	Mon 9/14/20	JPM OS
369	Operations Completes Setup	2 days	0%	Mon 9/14/20	Tue 9/15/20	JPM Ops
370	Advise Client of Completed Set-up	1 day	0%	Wed 9/16/20	Wed 9/16/20	JPM OS
371	ADT Setup Completed	0 days	0%	Wed 9/16/20	Wed 9/16/20	
421	**Fraud**	**2 days**	**0%**	**Thu 9/10/20**	**Fri 9/11/20**	
422	**ACH Debit Blocking- Full Debit Block**	**2 days**	**0%**	**Thu 9/10/20**	**Fri 9/11/20**	
423	Review ACH Debit Blocking Business Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
424	Submit ACH Debit Blocking Request for Setup	1 day	0%	Thu 9/10/20	Thu 9/10/20	JPM OS
425	Operations Completes Setup	0 days	0%	Thu 9/10/20	Thu 9/10/20	JPM Ops
426	Advise Client of Completed Set-up	1 day	0%	Fri 9/11/20	Fri 9/11/20	JPM OS
427	ACH Debit Block Completed	0 days	0%	Fri 9/11/20	Fri 9/11/20	
434	**Payables**	**19 days**	**0%**	**Thu 9/10/20**	**Tue 10/6/20**	
435	**ACH (US) Direct Send**	**19 days**	**0%**	**Thu 9/10/20**	**Tue 10/6/20**	
436	Review ACH (US) Direct Send Business Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
437	Confirm ACH PDD is Approved per ECID	2 days	0%	Mon 9/14/20	Tue 9/15/20	
438	Confirm ACH Credit Line in place (if applicable)	1 day	0%	Mon 9/14/20	Mon 9/14/20	Sales,JPM OS
439	Client Secures Technical Resources for ACH Connectivity Setup and Testing	1 day	0%	Mon 9/14/20	Mon 9/14/20	Client
440	Submit Request to have Technical Implementation Resource assigned	1 day	0%	Wed 9/16/20	Wed 9/16/20	JPM OS
441	Secure Technical Implementation Resource	2 days	0%	Thu 9/17/20	Fri 9/18/20	JPM TIM
442	Create Requirements Document	3 days	0%	Mon 9/21/20	Wed 9/23/20	JPM TIM
443	Provide ACH Origin and Company ID Numbers to Client	1 day	0%	Thu 9/24/20	Thu 9/24/20	JPM TIM,JPM OS
444	Review and Confirm Requirements Document with Client (if applicable)	2 days	0%	Fri 9/25/20	Mon 9/28/20	Client,JPM OS,JPM TIM
445	Secure Connectivity Resources	6 days	0%	Tue 9/29/20	Tue 10/6/20	JPM TIM
673	**Telephonic Wire Transfer**	**11 days**	**0%**	**Thu 9/10/20**	**Thu 9/24/20**	
674	Review Telephone Wire Transfer Business Requirements	1 day	0%	Thu 9/10/20	Thu 9/10/20	Client,JPM OS
675	Interview Client to Complete Telephone Transfer Set-up Form	2 days	0%	Fri 9/11/20	Mon 9/14/20	Client
676	Return Signed Wire Form	2 days	0%	Tue 9/15/20	Wed 9/16/20	Client

For illustrative purposes only

ID	Task Name	Duration	% Complete	Start	Finish	Resource Names
677	Submit Request to Operations	1 day	0%	Tue 9/15/20	Tue 9/15/20	JPM OS
678	Operations Completes Setup	2 days	0%	Tue 9/15/20	Wed 9/16/20	JPM Ops
679	Send PIN's and Activation Code (s) Once Setup is Completed	5 days	0%	Thu 9/17/20	Wed 9/23/20	JPM Ops
680	Notify Client Setup is Complete and to Activate PINs within 30 days	1 day	0%	Thu 9/24/20	Thu 9/24/20	JPM OS
688	**Receivables**	**65 days**	**0%**	**Thu 9/10/20**	**Fri 12/11/20**	
689	**ACH Receiver Services/eLockbox**	**65 days**	**0%**	**Thu 9/10/20**	**Fri 12/11/20**	
690	Review ACH Receiver Services Business Requirements	2 days	0%	Thu 9/10/20	Fri 9/11/20	Client,JPM OS
691	Client Secures Technical Resources for ACH Receiver Services Setup and Testing	1 day	0%	Mon 9/14/20	Mon 9/14/20	Client
692	Confirm ACH Credit Line in place (if applicable)	1 day	0%	Mon 9/14/20	Mon 9/14/20	Sales,JPM OS
693	Submit Request to have Technical Implementation Resource assigned	1 day	0%	Tue 9/15/20	Tue 9/15/20	JPM OS
694	Secure Technical Implementation Resource	2 days	0%	Tue 9/15/20	Wed 9/16/20	JPM TIM
695	Interview Client to Finalize Set-up Details & Review ACH File Specifications	14 days	0%	Thu 9/17/20	Tue 10/6/20	JPM TIM
696	Complete Custom Programming for ACH Receiver Services (if applicable)	40 days	0%	Wed 10/7/20	Thu 12/3/20	JPM TIM
697	JPM Developer completes programming based on scope of request	40 days	0%	Wed 10/7/20	Thu 12/3/20	JPM Developer
698	Secure Connectivity Resources	5 days	0%	Fri 12/4/20	Fri 12/11/20	JPM TIM
914	**Testing & Training**	**80 days**	**0%**	**Tue 9/22/20**	**Thu 1/14/21**	
927	**US**	**69 days**	**0%**	**Wed 10/7/20**	**Thu 1/14/21**	
928	**Payables**	**19 days**	**0%**	**Wed 10/7/20**	**Mon 11/2/20**	
929	**ACH (US) Direct Send**	**19 days**	**0%**	**Wed 10/7/20**	**Mon 11/2/20**	
930	Establish and Test Connectivity	5 days	0%	Wed 10/7/20	Tue 10/13/20	JPM Conn Analyst,
931	Create and Send Test File via Chosen Connectivity Method	7 days	0%	Wed 10/14/20	Thu 10/22/20	Client
932	Test File and Provide Feedback	7 days	0%	Wed 10/14/20	Thu 10/22/20	JPM TIM
933	Confirm Acknowledgement File Received (if applicable)	7 days	0%	Wed 10/14/20	Thu 10/22/20	JPM TIM,Client
934	Conduct Additional File Testing (if applicable)	5 days	0%	Fri 10/23/20	Thu 10/29/20	JPM TIM
935	Sign-off on File Testing	2 days	0%	Fri 10/30/20	Mon 11/2/20	Client
1166	**Receivables**	**23 days**	**0%**	**Mon 12/14/20**	**Thu 1/14/21**	
1167	**ACH Receiver Services/eLockbox**	**23 days**	**0%**	**Mon 12/14/20**	**Thu 1/14/21**	
1168	Establish and Test Connectivity	3 days	0%	Mon 12/14/20	Wed 12/16/20	JPM Conn Analyst,
1169	Provide Test data	5 days	0%	Thu 12/17/20	Wed 12/23/20	Client
1170	Create and Send Test File via Chosen Connectivity Method	8 days	0%	Thu 12/24/20	Tue 1/5/21	JPM TIM
1171	Test File and Provide Feedback	8 days	0%	Thu 12/24/20	Tue 1/5/21	Client
1172	Conduct Additional File Testing (if applicable)	5 days	0%	Wed 1/6/21	Tue 1/12/21	JPM TIM,Client
1173	Sign-off on File Testing	2 days	0%	Wed 1/13/21	Thu 1/14/21	Client
1263	**Reporting**	**15 days**	**0%**	**Fri 10/9/20**	**Thu 10/29/20**	

