

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549**

FORM 10-K

Annual report pursuant to Section 13 or 15(d) of
the Securities Exchange Act of 1934

For the fiscal year ended
December 31, 2019

Commission file
number 1-5805

JPMorgan Chase & Co.

(Exact name of registrant as specified in its charter)

Delaware	13-2624428
(State or other jurisdiction of incorporation or organization)	(I.R.S. employer identification no.)
383 Madison Avenue,	
New York, New York	10179
(Address of principal executive offices)	(Zip Code)

Registrant's telephone number, including area code: (212) 270-6000
Securities registered pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Trading Symbol(s)</u>	<u>Name of each exchange on which registered</u>
Common stock	JPM	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 6.125% Non-Cumulative Preferred Stock, Series Y	JPM PR F	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 6.10% Non-Cumulative Preferred Stock, Series AA	JPM PR G	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 6.15% Non-Cumulative Preferred Stock, Series BB	JPM PR H	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 5.75% Non-Cumulative Preferred Stock, Series DD	JPM PR D	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 6.00% Non-Cumulative Preferred Stock, Series EE	JPM PR C	The New York Stock Exchange
Depository Shares, each representing a one-four hundredth interest in a share of 4.75% Non-Cumulative Preferred Stock, Series GG	JPM PR J	The New York Stock Exchange
Alerian MLP Index ETNs due May 24, 2024	AMJ	NYSE Arca, Inc.
Guarantee of Callable Step-Up Fixed Rate Notes due April 26, 2028 of JPMorgan Chase Financial Company LLC	JPM/28	The New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The aggregate market value of JPMorgan Chase & Co. common stock held by non-affiliates as of June 30, 2019: \$354,989,423,493

Number of shares of common stock outstanding as of January 31, 2020: 3,073,976,616

Documents incorporated by reference: Portions of the registrant's Proxy Statement for the annual meeting of stockholders to be held on May 19, 2020, are incorporated by reference in this Form 10-K in response to Items 10, 11, 12, 13 and 14 of Part III.

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Part I

Item 1. Business.

Overview

JPMorgan Chase & Co. (“JPMorgan Chase” or the “Firm”, 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 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.

The Firm’s website is www.jpmorganchase.com. JPMorgan Chase makes available on its website, free of charge, annual reports on Form 10-K, quarterly reports on Form 10-Q and current reports on Form 8-K pursuant to Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934, as soon as reasonably practicable after it electronically files or furnishes such material to the U.S. Securities and Exchange Commission (the “SEC”) at www.sec.gov. The Firm has adopted, and posted on its website, a Code of Conduct for all employees of the Firm and a Code of Ethics for its Chairman and Chief Executive Officer, Chief Financial Officer, Principal Accounting Officer and all other professionals of the Firm worldwide serving in a finance, accounting, treasury, tax or investor relations role.

Business segments

For management reporting purposes, JPMorgan Chase’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 the Corporate & Investment Bank (“CIB”), Commercial Banking (“CB”), and Asset & Wealth Management (“AWM”).

A description of the Firm’s business segments and the products and services they provide to their respective client bases is provided in the “Business segment results” section of Management’s discussion and analysis of financial condition and results of operations (“Management’s

discussion and analysis” or “MD&A”), beginning on page 42 and in Note 32.

Competition

JPMorgan Chase and its subsidiaries and affiliates operate in highly competitive environments. Competitors include other banks, brokerage firms, investment banking companies, merchant banks, hedge funds, commodity trading companies, private equity firms, insurance companies, mutual fund companies, investment managers, credit card companies, mortgage banking companies, trust companies, securities processing companies, automobile financing companies, leasing companies, e-commerce and other internet-based companies, financial technology companies, and other companies engaged in providing similar products and services. The Firm’s businesses generally compete on the basis of the quality and variety of the Firm’s products and services, transaction execution, innovation, reputation and price. Competition also varies based on the types of clients, customers, industries and geographies served. With respect to some of its geographies and products, JPMorgan Chase competes globally; with respect to others, the Firm competes on a national or regional basis.

Competition in the financial services industry continues to be intense. In some cases, the Firm’s businesses compete with other financial institutions that may have a stronger local presence in certain geographies or that operate under different rules and regulatory regimes than the Firm, and with companies that provide new or innovative products or services, including those that the Firm does not provide.

Supervision and regulation

The Firm is subject to extensive and comprehensive regulation under U.S. federal and state laws, as well as the applicable laws of the jurisdictions outside the U.S. in which the Firm does business.

Financial holding company:

Consolidated supervision. JPMorgan Chase & Co. is a bank holding company (“BHC”) and a financial holding company (“FHC”) under U.S. federal law, and is subject to comprehensive consolidated supervision, regulation and examination by the Board of Governors of the Federal Reserve System (the “Federal Reserve”). The Federal Reserve acts as an “umbrella regulator,” and certain of JPMorgan Chase’s subsidiaries are also regulated directly by additional authorities based on the activities of those subsidiaries.

JPMorgan Chase’s national bank subsidiary, JPMorgan Chase Bank, N.A., is supervised and regulated by the Office of the Comptroller of the Currency (“OCC”) and, with respect to certain matters, by the Federal Deposit Insurance Corporation (the “FDIC”).

JPMorgan Chase’s U.S. broker-dealers are supervised and regulated by the Securities and Exchange Commission

Part I

(“SEC”) and the Financial Industry Regulatory Authority (“FINRA”), and subsidiaries of the Firm that engage in certain futures-related and swaps-related activities are supervised and regulated by the Commodity Futures Trading Commission (“CFTC”). J.P. Morgan Securities plc is a U.K.-based bank regulated by the U.K. Prudential Regulation Authority (the “PRA”) and the U.K. Financial Conduct Authority (“FCA”).

The Firm’s other non-U.S. subsidiaries are regulated by the banking, securities, prudential and conduct regulatory authorities in the countries in which they operate.

Permissible business activities. The Bank Holding Company Act restricts BHCs from engaging in business activities other than the business of banking and certain closely-related activities. FHCs can engage in a broader range of financial activities, including underwriting, dealing and making markets in securities, and making merchant banking investments in non-financial companies. The Federal Reserve has the authority to limit an FHC’s ability to conduct otherwise permissible activities if the FHC or any of its depository institution subsidiaries ceases to meet applicable eligibility requirements. The Federal Reserve may also impose corrective capital and/or managerial requirements on the FHC, and if deficiencies are persistent, may require divestiture of the FHC’s depository institutions. If any depository institution controlled by an FHC fails to maintain a satisfactory rating under the Community Reinvestment Act, the Federal Reserve must prohibit the FHC and its subsidiaries from engaging in any activities other than those permissible for BHCs.

Capital and liquidity requirements. The Federal Reserve establishes capital, liquidity and leverage requirements for JPMorgan Chase and evaluates the Firm’s compliance with those requirements. The OCC establishes similar requirements for JPMorgan Chase Bank, N.A. Banking supervisors globally continue to refine and enhance the Basel III capital framework for financial institutions.

In January 2019, the Basel Committee issued “Minimum capital requirements for market risk,” which supersedes a previous release from January 2016. The Basel Committee expects national regulators to implement these revised market risk requirements for banking organizations in their jurisdictions by January 1, 2022, in line with the other elements of the Basel III Reforms.

U.S. banking regulators have announced their support for the issuance of the Basel III Reforms and are considering how to appropriately apply such reforms in the U.S. Any changes to U.S. capital rules based on the Basel III Reforms would first be proposed for public comment. In 2018, the Federal Reserve and the OCC released a proposal to revise the enhanced supplementary leverage ratio (“eSLR”) requirements applicable to the U.S. global systemically important banks (“GSIBs”) and their insured depository institutions (“IDIs”) and to make conforming changes to the rules which are applicable to U.S. GSIBs relating to total loss-absorbing capacity (“TLAC”) and external long-term

debt that must satisfy certain eligibility criteria. Final requirements have not yet been issued. In November 2019, the U.S. banking regulators adopted a rule implementing “Standardized Approach for Counterparty Credit Risk” (“SA-CCR”), which will be effective in April 2020 and which has a mandatory compliance date of January 1, 2022.

Under Basel III, bank holding companies and banks are required to measure their liquidity against two specific liquidity tests: the liquidity coverage ratio (“LCR”) and the net stable funding ratio (“NSFR”). In 2016, the U.S. banking regulators issued a proposed rule for NSFR, but no final rule has been issued.

Refer to Capital Risk Management on pages 85–92 and Liquidity Risk Management on pages 93–98 .

Stress tests. As a large BHC, JPMorgan Chase is subject to supervisory stress testing administered by the Federal Reserve as part of the Federal Reserve’s annual Comprehensive Capital Analysis and Review (“CCAR”) framework. The Firm must conduct annual company-run stress tests and must also submit an annual capital plan to the Federal Reserve, taking into account the results of separate stress tests designed by the Firm and the Federal Reserve. The Firm is required to receive a notice of non-objection from the Federal Reserve each year before taking capital actions, such as paying dividends, implementing common equity repurchase programs or redeeming or repurchasing capital instruments. The OCC requires JPMorgan Chase Bank, N.A. to perform separate, similar stress tests annually. The Firm publishes each year the results of the annual stress tests for the Firm and JPMorgan Chase Bank, N.A. under the supervisory “severely adverse” scenarios provided by the Federal Reserve and the OCC. The Firm is required to file its 2020 annual CCAR submission on April 6, 2020. Results will be published by the Federal Reserve by June 30, 2020, with disclosures of results by BHCs, including the Firm, to follow within 15 days.

In April 2018, the Federal Reserve proposed the introduction of a stress buffer framework that would create a single, integrated set of capital requirements by combining the supervisory stress test results of the CCAR assessment and those under the Dodd-Frank Act with current point-in-time capital requirements. In December 2019, the Federal Reserve indicated that it intends to have the stress buffer framework in place for the 2020 stress tests. Final requirements have not yet been issued.

Refer to Capital Risk Management on pages 85–92 for more information concerning the Firm’s CCAR.

Enhanced prudential standards. As part of its mandate to identify and monitor risks to the financial stability of the U.S. posed by large banking organizations, the Financial Stability Oversight Council (“FSOC”) recommends prudential standards and reporting requirements to the Federal Reserve for systemically important financial institutions (“SIFIs”), such as JPMorgan Chase. The Federal Reserve has adopted several rules to implement those heightened

prudential standards, including rules relating to risk management and corporate governance of subject BHCs. Large BHCs such as JPMorgan Chase are required to comply with enhanced liquidity and overall risk management standards, including oversight by the board of directors of risk management activities.

Resolution and recovery. The Firm is required to submit periodically to the Federal Reserve and the FDIC a plan for resolution under Title I of the Dodd-Frank Wall Street Reform and Consumer Protection Act (“Dodd-Frank Act”) in the event of material distress or failure (a “resolution plan”). On December 17, 2019, the Firm received feedback from the Federal Reserve and FDIC on its 2019 resolution plan that set forth certain expectations for further enhancement of the Firm’s resolution capabilities and provided initial expectations for the Firm’s next resolution plan, but did not identify shortcomings or deficiencies. In the future, the Firm’s resolution plan submissions will alternate between “targeted” and “full” plans, with the Firm’s next “targeted” resolution plan due to be filed on or before July 1, 2021. The Firm also has a comprehensive recovery plan summarizing the actions it would take to avoid failure by remaining well-capitalized and well-funded in the case of an adverse event.

JPMorgan Chase Bank, N.A. is also required to provide a resolution plan to the FDIC. The FDIC has proposed changes to its rules relating to the resolution plans of IDIs in an advanced notice of proposed rulemaking. The OCC has published guidelines establishing standards for recovery planning by insured national banks, and JPMorgan Chase Bank, N.A. has submitted its recovery plan to the OCC.

Certain of the Firm’s non-U.S. subsidiaries are also subject to local resolution and recovery planning requirements.

Orderly liquidation authority. Certain financial companies, including JPMorgan Chase and certain of its subsidiaries, can also be subjected to resolution under an “orderly liquidation authority.” The U.S. Treasury Secretary, in consultation with the President of the United States, must first make certain determinations concerning extraordinary financial distress and systemic risk, and action must be recommended by the FDIC and the Federal Reserve. Absent such actions, the Firm, as a BHC, would remain subject to resolution under the Bankruptcy Code. The FDIC has issued a draft policy statement describing its “single point of entry” strategy for resolution of SIFIs under the orderly liquidation authority, which seeks to keep operating subsidiaries of a BHC open and impose losses on shareholders and creditors of the BHC in receivership according to their statutory order of priority.

Holding company as a source of strength. JPMorgan Chase & Co. is required to serve as a source of financial strength for its depository institution subsidiaries and to commit resources to support those subsidiaries, including when directed to do so by the Federal Reserve.

Regulation of acquisitions. Acquisitions by BHCs and their banks are subject to multiple requirements established by the Federal Reserve and the OCC. For example, FHCs and BHCs are required to obtain the approval of the Federal Reserve before they may acquire more than 5% of the voting shares of an unaffiliated bank. In addition, acquisitions by financial companies are prohibited if, as a result of the acquisition, the total liabilities of the financial company would exceed 10% of the total liabilities of all financial companies. Furthermore, for certain acquisitions, the Firm must provide written notice to the Federal Reserve prior to acquiring direct or indirect ownership or control of any voting shares of any company with over \$10 billion in assets that is engaged in activities that are “financial in nature.”

Volcker Rule. The Volcker Rule prohibits banking entities, including the Firm, from engaging in certain “proprietary trading” activities, subject to exceptions for underwriting, market-making, risk-mitigating hedging and certain other activities. The Volcker Rule also limits the sponsorship of, and investment in, “covered funds,” and imposes limits on certain transactions between the Firm and covered funds for which a JPMorgan Chase entity serves as the investment manager, investment advisor, commodity trading advisor or sponsor, as well as certain covered funds controlled by such funds. The Volcker Rule requires banking entities to establish comprehensive compliance programs reasonably designed to help ensure and monitor compliance with the restrictions under the Volcker Rule. In August 2019, the Federal Reserve and other regulatory agencies finalized revisions to the proprietary trading restrictions of the Volcker Rule, including simplifications to the Volcker Rule’s framework for demonstrating compliance with the permitted activities under the rule. On January 30, 2020, the agencies proposed revisions to the Volcker Rule’s provisions relating to covered funds that would streamline the existing exclusion for non-U.S. public funds and introduce new exclusions for new classes of funds and from existing prohibitions on engaging in “covered transactions” with covered funds.

Consent orders. The Firm remains subject to consent orders entered into with its banking regulators between 2014 and 2016 concerning foreign exchange trading and referral hiring practices.

Subsidiary banks:

The activities of JPMorgan Chase Bank, N.A., the Firm’s principal subsidiary bank, are limited to those specifically authorized under the National Bank Act and related interpretations of the OCC. The OCC has authority to bring an enforcement action against JPMorgan Chase Bank, N.A. for unsafe or unsound banking practices, which could include limiting JPMorgan Chase Bank, N.A.’s ability to conduct otherwise permissible activities, or imposing corrective capital and/or managerial requirements on the bank.

Part I

FDIC deposit insurance. The FDIC deposit insurance fund provides insurance coverage for certain deposits and is funded through assessments on banks, such as JPMorgan Chase Bank, N.A.

FDIC powers upon a bank insolvency. Upon the insolvency of an IDI, such as JPMorgan Chase Bank, N.A., the FDIC could be appointed as conservator or receiver under the Federal Deposit Insurance Act. The FDIC has broad powers to transfer assets and liabilities without the approval of the institution's creditors.

Prompt corrective action. The Federal Deposit Insurance Corporation Improvement Act of 1991 requires the relevant federal banking regulator to take "prompt corrective action" with respect to a depository institution if that institution does not meet certain capital adequacy standards. Although these regulations apply only to banks, such as JPMorgan Chase Bank, N.A., the Federal Reserve is authorized to take appropriate action against the parent BHC, such as JPMorgan Chase & Co., based on the undercapitalized status of any bank subsidiary. In certain instances, the BHC would be required to guarantee the performance of the capital restoration plan for its undercapitalized subsidiary.