For illustrative purposes only

ID	Task Name	Duration	% Complete	Start	Finish	Resource Names
1277	**JPMorgan ACCESS H2H Direct Transmission (Current/Prior Day Reporting)**	**15 days**	**0%**	**Fri 10/9/20**	**Thu 10/29/20**	
1278	Establish and Test Connectivity	3 days	0%	Fri 10/9/20	Tue 10/13/20	JPM Conn Analyst,(
1279	Send Test File via Chosen Connectivity Method	5 days	0%	Wed 10/14/20	Tue 10/20/20	JPM Ops
1280	Test File and Provide Feedback	5 days	0%	Wed 10/14/20	Tue 10/20/20	Client
1281	Conduct Additional File Testing	5 days	0%	Wed 10/21/20	Tue 10/27/20	JPM TIM,Client
1282	Sign-off on File Testing	1 day	0%	Wed 10/28/20	Wed 10/28/20	Client,JPM OS,JPM
1283	Notify Client to Start Partner Key Management Process	1 day	0%	Thu 10/29/20	Thu 10/29/20	JPM TIM,JPM OS
1294	**JPMorgan ACCESS Product Training**	**11 days**	**0%**	**Tue 9/22/20**	**Tue 10/6/20**	
1295	Schedule Security Administrator Training	2 days	0%	Tue 9/22/20	Wed 9/23/20	JPM OS
1296	Attend Security Administrator Training	1 day	0%	Thu 9/24/20	Thu 9/24/20	Client
1297	Entitle Users	5 days	0%	Fri 9/25/20	Thu 10/1/20	Client
1298	Schedule Training (as applicable to each product type)	2 days	0%	Fri 10/2/20	Mon 10/5/20	Client,JPM OS
1299	Reporting	2 days	0%	Fri 10/2/20	Mon 10/5/20	
1301	Payments - ACH, Wire and Transaction Services	2 days	0%	Fri 10/2/20	Mon 10/5/20	
1306	Attend Relevant Product Training	1 day	0%	Tue 10/6/20	Tue 10/6/20	Client
1307	Reporting	1 day	0%	Tue 10/6/20	Tue 10/6/20	
1309	Payments - ACH, Wire and Transaction Services	1 day	0%	Tue 10/6/20	Tue 10/6/20	
1314	Go Live	119 days	0%	Tue 9/1/20	Mon 2/22/21	
1336	**US**	**119 days**	**0%**	**Tue 9/1/20**	**Mon 2/22/21**	
1337	**Payables**	**4 days**	**0%**	**Tue 11/3/20**	**Fri 11/6/20**	
1338	**ACH Direct Send**	**4 days**	**0%**	**Tue 11/3/20**	**Fri 11/6/20**	
1339	Activate ACH Service in Production	2 days	0%	Tue 11/3/20	Wed 11/4/20	JPM TIM
1340	Transmit First Production ACH File	1 day	0%	Thu 11/5/20	Thu 11/5/20	Client
1341	Confirm Receipt of First Production File	1 day	0%	Fri 11/6/20	Fri 11/6/20	JPM TIM
1415	**Receivables**	**25 days**	**0%**	**Fri 1/15/21**	**Mon 2/22/21**	
1416	**ACH Reiver Services**	**25 days**	**0%**	**Fri 1/15/21**	**Mon 2/22/21**	
1417	Activate ACH Receiver Service in Production (Only moves into production once a month)	21 days	0%	Fri 1/15/21	Tue 2/16/21	JPM TIM
1418	Transmit First Production ACH File	2 days	0%	Wed 2/17/21	Thu 2/18/21	Client
1419	Confirm Receipt of First Production File	1 day	0%	Fri 2/19/21	Fri 2/19/21	JPM TIM
1420	Conduct call with Client to ensure product satisfaction/answer questions	1 day	0%	Mon 2/22/21	Mon 2/22/21	JPM TIM
1457	**Reporting**	**48 days**	**0%**	**Tue 9/1/20**	**Fri 11/6/20**	
1468	**JPMorgan ACCESS H2H Direct Transmission (Current/Prior Day Reporting)**	**48 days**	**0%**	**Tue 9/1/20**	**Fri 11/6/20**	
1473	**Deal Closure Phase**	**39 days**	**0%**	**Fri 1/15/21**	**Fri 3/12/21**	
1474	Ensure relevant training has been completed	1 day	0%	Fri 1/15/21	Fri 1/15/21	
1475	Monitor Services During Production Verification Period	5 days	0%	Tue 1/19/21	Mon 1/25/21	JPM TIM,JPM OS
1476	Sign-off on Project	1 day	0%	Tue 1/26/21	Tue 1/26/21	JPM TIM,Client,JPM

For illustrative purposes only

ID	Task Name	Duration	% Complete	Start	Finish	Resource Names
1477	Provide Handover documentation/ Wrap-up Material	1 day	0%	Wed 1/27/21	Wed 1/27/21	JPM OS
1478	Transition to Customer Service	1 day	0%	Thu 1/28/21	Thu 1/28/21	JPM OS
1479	Review Billing and Product Satisfaction in a Post-Implementation Review	30 days	0%	Fri 1/29/21	Fri 3/12/21	Client,JPM OS

For illustrative purposes only

CUSTOMER NAME - Integrated Receivables Connect Application Implementation

ID	%	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1	0%	**Implementation Project Plan**	**169 days**	**Thu 9/10/20**	**Thu 5/13/21**		
2	0%	**Initiation Phase**	**12 days**	**Thu 9/10/20**	**Fri 9/25/20**		
3	0%	**New Program Implementation**	**12 days**	**Thu 9/10/20**	**Fri 9/25/20**		
4	0%	Program Assignment (done within 3 days of all contract pieces received and confirmed as complete)	0 days	Thu 9/10/20	Thu 9/10/20		JPMC Implementation Unit Manager
5	0%	Accept the Deal Manager Request	1 day	Thu 9/10/20	Thu 9/10/20		JPMC Impl Mgr
6	0%	**Internal Meeting with Sales and the TMO**	**2 days**	**Fri 9/11/20**	**Mon 9/14/20**	**5**	
10	0%	**Client Introduction Meeting**	**3 days**	**Fri 9/11/20**	**Tue 9/15/20**	**5**	
14	0%	**Client Kick-off**	**7 days**	**Tue 9/15/20**	**Wed 9/23/20**	**6**	
18	0%	**Client Draft Build**	**5 days**	**Mon 9/21/20**	**Fri 9/25/20**	**16**	
23	0%	**Requirements and Planning Phase**	**8 days**	**Mon 9/28/20**	**Wed 10/7/20**		
24	0%	**Define Program Requirements**	**6 days**	**Mon 9/28/20**	**Mon 10/5/20**	**18**	
33	0%	**Develop Customized Project Plan**	**8 days**	**Mon 9/28/20**	**Wed 10/7/20**	**18**	
36	0%	**Documentation & Account Opening Phase**	**2 days**	**Thu 10/8/20**	**Fri 10/9/20**		
37	0%	**Product Documentation Delivery (if not already delivered by the relationsihp team)**	**1 day**	**Thu 10/8/20**	**Thu 10/8/20**	**23**	
45	0%	**Documentation Creation and Delivery**	**2 days**	**Thu 10/8/20**	**Fri 10/9/20**	**23**	
56	0%	**Product & Service Setup Phase**	**94 days**	**Mon 9/14/20**	**Fri 1/29/21**		
57	0%	**Client Development Phase**	**18 days**	**Mon 9/28/20**	**Thu 10/22/20**	**18**	
74	0%	**Physical Space Development (Point-of-Sale) Phase**	**10 days**	**Tue 10/6/20**	**Tue 10/20/20**	**28**	
76	0%	**Build Phase**	**94 days**	**Mon 9/14/20**	**Fri 1/29/21**		
77	0%	**Initial Build**	**38 days**	**Mon 9/28/20**	**Fri 11/20/20**	**18**	
78	0%	Finalize build of client biller(s)	5 days	Mon 9/28/20	Fri 10/2/20		JPMC Impl Mgr
79	0%	Execute Peer Review SQLs	1 day	Mon 10/5/20	Mon 10/5/20	78	JPMC Impl Mgr
80	0%	Set up Admin Site Security Officer(s)	1 day	Tue 10/6/20	Tue 10/6/20	32	JPMC Impl Mgr
81	0%	Deliver Admin Site Security Officer(s) User Id and Password	1 day	Wed 10/7/20	Wed 10/7/20	80	JPMC Impl Mgr
82	0%	Build Administrative Organization sites for Point-of-Sale	5 days	Tue 10/6/20	Tue 10/13/20	28	JPMC Impl Mgr
83	0%	Enter devices and assign to Administrative Sites for Point-of-Sale	5 days	Tue 10/6/20	Tue 10/13/20	28	JPMC Impl Mgr
84	0%	Seed pre-registration users	1 day	Fri 10/2/20	Fri 10/2/20	78FF	JPMC Impl Mgr
85	0%	Internal Web and Admin Site Review (English)	1 day	Fri 10/2/20	Fri 10/2/20	78FF	JPMC Impl Mgr
86	0%	Internal Web Review (Spanish)	1 day	Wed 10/28/20	Wed 10/28/20	93	JPMC Impl Mgr
87	0%	Internal IVR Review (English)	2 days	Thu 10/29/20	Fri 10/30/20	102	JPMC Impl Mgr
88	0%	Internal IVR Review (Spanish)	2 days	Thu 11/19/20	Fri 11/20/20	93,108	JPMC Impl Mgr
89	0%	**Internal Setup Requests**	**94 days**	**Mon 9/14/20**	**Fri 1/29/21**		
90	0%	**Graphics**	**5 days**	**Mon 9/28/20**	**Fri 10/2/20**		
91	0%	Submit WEB and Mobile graphics to JPMC	5 days	Mon 9/28/20	Fri 10/2/20	18	Client
92	0%	Submit Administrative Site Graphics (Admin Org and Product Level)	5 days	Mon 9/28/20	Fri 10/2/20	18	Client
93	0%	**Alternate Language Translations**	**11 days**	**Tue 10/13/20**	**Tue 10/27/20**		
94	0%	Submit Translation Request for Spanish	1 day	Tue 10/13/20	Tue 10/13/20	26,211	JPMC Impl Mgr
95	0%	Translations Performed	10 days	Wed 10/14/20	Tue 10/27/20	94	JPMC Translation Services
96	0%	**IVR**	**30 days**	**Tue 10/6/20**	**Wed 11/18/20**		
97	0%	**Phone Number procurement**	**12 days**	**Tue 10/6/20**	**Thu 10/22/20**		
98	0%	Submit EURC request to secure IVR Phone Number(s) and Rollout Phone Number(s)	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
99	0%	Procure IVR Number(s)	10 days	Wed 10/7/20	Wed 10/21/20	98	JPMC GTI
100	0%	Receive Phone Numbers and place in application	1 day	Thu 10/22/20	Thu 10/22/20	99	JPMC Impl Mgr