OCC Heightened Standards. The OCC has established guidelines setting forth heightened standards for large banks, including minimum standards for the design and implementation of a risk governance framework for banks. Under these standards, a bank's risk governance framework must ensure that the bank's risk profile is easily distinguished and separate from that of its parent BHC for risk management purposes. The bank's board or risk committee is responsible for approving the bank's risk governance framework, providing active oversight of the bank's risk-taking activities, and holding management accountable for adhering to the risk governance framework.

Restrictions on transactions with affiliates. JPMorgan Chase Bank, N.A. and its subsidiaries are subject to restrictions imposed by federal law on extensions of credit to, investments in stock or securities of, and derivatives, securities lending and certain other transactions with, JPMorgan Chase & Co. and certain other affiliates. These restrictions prevent JPMorgan Chase & Co. and other affiliates from borrowing from such subsidiaries unless the loans are secured in specified amounts and comply with certain other requirements.

Dividend restrictions. Federal law imposes limitations on the payment of dividends by national banks, such as JPMorgan Chase Bank, N.A. Refer to Note 26 for the amount of dividends that JPMorgan Chase Bank, N.A. could pay, at January 1, 2020, to JPMorgan Chase without the approval of the banking regulators. The OCC and the Federal Reserve also have authority to prohibit or limit the payment of dividends of a bank subsidiary that they supervise 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 bank.

Depositor preference. Under federal law, the claims of a receiver of an IDI for administrative expense and the claims of holders of U.S. deposit liabilities (including the FDIC and deposits in non-U.S. branches that are dually payable in the U.S. and in a non-U.S. branch) have priority over the claims of other unsecured creditors of the institution, including depositors in non-U.S. branches and public noteholders.

Consumer supervision and regulation. JPMorgan Chase and JPMorgan Chase Bank, N.A. are subject to supervision and regulation by the Consumer Financial Protection Bureau ("CFPB") with respect to federal consumer protection laws, including laws relating to fair lending and the prohibition of unfair, deceptive or abusive acts or practices in connection with the offer, sale or provision of consumer financial products and services. The CFPB also has jurisdiction over small business lending activities with respect to fair lending and the Equal Credit Opportunity Act. As part of its regulatory oversight, the CFPB has authority to take enforcement actions against firms that offer certain products and services to consumers using practices that are deemed to be unfair, deceptive or abusive. The Firm's consumer activities are also subject to regulation under state statutes which are enforced by the Attorney General or empowered agency of each state.

Securities and broker-dealer regulation:

The Firm conducts securities underwriting, dealing and brokerage activities in the U.S. through J.P. Morgan Securities LLC and other non-bank broker-dealer subsidiaries, all of which are subject to regulations of the SEC, FINRA and the New York Stock Exchange, among others. The Firm conducts similar securities activities outside the U.S. subject to local regulatory requirements. In the U.K., those activities are conducted by J.P. Morgan Securities plc. Broker-dealers are subject to laws and regulations covering all aspects of the securities business, including sales and trading practices, securities offerings, publication of research reports, use of customer funds, the financing of client purchases, capital structure, record-keeping and retention, and the conduct of their directors, officers and employees. Refer to Broker-dealer regulatory capital on page 92 for information concerning the capital of J.P. Morgan Securities LLC and J.P. Morgan Securities plc.

Investment management regulation:

The Firm's asset and wealth management businesses are subject to significant regulation in jurisdictions around the world relating to, among other things, the safeguarding and management of client assets, offerings of funds and marketing activities. Certain of the Firm's subsidiaries are registered with, and subject to oversight by, the SEC as investment advisers. The Firm's registered investment advisers are subject to the fiduciary and other obligations imposed under the Investment Advisers Act of 1940, as well as various state securities laws. The Firm's fiduciary activities are also subject to supervision by the OCC.

The Firm's asset and wealth management businesses continue to be affected by ongoing rule-making and

implementation of new regulations, including the SEC's Regulation Best Interest, which becomes operative on June 30, 2020, and rules proposed or adopted by certain U.S. states relating to enhanced standards of conduct for broker-dealers and certain other market participants.

Derivatives regulation:

The Firm is subject to comprehensive regulation of its derivatives businesses, including regulations that impose capital and margin requirements, require central clearing of standardized over-the-counter ("OTC") derivatives, mandate that certain standardized over-the-counter swaps be traded on regulated trading venues, and provide for reporting of certain mandated information. In accordance with requirements under the Dodd-Frank Act, JPMorgan Chase Bank, N.A., J.P. Morgan Securities LLC and J.P. Morgan Securities plc have registered with the CFTC as "swap dealers" and may be required to register with the SEC as "security-based swap dealers." As a result, these entities are or will be subject to a comprehensive regulatory framework applicable to their swap or security-based swap activities, including capital requirements, rules requiring the collateralization of uncleared swaps and security-based swaps, rules regarding segregation of counterparty collateral, business conduct and documentation standards, record-keeping and reporting obligations, and anti-fraud and anti-manipulation requirements. In the European Union ("EU"), the implementation of the European Market Infrastructure Regulation ("EMIR") and substantial revisions to the Markets in Financial Instruments Directive ("MiFID II") has resulted in comparable, but not identical, changes to the European regulatory regime for derivatives.

The Firm and other derivatives market participants have agreed to adhere to several protocols developed by the International Swaps and Derivatives Association ("ISDA") in response to regulator concerns that the close-out of derivatives and other financial transactions during the resolution of a large cross-border financial institution could impede resolution efforts and potentially destabilize markets. These protocols provide for the contractual recognition of cross-border stays under various statutory resolution regimes and, in the case of certain of the protocols, a contractual stay on certain cross-default rights.

J.P. Morgan Securities LLC is registered with the CFTC as a futures commission merchant, and is a member of the National Futures Association.

Data and cyber regulation:

The Firm and its subsidiaries are subject to numerous U.S. federal and state as well as international laws and regulations concerning the collection, use, confidentiality, disclosure, transfer, protection and handling of information, including personal information of individuals and confidential information (including the EU General Data Protection Regulation), as well as the management of internal and external threats and vulnerabilities to protect information assets and the supporting infrastructure from cyberattacks. These laws and regulations are evolving at a rapid pace, remain a focus of regulators globally and will

continue to have a significant impact on all of the Firm's businesses.

The Bank Secrecy Act and Economic Sanctions:

The Bank Secrecy Act ("BSA") requires all financial institutions, including banks and securities broker-dealers, to establish a risk-based system of internal controls reasonably designed to prevent money laundering and the financing of terrorism. The BSA includes a variety of record-keeping and reporting requirements, as well as due diligence/know-your-customer documentation requirements. The Firm is also subject to the regulations and economic sanctions programs administered by the U.S. Treasury's Office of Foreign Assets Control ("OFAC"). In addition, the EU has adopted various economic sanctions programs targeted at entities or individuals that are, or are located in countries that are, involved in terrorism, hostilities, embezzlement or human rights violations.

Anti-Corruption:

The Firm is subject to laws and regulations relating to corrupt and illegal payments to government officials and others in the jurisdictions in which it operates, including the U.S. Foreign Corrupt Practices Act and the U.K. Bribery Act.

Compensation practices:

The Firm's compensation practices are subject to oversight by the Federal Reserve, as well as other agencies. The Federal Reserve has issued guidance jointly with the FDIC and the OCC that is designed to ensure that incentive compensation paid by banking organizations does not encourage imprudent risk-taking that threatens the organizations' safety and soundness. The Financial Stability Board ("FSB") has also established standards covering compensation principles for banks. The Firm's compensation practices are also subject to regulation and oversight by regulators in other jurisdictions, notably the EU Fourth Capital Requirements Directive ("CRD IV"), which includes compensation-related provisions. The European Banking Authority has instituted guidelines on compensation policies which in certain countries, such as the U.K., are implemented or supplemented by local regulations or guidelines. The Firm expects that the implementation of regulatory guidelines regarding compensation in the U.S. and other countries will continue to evolve, and may affect the manner in which the Firm structures its compensation programs and practices.

Other significant international regulatory initiatives:

The EU continues to implement an extensive and complex program of regulatory enhancement. Amendments to EMIR, known as "EMIR REFIT," entered into force during 2019 and made targeted changes to EMIR to make the rules more streamlined and proportionate. While most of the changes already apply, some will take effect in 2020 and 2021. This will include a new requirement for clearing firms to provide clearing services on "fair, reasonable, non-discriminatory and transparent commercial terms" as well as changes to the EMIR reporting rules.

Part I

The European Commission (“EC”) has begun its review of MiFID II, which will continue into 2020, with the EC expected to publish a legislative proposal for changes to MiFID II. MiFID II, which became effective in 2018, requires the trading of shares and certain OTC derivatives to take place on trading venues, and also significantly enhanced requirements for pre- and post-trade transparency, transaction reporting and investor protection, and introduced position limits and a reporting regime for commodities. The extent of the changes that will be proposed under the MiFID II review is not known.

The EU capital and liquidity legislation for banks and investment firms implemented many of the finalized Basel III capital and liquidity standards, including in relation to the leverage ratio, market risk capital, and a net stable funding ratio. These changes will begin to take effect from June 2021. The final EU legislation also includes a requirement for certain non-EU banks operating in the EU to establish an intermediate parent undertaking (“IPU”) located in the EU. The IPU rule will allow a second IPU to be established if a single IPU would conflict with “home country” bank separation rules or impede resolvability.

The EU has also proposed or implemented significant revisions to laws covering securities settlement, mutual funds and pensions, payments, anti-money laundering controls, data security and privacy, transparency and disclosure of securities financing transactions, benchmarks, and resolution of banks, investment firms and market infrastructures, such as central counterparties.

Item 1A. Risk Factors.

The following discussion sets forth the material risk factors that could affect JPMorgan Chase’s financial condition and operations. Readers should not consider any descriptions of these factors to be a complete set of all potential risks that could affect the Firm. Any of the risk factors discussed below could by itself, or combined with other factors, materially and adversely affect JPMorgan Chase’s business, results of operations, financial condition, capital position, liquidity, competitive position or reputation, including by materially increasing expenses or decreasing revenues, which could result in material losses or a decrease in earnings.

Regulatory

JPMorgan Chase’s businesses are highly regulated, and the laws and regulations that apply to JPMorgan Chase have a significant impact on its business and operations.

JPMorgan Chase is a financial services firm with operations worldwide. JPMorgan Chase must comply with the laws, rules and regulations that apply to its operations in all of the jurisdictions around the world in which it does business. Regulation of financial services is extensive.

JPMorgan Chase has experienced an extended period of significant change in laws and regulations affecting the financial services industry, both within and outside the U.S. The supervision of financial services firms also expanded

significantly. The increased regulation and supervision of JPMorgan Chase has affected the way that it conducts its business and structures its operations. Existing and new laws and regulations and expanded supervision could require JPMorgan Chase to make further changes to its business and operations. These changes could result in JPMorgan Chase incurring additional costs for complying with laws and regulations and could reduce its profitability. For example, existing and new laws and regulations have in the past and could in the future require JPMorgan Chase to:

- limit the products and services that it offers
- reduce the liquidity that it can provide through its market-making activities
- stop or discourage it from engaging in business opportunities that it might otherwise pursue
- recognize losses in the value of assets that it holds
- pay higher taxes, assessments, levies or other governmental charges, including in connection with the resolution of tax examinations
- dispose of certain assets, and do so at times or prices that are disadvantageous
- impose restrictions on certain business activities, or
- increase the prices that it charges for products and services, which could reduce the demand for them.

Differences in financial services regulation can be disadvantageous for JPMorgan Chase’s business.

The content and application of laws and regulations affecting financial services firms sometimes vary according to factors such as the size of the firm, the jurisdiction in which it is organized or operates, and other criteria. For example:

- larger firms are often subject to more stringent supervision and regulation
- financial technology companies and other non-traditional competitors may not be subject to banking regulation, or may be supervised by a national or state regulatory agency that does not have the same resources or regulatory priorities as the regulatory agencies which supervise more diversified financial services firms, or
- the financial services regulatory framework in a particular jurisdiction may favor financial institutions that are based in that jurisdiction.

These differences in the regulatory framework can result in a firm such as JPMorgan Chase losing market share to competitors that are less regulated or not subject to regulation, especially with respect to unregulated financial products.

There can also be significant differences in the ways that similar regulatory initiatives affecting the financial services industry are implemented in the U.S. and in other countries

and regions in which JPMorgan Chase does business. For example, when adopting rules that are intended to implement a global regulatory initiative or standard, a national regulator may introduce additional or more restrictive requirements, which can create competitive disadvantages for financial services firms, such as JPMorgan Chase, that may be subject to those enhanced regulations.

Legislative and regulatory initiatives outside the U.S. could require JPMorgan Chase to make significant modifications to its operations and legal entity structure in the relevant countries or regions in order to comply with those requirements. These include laws and regulations that have been adopted or proposed relating to:

- the resolution of financial institutions
- the establishment of locally-based intermediate holding companies or operating subsidiaries
- requirements to maintain minimum amounts of capital or liquidity in locally-based subsidiaries
- the separation (or “ring fencing”) of core banking products and services from markets activities
- requirements for executing or settling transactions on exchanges or through central counterparties (“CCPs”)
- position limits and reporting rules for derivatives
- governance and accountability regimes
- conduct of business requirements, and
- restrictions on compensation.

These types of differences in financial services regulation, or inconsistencies or conflicts between laws and regulations between different jurisdictions, could require JPMorgan Chase to:

- divest assets or restructure its operations
- absorb increased operational, capital and liquidity costs
- change the prices that it charges for its products and services
- curtail the products and services that it offers to its customers and clients, or
- incur higher costs for complying with different legal and regulatory frameworks.

Any or all of these factors could harm JPMorgan Chase’s ability to compete against other firms that are not subject to the same laws and regulations or supervisory oversight, or harm JPMorgan Chase’s businesses, results of operations and profitability.

Heightened regulatory scrutiny of JPMorgan Chase’s businesses has increased its compliance costs and could result in restrictions on its operations.

JPMorgan Chase’s operations are subject to heightened oversight and scrutiny from regulatory authorities in many jurisdictions where JPMorgan Chase does business.

JPMorgan Chase has paid significant fines, provided other monetary relief, incurred other penalties and experienced other repercussions in connection with resolving several investigations and enforcement actions by governmental agencies. JPMorgan Chase could become subject to similar regulatory resolutions or other actions in the future, and addressing the requirements of any such resolutions or actions could result in JPMorgan Chase incurring higher operational and compliance costs or needing to comply with other restrictions.

In connection with resolving specific regulatory investigations or enforcement actions, certain regulators have required JPMorgan Chase and other financial institutions to admit wrongdoing with respect to the activities that gave rise to the resolution. These types of admissions can lead to:

- greater exposure in civil litigation
- damage to reputation
- disqualification from doing business with certain clients or customers, or in specific jurisdictions, or
- other direct and indirect adverse effects.

Furthermore, U.S. government officials have demonstrated a willingness to bring criminal actions against financial institutions and have demanded that institutions plead guilty to criminal offenses or admit other wrongdoing in connection with resolving regulatory investigations or enforcement actions. Resolutions of this type can have significant collateral consequences for the subject financial institution, including:

- loss of clients, customers and business
- restrictions on offering certain products or services, and
- losing permission to operate certain businesses, either temporarily or permanently.

JPMorgan Chase expects that it and other financial services firms will continue to be subject to heightened regulatory scrutiny and governmental investigations and enforcement actions. JPMorgan Chase also expects that regulators will continue to insist that financial institutions be penalized for actual or deemed violations of law with formal and punitive enforcement actions, including the imposition of significant monetary and other sanctions, rather than resolving these matters through informal supervisory actions. Furthermore, if JPMorgan Chase fails to meet the requirements of any resolution of a governmental investigation or enforcement action, or to maintain risk and control processes that meet

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the heightened standards established by its regulators, it could be required to:

- enter into further resolutions of investigations or enforcement actions
- pay additional regulatory fines, penalties or judgments, or
- accept material regulatory restrictions on, or changes in the management of, its businesses.

In these circumstances, JPMorgan Chase could also become subject to other sanctions, or to prosecution or civil litigation with respect to the conduct that gave rise to an investigation or enforcement action.

Complying with economic sanctions and anti-corruption and anti-money laundering laws and regulations can increase JPMorgan Chase's operational and compliance costs and risks.