For illustrative purposes only

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Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Progress | Deadline

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ID		%	Task Name	Duration	Start	Finish	Predecessors	Resource Names
101		**0%**	**IVR phrases**	**30 days**	**Tue 10/6/20**	**Wed 11/18/20**		
102		**0%**	**English Phrases**	**16 days**	**Tue 10/6/20**	**Wed 10/28/20**		
103		0%	Send Phrases to Convergys for recording	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
104		0%	Enter QC Request for Phrase Migration	1 day	Wed 10/7/20	Wed 10/7/20	103	JPMC Impl Mgr
105		0%	Phrases recorded by Convergys	10 days	Thu 10/8/20	Thu 10/22/20	104	Convergys
106		0%	Internal Review of Phrases	1 day	Thu 10/22/20	Thu 10/22/20	105FF	JPMC Impl Mgr
107		0%	Migrate Phrases	1 day	Wed 10/28/20	Wed 10/28/20	106	Convergys Migration
108		**0%**	**Spanish Phrases**	**15 days**	**Wed 10/28/20**	**Wed 11/18/20**		
109		0%	Send Phrases to Convergys for recording	1 day	Wed 10/28/20	Wed 10/28/20	95	JPMC Impl Mgr
110		0%	Enter QC Request for Phrase Migration	1 day	Thu 10/29/20	Thu 10/29/20	109	JPMC Impl Mgr
111		0%	Phrases recorded by Convergys	10 days	Fri 10/30/20	Fri 11/13/20	110	Convergys
112		0%	Internal Review of Phrases	1 day	Fri 11/13/20	Fri 11/13/20	111FF	JPMC Impl Mgr
113		0%	Migrate Phrases	1 day	Wed 11/18/20	Wed 11/18/20	112	Convergys Migration
114		**0%**	**ACH**	**11 days**	**Tue 10/6/20**	**Wed 10/21/20**		
115		0%	Request JPMC Fee DDA for Manage Model Applications (from the JPMC Designate)	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
116		0%	Obtain and send the JPMC Fee DDA for Manage Model Applications to IM	5 days	Wed 10/7/20	Wed 10/14/20	115,26	JPMC Implementation Unit Manager/SME
117		0%	Submit ACH setup form to JPMC Treasury	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
118		0%	Receive ACH company id number and place in application	10 days	Wed 10/7/20	Wed 10/21/20	117	JPMC Impl Mgr
119		**0%**	**Merchant Services**	**39 days**	**Thu 9/24/20**	**Thu 11/19/20**		
120		**0%**	**Client Setups for Non-Managed Model**	**5 days**	**Thu 9/24/20**	**Wed 9/30/20**		
121		0%	Client creates and sends all necessary forms to Merchant Services	5 days	Thu 9/24/20	Wed 9/30/20	14	Client
122		0%	IM receives the Merchant Services Rep name from Client	1 day	Thu 9/24/20	Thu 9/24/20	14	Client
123		0%	IM follows up with the Merchant Services Reo on the setup	1 day	Thu 9/24/20	Thu 9/24/20	14	JPMC Impl Mgr
124		**0%**	**Tampa Forms for Managed Model**	**7 days**	**Tue 10/6/20**	**Thu 10/15/20**		
125		0%	Create the Tampa Forms	1 day	Tue 10/6/20	Tue 10/6/20	26,28	JPMC Impl Mgr
126		0%	Send out for signatures (client or product)	5 days	Wed 10/7/20	Wed 10/14/20	125	JPMC Impl Mgr
127		0%	Send to Merchant Services	1 day	Thu 10/15/20	Thu 10/15/20	126	JPMC Impl Mgr
128		**0%**	**Salem Forms for Managed Model**	**7 days**	**Tue 10/6/20**	**Thu 10/15/20**		
129		0%	Create the Salem Forms	1 day	Tue 10/6/20	Tue 10/6/20	26,28	JPMC Product
130		0%	Send out for signatures	5 days	Wed 10/7/20	Wed 10/14/20	129	JPMC Product
131		0%	Send to Merchant Services	1 day	Thu 10/15/20	Thu 10/15/20	130	JPMC Product
132		**0%**	**Merchant Services Request Set-up**	**21 days**	**Fri 10/16/20**	**Mon 11/16/20**		
133		0%	Paymentech Set-up	20 days	Fri 10/16/20	Fri 11/13/20	124,128,120	JPMC Impl Mgr
134		0%	Receive Paymentech Set-up Information	1 day	Fri 11/13/20	Fri 11/13/20	133FF	JPMC Impl Mgr
135		0%	Update Application with Merchatn Services information	1 day	Mon 11/16/20	Mon 11/16/20	134	
136		**0%**	**Account Updater Set-up (Salem)**	**23 days**	**Fri 10/16/20**	**Wed 11/18/20**		
137		0%	Submit Request for Account Updater	1 day	Fri 10/16/20	Fri 10/16/20	133SS	Client
138		0%	Account Updater set-up	20 days	Mon 10/19/20	Mon 11/16/20	137	JPMC Impl Mgr
139		0%	Confirm Account Updater added to Paymentech Setup	1 day	Tue 11/17/20	Tue 11/17/20	138	JPMC Impl Mgr
140		0%	Enter Request to Update the Account Updater Table	1 day	Wed 11/18/20	Wed 11/18/20	139	JPMC Impl Mgr
141		**0%**	**Live Processor Set-up (Salem)**	**4 days**	**Mon 11/16/20**	**Thu 11/19/20**	**134**	
142		0%	Enter Request to update Live Processor	1 day	Mon 11/16/20	Mon 11/16/20		JPMC Impl Mgr
143		0%	Live Processor Updates	2 days	Tue 11/17/20	Wed 11/18/20	142	JPMC PIM
144		0%	Enter DFR for Chargebacks	1 day	Thu 11/19/20	Thu 11/19/20	143	JPMC Impl Mgr