JPMorgan Chase must comply with economic sanctions and embargo programs administered by the Office of Foreign Assets Control ("OFAC") and similar national and multi-national bodies and governmental agencies outside the U.S., as well as anti-corruption and anti-money laundering laws and regulations throughout the world. JPMorgan Chase can incur higher costs and face greater compliance risks in structuring and operating its businesses to comply with these requirements. Furthermore, a violation of a sanction or embargo program or anti-corruption or anti-money laundering laws and regulations could subject JPMorgan Chase, and individual employees, to regulatory enforcement actions as well as significant civil and criminal penalties.

JPMorgan Chase's operations can be constrained in countries with less predictable legal and regulatory frameworks.

If the legal and regulatory system in a particular country is less predictable, this can create a more difficult environment in which to conduct business. For example, any of the following could hamper JPMorgan Chase's operations and reduce its earnings in these types of countries:

- the absence of a statutory or regulatory basis or guidance for engaging in specific types of business or transactions
- conflicting or ambiguous laws and regulations, or the inconsistent application or interpretation of existing laws and regulations
- uncertainty concerning the enforceability of contractual, intellectual property or other obligations
- difficulty in competing in economies in which the government controls or protects all or a portion of the local economy or specific businesses, or where graft or corruption may be pervasive, and
- the threat of arbitrary regulatory investigations, civil litigations or criminal prosecutions, the termination of licenses required to operate in the local market or the

suspension of business relationships with governmental bodies.

Conducting business in countries with less predictable legal and regulatory regimes could require JPMorgan Chase to devote significant additional resources to understanding, and monitoring changes in, local laws and regulations, as well as structuring its operations to comply with local laws and regulations and implementing and administering related internal policies and procedures.

There can be no assurance that JPMorgan Chase will always be successful in its efforts to fully understand and to conduct its business in compliance with the laws and regulations of all of the jurisdictions in which it operates, and the risk of non-compliance can be greater in countries that have less predictable legal and regulatory systems.

Requirements for the orderly resolution of JPMorgan Chase could result in JPMorgan Chase having to restructure or reorganize its businesses.

JPMorgan Chase is required under Federal Reserve and FDIC rules to prepare and submit periodically to those agencies a detailed plan for rapid and orderly resolution in bankruptcy, without extraordinary government support, in the event of material financial distress or failure. The agencies' evaluation of JPMorgan Chase's resolution plan may change, and the requirements for resolution plans may be modified from time to time. Any such determinations or modifications could result in JPMorgan Chase needing to make changes to its legal entity structure or to certain internal or external activities, which could increase its funding or operational costs, or hamper its ability to serve clients and customers.

If the Federal Reserve and the FDIC were to determine that a resolution plan submitted by JPMorgan Chase has deficiencies, they could jointly impose more stringent capital, leverage or liquidity requirements or restrictions on JPMorgan Chase's growth, activities or operations. After two years, if the deficiencies are not cured, the agencies could also require that JPMorgan Chase restructure, reorganize or divest assets or businesses in ways that could materially and adversely affect JPMorgan Chase's operations and strategy.

Holders of JPMorgan Chase & Co.'s debt and equity securities will absorb losses if it were to enter into a resolution.

Federal Reserve rules require that JPMorgan Chase & Co. (the "Parent Company") maintain minimum levels of unsecured external long-term debt and other loss-absorbing capacity with specific terms ("eligible LTD") for purposes of recapitalizing JPMorgan Chase's operating subsidiaries if the Parent Company were to enter into a resolution either:

- in a bankruptcy proceeding under Chapter 11 of the U.S. Bankruptcy Code, or
- in a receivership administered by the FDIC under Title II of the Dodd-Frank Act ("Title II").

If the Parent Company were to enter into a resolution, holders of eligible LTD and other debt and equity securities of the Parent Company will absorb the losses of the Parent Company and its subsidiaries.

The preferred “single point of entry” strategy under JPMorgan Chase’s resolution plan contemplates that only the Parent Company would enter bankruptcy proceedings. JPMorgan Chase’s subsidiaries would be recapitalized, as needed, so that they could continue normal operations or subsequently be divested or wound down in an orderly manner. As a result, the Parent Company’s losses and any losses incurred by its subsidiaries would be imposed first on holders of the Parent Company’s equity securities and thereafter on its unsecured creditors, including holders of eligible LTD and other debt securities. Claims of holders of those securities would have a junior position to the claims of creditors of JPMorgan Chase’s subsidiaries and to the claims of priority (as determined by statute) and secured creditors of the Parent Company.

Accordingly, in a resolution of the Parent Company in bankruptcy, holders of eligible LTD and other debt securities of the Parent Company would realize value only to the extent available to the Parent Company as a shareholder of JPMorgan Chase Bank, N.A. and its other subsidiaries, and only after any claims of priority and secured creditors of the Parent Company have been fully repaid.

The FDIC has similarly indicated that a single point of entry recapitalization model could be a desirable strategy to resolve a systemically important financial institution, such as the Parent Company, under Title II. However, the FDIC has not formally adopted a single point of entry resolution strategy.

If the Parent Company were to approach, or enter into, a resolution, none of the Parent Company, the Federal Reserve or the FDIC is obligated to follow JPMorgan Chase’s preferred strategy, and losses to holders of eligible LTD and other debt and equity securities of the Parent Company, under whatever strategy is ultimately followed, could be greater than they might have been under JPMorgan Chase’s preferred strategy.

Political

The departure of the U.K. from the EU could negatively affect JPMorgan Chase’s business, results of operations and operating model.

It remains highly uncertain how the departure of the U.K. from the EU, which is commonly referred to as “Brexit,” will affect financial services firms such as JPMorgan Chase that conduct substantial operations in the EU from legal entities that are organized in or operating from the U.K. It is possible that the transition period following the U.K.’s departure from the EU on January 31, 2020 will expire on December 31, 2020 without any agreement having been reached between the U.K. and the EU concerning whether or to what extent U.K.-based firms may conduct financial services activities within the EU. It is also possible that any

agreement reached between the U.K. and the EU may, depending on the final outcome of the ongoing negotiations and related legislative developments:

- impede the ability of U.K.-based financial services firms to conduct business in the EU
- fail to address significant unresolved issues relating to the cross-border conduct of financial services activities, or
- apply only temporarily.

JPMorgan Chase has been making appropriate modifications to its legal entity structure and operations in the EU, the locations in which it operates and the staffing in those locations to address the departure of the U.K. from the EU. If the U.K. and the EU fail to reach an agreement on their future relationship before the end of the transition period or if any other outcome persists that does not assure ongoing access for U.K.-based financial services firms to the EU market, the types of structural and operational changes that JPMorgan Chase is in the process of making to its European operations may result in JPMorgan Chase having to sustain a more fragmented operating model across its U.K., EU and other operating entities. Due to considerations such as operating expenses, liquidity, leverage and capital, the modified European operating framework will be more complex, less efficient and more costly than would otherwise have been the case.

A disorderly withdrawal of the U.K. from the EU, or unexpected consequences of the withdrawal, could have significant and immediate destabilizing effects on economic and market conditions in the region and globally. In particular, cross-border financial services activities could be severely disrupted depending on circumstances that may exist following the withdrawal, including:

- the possibility that financial institutions, their clients and counterparties, and other market participants may not be positioned to continue to do business through EU-based legal entities
- reduction or fragmentation of market liquidity that may be caused if significant market participants (including trading venues and CCPs) that are currently based in the U.K. have not completed arrangements to conduct operations from the EU either in the near term or, if authorized to continue to operate from the U.K. on a transitional basis, after any transitional or temporary relief has expired
- uncertainties concerning the application and interpretation of laws and regulations relating to cross-border financial services activities
- inability to engage in certain financial services activities through EU-based legal entities to the extent that licenses or temporary permission to engage in such activities have not been granted timely by local regulators

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- unexpected or unfavorable changes in laws and regulations, governmental policies or public sentiment, and
- losses due to process errors or incorrect judgments concerning economic, political or regulatory developments.

Any or all of the above factors could have an adverse effect on the overall operation of the European financial services market as well as JPMorgan Chase's business, operations and earnings in the U.K., the EU and globally.

Economic uncertainty or instability caused by political developments can hurt JPMorgan Chase's businesses.

The economic environment and market conditions in which JPMorgan Chase operates continue to be uncertain due to political developments in the U.S. and other countries. Certain monetary, fiscal and other policy initiatives and proposals could cause a contraction in U.S. and global economic growth and higher volatility in the financial markets, including:

- monetary and fiscal policies and actions taken by the Federal Reserve and other central banks or governmental authorities, including any suspension or reversal of large-scale asset purchases
- inability to reach political consensus to keep the U.S. government open
- isolationist foreign policies
- the implementation of tariffs and other protectionist trade policies
- political pressure on monetary policy decisions of central banks, or
- the possible withdrawal or reduction of government support for the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation (together, the "U.S. GSEs").

These types of political developments, and uncertainty about the possible outcomes of these developments, could:

- erode investor confidence in the U.S. economy and financial markets, which could potentially undermine the status of the U.S. dollar as a safe haven currency
- provoke retaliatory countermeasures by other countries and otherwise heighten tensions in diplomatic relations
- increase concerns about whether the U.S. government will be funded, and its outstanding debt serviced, at any particular time, and
- result in periodic shutdowns of the U.S. government or governments in other countries.

These factors could lead to:

- slower growth rates, rising inflation or recession
- greater market volatility

- a contraction of available credit and the widening of credit spreads
- diminished investor and consumer confidence
- lower investment growth
- large-scale sales of government debt and other debt and equity securities in the U.S. and other countries
- reduced commercial activity among trading partners
- the potential for a currency redenomination by a particular country
- the possible departure of a country from, or the dissolution of, a political or economic alliance or treaty
- potential expropriation or nationalization of assets
- other market dislocations, including the spread of unfavorable economic conditions from a particular country or region to other countries or regions.

Any of these potential outcomes could cause JPMorgan Chase to suffer losses on its market-making positions or in its investment portfolio, reduce its liquidity and capital levels, hamper its ability to deliver products and services to its clients and customers, and weaken its results of operations and financial condition.

Market

Economic and market events and conditions can materially affect JPMorgan Chase's businesses and investment and market-making positions.

JPMorgan Chase's results of operations can be negatively affected by adverse changes in any of the following:

- investor, consumer and business sentiment
- events that reduce confidence in the financial markets
- inflation or deflation
- high unemployment or, conversely, a tightening labor market
- the availability and cost of capital, liquidity and credit
- levels and volatility of interest rates (including overnight repo rates), credit spreads and market prices for currencies, equities and commodities, and the duration of any changes in levels or volatility
- the economic effects of outbreaks of hostilities, terrorism or other geopolitical instabilities, cyberattacks, climate change, natural disasters, severe weather conditions, health emergencies, the spread of infectious diseases or pandemics, and
- the health of the U.S. and global economies.

All of these are affected by global economic, market and political events and conditions, as well as regulatory restrictions.

In addition, JPMorgan Chase's investment portfolio and market-making businesses can suffer losses due to unanticipated market events, including:

- severe declines in asset values
- unexpected credit events
- unforeseen events or conditions that may cause previously uncorrelated factors to become correlated (and vice versa)
- the inability to effectively hedge market and other risks related to market-making position, or
- other market risks that may not have been appropriately taken into account in the development, structuring or pricing of a financial instrument.

If JPMorgan Chase experiences significant losses in its investment portfolio or from market-making activities, this could reduce JPMorgan Chase's profitability and its liquidity and capital levels, and thereby constrain the growth of its businesses.

JPMorgan Chase's consumer businesses can be negatively affected by adverse economic conditions.

JPMorgan Chase's consumer businesses are particularly affected by U.S. and global economic conditions, including:

- interest rates
- the rates of inflation and unemployment
- housing prices
- the level of consumer and small business confidence
- changes in consumer spending or in the level of consumer debt, and
- the number of personal bankruptcies.

A rapid increase in interest rates could negatively affect consumer credit performance to the extent that consumers are less able to service their debts. Sustained low growth, low or negative interest rates, inflationary pressures or recessionary conditions could diminish customer demand for the products and services offered by JPMorgan Chase's consumer businesses. These conditions could also increase the cost to provide those products and services. Adverse economic conditions could also lead to an increase in delinquencies and higher net charge-offs, which can reduce JPMorgan Chase's earnings. These consequences could be significantly worse in certain geographies where high levels of unemployment have resulted from declining industrial or manufacturing activity, or where high levels of consumer debt, such as outstanding student loans, impair the ability of customers to pay their other consumer loan obligations. JPMorgan Chase's earnings from its consumer businesses could also be adversely affected by governmental policies and actions that affect consumers, including:

- policies and initiatives relating to medical insurance, education, immigration and employment status

- the inability to reach political consensus to keep the U.S. government open and funded, and
- policies aimed at the economy more broadly, such as infrastructure spending and global trade, which could result in higher inflation or reductions in consumer disposable income.

In addition, governmental proposals to permit student loan obligations to be discharged in bankruptcy proceedings could, if enacted into law, encourage certain of JPMorgan Chase's customers to declare personal bankruptcy and thereby trigger defaults and charge-offs of credit card and other consumer loans extended to those customers.

Unfavorable market and economic conditions can have an adverse effect on JPMorgan Chase's wholesale businesses.

In JPMorgan Chase's wholesale businesses, market and economic factors can affect the volume of transactions that JPMorgan Chase executes for its clients or for which it advises clients, and, therefore, the revenue that JPMorgan Chase receives from those transactions. These factors can also influence the willingness of other financial institutions and investors to participate in capital markets transactions that JPMorgan Chase manages, such as loan syndications or securities underwritings. Furthermore, if a significant and sustained deterioration in market conditions were to occur, the profitability of JPMorgan Chase's capital markets businesses, including its loan syndication, securities underwriting and leveraged lending activities, could be reduced to the extent that those businesses:

- earn less fee revenue due to lower transaction volumes, including when clients are unwilling or unable to refinance their outstanding debt obligations in unfavorable market conditions, or
- dispose of portions of credit commitments at a loss, or hold larger residual positions in credit commitments that cannot be sold at favorable prices.

An adverse change in market conditions in particular segments of the economy, such as a sudden and severe downturn in oil and gas prices or an increase in commodity prices, could have a material adverse effect on clients of JPMorgan Chase whose operations or financial condition are directly or indirectly dependent on the health or stability of those market segments, as well as clients that are engaged in related businesses. JPMorgan Chase could incur losses on its loans and other credit commitments to clients that operate in, or are dependent on, any sector of the economy that is under stress.

The fees that JPMorgan Chase earns from managing client assets or holding assets under custody for clients could be diminished by declining asset values or other adverse macroeconomic conditions. For example, higher interest rates or a downturn in financial markets could affect the valuations of client assets that JPMorgan Chase manages or holds under custody, which, in turn, could affect JPMorgan Chase's revenue from fees that are based on the amount of assets under management or custody. Similarly, adverse

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macroeconomic or market conditions could prompt outflows from JPMorgan Chase funds or accounts, or cause clients to invest in products that generate lower revenue. Substantial and unexpected withdrawals from a JPMorgan Chase fund can also hamper the investment performance of the fund, particularly if the outflows create the need for the fund to dispose of fund assets at disadvantageous times or prices, and could lead to further withdrawals based on the weaker investment performance.

An economic downturn that results in lower consumer and business spending could also have a negative impact on certain of JPMorgan Chase's wholesale clients, and thereby diminish JPMorgan Chase's earnings from its wholesale operations. For example, the businesses of certain of JPMorgan Chase's wholesale clients are dependent on consistent streams of rental income from commercial real estate properties which are owned or being built by those clients. Severe and sustained adverse economic conditions could reduce the rental cash flows that owners or developers receive from those properties which, in turn, could depress the values of the properties and impair the ability of borrowers to service or refinance their commercial real estate loans. These consequences could result in JPMorgan Chase experiencing higher delinquencies, defaults and write-offs within its commercial real estate loan portfolio and incurring higher costs for servicing a larger volume of delinquent loans in that portfolio, thereby reducing JPMorgan Chase's earnings from its wholesale businesses.

Changes in interest rates and credit spreads can adversely affect certain of JPMorgan Chase's revenue and income streams.

JPMorgan Chase can generally be expected to earn higher net interest income when interest rates are increasing. However, higher interest rates can also lead to:

- fewer originations of commercial and residential real estate loans
- losses on underwriting exposures
- the loss of deposits, including in the event that JPMorgan Chase makes incorrect assumptions about depositor behavior
- lower net interest income if central banks introduce interest rate increases more quickly than anticipated and this results in a misalignment in the pricing of short-term and long-term borrowings
- less liquidity in the financial markets, and
- higher funding costs.