For illustrative purposes only

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Task, Split, Milestone, Summary, Project Summary, External Tasks, External Milestone, Inactive Task, Inactive Milestone, Inactive Summary, Manual Task, Duration-only, Manual Summary Rollup, Manual Summary, Start-only, Finish-only, Progress, Deadline

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CUSTOMER NAME - Integrated Receivables Connect Application Implementation

ID	%	Task Name	Duration	Start	Finish	Predecessors	Resource Names
145	**0%**	**MIT CIT Flag Product (Salem)**	**1 day**	**Mon 11/16/20**	**Mon 11/16/20**	**134**	
146	0%	Submit BIM to Set MIT CIT Flag for Registered Payers	1 day	Mon 11/16/20	Mon 11/16/20		
147	**0%**	**Check Print Outsourcing (CKO)**	**27 days**	**Mon 9/14/20**	**Wed 10/21/20**		
148	**0%**	**Client Setups for CKO**	**27 days**	**Mon 9/14/20**	**Wed 10/21/20**		
149	0%	Send email to CKO IC for inclusion in the IR	1 day	Mon 9/14/20	Mon 9/14/20	9	JPMC Impl Mgr
150	0%	Complete CKO Requirements (Statement of Work)	15 days	Tue 9/15/20	Mon 10/5/20	149	JPMC SI
151	0%	CKO Setup	3 days	Tue 10/6/20	Thu 10/8/20	150	JPMC CKO IT
152	0%	Receive CKO information and place in application (Product)	1 day	Fri 10/9/20	Fri 10/9/20	151	JPMC Impl Mgr
153	**0%**	**File Transmission**	**11 days**	**Tue 10/6/20**	**Wed 10/21/20**	**163SS**	
154	0%	Confirm Connect FTP User ID ftsi7252 is active	1 day	Tue 10/6/20	Tue 10/6/20		JPMC Impl Mgr
155	0%	Place FTP information in application	1 day	Wed 10/21/20	Wed 10/21/20	165FF,154	JPMC Impl Mgr
156	**0%**	**Test Connectivity**	**3.5 days**	**Tue 10/13/20**	**Fri 10/16/20**	**152**	
157	0%	Deliver Inbound File with initial Integrated Payables Connect Information	1 day	Tue 10/13/20	Tue 10/13/20		Client,JPMC Impl Mgr
158	**0%**	**Confirm status of Connect CKO Jobs**	**2.5 days**	**Wed 10/14/20**	**Fri 10/16/20**	**157**	
159	0%	Confirm Check Print File created	0.25 days	Wed 10/14/20	Wed 10/14/20		JPMC Impl Mgr
160	0%	Send email to CKO IM to engage CKO IT Back Office to process Connect Check Print File	0.25 days	Wed 10/14/20	Wed 10/14/20	159	JPMC Impl Mgr
161	0%	CKO IM to notify CKO IT Back Office of test file	1 day	Wed 10/14/20	Thu 10/15/20	160	JPMC SI
162	0%	Confirm Check Print Response File Processed	1 day	Thu 10/15/20	Fri 10/16/20	161	JPMC Impl Mgr
163	**0%**	**Connectivity Services**	**16 days**	**Tue 10/6/20**	**Wed 10/28/20**		
164	0%	Submit connectivity request FTP Transmissions	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
165	0%	Perform FTP set-ups	10 days	Wed 10/7/20	Wed 10/21/20	164	JPMC Conn Services
166	0%	Receive FTP information and place in application	1 day	Wed 10/21/20	Wed 10/21/20	165FF	JPMC Impl Mgr
167	0%	Test Connectivity for all files using files with a header and trailer record only	5 days	Thu 10/22/20	Wed 10/28/20	166	Client,JPMC GTI,JPMC Impl Mgr
168	**0%**	**Web Services API**	**9 days**	**Mon 9/28/20**	**Thu 10/8/20**		
169	0%	Send all Web Service technical documentation to client and JPMC certificate	1 day	Mon 9/28/20	Mon 9/28/20	18	JPMC Impl Mgr
170	**0%**	**Client Test Environment Certificate (if using a separate certificate for the client test environment and production environment)**	**9 days**	**Mon 9/28/20**	**Thu 10/8/20**		
171	0%	Receive Certificate from Client	1 day	Mon 9/28/20	Mon 9/28/20	18	Client
172	0%	Enter request to Load Certificate	1 day	Mon 9/28/20	Mon 9/28/20	18	JPMC Impl Mgr
173	0%	Certificates Loaded	3 days	Tue 10/6/20	Thu 10/8/20	172FS+5 days	JPMC Certificate Unit (WS)
174	**0%**	**Client Production Environment Certificate**	**9 days**	**Mon 9/28/20**	**Thu 10/8/20**		
175	0%	Receive Certificate from Client	1 day	Mon 9/28/20	Mon 9/28/20	18	Client
176	0%	Enter request to Load Certificate	1 day	Mon 9/28/20	Mon 9/28/20	18	JPMC Impl Mgr
177	0%	Certificates Loaded	3 days	Tue 10/6/20	Thu 10/8/20	176FS+5 days	JPMC Certificate Unit (WS)
178	**0%**	**Edge - Remit Admin**	**41 days**	**Tue 12/1/20**	**Fri 1/29/21**		
179	0%	Complete Edge Requirements Doc	3 days	Tue 12/1/20	Thu 12/3/20	210,218	JPMC Impl Mgr
180	0%	Send to IC for inclusion in the IR	1 day	Fri 12/4/20	Fri 12/4/20	179	JPMC Impl Mgr
181	**0%**	**Remit Admin**	**10 days**	**Mon 12/7/20**	**Fri 12/18/20**		
182	0%	Complete Edge questionnaire with client	5 days	Mon 12/7/20	Fri 12/11/20	180	JPMC Impl Coord,Client
183	0%	Remit Admin Set-up	5 days	Mon 12/14/20	Fri 12/18/20	182	JPMC Remit Admin Analyst
184	**0%**	**File Transmission**	**37 days**	**Mon 12/7/20**	**Fri 1/29/21**		
185	0%	Complete SOW, Confirm File Format, Provide test File	5 days	Mon 12/7/20	Fri 12/11/20	180	JPMC Impl Mgr,JPMC SI,Client
186	0%	Submit Connectivity Request	2 days	Mon 12/14/20	Tue 12/15/20	185	JPMC SI
187	0%	Submit request to Edge Development Team	2 days	Mon 12/14/20	Tue 12/15/20	185	JPMC SI

For illustrative purposes only

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Task	External Tasks	Manual Task	Finish-only		
Split	External Milestone	Duration-only	Progress		
Milestone	Inactive Task	Manual Summary Rollup	Deadline		
Summary	Inactive Milestone	Manual Summary			
Project Summary	Inactive Summary	Start-only			

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CUSTOMER NAME - Integrated Receivables Connect Application Implementation

ID	%	Task Name	Duration	Start	Finish	Predecessors	Resource Names
188	0%	File Development	30 days	Wed 12/16/20	Fri 1/29/21	187	JPMC SI
189	**0%**	**Real Time Payment Confirmation (RTPC)**	**16 days**	**Tue 10/6/20**	**Wed 10/28/20**		
190	**0%**	**Load Certificate (Only needed if the certificate the client is using is not in our approved list)**	**16 days**	**Tue 10/6/20**	**Wed 10/28/20**		
191	0%	Receive Certificate from Client	1 day	Tue 10/6/20	Tue 10/6/20	26	Client
192	0%	Enter request to Load Certificate with PIM	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
193	0%	Certificates Loaded (Wednesday's Only)	1 day	Wed 10/28/20	Wed 10/28/20	192FS+10 days	JPMC Certificate Unit (RTPC/RTI)
194	**0%**	**Point-of-Sale Device configuration**	**38 days**	**Mon 11/16/20**	**Mon 1/11/21**		
195	0%	Create Device Configuration forms	5 days	Mon 11/16/20	Fri 11/20/20	134,28	JPMC Impl Mgr
196	0%	Device Configuration	30 days	Mon 11/23/20	Wed 1/6/21	195	JPMC Hardware Unit
197	0%	Devices shipped to Client	1 day	Wed 1/6/21	Wed 1/6/21	196FF	JPMC Hardware Unit
198	0%	Validate the contents of the package with the packing slip	1 day	Wed 1/6/21	Wed 1/6/21	196FF	Client
199	0%	Validate the PIN Pad configurations	3 days	Thu 1/7/21	Mon 1/11/21	198	Client
200	0%	Receive device information and update in the application	1 day	Thu 1/7/21	Thu 1/7/21	196	JPMC Impl Mgr
201	**0%**	**JPMC Call Center Engagement**	**26 days**	**Tue 10/6/20**	**Thu 11/12/20**		
202	0%	Complete CS Form-1	1 day	Tue 10/6/20	Tue 10/6/20	26	JPMC Impl Mgr
203	0%	Review with Client Services	5 days	Wed 10/7/20	Wed 10/14/20	202	JPMC Client Services,JPMC Impl Mgr
204	0%	Develop Call Center Project Plan	10 days	Thu 10/15/20	Wed 10/28/20	203	JPMC Client Services
205	0%	Review Plan with IM and make changes	10 days	Thu 10/29/20	Thu 11/12/20	204	JPMC Impl Mgr,JPMC Client Services
206	**0%**	**Testing & Go-Live Phase**	**131 days**	**Tue 9/29/20**	**Thu 4/8/21**		
439	**0%**	**Deal Closure Phase**	**24 days**	**Wed 4/7/21**	**Mon 5/10/21**		

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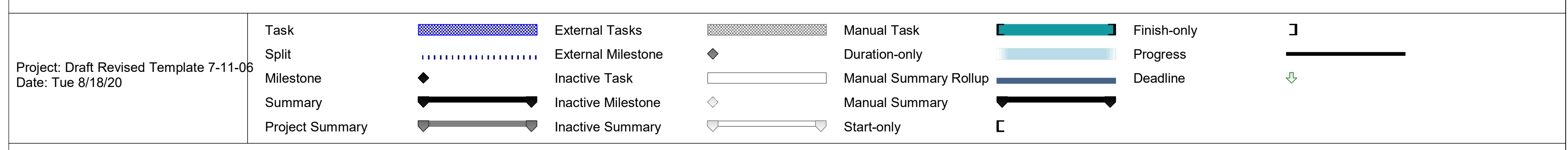

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JPMORGAN CHASE & CO.

Dorothy Bennett
Global Head of Sanctions
Global Sanctions Compliance

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The Firm has established a Global Sanctions Compliance Program ("GSC Program") consisting of the following elements: (i) procedures, systems, and internal controls designed to comply with applicable sanctions; (ii) a designated person responsible for the day-to-day implementation and operation of the GSC Program; (iii) independent testing; (iv) an ongoing training program; and (v) reporting and recordkeeping. GSC is headed by the Director of Global Sanctions Compliance who is designated by the Head of Global Financial Crimes Compliance.

Under the OFAC regulations, JPMC Entities and its Employees are prohibited from engaging in transactions involving Specially Designated Nationals ("SDNs") and other activities such as:

- opening or maintaining accounts for SDNs or any other person subject to prohibitions of U.S. Sanctions;
- conducting transactions either directly or indirectly with SDNs or any other person, entity or country prohibited by U.S. Sanctions;
- facilitating any prohibited transaction by advising on ways to avoid U.S. Sanctions; or
- facilitating any non-U.S. person to engage in transactions prohibited by U.S. Sanctions.