All of these outcomes could adversely affect JPMorgan Chase's revenues and its liquidity and capital levels. Higher interest rates can also negatively affect the payment performance on loans within JPMorgan Chase's consumer and wholesale loan portfolios that are linked to variable interest rates. If borrowers of variable rate loans are unable to afford higher interest payments, those borrowers may

reduce or stop making payments, thereby causing JPMorgan Chase to incur losses and increased operational costs related to servicing a higher volume of delinquent loans.

On the other hand, a low or negative interest rate environment may cause:

- net interest margins to be compressed, which could reduce the amounts that JPMorgan Chase earns on its investment portfolio to the extent that it is unable to reinvest contemporaneously in higher-yielding instruments
- unanticipated or adverse changes in depositor behavior, which could negatively affect JPMorgan Chase's broader asset and liability management strategy, and
- a reduction in the value of JPMorgan Chase's mortgage servicing rights ("MSRs") asset, thereby decreasing revenues.

When credit spreads widen, it becomes more expensive for JPMorgan Chase to borrow. JPMorgan Chase's credit spreads may widen or narrow not only in response to events and circumstances that are specific to JPMorgan Chase but also as a result of general economic and geopolitical events and conditions. Changes in JPMorgan Chase's credit spreads will affect, positively or negatively, JPMorgan Chase's earnings on certain liabilities, such as derivatives, that are recorded at fair value.

JPMorgan Chase's results may be materially affected by market fluctuations and significant changes in the value of financial instruments.

The value of securities, derivatives and other financial instruments which JPMorgan Chase owns or in which it makes markets can be materially affected by market fluctuations. Market volatility, illiquid market conditions and other disruptions in the financial markets may make it extremely difficult to value certain financial instruments, particularly during periods of market displacement. Subsequent valuations of financial instruments in future periods, in light of factors then prevailing, may result in significant changes in the value of these instruments. In addition, at the time of any disposition of these financial instruments, the price that JPMorgan Chase ultimately realizes will depend on the demand and liquidity in the market at that time and may be materially lower than their current fair value. Any of these factors could cause a decline in the value of JPMorgan Chase's financial instruments which may have an adverse effect on JPMorgan Chase's results of operations.

JPMorgan Chase's risk management and monitoring processes, including its stress testing framework, seek to quantify and control JPMorgan Chase's exposure to more extreme market moves. However, JPMorgan Chase could realize significant losses if extreme market events were to occur. Under extreme market conditions, hedging and other risk management strategies may not be as effective at

mitigating losses as they would be under more normal market conditions.

Credit

JPMorgan Chase can be adversely affected by the financial condition of clients, counterparties, custodians and CCPs.

JPMorgan Chase routinely executes transactions with brokers and dealers, commercial and investment banks, mutual and hedge funds, investment managers and other types of financial institutions and market participants. Many of these transactions expose JPMorgan Chase to the credit risk of its clients and counterparties, and can involve JPMorgan Chase in disputes and litigation if a client or counterparty defaults. JPMorgan Chase can also be subject to losses or liability where a financial institution that it has appointed to provide custodial services for client assets or funds becomes insolvent as a result of fraud or the failure to abide by existing laws and obligations, including under the EU Alternative Investment Fund Managers Directive.

A default by, or the financial or operational failure of, a CCP through which JPMorgan Chase executes contracts would require JPMorgan Chase to replace those contracts, thereby increasing its operational costs and potentially resulting in losses. JPMorgan Chase can also be exposed to losses if a member of a CCP in which JPMorgan Chase is also a member defaults on its obligations to the CCP because of requirements that each member of the CCP absorb a portion of those losses. As part of its clearing services activities, JPMorgan Chase is also exposed to the risk of nonperformance by its clients, which it seeks to mitigate by requiring clients to provide adequate collateral. JPMorgan Chase is also exposed to intra-day credit risk of its clients in connection with providing cash management, clearing, custodial and other transaction services to those clients. If a client for which JPMorgan Chase provides these services becomes bankrupt or insolvent, JPMorgan Chase may incur losses, become involved in disputes and litigation with one or more CCPs, the client's bankruptcy estate and other creditors, or be subject to regulatory investigations. All of the foregoing events can increase JPMorgan Chase's operational and litigation costs, and JPMorgan Chase may suffer losses to the extent that any collateral that it has received is insufficient to cover those losses. JPMorgan Chase can also be subject to bearing its share of non-default losses incurred by a CCP, including losses from custodial, settlement or investment activities or due to cyber or other security breaches.

Disputes may arise with counterparties to derivatives contracts with regard to the terms, the settlement procedures or the value of underlying collateral. The disposition of those disputes could cause JPMorgan Chase to incur unexpected transaction, operational and legal costs, or result in credit losses. These consequences can also impair JPMorgan Chase's ability to effectively manage its credit risk exposure from its market activities, or cause harm to JPMorgan Chase's reputation.

The financial or operational failure of a significant market participant, such as a major financial institution or a CCP, or concerns about the creditworthiness of such a market participant, can have a cascading effect within the financial markets. JPMorgan Chase's businesses could be significantly disrupted by such an event, particularly if it leads to other market participants incurring significant losses, experiencing liquidity issues or defaulting. JPMorgan Chase is likely to have significant interrelationships with, and credit exposure to, such a significant market participant, and would seek to unwind or hedge positions in securities, derivatives and other obligations in multiple jurisdictions during a period of heightened market volatility.

JPMorgan Chase may suffer losses if the value of collateral declines in stressed market conditions.

During periods of market stress or illiquidity, JPMorgan Chase's credit risk may be further increased when JPMorgan Chase cannot realize the fair value of the collateral held by it or when collateral is liquidated at prices that are not sufficient to recover the full amount of the loan, derivative or other exposure due to it. Furthermore, disputes with counterparties concerning the valuation of collateral may increase in times of significant market stress, volatility or illiquidity, and JPMorgan Chase could suffer losses during these periods if it is unable to realize the fair value of collateral or to manage declines in the value of collateral.

JPMorgan Chase could incur significant losses arising from concentrations of credit and market risk.

JPMorgan Chase is exposed to greater credit and market risk to the extent that groupings of its clients or counterparties:

- engage in similar or related businesses, or in businesses in related industries
- do business in the same geographic region, or
- have business profiles, models or strategies that could cause their ability to meet their obligations to be similarly affected by changes in economic conditions.

For example, a significant deterioration in the credit quality of one of JPMorgan Chase's borrowers or counterparties could lead to concerns about the creditworthiness of other borrowers or counterparties in similar, related or dependent industries. This type of interrelationship could exacerbate JPMorgan Chase's credit, liquidity and market risk exposure and potentially cause it to incur losses, including fair value losses in its market-making businesses.

Similarly, challenging economic conditions that affect a particular industry or geographic area could lead to concerns about the credit quality of JPMorgan Chase's borrowers or counterparties not only in that particular industry or geography but in related or dependent industries, wherever located. These conditions could also heighten concerns about the ability of customers of JPMorgan Chase's consumer businesses who live in those areas or work in those affected industries or related or

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dependent industries to meet their obligations to JPMorgan Chase. JPMorgan Chase regularly monitors various segments of its credit and market risk exposures to assess the potential risks of concentration or contagion, but its efforts to diversify or hedge its exposures against those risks may not be successful.

JPMorgan Chase's consumer businesses can also be harmed by an excessive expansion of consumer credit by bank or non-bank competitors. Heightened competition for certain types of consumer loans could prompt industry-wide reactions such as significant reductions in the pricing or margins of those loans or the making of loans to less-creditworthy borrowers. If large numbers of consumers subsequently default on their loans, whether due to weak credit profiles, an economic downturn or other factors, this could impair their ability to repay obligations owed to JPMorgan Chase and result in higher charge-offs and other credit-related losses. More broadly, widespread defaults on consumer debt could lead to recessionary conditions in the U.S. economy, and JPMorgan Chase's consumer businesses may earn lower revenues in such an environment.

If JPMorgan Chase is unable to reduce positions effectively during a market dislocation, this can increase both the market and credit risks associated with those positions and the level of risk-weighted assets ("RWA") that JPMorgan Chase holds on its balance sheet. These factors could adversely affect JPMorgan Chase's capital position, funding costs and the profitability of its businesses.

Liquidity

Liquidity is critical to JPMorgan Chase's ability to operate its businesses.

JPMorgan Chase's liquidity could be impaired at any given time by factors such as:

- market-wide illiquidity or disruption
- unforeseen liquidity or capital requirements, including as a result of changes in laws, rules and regulations
- inability to sell assets, or to sell assets at favorable times or prices
- default by a CCP or other significant market participant
- unanticipated outflows of cash or collateral
- unexpected loss of consumer deposits caused by changes in consumer behavior, and
- lack of market or customer confidence in JPMorgan Chase or financial institutions in general.

A reduction in JPMorgan Chase's liquidity may be caused by events over which it has little or no control. For example, during periods of market stress, low investor confidence and significant market illiquidity could result in higher funding costs for JPMorgan Chase and could limit its access to some of its traditional sources of liquidity. There is no assurance that severe conditions of this type will not occur.

JPMorgan Chase may need to raise funding from alternative sources if its access to stable and lower-cost sources of funding, such as deposits and borrowings from Federal Home Loan Banks, is reduced. Alternative sources of funding could be more expensive or limited in availability. JPMorgan Chase's funding costs could also be negatively affected by actions that JPMorgan Chase may take in order to:

- satisfy applicable liquidity coverage ratio and net stable funding ratio requirements
- address obligations under its resolution plan, or
- satisfy regulatory requirements in jurisdictions outside the U.S. relating to the pre-positioning of liquidity in subsidiaries that are material legal entities.

More generally, if JPMorgan Chase fails to effectively manage its liquidity, this could constrain its ability to fund or invest in its businesses and subsidiaries (including, in particular, its broker-dealer subsidiaries), and thereby adversely affect its results of operations.

JPMorgan Chase & Co. is a holding company and depends on the cash flows of its subsidiaries to make payments on its outstanding securities.

JPMorgan Chase & Co. is a holding company that holds the stock of JPMorgan Chase Bank, N.A. and an intermediate holding company, JPMorgan Chase Holdings LLC (the "IHC"). The IHC in turn 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 holding 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 ability of JPMorgan Chase Bank, N.A. and the IHC to make payments to the holding company is also limited. JPMorgan Chase Bank, N.A. is subject to restrictions on its dividend distributions, as well as capital adequacy and liquidity requirements and other regulatory restrictions on its ability to make payments to the holding company. The IHC is prohibited from paying dividends or extending credit to the holding company if certain capital or liquidity "thresholds" are breached or if limits are otherwise imposed by JPMorgan Chase's management or Board of Directors.

As a result of these arrangements, the ability of the holding company to make various payments is dependent on its receiving dividends from JPMorgan Chase Bank, N.A. and dividends and extensions of credit from the IHC. These limitations could affect the holding company's ability to:

- pay interest on its debt securities
- pay dividends on its equity securities
- redeem or repurchase outstanding securities, and

- fulfill its other payment obligations.

These regulatory restrictions and limitations could also result in the holding company seeking protection under bankruptcy laws at a time earlier than would have been the case absent the existence of the capital and liquidity thresholds to which the IHC is subject.

Reductions in JPMorgan Chase's credit ratings may adversely affect its liquidity and cost of funding.

JPMorgan Chase & Co. and certain of its principal subsidiaries are rated by credit rating agencies. Rating agencies evaluate both general and firm-specific and industry-specific factors when determining credit ratings for a particular financial institution, including:

- expected future profitability
- risk management practices
- legal expenses
- ratings differentials between bank holding companies and their bank and non-bank subsidiaries
- regulatory developments
- assumptions about government support, and
- economic and geopolitical trends.

JPMorgan Chase closely monitors and manages, to the extent that it is able, factors that could influence its credit ratings. However, there is no assurance that JPMorgan Chase's credit ratings will not be lowered in the future. Furthermore, any such downgrade could occur at times of broader market instability when JPMorgan Chase's options for responding to events may be more limited and general investor confidence is low.

A reduction in JPMorgan Chase's credit ratings could curtail JPMorgan Chase's business activities and reduce its profitability in a number of ways, including:

- reducing its access to capital markets
- materially increasing its cost of issuing and servicing securities
- triggering additional collateral or funding requirements, and
- decreasing the number of investors and counterparties that are willing or permitted to do business with or lend to JPMorgan Chase.

Any rating reduction could also increase the credit spreads charged by the market for taking credit risk on JPMorgan Chase & Co. and its subsidiaries. This could, in turn, adversely affect the value of debt and other obligations of JPMorgan Chase & Co. and its subsidiaries.

The reform and replacement of benchmark rates could adversely affect JPMorgan Chase's funding, investments and financial products, and expose it to litigation and other disputes.

Interest rate, equity, foreign exchange rate and other types of indices which are deemed to be "benchmarks," including those in widespread and long-standing use, have been the subject of ongoing international, national and other regulatory scrutiny and initiatives and proposals for reform. Some of these reforms are already effective while others are still to be implemented or are under consideration. These reforms may cause benchmarks to perform differently than in the past, or to disappear entirely, or have other consequences which cannot be fully anticipated.

Any of the benchmark reforms which have been proposed or implemented, or the general increased regulatory scrutiny of benchmarks, could also increase the costs and risks of administering or otherwise participating in the setting of benchmarks and complying with regulations or requirements relating to benchmarks. Such factors may have the effect of discouraging market participants from continuing to administer or contribute to certain benchmarks, trigger changes in the rules or methodologies used in certain benchmarks or lead to the disappearance of certain benchmarks.

Any of these developments, and any future initiatives to regulate, reform or change the administration of benchmarks, could result in adverse consequences to the return on, value of and market for loans, mortgages, securities, derivatives and other financial instruments whose returns are linked to any such benchmark, including those issued, funded, serviced or held by JPMorgan Chase.

Various regulators, industry bodies and other market participants in the U.S. and other countries are engaged in initiatives to develop, introduce and encourage the use of alternative rates to replace certain benchmarks. There is no assurance that these new rates will be accepted or widely used by market participants, or that the characteristics of any of these new rates will be similar to, or produce the economic equivalent of, the benchmarks that they seek to replace. If a particular benchmark were to be discontinued and an alternative rate has not been successfully introduced to replace that benchmark, this could result in widespread dislocation in the financial markets, engender volatility in the pricing of securities, derivatives and other instruments, and suppress capital markets activities, all of which could have adverse effects on JPMorgan Chase's results of operations. In addition, to the extent that appropriate relief is not provided by accounting standard setters with respect to the transition from benchmark rates, the transition could:

- affect hedge accounting relationships between financial instruments linked to a particular benchmark and any related derivatives, which could adversely affect JPMorgan Chase's results of operations, or
- increase JPMorgan Chase's operational costs with respect to the determination of whether the transition

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has resulted in the modification or extinguishment of specific contracts for accounting purposes.

Representatives of the U.K. Financial Conduct Authority (the “FCA”), which regulates the London interbank offered rate (“LIBOR”), have made a series of public statements during the past several years to the effect that:

- the FCA will no longer persuade or compel banks to submit rates for the calculation of the LIBOR benchmark after 2021, and
- once a significant number of banks are no longer submitting such rates, the FCA may make a determination under applicable regulations that the LIBOR benchmark may not meet the standards required under those regulations for use as a benchmark.

These statements indicate that it is highly likely that LIBOR will be discontinued on or about the end of 2021. Vast amounts of loans, mortgages, securities, derivatives and other financial instruments are linked to the LIBOR benchmark, and any inability of market participants and regulators to successfully introduce benchmark rates to replace LIBOR and implement effective transitional arrangements to address the discontinuation of LIBOR could result in disruption in the financial markets and suppress capital markets activities, all of which could have a negative impact on JPMorgan Chase’s results of operations and on LIBOR-linked securities, credit or other instruments which are issued, funded, serviced or held by JPMorgan Chase.

JPMorgan Chase could also become involved in litigation and other types of disputes with clients, customers, counterparties and investors as a consequence of the transition from LIBOR and other benchmark rates to replacement rates, including claims that JPMorgan Chase has:

- treated clients, customers, counterparties or investors unfairly, or caused them to experience losses, higher financing costs or lower returns on investments
- failed to appropriately communicate the effects of the transition from benchmark rates on the products that JPMorgan Chase has sold to its clients and customers, or failed to disclose purported conflicts of interest
- made inappropriate product recommendations to or investments on behalf of its clients, or sold products that did not serve their intended purpose, in connection with the transition from benchmark rates
- engaged in anti-competitive behavior, or in the manipulation of markets or specific benchmarks, in connection with the discontinuation of or transition from benchmark rates, or
- disadvantaged clients, customers, counterparties or investors when interpreting or making determinations under the terms of agreements or financial instruments.

These types of claims could subject JPMorgan Chase to higher legal expenses and operational costs, require it to pay significant amounts in connection with resolving litigation and other disputes, and harm its reputation.

Capital

Maintaining the appropriate level and composition of capital is critical to support JPMorgan Chase’s business activities, meet regulatory requirements and distribute capital to shareholders.

JPMorgan Chase is subject to various regulatory capital requirements, and although many of these requirements have been finalized, prudential regulators have recently issued new regulatory capital proposals, and continued uncertainty remains as to the manner in which these requirements ultimately will apply to JPMorgan Chase. As a result, it is possible that these requirements could limit JPMorgan Chase’s ability to support its businesses and make capital distributions to its shareholders.

JPMorgan Chase is required to submit, on an annual basis, a capital plan describing proposed dividend payments to shareholders, redemptions and repurchases of its outstanding securities and other capital actions that it intends to take. JPMorgan Chase considers various factors in the management of capital, including the impact of stress on its capital levels, as determined by both internal modeling and the Federal Reserve’s modeling of JPMorgan Chase’s capital position in supervisory stress tests and CCAR. Because the Federal Reserve and JPMorgan Chase use different forecasting models and methodologies when determining stress test results, there can be significant differences between the estimates of stress loss as determined by the Federal Reserve and JPMorgan Chase, respectively. The Federal Reserve may object to or require modifications to JPMorgan Chase’s capital plan, or JPMorgan Chase may otherwise modify its capital plan, and any such modification could have an adverse effect on JPMorgan Chase’s shareholders, including by:

- constraining the amount of dividends that may be paid on common stock
- reducing the amount of common stock that JPMorgan Chase is permitted to repurchase
- requiring the issuance of, or prohibiting the redemption of, capital instruments in a manner inconsistent with JPMorgan Chase’s capital management strategy
- curtailing JPMorgan Chase’s business activities or operations, or
- damaging JPMorgan Chase’s reputation.

Operational

JPMorgan Chase's businesses are highly dependent on the effectiveness of its operational systems and those of other market participants.

JPMorgan Chase's businesses rely comprehensively on the ability of JPMorgan Chase's financial, accounting, transaction execution, data processing and other operational systems to process, record, monitor and report a large number of transactions on a continuous basis, and to do so accurately, quickly and securely. In addition to proper design, installation, maintenance and training, the effective functioning of JPMorgan Chase's operational systems depends on:

- the quality of the information contained in those systems, as inaccurate, outdated or corrupted data can significantly compromise the functionality or reliability of a particular system and other systems to which it transmits or from which it receives information, and
- JPMorgan Chase's ability to appropriately maintain and upgrade its systems on a regular basis, and to ensure that any changes introduced to its systems are managed carefully to ensure security and operational continuity and adhere to all applicable legal and regulatory requirements.

JPMorgan Chase also depends on its ability to access and use the operational systems of its vendors, custodians and other market participants, including clearing and payment systems, CCPs, securities exchanges and data processing, security and technology companies.

The ineffectiveness, failure or other disruption of operational systems upon which JPMorgan Chase depends, including due to a systems malfunction, cyberbreach or other systems failure, could result in unfavorable ripple effects in the financial markets and for JPMorgan Chase and its clients and customers, including:

- delays or other disruptions in providing information, services and liquidity to clients and customers
- the inability to settle transactions or obtain access to funds and other assets, including those for which physical settlement and delivery is required
- failure to timely settle or confirm transactions
- the possibility that funds transfers, capital markets trades or other transactions are executed erroneously, illegally or with unintended consequences
- financial losses, including due to loss-sharing requirements of CCPs, payment systems or other market infrastructures, or as possible restitution to clients and customers
- higher operational costs associated with replacing services provided by a system that is unavailable
- client or customer dissatisfaction with JPMorgan Chase's products and services

- loss of confidence in the ability of JPMorgan Chase, or financial institutions generally, to protect against and withstand operational disruptions, or
- harm to JPMorgan Chase's reputation.

As the speed, frequency, volume, interconnectivity and complexity of transactions continue to increase, it becomes more challenging to effectively maintain and upgrade JPMorgan Chase's operational systems and infrastructure, especially due to the heightened risks that:

- errors made by JPMorgan Chase or another market participant, whether inadvertent or malicious, cause widespread system disruption
- isolated or seemingly insignificant errors in operational systems compound, or migrate to other systems over time, to become larger issues
- failures in synchronization or encryption software, or degraded performance of microprocessors due to design flaws, could cause disruptions in operational systems, or the inability of systems to communicate with each other, and
- third parties may attempt to block the use of key technology solutions by claiming that the use infringes on their intellectual property rights.

If JPMorgan Chase's operational systems, or those of external parties on which JPMorgan Chase's businesses depend, are unable to meet the demanding standards of JPMorgan Chase's businesses and operations, or if they fail or have other significant shortcomings, JPMorgan Chase could be materially and adversely affected.

JPMorgan Chase can be negatively affected if it fails to identify and address operational risks associated with the introduction of or changes to products, services and delivery platforms.

When JPMorgan Chase launches a new product or service, introduces a new platform for the delivery or distribution of products or services (including mobile connectivity, electronic trading and cloud computing), or makes changes to an existing product, service or delivery platform, it may not fully appreciate or identify new operational risks that may arise from those changes, or may fail to implement adequate controls to mitigate the risks associated with those changes. Any significant failure in this regard could diminish JPMorgan Chase's ability to operate one or more of its businesses or result in:

- potential liability to clients, counterparties and customers
- increased operating expenses
- higher litigation costs, including regulatory fines, penalties and other sanctions
- damage to JPMorgan Chase's reputation
- impairment of JPMorgan Chase's liquidity

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- regulatory intervention, or
- weaker competitive standing.

Any of the foregoing consequences could materially and adversely affect JPMorgan Chase's businesses and results of operations.

JPMorgan Chase's connections to external operational systems expose it to greater operational risks.

External operational systems with which JPMorgan is connected, whether directly or indirectly, can be sources of operational risk to JPMorgan Chase. JPMorgan Chase may be exposed not only to a systems failure that may be experienced by a vendor or market infrastructure with which JPMorgan Chase is directly connected, but also to a systems breakdown of another party to which such a vendor or infrastructure is connected. Similarly, retailers, data aggregators and other external parties with which JPMorgan Chase's customers do business can increase JPMorgan Chase's operational risk. This is particularly the case where activities of customers or those parties are beyond JPMorgan Chase's security and control systems, including through the use of the internet, cloud computing services and personal smart phones and other mobile devices or services.

If an external party obtains access to customer account data on JPMorgan Chase's systems, and that party experiences a cyberbreach of its own systems or misappropriates that data, this could result in a variety of negative outcomes for JPMorgan Chase and its clients and customers, including:

- heightened risk that external parties will be able to execute fraudulent transactions using JPMorgan Chase's systems
- losses from fraudulent transactions, as well as potential liability for losses that exceed thresholds established in consumer protection laws and regulations
- increased operational costs to remediate the consequences of the external party's security breach, and
- harm to reputation arising from the perception that JPMorgan Chase's systems may not be secure.

As JPMorgan Chase's interconnectivity with clients, customers and other external parties expands, JPMorgan Chase increasingly faces the risk of operational failure with respect to the systems of those parties. Security breaches affecting JPMorgan Chase's clients or customers, or systems breakdowns or failures, security breaches or human error or misconduct affecting other external parties, may require JPMorgan Chase to take steps to protect the integrity of its own operational systems or to safeguard confidential information, including restricting the access of customers to their accounts. These actions can increase JPMorgan Chase's operational costs and potentially diminish customer satisfaction and confidence in JPMorgan Chase.

Furthermore, the widespread and expanding interconnectivity among financial institutions, central agents, CCPs, payment processors, securities exchanges, clearing houses and other financial market infrastructures increases the risk that an operational failure at one institution or entity may cause an industry-wide operational failure that could materially affect JPMorgan Chase's ability to conduct business.

JPMorgan Chase's operations depend on the competence and integrity of its employees and those of external parties.

JPMorgan Chase's ability to operate its businesses efficiently and profitably, to offer products and services that meet the expectations of its clients and customers, and to maintain an effective risk management framework is highly dependent on the competence and integrity of its employees, as well as employees of other parties on which JPMorgan Chase's operations rely, including vendors, custodians and financial markets infrastructures. JPMorgan Chase's businesses could be materially and adversely affected by:

- the ineffective implementation of business decisions
- any failure to institute controls that appropriately address risks associated with business activities, or to appropriately train employees with respect to those risks and controls
- a significant operational breakdown or failure, theft, fraud or other unlawful conduct, or
- other negative outcomes caused by human error or misconduct by an employee of JPMorgan Chase or of another party on which JPMorgan Chase's operations depend.

JPMorgan Chase faces substantial legal and operational risks in safeguarding personal information.

JPMorgan Chase's businesses are subject to complex and evolving laws and regulations, both within and outside the U.S., governing the privacy and protection of personal information of individuals. The protected parties can include:

- JPMorgan Chase's clients and customers, and prospective clients and customers
- clients and customers of JPMorgan Chase's clients and customers
- employees and prospective employees, and
- employees of JPMorgan Chase's vendors, counterparties and other external parties.

Ensuring that JPMorgan Chase's collection, use, transfer and storage of personal information comply with all applicable laws and regulations in all relevant jurisdictions, including where the laws of different jurisdictions are in conflict, can:

- increase JPMorgan Chase's compliance and operating costs

- hinder the development of new products or services, curtail the offering of existing products or services, or affect how products and services are offered to clients and customers
- demand significant oversight by JPMorgan Chase's management, and
- require JPMorgan Chase to structure its businesses, operations and systems in less efficient ways.

Furthermore, JPMorgan Chase cannot ensure that all of its clients and customers, vendors, counterparties and other external parties have appropriate controls in place to protect the confidentiality of the information exchanged between them and JPMorgan Chase, particularly where information is transmitted by electronic means. JPMorgan Chase could be exposed to litigation or regulatory fines, penalties or other sanctions if personal, confidential or proprietary information of clients, customers, employees or others were to be mishandled or misused, such as situations where such information is:

- erroneously provided to parties who are not permitted to have the information, or
- intercepted or otherwise compromised by third parties.

Concerns regarding the effectiveness of JPMorgan Chase's measures to safeguard personal information, or even the perception that those measures are inadequate, could cause JPMorgan Chase to lose existing or potential clients and customers, and thereby reduce JPMorgan Chase's revenues. Furthermore, any failure or perceived failure by JPMorgan Chase to comply with applicable privacy or data protection laws and regulations may subject it to inquiries, examinations and investigations that could result in requirements to modify or cease certain operations or practices, significant liabilities or regulatory fines, penalties or other sanctions. Any of these could damage JPMorgan Chase's reputation and otherwise adversely affect its businesses.

In recent years, well-publicized allegations involving the misuse or inappropriate sharing of personal information have led to expanded governmental scrutiny of practices relating to the safeguarding of personal information and the use or sharing of personal data by companies in the U.S. and other countries. That scrutiny has in some cases resulted in, and could in the future lead to, the adoption of stricter laws and regulations relating to the use and sharing of personal information. These types of laws and regulations could prohibit or significantly restrict financial services firms such as JPMorgan Chase from sharing information among affiliates or with third parties such as vendors, and thereby increase compliance costs, or could restrict JPMorgan Chase's use of personal data when developing or offering products or services to customers. These restrictions could also inhibit JPMorgan Chase's development or marketing of certain products or services, or increase the costs of offering them to customers.

A successful cyberattack against JPMorgan Chase could cause significant harm to JPMorgan Chase or its clients and customers.

JPMorgan Chase experiences numerous cyberattacks on its computer systems, software, networks and other technology assets on a daily basis from various actors, including cyber-criminals and "hacktivists" (i.e., individuals or groups that use technology to promote a political agenda or social change). These cyberattacks can take many forms, but a common objective of many of these attacks is to introduce computer viruses or malware into JPMorgan Chase's systems. These viruses or malicious code are typically designed to:

- obtain unauthorized access to confidential information belonging to JPMorgan Chase or its clients, customers, counterparties or employees
- manipulate or destroy data
- disrupt, sabotage or degrade service on JPMorgan Chase's systems, or
- steal money.

JPMorgan Chase has also experienced significant distributed denial-of-service attacks which are intended to disrupt online banking services.

JPMorgan Chase devotes significant resources to maintain and regularly upgrade its systems to protect them against cyberattacks. However, JPMorgan Chase has experienced security breaches due to cyberattacks in the past, and it is inevitable that additional breaches will occur in the future. Any such breach could result in serious and harmful consequences for JPMorgan Chase or its clients and customers.

A principal reason that JPMorgan Chase cannot provide absolute security against cyberattacks is that it may not always be possible to anticipate, detect or recognize threats to JPMorgan Chase's systems, or to implement effective preventive measures against all breaches. This is because:

- the techniques used in cyberattacks change frequently and are increasingly sophisticated, and therefore may not be recognized until launched
- cyberattacks can originate from a wide variety of sources, including third parties who are or may be involved in organized crime or linked to terrorist organizations or hostile countries, or whose objective is to disrupt the operations of financial institutions more generally
- JPMorgan Chase does not have control over the cybersecurity of the systems of the large number of clients, customers, counterparties and third-party service providers with which it does business
- third parties may seek to gain access to JPMorgan Chase's systems either directly or using equipment or security passwords belonging to employees, customers,

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third-party service providers or other users of JPMorgan Chase's systems, and

- it is possible that a third party, after establishing a foothold on an internal network without being detected, might obtain access to other networks and systems.

The risk of a security breach due to a cyberattack could increase in the future as JPMorgan Chase continues to expand its mobile banking and other internet-based product offerings and its internal use of internet-based products and applications.

A successful penetration or circumvention of the security of JPMorgan Chase's systems or the systems of a vendor, governmental body or another market participant could cause serious negative consequences, including:

- significant disruption of JPMorgan Chase's operations and those of its clients, customers and counterparties, including losing access to operational systems
- misappropriation of confidential information of JPMorgan Chase or that of its clients, customers, counterparties, employees or regulators
- damage to computers or systems of JPMorgan Chase and those of its clients, customers and counterparties
- inability to fully recover and restore data that has been stolen, manipulated or destroyed, or to prevent systems from processing fraudulent transactions
- violations by JPMorgan Chase of applicable privacy and other laws
- financial loss to JPMorgan Chase or to its clients, customers, counterparties or employees
- loss of confidence in JPMorgan Chase's cybersecurity measures
- dissatisfaction among JPMorgan Chase's clients, customers or counterparties
- significant exposure to litigation and regulatory fines, penalties or other sanctions, and
- harm to JPMorgan Chase's reputation.

JPMorgan Chase could also suffer some of the above consequences if a third party were to misappropriate confidential information obtained by intercepting signals or communications from mobile devices used by JPMorgan Chase's employees.

The extent of a particular cyberattack and the steps that JPMorgan Chase may need to take to investigate the attack may not be immediately clear, and it may take a significant amount of time before such an investigation can be completed. While such an investigation is ongoing, JPMorgan Chase may not necessarily know the full extent of the harm caused by the cyberattack, and that damage may continue to spread. These factors may inhibit JPMorgan Chase's ability to provide full and reliable information about

the cyberattack to its clients, customers, counterparties and regulators, as well as the public. Furthermore, it may not be clear how best to contain and remediate the harm caused by the cyberattack, and certain errors or actions could be repeated or compounded before they are discovered and remediated. Any or all of these factors could further increase the costs and consequences of a cyberattack.

JPMorgan Chase's operations, results and reputation could be harmed by catastrophes or other events.