In order to prevent dealings with sanctioned parties, JPMC requires screening of customer relationships and transactions against the SDN list or other legally applicable sanctions lists, including those published or administered by the European Union and Her Majesty's Treasury of the United Kingdom. JPMC has adopted policies and procedures governing the maintenance of its screening systems and processes.

Sincerely,

Dorothy Bennett
Global Head of Sanctions

Last updated: May 2018

ADDENDUM ONE
QUESTIONS and ANSWERS

Date: July 10, 2020

To: All Bidders

From: Julie Schiltz, Buyer
AS Materiel State Purchasing Bureau

RE: Addendum for Request for Proposal 6304 Z1 to be opened on August 18, 2020, at 2:00 P.M. Central Time

Questions and Answers

Following are the questions submitted and answers provided for the above mentioned Request for Proposal. The questions and answers are to be considered as part of the Request for Proposal. It is the Bidder's responsibility to check the State Purchasing Bureau website for all addenda or amendments.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
1	4b Nebraska Lottery – Charitable Gaming	30-31	For Charitable Gaming, is there a need to support over and under payments at the invoice level?	Payments must be the exact amount. Payments must equal the invoice amount.
2	4b Nebraska Lottery – Charitable Gaming	30-31	Regarding Charitable Gaming, does the State wish to expand the total number of invoices beyond five (5) invoices?	At this time, the State does not intend to expand beyond five (5) invoices.
3	General Question		What is the average ACH single payment amount? If you need to list by departments listed, please provide the highest and lowest payment average amounts for a single payment across all departments.	**NE Lottery** Average $1,000.00 Highest $301,455 Lowest $1.00 **NE Department of Revenue** Average $6,000.00 Highest $10,000,000.00 Lowest $.01 **NE Child Support Payment** Center Average $242.86 Highest $55,000.00 Lowest $.01 **NE Department of Labor** Average $342.21 Highest $440.00 Lowest $70.00 **State Accounting**: Average $6,540.30 Highest $40,621,260.71 Lowest $.01

4	General Question		For IVR toll free numbers, do you already have toll free numbers that a vendor will take over? Or do you need new toll free numbers to be provided by your chosen vendor? How many toll free numbers in total will be required?	Agency's that use an IRV are NE Department of Revenue and NE Child Support Payment Center. NE Department of Revenue would need one (1) toll free number provided by the contractor. NE Child Support Payment Center would not need a toll free number provided by the contractor.
5	General Question		Does the DOR have real time validation capabilities? Or is validation of taxpayers IDs only available through the DOR business master file?	The first question is unclear, however, as the question relates to real-time validation of taxpayer ID's so users can initiate a payment through the payment site, no. Each workday, DOR provides a pre-registration file to the current contractor. This file acts as the gateway to allow a payment from the specific taxpayer. The pre-registration file validates those taxpayers who can initiate payments through the payment site.
6	General Question		Does DOR have any type of existing taxpayer username/password account logins?	No, DOR does not store username/password information for account logins to the current e-pay system.
7	General Question		If yes to #4, do you have any type of secured Single Sign On (SSO) technology in use across the State departments? Example technology may be SAML 2.0 which is Security Assertion Markup Language and is a standard tool for users logging into multiple applications.	See response to question 6.
8	General Question		How many billing systems do you utilize across all of these departments listed?	**NE Lottery -** 2 systems. **NE Department of Revenue –** 4 systems **NE Child Support Payment** - systems. **State Accounting** -1 system.

9	General Question		Which billing systems have real time capabilities to allow for immediate payment posting to the billing systems?	State Accounting EnterpriseOne (State's Accounting System).
10	General Question		Please describe with a use case and your requirements around "standard entry class codes".	The use of the standard entry class codes would be in accordance with the NACHA operating rules.
11	General Question		Related to taxpayer payment dates, do you want to only allow taxpayer payments to be made for certain ranges of dates up to the final due dates? Example would be business taxpayers who have payments due for June 15th, may only be allowed to make those payments from June 1st to June 15th at midnight CST?	No.
12	General Question		For the Child support payments processed via an ACH file, do you want those reported back via a file or real time?	Currently, Child Support receives a report via file. However Child Support is interested in receiving via real-time in conjunction with a file or other API posting process either batch driven or real-time driven.
13	General Question		For what monetary disbursement categories do you specifically anticipate the use of prepaid cards?	Prepaid cards are part of a separate contract and is not in the scope of this RFP.
14	General Question		How many cards do you anticipate in total, by category?	See response to question 13.
15	General Question		What are the anticipated load amounts for cards across each category of disbursements?	See response to question 13.
16	General Question		Is it a requirement that the vendor be a bank? We are one of the top FinTechs in the U.S. for payment processing and have strong relationships with many of the leading banks that would make us a good fit for the requirements of this RFP.	Yes, it is a requirement to be a National Bank. Refer to Section V.C.1 Neb. Rev. Stat § 77-2301—The bank must be a state or national bank licensed to do business in the State and will cash State warrants free of charge.

This addendum will become part of the RFP and should be acknowledged with the Request for Proposal response.

ADDENDUM TWO
QUESTIONS and ANSWERS

Date: July 31, 2020

To: All Bidders

From: Julie Schiltz, Annette Walton Buyers
AS Materiel State Purchasing Bureau

RE: Addendum for Request for Proposal 6304 Z1 to be opened on August 18, 2020, at 2:00 P.M. Central Time