JPMorgan Chase's business and operational systems could be seriously disrupted, and its reputation could be harmed, by events or contributing factors that are wholly or partially beyond its control, including:

- cyberbreaches or breaches of physical premises, including data centers
- power, telecommunications or internet outages
- failures of, or loss of access to, operational systems, including computer systems, servers, networks and other technology assets
- damage to or loss of property or assets of JPMorgan Chase or third parties, and any consequent injuries, including in connection with any construction projects undertaken by JPMorgan Chase
- effects of climate change
- natural disasters or severe weather conditions
- accidents such as explosions or structural failures
- health emergencies, the spread of infectious diseases or pandemics, or
- events arising from local or larger-scale political events, including outbreaks of hostilities or terrorist acts.

JPMorgan Chase maintains a firmwide resiliency program that is intended to enable it to recover critical business functions and supporting assets, including staff, technology and facilities, in the event of a business interruption. There can be no assurance that JPMorgan Chase's resiliency plans will fully mitigate all potential business continuity risks to JPMorgan Chase or its clients and customers. In particular, JPMorgan Chase's ability to respond effectively to a business interruption could be hampered to the extent that the members of its workforce, physical assets or systems and other support infrastructure needed to address the event are geographically dispersed, or conversely, if a catastrophic event occurs in an area in which a critical segment of JPMorgan Chase's workforce, physical assets or systems and other support infrastructure is concentrated. In addition, should emergency or catastrophic events such as severe or abnormal weather conditions become more chronic, the disruptive effects of those events on JPMorgan Chase's business and operations, and on its clients, customers, counterparties and employees, could become more significant and long-lasting.

Any significant failure or disruption of JPMorgan Chase's operations or operational systems, or any catastrophic event, could:

- hinder JPMorgan Chase's ability to provide services to its clients and customers or to transact with its counterparties
- require it to expend significant resources to correct the failure or disruption
- cause it to incur losses or liabilities, including from loss of revenue, damage to or loss of property, or injuries
- expose it to litigation or regulatory fines, penalties or other sanctions, and
- harm its reputation.

JPMorgan Chase's risk management framework may not be effective in identifying and mitigating every risk to JPMorgan Chase.

Any inadequacy or lapse in JPMorgan Chase's risk management framework, governance structure, practices, models or reporting systems could expose it to unexpected losses, and its financial condition or results of operations could be materially and adversely affected. In addition, any such inadequacy or lapse could:

- require significant resources to remediate
- attract heightened regulatory scrutiny
- expose JPMorgan Chase to regulatory investigations or legal proceedings
- subject it to litigation or regulatory fines, penalties or other sanctions
- harm its reputation, or
- otherwise diminish confidence in JPMorgan Chase.

JPMorgan Chase relies on data to assess its various risk exposures. Any deficiencies in the quality or effectiveness of JPMorgan Chase's data gathering and validation processes could result in ineffective risk management practices. These deficiencies could also result in inaccurate risk reporting.

Many of JPMorgan Chase's risk management strategies and techniques consider historical market behavior. These strategies and techniques are based to some degree on management's subjective judgment. For example, many models used by JPMorgan Chase are based on assumptions regarding historical correlations among prices of various asset classes or other market indicators. In times of market stress, including difficult or less liquid market environments, or in the event of other unforeseen circumstances, previously uncorrelated indicators may become correlated. Conversely, previously-correlated indicators may make unrelated movements at those times. Sudden market movements and unanticipated or unidentified market or economic movements could, in some circumstances, limit the effectiveness of JPMorgan Chase's risk management strategies, causing it to incur losses.

JPMorgan Chase could incur significant losses, its capital levels could be reduced and it could face greater regulatory scrutiny if its models or estimations prove to be inadequate.

JPMorgan Chase has developed and uses a variety of models and other analytical and judgment-based estimations to measure, monitor and implement controls over its market, credit, liquidity, operational and other risks. These models and estimations are based on a variety of assumptions and historical trends, and are periodically reviewed and modified as necessary. The models and estimations that JPMorgan Chase uses may not be effective in all cases to identify, observe and mitigate risk due to a variety of factors, such as:

- reliance on historical trends that may not accurately predict future events, including assumptions underlying the models and estimations which predict correlation among certain market indicators or asset prices
- inherent limitations associated with forecasting uncertain economic and financial outcomes
- historical trend information may be incomplete, or may not anticipate severely negative market conditions such as extreme volatility, dislocation or lack of liquidity
- technology that is introduced to run models or estimations may not perform as expected, or may not be well understood by the personnel using the technology
- models and estimations may contain erroneous data, valuations, formulas or algorithms, and
- review processes may fail to detect flaws in models and estimations.

Some of the models and other analytical and judgment-based estimations used by JPMorgan Chase in managing risks are subject to review by, and require the approval of, JPMorgan Chase's regulators. These reviews are required before JPMorgan Chase may use those models and estimations in connection with calculating market risk RWA, credit risk RWA and operational risk RWA under Basel III. If JPMorgan Chase's models or estimations are not approved by its regulators, it may be subject to higher capital charges, which could adversely affect its financial results or limit the ability to expand its businesses. JPMorgan Chase's capital actions could also be constrained if a CCAR submission is not approved by its banking regulators due to the perceived inadequacy of its models or estimations.

Enhanced regulatory and other standards for the oversight of vendors and other service providers can result in higher costs and other potential exposures.

JPMorgan Chase must comply with enhanced regulatory and other standards associated with doing business with vendors and other service providers, including standards relating to the outsourcing of functions as well as the performance of significant banking and other functions by subsidiaries. JPMorgan Chase incurs significant costs and

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expenses in connection with its initiatives to address the risks associated with oversight of its internal and external service providers. JPMorgan Chase's failure to appropriately assess and manage these relationships, especially those involving significant banking functions, shared services or other critical activities, could materially adversely affect JPMorgan Chase. Specifically, any such failure could result in:

- potential liability to clients and customers
- regulatory fines, penalties or other sanctions
- lower revenues, and the opportunity cost from lost revenues
- increased operational costs, or
- harm to JPMorgan Chase's reputation.

JPMorgan Chase could incur unexpected losses if estimates and judgments underlying its financial statements are incorrect.

Under U.S. generally accepted accounting principles ("U.S. GAAP"), JPMorgan Chase is required to use estimates and apply judgments in preparing its financial statements, including in determining the allowance for credit losses and reserves related to litigation. Certain financial instruments require a determination of their fair value in order to prepare JPMorgan Chase's financial statements, including:

- trading assets and liabilities
- instruments in the investment portfolio
- certain loans
- MSRs
- structured notes, and
- certain repurchase and resale agreements.

Where quoted market prices are not available for these types of financial instruments, JPMorgan Chase may make fair value determinations based on internally developed models or other means which ultimately rely to some degree on management estimates and judgment, and these types of estimates and judgments may not prove to be accurate due to a variety of factors, as noted above. In addition, sudden illiquidity in markets or declines in prices of certain loans and securities may make it more difficult to value certain financial instruments, which could lead to valuations being subsequently changed or adjusted. If estimates or judgments underlying JPMorgan Chase's financial statements prove to have been incorrect, JPMorgan Chase may experience material losses.

JPMorgan Chase establishes an allowance for expected credit losses that are inherent in its credit exposures. It then employs stress testing and other techniques to determine the amounts of capital and liquidity that would be needed in the event of adverse economic or market events. These processes are critical to JPMorgan Chase's results of operations and financial condition. They require difficult,

subjective and complex judgments, including forecasts of how economic conditions might impair the ability of JPMorgan Chase's borrowers and counterparties to repay their loans or other obligations. It is possible that JPMorgan Chase will fail to identify the proper factors or that it will fail to accurately estimate the impact of factors that it identifies.

Lapses in controls over disclosure or financial reporting could materially affect JPMorgan Chase's profitability or reputation.

There can be no assurance that JPMorgan Chase's disclosure controls and procedures will be effective in every circumstance, or that a material weakness or significant deficiency in internal control over financial reporting will not occur. Any such lapses or deficiencies could:

- materially and adversely affect JPMorgan Chase's business and results of operations or financial condition
- restrict its ability to access the capital markets
- require it to expend significant resources to correct the lapses or deficiencies
- expose it to litigation or regulatory fines, penalties or other sanctions
- harm its reputation, or
- otherwise diminish investor confidence in JPMorgan Chase.

JPMorgan Chase could be adversely affected by changes in accounting standards or policies.

The preparation of JPMorgan Chase's financial statements is based on accounting standards established by the Financial Accounting Standards Board and the Securities and Exchange Commission, as well as more detailed accounting policies established by JPMorgan Chase's management. From time to time these accounting standards or accounting policies may change, and in some cases these changes could have a significant effect on JPMorgan Chase's financial statements and may adversely affect its financial results or investor perceptions of those results.

As of January 1, 2020, JPMorgan Chase has implemented a new accounting standard, commonly referred to as the Current Expected Credit Losses ("CECL") framework, which requires earlier recognition of expected credit losses on loans and certain other instruments. The allowance for credit losses related to JPMorgan Chase's loans and other lending-related commitments increased as a result of the implementation of CECL, which has a negative impact on JPMorgan Chase's capital levels.

The ongoing impact of the adoption of CECL could include the following, each of which could result in diminished investor confidence:

- greater volatility in JPMorgan Chase's earnings and capital levels over economic cycles

- potential reductions in its capital distributions, or
- unexpected increases in the allowance for credit losses.

In addition, JPMorgan Chase could be adversely impacted by associated changes in the competitive environment in which it operates, including changes in the availability or pricing of loan products, particularly during periods of economic stress, as well as changes related to non-U.S. financial institutions or other competitors that are not subject to this accounting standard.

Strategic

If JPMorgan Chase's management fails to develop and execute effective business strategies, and to anticipate changes affecting those strategies, JPMorgan Chase's competitive standing and results could suffer.

JPMorgan Chase's business strategies significantly affect its competitive standing and operations. These strategies relate to:

- the products and services that JPMorgan Chase offers
- the geographies in which it operates
- the types of clients and customers that it serves
- the counterparties with which it does business, and
- the methods and distribution channels by which it offers products and services.

If management makes choices about these strategies and goals that prove to be incorrect, do not accurately assess the competitive landscape and industry trends, or fail to address changing regulatory and market environments, then the franchise values and growth prospects of JPMorgan Chase's businesses may suffer and its earnings could decline.

JPMorgan Chase's growth prospects also depend on management's ability to develop and execute effective business plans to address these strategic priorities, both in the near term and over longer time horizons. Management's effectiveness in this regard will affect JPMorgan Chase's ability to develop and enhance its resources, control expenses and return capital to shareholders. Each of these objectives could be adversely affected by any failure on the part of management to:

- devise effective business plans and strategies
- offer products and services that meet changing expectations of clients and customers
- allocate capital in a manner that promotes long-term stability to enable JPMorgan Chase to build and invest in market-leading businesses, even in a highly stressed environment
- allocate capital appropriately due to imprecise modeling or subjective judgments made in connection with those allocations
- appropriately address shareholder concerns

- react quickly to changes in market conditions or market structures, or
- develop and enhance the operational, technology, risk, financial and managerial resources necessary to grow and manage JPMorgan Chase's businesses.

Additionally, JPMorgan Chase's Board of Directors plays an important role in exercising appropriate oversight of management's significant strategic decisions, and a failure by the Board to perform this function could also impair JPMorgan Chase's results of operations.

JPMorgan Chase faces significant and increasing competition in the rapidly evolving financial services industry.

JPMorgan Chase operates in a highly competitive environment in which it must evolve and adapt to the significant changes as a result of financial regulatory reform, technological advances, increased public scrutiny and current economic conditions. JPMorgan Chase expects that competition in the U.S. and global financial services industry will continue to be intense. Competitors include:

- other banks and financial institutions
- trading, advisory and investment management firms
- finance companies and technology companies, and
- other nonbank firms that are engaged in providing similar products and services.

JPMorgan Chase cannot provide assurance that the significant competition in the financial services industry will not materially and adversely affect its future results of operations.

New competitors in the financial services industry continue to emerge. For example, technological advances and the growth of e-commerce have made it possible for non-depository institutions to offer products and services that traditionally were banking products. These advances have also allowed financial institutions and other companies to provide electronic and internet-based financial solutions, including electronic securities trading, payments processing and online automated algorithmic-based investment advice. Furthermore, both financial institutions and their non-banking competitors face the risk that payments processing and other services could be significantly disrupted by technologies, such as cryptocurrencies, that require no intermediation. New technologies have required and could require JPMorgan Chase to spend more to modify or adapt its products to attract and retain clients and customers or to match products and services offered by its competitors, including technology companies. In addition, new technologies may be used by customers, or breached or infiltrated by third parties, in unexpected ways, which can increase JPMorgan Chase's costs for complying with laws and regulations that apply to the offering of products and services through those technologies and reduce the income

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that JPMorgan Chase earns from providing products and services through those new technologies.

Ongoing or increased competition may put pressure on the pricing for JPMorgan Chase's products and services or may cause JPMorgan Chase to lose market share, particularly with respect to traditional banking products such as deposits and bank accounts. This competition may be on the basis of quality and variety of products and services offered, transaction execution, innovation, reputation and price. The failure of any of JPMorgan Chase's businesses to meet the expectations of clients and customers, whether due to general market conditions, under-performance, a decision not to offer a particular product or service, changes in client and customer expectations or other factors, could affect JPMorgan Chase's ability to attract or retain clients and customers. Any such impact could, in turn, reduce JPMorgan Chase's revenues. Increased competition also may require JPMorgan Chase to make additional capital investments in its businesses, or to extend more of its capital on behalf of its clients in order to remain competitive.

Climate change could have a material adverse impact on JPMorgan Chase's business operations, clients and customers.

JPMorgan Chase operates in many regions, countries and communities around the world where its businesses, and the activities of its clients and customers, could be disrupted by climate change. Potential physical risks from climate change may include:

- altered distribution and intensity of rainfall
- prolonged droughts or flooding
- increased frequency of wildfires
- rising sea levels
- rising heat index

In addition, these physical changes may prompt changes in regulations or consumer preferences which in turn could have negative consequences for the business models of JPMorgan Chase's clients.

These climate driven changes could have a material adverse impact on asset values and the financial performance of JPMorgan Chase's businesses, and those of its clients and customers.

Conduct

Conduct failure by JPMorgan Chase employees can harm clients and customers, impact market integrity, damage JPMorgan Chase's reputation and trigger litigation and regulatory action.

JPMorgan Chase's employees interact with clients, customers and counterparties, and with each other, every day. All employees are expected to demonstrate values and exhibit the behaviors that are an integral part of JPMorgan Chase's How We Do Business Principles, including JPMorgan

Chase's commitment to "do first class business in a first class way." JPMorgan Chase endeavors to embed conduct risk management throughout an employee's life cycle, including recruiting, onboarding, training and development, and performance management. Conduct risk management is also an integral component of JPMorgan Chase's promotion and compensation processes.

Notwithstanding these expectations, policies and practices, certain employees have in the past engaged in improper or illegal conduct, and these instances of misconduct have resulted in litigation as well as resolutions of governmental investigations or enforcement actions involving consent orders, deferred prosecution agreements, non-prosecution agreements and other civil or criminal sanctions. There is no assurance that further inappropriate or unlawful actions by employees will not occur or that any such actions will always be detected, deterred or prevented.

JPMorgan Chase's reputation could be harmed, and collateral consequences could result, from a failure by one or more employees to act consistently with JPMorgan Chase's expectations, policies and practices, including by acting in ways that harm clients, customers, other market participants or other employees. Some examples of this include:

- improperly selling and marketing JPMorgan Chase's products or services
- engaging in insider trading, market manipulation or unauthorized trading
- facilitating illegal or aggressive tax-motivated transactions, or transactions designed to circumvent economic sanction programs
- failing to fulfill fiduciary obligations or other duties owed to clients or customers
- violating anti-trust or anti-competition laws by colluding with other market participants to manipulate markets, prices or indices
- engaging in discriminatory behavior or harassment
- making risk decisions in ways that subordinate JPMorgan Chase's risk appetite to employee compensation objectives, and
- misappropriating property, confidential or proprietary information, or technology assets belonging to JPMorgan Chase, its clients and customers or third parties.

The consequences of any failure by employees to act consistently with JPMorgan Chase's expectations, policies or practices could include litigation, or regulatory or other governmental investigations or enforcement actions. Any of these proceedings or actions could result in judgments, settlements, fines, penalties or other sanctions, or lead to:

- financial losses
- increased operational and compliance costs

- greater scrutiny by regulators and other parties
- regulatory actions that require JPMorgan Chase to restructure, curtail or cease certain of its activities
- the need for significant oversight by JPMorgan Chase's management
- loss of clients or customers, and
- harm to JPMorgan Chase's reputation.

Reputation

Damage to JPMorgan Chase's reputation could harm its businesses.

Maintaining trust in JPMorgan Chase is critical to its ability to attract and retain clients, customers, investors and employees. Damage to JPMorgan Chase's reputation can therefore cause significant harm to JPMorgan Chase's business and prospects. Harm to JPMorgan Chase's reputation can arise from numerous sources, including:

- employee misconduct, including discriminatory behavior or harassment
- security breaches, including cyberattacks
- failure to safeguard client, customer or employee information
- failure to manage environmental, social and sustainability risk issues associated with its business activities or those of its clients
- compliance or operational failures
- litigation or regulatory fines, penalties or other sanctions
- regulatory investigations or enforcement actions, or resolutions of these matters, and
- failure or perceived failure of clients, customers, counterparties or other parties to comply with laws or regulations, including companies in which JPMorgan Chase has made principal investments, parties to joint ventures with JPMorgan Chase, and vendors with which JPMorgan Chase does business.

JPMorgan Chase's reputation may be significantly damaged by adverse publicity or negative information regarding JPMorgan Chase, whether or not true, that may be published or broadcast by the media or posted on social media, non-mainstream news services or other parts of the internet. This latter risk can be magnified by the speed and pervasiveness with which information is disseminated through those channels.

Social and environmental activists are increasingly targeting financial services firms such as JPMorgan Chase with public criticism for their relationships with clients that are engaged in certain sensitive industries, including businesses whose products are or are perceived to be harmful to human health, or whose activities negatively affect or are perceived to negatively affect the environment, workers'

rights or communities. Activists have also engaged in public protests at JPMorgan Chase's headquarters and other properties. Activist criticism of JPMorgan Chase's relationships with clients in sensitive industries could potentially engender dissatisfaction among clients, customers, investors and employees with how JPMorgan Chase addresses social and environmental concerns in its business activities. Alternatively, yielding to activism targeted at certain sensitive industries could damage JPMorgan Chase's relationships with clients and customers, and with governmental bodies in jurisdictions in which JPMorgan Chase does business, whose views are not aligned with those of social and environmental activists. In either case, the resulting harm to JPMorgan Chase's reputation could:

- cause certain clients and customers to cease doing business with JPMorgan Chase
- impair JPMorgan Chase's ability to attract new clients and customers, or to expand its relationships with existing clients and customers
- diminish JPMorgan Chase's ability to hire or retain employees, or
- prompt JPMorgan Chase to cease doing business with certain clients or customers.

Actions by the financial services industry generally or individuals in the industry can also affect JPMorgan Chase's reputation. For example, concerns that consumers have been treated unfairly by a financial institution, or that a financial institution has acted inappropriately with respect to the methods used to offer products to customers, can damage the reputation of the industry as a whole. If JPMorgan Chase is perceived to have engaged in these types of behaviors, this could weaken its reputation among clients or customers.

Failure to effectively manage potential conflicts of interest can result in litigation and enforcement actions, as well as damage JPMorgan Chase's reputation.

JPMorgan Chase's ability to manage potential conflicts of interest is highly complex due to the broad range of its business activities which encompass a variety of transactions, obligations and interests with and among JPMorgan Chase's clients and customers. JPMorgan Chase can become subject to litigation and enforcement actions, and its reputation can be damaged, by the failure or perceived failure to:

- adequately address or appropriately disclose conflicts of interest, including potential conflicts of interest that may arise in connection with providing multiple products and services in the same transaction
- deliver appropriate standards of service and quality
- treat clients and customers with the appropriate standard of care

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- use client and customer data responsibly and in a manner that meets legal requirements and regulatory expectations
- provide fiduciary products or services in accordance with the applicable legal and regulatory standards, or
- handle or use confidential information of customers or clients appropriately or in compliance with applicable data protection and privacy laws and regulations.

In the future, a failure or perceived failure to appropriately address conflicts of interest or fiduciary obligations could result in customer dissatisfaction, litigation and regulatory fines, penalties or other sanctions, and heightened regulatory scrutiny and enforcement actions, all of which can lead to lost revenue and higher operating costs and cause serious harm to JPMorgan Chase's reputation.

Country

An outbreak of hostilities between countries or within a country or region could have a material adverse effect on the global economy and on JPMorgan Chase's businesses within the affected region or globally.

Aggressive actions by hostile governments or groups, including armed conflict or intensified cyberattacks, could expand in unpredictable ways by drawing in other countries or escalating into full-scale war with potentially catastrophic consequences, particularly if one or more of the combatants possess nuclear weapons. Depending on the scope of the conflict, the hostilities could result in:

- worldwide economic disruption
- heightened volatility in financial markets
- severe declines in asset values, accompanied by widespread sell-offs of investments
- substantial depreciation of local currencies, potentially leading to defaults by borrowers and counterparties in the affected region
- disruption of global trade, and
- diminished consumer, business and investor confidence.

Any of the above consequences could have significant negative effects on JPMorgan Chase's operations and earnings, both in the countries or regions directly affected by the hostilities or globally. Further, if the U.S. were to become directly involved in such a conflict, this could lead to a curtailment of any operations that JPMorgan Chase may have in the affected countries or region, as well as in any nation that is aligned against the U.S. in the hostilities. JPMorgan Chase could also experience more numerous and aggressive cyberattacks launched by or under the sponsorship of one or more of the adversaries in such a conflict.

JPMorgan Chase's business activities with governmental entities can pose an enhanced risk of loss.

Several of JPMorgan Chase's businesses engage in transactions with, or trade in obligations of, governmental entities, including national, state, provincial, municipal and local authorities, both within and outside the U.S. These activities can expose JPMorgan Chase to enhanced sovereign, credit-related, operational and reputation risks, as governmental entities have in the past, and may in the future, taken actions such as:

- defaulting on or restructuring their obligations
- claiming that actions taken by government officials were beyond the legal authority of those officials, or
- repudiating transactions authorized by a previous incumbent government.

Any or all of these actions could adversely affect JPMorgan Chase's financial condition and results of operations and could hurt its reputation, particularly if JPMorgan Chase pursues claims against a government obligor in a jurisdiction in which it has significant business relationships with clients or customers.

JPMorgan Chase's business and revenues in emerging markets can be hampered by local economic, political, regulatory and social factors.

Some of the countries in which JPMorgan Chase conducts business have economies or markets that are less developed and more volatile, and may have legal and regulatory regimes that are less established or predictable, than the U.S. and other developed markets in which JPMorgan Chase operates. Some of these countries have in the past experienced severe economic disruptions, including:

- extreme currency fluctuations
- high inflation
- low or negative growth, and
- defaults or potential defaults on sovereign debt.

The governments in these countries have sometimes reacted to these developments by imposing restrictive policies that adversely affect the local and regional business environment, including:

- price, capital or exchange controls, including imposition of punitive transfer and convertibility restrictions
- expropriation or nationalization of assets or confiscation of property, including intellectual property, and
- changes in laws and regulations.

The impact of these actions could be accentuated in trading markets that are smaller, less liquid and more volatile than more-developed markets. These types of government actions can negatively affect JPMorgan Chase's operations

in the relevant country, either directly or by suppressing the business activities of local clients or multi-national clients that conduct business in the jurisdiction. For example, some or all of these governmental actions can result in funds belonging to JPMorgan Chase, or that it places with a local custodian on behalf of a client, being effectively trapped in a country. In addition to the ultimate risk of losing the funds entirely, JPMorgan Chase could be exposed for an extended period of time to the credit risk of a local custodian that is now operating in a deteriorating domestic economy.

In addition, emerging markets countries, as well as certain more developed countries, have been susceptible to unfavorable social developments arising from poor economic conditions and related governmental actions, as well as natural disasters, including:

- social unrest
- general strikes and demonstrations
- crime and corruption
- security and personal safety issues
- outbreaks of hostilities
- overthrow of incumbent governments
- terrorist attacks, and
- other forms of internal discord.

These economic, political, regulatory and social developments have in the past resulted in, and in the future could lead to, conditions that can adversely affect JPMorgan Chase's operations in those countries and impair the revenues, growth and profitability of those operations. In addition, any of these events or circumstances in one country can affect JPMorgan Chase's operations and investments in another country or countries, including in the U.S.

People

JPMorgan Chase's ability to attract and retain qualified employees is critical to its success.

JPMorgan Chase's employees are its most important resource, and in many areas of the financial services industry, competition for qualified personnel is intense. JPMorgan Chase endeavors to attract talented and diverse new employees and retain and motivate its existing employees. If JPMorgan Chase were unable to continue to attract or retain qualified employees, including successors to the Chief Executive Officer or members of the Operating Committee, JPMorgan Chase's performance, including its competitive position, could be materially and adversely affected.

Unfavorable changes in immigration policies could adversely affect the quality of JPMorgan Chase's businesses and operations.

JPMorgan Chase relies on the skills, knowledge and expertise of employees located throughout the world. Changes in immigration policies in the U.S. and other countries that unduly restrict or otherwise make it more difficult for employees or their family members to work in, or transfer among, jurisdictions in which JPMorgan Chase has operations or conducts its business could inhibit JPMorgan Chase's ability to attract and retain qualified employees, and thereby dilute the quality of its workforce, or could prompt JPMorgan Chase to make structural changes to its worldwide operating model that are less efficient or more costly.

Legal

JPMorgan Chase faces significant legal risks from private actions and formal and informal regulatory and government investigations.

JPMorgan Chase is named as a defendant or is otherwise involved in many legal proceedings, including class actions and other litigation or disputes with third parties. Actions currently pending against JPMorgan Chase may result in judgments, settlements, fines, penalties or other sanctions adverse to JPMorgan Chase. Any of these matters could materially and adversely affect JPMorgan Chase's business, financial condition or results of operations, or cause serious reputational harm. As a participant in the financial services industry, it is likely that JPMorgan Chase will continue to experience a high level of litigation and regulatory and government investigations related to its businesses and operations.

Regulators and other government agencies conduct examinations of JPMorgan Chase and its subsidiaries both on a routine basis and in targeted exams, and JPMorgan Chase's businesses and operations are subject to heightened regulatory oversight. This heightened regulatory scrutiny, or the results of such an investigation or examination, may lead to additional regulatory investigations or enforcement actions. There is no assurance that those actions will not result in resolutions or other enforcement actions against JPMorgan Chase. Furthermore, a single event involving a potential violation of law or regulation may give rise to numerous and overlapping investigations and proceedings, either by multiple federal, state or local agencies and officials in the U.S. or, in some instances, regulators and other governmental officials in non-U.S. jurisdictions.

If another financial institution violates a law or regulation relating to a particular business activity or practice, this will often give rise to an investigation by regulators and other governmental agencies of the same or similar activity or practice by JPMorgan Chase.

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These and other initiatives by U.S. and non-U.S. governmental authorities may subject JPMorgan Chase to judgments, settlements, fines, penalties or other sanctions, and may require JPMorgan Chase to restructure its operations and activities or to cease offering certain products or services. All of these potential outcomes could harm JPMorgan Chase's reputation or lead to higher operational costs, thereby reducing JPMorgan Chase's profitability, or result in collateral consequences. In addition, the extent of JPMorgan Chase's exposure to legal and regulatory matters can be unpredictable and could, in some cases, exceed the amount of reserves that JPMorgan Chase has established for those matters.

Item 1B. Unresolved Staff Comments.

None.

Item 2. Properties.

JPMorgan Chase's headquarters is located in New York City at 383 Madison Avenue, a 47-story office building that it owns. The Firm is demolishing its former headquarters at 270 Park Avenue in New York City and is building a new headquarters on the same site.

The Firm owned or leased facilities in the following locations at December 31, 2019.

December 31, 2019 (in millions)	Approximate square footage
United States^(a)	
New York City, New York	
383 Madison Avenue, New York, New York	1.1
All other New York City locations	8.3
Total New York City, New York	9.4
Other U.S. locations	
Columbus/Westerville, Ohio	3.7
Chicago, Illinois	2.8
Phoenix/Tempe, Arizona	2.5
Wilmington/Newark, Delaware	2.2
Houston, Texas	1.9
Jersey City, New Jersey	1.7
Dallas/Plano, Texas	1.6
All other U.S. locations	34.5
Total United States	60.3
Europe, the Middle East and Africa ("EMEA")	
25 Bank Street, London, U.K.	1.4
All other U.K. locations	2.9
All other EMEA locations	1.4
Total EMEA	5.7
Asia-Pacific, Latin America and Canada	
India	3.8
All other locations	4.0
Total Asia-Pacific, Latin America and Canada	7.8
Total	73.8

(a) At December 31, 2019, the Firm owned or leased 4,976 retail branches in 38 states and Washington D.C.

The premises and facilities occupied by JPMorgan Chase are used across all of the Firm's business segments and for corporate purposes. JPMorgan Chase continues to evaluate its current and projected space requirements and may determine from time to time that certain of its properties (including the premises and facilities noted above) are no longer necessary for its operations. There is no assurance that the Firm will be able to dispose of any such excess properties, premises, or facilities or that it will not incur costs in connection with such dispositions. Such disposition costs may be material to the Firm's results of operations in a given period. Refer to the Consolidated Results of Operations on pages 48-51 for information on occupancy expense.

Item 3. Legal Proceedings.

Refer to Note 30 for a description of the Firm's material legal proceedings.

Item 4. Mine Safety Disclosures.

Not applicable.

Part II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market for registrant's common equity

JPMorgan Chase's common stock is listed and traded on the New York Stock Exchange. Refer to "Five-year stock performance," on page 41 for a comparison of the cumulative total return for JPMorgan Chase common stock with the comparable total return of the S&P 500 Index, the KBW Bank Index and the S&P Financial Index over the five-year period ended December 31, 2019.

Refer to Capital actions in the Capital Risk Management section of Management's discussion and analysis on pages 90-91 for information on the common dividend payout ratio. Refer to Note 21 and Note 26 for a discussion of restrictions on dividend payments. On January 31, 2020, there were 195,467 holders of record of JPMorgan Chase common stock. Refer to Part III, Item 12 on page 33 for information regarding securities authorized for issuance under the Firm's employee share-based incentive plans.

Repurchases under the common equity repurchase program

Refer to Capital actions in the Capital Risk Management section of Management's discussion and analysis on pages 90-91 for information regarding repurchases under the Firm's common equity repurchase program.

Shares repurchased pursuant to the common equity repurchase program during 2019 were as follows.

Year ended December 31, 2019	Total number of shares of common stock repurchased	Average price paid per share of common stock ^(a)	Aggregate purchase price of common stock repurchases (in millions) ^(a)	Dollar value of remaining authorized repurchase (in millions) ^(a)
First quarter	49,534,646	\$ 102.78	\$ 5,091	\$ 5,290
Second quarter	47,434,255	109.83	5,210	80 ^(b)
Third quarter	62,011,400	112.07	6,949	22,451
October	19,728,145	118.30	2,334	20,116
November	17,489,713	129.27	2,261	17,856
December	16,777,026	135.65	2,276	15,580 ^(c)
Fourth quarter	53,994,884	127.24	6,871	15,580 ^(c)
Year-to-date	212,975,185	\$ 113.26	\$ 24,121	\$ 15,580 ^(c)

(a) Excludes commissions cost.

(b) The \$80 million unused portion under the prior Board authorization was canceled when the \$29.4 billion repurchase program was authorized by the Board of Directors on June 27, 2019.

(c) Represents the amount remaining under the \$29.4 billion repurchase program.

Item 6. Selected Financial Data.

Refer to "Five-year summary of consolidated financial highlights (unaudited)" on page 40 for five-year selected financial data.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

Management's discussion and analysis of financial condition and results of operations, entitled "Management's discussion and analysis," appears on pages 42-141. Such information should be read in conjunction with the Consolidated Financial Statements and Notes thereto, which appear on pages 147-286.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Refer to the Market Risk Management section of Management's discussion and analysis on pages 119-126 for a discussion of quantitative and qualitative disclosures about market risk.