Questions and Answers

Following are the questions submitted and answers provided for the above mentioned Request for Proposal. The questions and answers are to be considered as part of the Request for Proposal. It is the Bidder's responsibility to check the State Purchasing Bureau website for all addenda or amendments.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
1.	General		Does State of NE offer online gambling (via lottery ticket sales – only)? If "Yes", then please answer question #2 below.	No.
2.	General		Does State of NE have procedures in place to meet requirements of regulations implementing the Unlawful Internet Gambling Enforcement Act of 2006?	N/A
3.	O & S	11	Please describe the purpose for the Trap file from a State perspective.	The Department of Revenue (DOR) uses the TRAP file contents as an input to our processing systems. Ultimately, these transactions are used to update the taxpayer accounts within these Revenue processing systems. The file must contain a copy of all ACH Credit transactions that go into the bank accounts designated for the DOR.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
4.	O & S	11	Please describe the desired contents within the Trap file(s) from an ACH Origination perspective, if any. For instance, are the Trap files to mirror the ACH Origination files the State initiates (aka: file level)? Are the Trap files to mirror the originated items within the ACH Origination files (aka: transaction level)?	The Trap file contains all credits, both those originated and received. Note, there is one offsetting credit for each originated debit from the taxpayers account in the origination files. This is in contrast to the possibility of a single offsetting credit transaction for the originated debits. No, the file must contain both originated and received transactions. See above. The trap file must contain all transactions so that the taxpayer accounts can be correctly updated showing the receipt of funds.
5.	O & S	11	Please describe the desired contents within the Trap file(s) from an ACH Receiver perspective, if any. For instance, are the Trap files to mirror the incoming ACH credit transactions received by the State from its Vendors? Are the Trap files to mirror the received debit transactions by the State from its Vendors?	The trap file doesn't relate to the ACH Receiver.
6.	Liquidated Damages	15	Given the importance noted by the State for quick resolution of connectivity issues between chosen contractor and yourself for exchanging various ACH files and Daily Account Activity Reporting, is it your desire that multiple channels be implemented for business resiliency and continuity purposes? This is recommended because the root cause may not always be within the Contractor's control.	The bidder should provide a response that best meets the requirements in the RFP.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
7.	ACH Trap File	15	Regarding your existing ACH Trap File service. We understand this to be reporting of prior-day incoming ACH credit payments made to the State agencies. These transactions are provided to the State in the original NACHA file format via direct transmission for Accounts Receivable processing. They are not converted to an EDI 820 format. Can you confirm that Is correct?	Yes, that is correct the files are not converted to an EDI 820 format.
8.	Project Overview	29	Please describe the State's process for the enrollment and collection of bank account information for payment to new vendors or employees. Is Bank Account Ownership verification and authentication an area the State would like to enhance?	State agencies instruct vendors to complete the Nebraska W-9 & ACH Enrollment Form (http://das.nebraska.gov/accounting/forms/ACH_W9_Fillable.pdf) with one of the listed attachments. For ACH changes, the vendor must fill in the prior routing and account number information. The agency uploads the form and attachments into the state accounting system. State Accounting monitors the address book queue for final review and creation of the vendor record. The State currently uses the pre-note process to confirm banking information for vendor payments. The bidder should provide a response that best meets the requirements of the RFP including optional enhancements.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
9.	Project Overview	29	Does the State wish to continue collecting and storing sensitive bank account information and managing the needed controls within your internal environment for all processes? Or, is there an interest in outsourcing any of the collection or storage functions to the chosen contractor?	The bidder should provide a response that best meets the requirements of the RFP. The bidder may provide options including storing sensitive bank account information for State Accounting and the payment scheduling system for DOR.
10.	Bank Account	30	Your Treasury staff initiates wires via a secure online portal solution. Has the State investigated the usage of Real Time Payments in the past, to replace some of your wire payment activity? If so, were there any challenges discovered in doing so?	We have investigated Real Time Payments, however, some small banks where the wires are sent, will not accept Real Time Payments and the transaction limit is an issue.
11.	Nebraska Lottery	30	The State currently follows a web-based ACH file verification procedure, manually confirming Lottery payment files and totals. In addition, you utilize balanced ACH files with control totals. Is there a desire to seek a more automated ACH file confirmation and reporting process requiring less manual intervention?	Nebraska Lottery would prefer to use the current procedures so they can reconcile the unique activity for Lottery operations.
12.	Nebraska DOR	31	It was noted that the NOR creates debit ACH files to the contractor, by providing a "one for one" offsetting ACH credit entry for every single ACH debit entry in the file. Can you describe why this practice is currently being done, rather than creating one offsetting ACH credit entry for all the items in the batch? Would it be a benefit to have the bank create all the individual ACH offset entries instead?	The offsetting entries are used to update individual taxpayer accounts. If a single offsetting credit is used, the debit information would need to be provided to DOR and DOR would need to change its processing methodology. No, deviating from the existing process would create additional programming effort on the part of DOR.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
13.	R	31	For Operator Assisted payments, is the Operator State labor or Contractor provided labor? If Contractor provided, please provide the annualized # of payments.	Contractor provided labor for DOR. The three year average for Operator Assisted calls in calendar years 2017, 2018, and 2019 is 1,511 annual payments.
14.	D	31	Is the State interested in the acceptance of credit and debit cards as a method of payment by Web, IVR, or Operator Assisted Channels as part of this Request for Proposal?	NE Child Support uses EPayment services for Echecks (IVR initiated transactions that use a routing and account number Acceptance of credit and debit cards are a separate contract and is not in the scope of this RFP.
15.	D	31	If the acceptance of credit and debit cards as a method of payment are in scope for this Request for Proposal, please provide annualized # of payments and $ value of payments by card type (credit/debit) and by payment channel (Web, IVR, Operator Assisted) for each unique departmental application.	Refer to response to question 14.
16.	D	31	If the acceptance of credit and debit cards as a method of payment are in scope for this Request for Proposal, please provide the desired funding model (A, B, or C) for each unique departmental application. Funding Model options: a. State/"Biller" Funded Model - No Convenience Fee b. State/"Biller" Funded Model - State Collected Service/Convenience Fee c. "No Cost" Service / Convenience Fee - Funded Managed Model	Refer to response to question 14.

Question Number	RFP Section Reference	RFP Page Number	Question	State Response
17.	Nebraska Child Support	33	Please describe why some Child Support payments are currently being made to a VISA branded stored value card. Is this because the custodial parent does not have a bank account, or other reasons? Is the State open to newer digital technology solutions?	This is out of scope of the RFP. The bidder should provide a response that best meets the requirements of the RFP.

This addendum will become part of the RFP and should be acknowledged with the Request for Proposal response.