Item 8. Financial Statements and Supplementary Data.

The Consolidated Financial Statements, together with the Notes thereto and the report thereon dated February 25, 2020, of PricewaterhouseCoopers LLP, the Firm's independent registered public accounting firm, appear on pages 143-286.

Supplementary financial data for each quarter within the two years ended December 31, 2019, are included on page 287 in the table entitled "Selected quarterly financial data (unaudited)." Also included is a "Glossary of Terms and Acronyms" on pages 293-299.

Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure.

None.

Item 9B. Other Information.

None.

Item 9A. Controls and Procedures.

The internal control framework promulgated by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”), “Internal Control – Integrated Framework” (“COSO 2013”), provides guidance for designing, implementing and conducting internal control and assessing its effectiveness. The Firm used the COSO 2013 framework to assess the effectiveness of the Firm’s internal control over financial reporting as of December 31, 2019. Refer to “Management’s report on internal control over financial reporting” on page 142.

As of the end of the period covered by this report, an evaluation was carried out under the supervision and with the participation of the Firm’s management, including its Chairman and Chief Executive Officer and its Chief Financial Officer, of the effectiveness of its disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934). Based on that evaluation, the Chairman and Chief Executive Officer and the Chief Financial Officer concluded that these disclosure controls and procedures were effective. Refer to Exhibits 31.1 and 31.2 for the Certifications furnished by the Chairman and Chief Executive Officer and Chief Financial Officer, respectively.

The Firm is committed to maintaining high standards of internal control over financial reporting. Nevertheless, because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. In addition, in a firm as large and complex as JPMorgan Chase, lapses or deficiencies in internal controls may occur from time to time, and there can be no assurance that any such deficiencies will not result in significant deficiencies or material weaknesses in internal control in the future and collateral consequences therefrom. Refer to “Management’s report on internal control over financial reporting” on page 142 for further information. There was no change in the Firm’s internal control over financial reporting (as defined in Rule 13a-15(f) under the Securities Exchange Act of 1934) that occurred during the three months ended December 31, 2019, that has materially affected, or is reasonably likely to materially affect, the Firm’s internal control over financial reporting.

Part III

Item 10. Directors, Executive Officers and Corporate Governance.

Executive officers of the registrant

Name	Age (at December 31, 2019)	Positions and offices
James Dimon	63	Chairman of the Board and Chief Executive Officer; he had been President from July 2004 until January 2018.
Ashley Bacon	50	Chief Risk Officer since June 2013.
Lori A. Beer	52	Chief Information Officer since September 2017, prior to which she had been Chief Information Officer of the Corporate & Investment Bank since June 2016. She was Global Head of Banking Technology from January 2014 until May 2016. Prior to joining JPMorgan Chase in 2014, she was Executive Vice President of Specialty Businesses and Information Technology for Anthem, Inc.
Mary Callahan Erdoes	52	Chief Executive Officer of Asset & Wealth Management since September 2009.
Stacey Friedman	51	General Counsel since January 2016, prior to which she was Deputy General Counsel since July 2015 and General Counsel for the Corporate & Investment Bank since August 2012.
Marianne Lake	50	Chief Executive Officer of Consumer Lending and Card Services since May 2019, prior to which she had been Chief Financial Officer since January 2013.
Robin Leopold	55	Head of Human Resources since January 2018, prior to which she had been Head of Human Resources for the Corporate & Investment Bank since August 2012.
Douglas B. Petno	54	Chief Executive Officer of Commercial Banking since January 2012.
Jennifer Piepszak	49	Chief Financial Officer since May 2019, prior to which she had been the Chief Executive Officer for Card Services since 2017. She was Chief Executive Officer of Business Banking from 2015 to 2017.
Daniel E. Pinto	57	Co-President and Co-Chief Operating Officer since January 2018, Chief Executive Officer of the Corporate & Investment Bank since March 2014, and Chief Executive Officer of Europe, the Middle East and Africa since June 2011. He had been Co-Chief Executive Officer of the Corporate & Investment Bank from July 2012 until March 2014.
Peter Scher	58	Head of Corporate Responsibility since 2011 and Chairman of the Mid-Atlantic Region since 2015.
Gordon A. Smith	61	Co-President and Co-Chief Operating Officer since January 2018, and Chief Executive Officer of Consumer & Community Banking since December 2012.

Unless otherwise noted, during the five fiscal years ended December 31, 2019, all of JPMorgan Chase's above-named executive officers have continuously held senior-level positions with JPMorgan Chase. There are no family relationships among the foregoing executive officers. Information to be provided in Items 10, 11, 12, 13 and 14 of the Form 10-K and not otherwise included herein is incorporated by reference to the Firm's Definitive Proxy Statement for its 2020 Annual Meeting of Stockholders to be held on May 19, 2020, which will be filed with the SEC within 120 days of the end of the Firm's fiscal year ended December 31, 2019.

Item 11. Executive Compensation.

Refer to Item 10.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

Refer to Item 10 for security ownership of certain beneficial owners and management.

The following table sets forth the total number of shares available for issuance under JPMorgan Chase's employee share-based incentive plans (including shares available for issuance to non-employee directors). The Firm is not authorized to grant share-based incentive awards to non-employees, other than to non-employee directors.

December 31, 2019	Number of shares to be issued upon exercise of outstanding options/stock appreciation rights	Weighted-average exercise price of outstanding options/stock appreciation rights	Number of shares remaining available for future issuance under stock incentive plans
Plan category			
Employee share-based incentive plans approved by shareholders	5,527,331 ^(a)	\$ 41.36	74,945,900 ^(b)
Total	5,527,331	\$ 41.36	74,945,900

(a) Does not include restricted stock units or performance stock units granted under the shareholder-approved Long-Term Incentive Plan ("LTIP"), as amended and restated effective May 15, 2018. Refer to Note 9 for further discussion.

(b) Represents shares available for future issuance under the shareholder-approved LTIP.

All shares available for future issuance will be issued under the shareholder-approved LTIP. Refer to Note 9 for further discussion.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

Refer to Item 10.

Item 14. Principal Accounting Fees and Services.

Refer to Item 10.

Part IV

Item 15. Exhibits, Financial Statement Schedules.

1	Financial statements	The Consolidated Financial Statements, the Notes thereto and the report of the Independent Registered Public Accounting Firm thereon listed in Item 8 are set forth commencing on page 143.	3.8	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series V (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed on June 9, 2014).
2	Financial statement schedules		3.9	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series X (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed on September 23, 2014).
3	Exhibits		3.10	Certificate of Designations for 6.125% Non-Cumulative Preferred Stock, Series Y (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed February 17, 2015).
3.1	Restated Certificate of Incorporation of JPMorgan Chase & Co., effective April 5, 2006 (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed April 7, 2006).		3.11	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series Z (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed April 21, 2015).
3.2	Amendment to the Restated Certificate of Incorporation of JPMorgan Chase & Co., effective June 7, 2013 (incorporated by reference to Appendix F to the Proxy Statement on Schedule 14A of JPMorgan Chase & Co. (File No. 1-5805) filed April 10, 2013).		3.12	Certificate of Designations for 6.10% Non-Cumulative Preferred Stock, Series AA (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed June 4, 2015).
3.3	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series I (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed April 24, 2008).		3.13	Certificate of Designations for 6.15% Non-Cumulative Preferred Stock, Series BB (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed July 29, 2015).
3.4	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series Q (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed April 23, 2013).		3.14	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series CC (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed October 20, 2017).
3.5	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series R (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed July 29, 2013).		3.15	Certificate of Designations for 5.75% Non-Cumulative Preferred Stock, Series DD (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed September 21, 2018).
3.6	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series S (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 22, 2014).		3.16	Certificate of Designations for 6.00% Non-Cumulative Preferred Stock, Series EE (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 24, 2019).
3.7	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series U (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed on March 10, 2014).		3.17	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series FF (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed July 31, 2019).

3.18	Certificate of Designations for 4.75% Non-Cumulative Preferred Stock, Series GG (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed November 7, 2019).	4.3(b)	Sixth Supplemental Indenture, dated as of January 13, 2017, between JPMorgan Chase & Co. and Bankers Trust Company (succeeded by Deutsche Bank Trust Company Americas), as Trustee, to the Indenture, dated as of May 25, 2001 (incorporated by reference to Exhibit 4.3 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 13, 2017).
3.19	Certificate of Designations for Fixed-to-Floating Rate Non-Cumulative Preferred Stock, Series HH (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 23, 2020).	4.4	Indenture, dated as of February 19, 2016, among JPMorgan Chase Financial Company LLC, JPMorgan Chase & Co. and Deutsche Bank Trust Company Americas, as Trustee (incorporated by reference to Exhibit 4(a)(7) to the Registration Statement on Form S-3 of JPMorgan Chase & Co. and JPMorgan Chase Financial Company LLC (File No. 333-209682) filed February 24, 2016).
3.20	By-laws of JPMorgan Chase & Co., as amended, effective January 30, 2018 (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 30, 2018).	4.5	Form of Deposit Agreement (incorporated by reference to Exhibit 4.3 to the Registration Statement on Form S-3 of JPMorgan Chase & Co. (File No. 333-191692) filed October 11, 2013).
4.1(a)	Indenture, dated as of October 21, 2010, between JPMorgan Chase & Co. and Deutsche Bank Trust Company Americas, as Trustee (incorporated by reference to Exhibit 4.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed October 21, 2010).	4.6	Description of Securities of JPMorgan Chase & Co. registered pursuant to Section 12 of the Securities Exchange Act of 1934.(a)(b)
4.1(b)	First Supplemental Indenture, dated as of January 13, 2017, between JPMorgan Chase & Co. and Deutsche Bank Trust Company Americas, as Trustee, to the Indenture, dated as of October 21, 2010 (incorporated by reference to Exhibit 4.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 13, 2017).		<i>Other instruments defining the rights of holders of long-term debt securities of JPMorgan Chase & Co. and its subsidiaries are omitted pursuant to Section (b)(4)(iii)(A) of Item 601 of Regulation S-K. JPMorgan Chase & Co. agrees to furnish copies of these instruments to the SEC upon request.</i>
4.2(a)	Subordinated Indenture, dated as of March 14, 2014, between JPMorgan Chase & Co. and U.S. Bank Trust National Association, as Trustee (incorporated by reference to Exhibit 4.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed March 14, 2014).	10.1	Deferred Compensation Plan for Non-Employee Directors of JPMorgan Chase & Co., as amended and restated July 2001 and as of December 31, 2004 (incorporated by reference to Exhibit 10.1 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2007).(a)
4.2(b)	First Supplemental Indenture, dated as of January 13, 2017, between JPMorgan Chase & Co. and U.S. Bank Trust National Association, as Trustee, to the Subordinated Indenture, dated as of March 14, 2014 (incorporated by reference to Exhibit 4.2 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed January 13, 2017).	10.2	2005 Deferred Compensation Plan for Non-Employee Directors of JPMorgan Chase & Co., effective as of January 1, 2005 (incorporated by reference to Exhibit 10.2 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2007).(a)
4.3(a)	Indenture, dated as of May 25, 2001, between JPMorgan Chase & Co. and Bankers Trust Company (succeeded by Deutsche Bank Trust Company Americas), as Trustee (incorporated by reference to Exhibit 4(a)(1) to the Registration Statement on Form S-3 of JPMorgan Chase & Co. (File No. 333-52826) filed June 13, 2001).	10.3	2005 Deferred Compensation Program of JPMorgan Chase & Co., restated effective as of December 31, 2008 (incorporated by reference to Exhibit 10.4 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2008).(a)
		10.4	JPMorgan Chase & Co. Amended and Restated Long-Term Incentive Plan, effective May 15, 2018 (incorporated by reference to Appendix B of the Schedule 14A of JPMorgan Chase & Co. (File No. 1-5805) filed April 5, 2018).(a)

Part IV

10.5	Key Executive Performance Plan of JPMorgan Chase & Co., as amended and restated effective January 1, 2014 (incorporated by reference to Appendix G of the Schedule 14A of JPMorgan Chase & Co. (File No. 1-5805) filed April 10, 2013).(a)	10.13	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for performance share units and restricted stock units for Operating Committee members (U.S. and U.K.), dated as of January 17, 2017 (incorporated by reference to Exhibit 10.23 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2016).(a)
10.6	Excess Retirement Plan of JPMorgan Chase & Co., restated and amended as of December 31, 2008, as amended (incorporated by reference to Exhibit 10.7 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2009).(a)	10.14	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for performance share units and restricted stock units for Operating Committee members (U.S. and U.K.), dated as of January 16, 2018.(a)
10.7	Executive Retirement Plan of JPMorgan Chase & Co., as amended and restated December 31, 2008 (incorporated by reference to Exhibit 10.9 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2008).(a)	10.15	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for restricted stock units for Operating Committee members (U.S. and U.K.), dated as of January 15, 2019.(a)
10.8	Bank One Corporation Supplemental Savings and Investment Plan, as amended and restated effective December 31, 2008 (incorporated by reference to Exhibit 10.13 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2008).(a)	10.16	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions of Performance Share Unit Award Operating Committee (U.S.) (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed March 15, 2019).(a)
10.9	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for stock appreciation rights, dated as of January 20, 2009 (incorporated by reference to Exhibit 10.20 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2008).(a)	10.17	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions of Performance Share Unit Award Operating Committee (U.K.) (incorporated by reference to Exhibit 10.2 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed March 15, 2019).(a)
10.10	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for Operating Committee member stock appreciation rights, dated as of February 3, 2010 (incorporated by reference to Exhibit 10.23 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2009).(a)	10.18	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for restricted stock units and performance share unit awards for Operating Committee members (U.S. and U.K.), dated as of January 21, 2020.(a)(b)
10.11	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for stock appreciation rights and restricted stock units, dated as of January 18, 2012 (incorporated by reference to Exhibit 10.25 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2011).(a)	10.19	Form of JPMorgan Chase & Co. Terms and Conditions of Fixed Allowance (UK) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q of JPMorgan Chase & Co. (File No. 1-5805) for the quarter ended June 30, 2014).(a)
10.12	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for stock appreciation rights and restricted stock units for Operating Committee members, dated as of January 17, 2013 (incorporated by reference to Exhibit 10.23 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2012).(a)	10.20	Form of JPMorgan Chase & Co. Performance-Based Incentive Compensation Plan, effective as of January 1, 2006, as amended (incorporated by reference to Exhibit 10.27 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2009).(a)
		10.21	Employee Stock Purchase Plan of JPMorgan Chase & Co., as amended and restated effective as of January 1, 2019 (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q of JPMorgan Chase & Co. (File No. 1-5805) for the quarter ended September 30, 2019).

21	<u>List of subsidiaries of JPMorgan Chase & Co.(b)</u>
22	Annual Report on Form 11-K of The JPMorgan Chase 401(k) Savings Plan for the year ended December 31, 2019 (to be filed pursuant to Rule 15d-21 under the Securities Exchange Act of 1934).
23	<u>Consent of independent registered public accounting firm.(b)</u>
31.1	<u>Certification.(b)</u>
31.2	<u>Certification.(b)</u>
32	<u>Certification pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.(c)</u>

101.INS	The instance document does not appear in the interactive data file because its XBRL tags are embedded within the Inline XBRL document. (d)
101.SCH	XBRL Taxonomy Extension Schema Document. ^(b)
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document. ^(b)
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document. ^(b)
101.LAB	XBRL Taxonomy Extension Label Linkbase Document. ^(b)
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document. ^(b)
104	Cover Page Interactive Data File (embedded within the Inline XBRL document and included in Exhibit 101).

-
- (a) This exhibit is a management contract or compensatory plan or arrangement.
- (b) Filed herewith.
- (c) Furnished herewith. This exhibit shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that Section. Such exhibit shall not be deemed incorporated into any filing under the Securities Act of 1933 or the Securities Exchange Act of 1934.
- (d) Pursuant to Rule 405 of Regulation S-T, includes the following financial information included in the Firm's Form 10-K for the year ended December 31, 2019, formatted in XBRL (eXtensible Business Reporting Language) interactive data files: (i) the Consolidated statements of income for the years ended December 31, 2019, 2018 and 2017, (ii) the Consolidated statements of comprehensive income for the years ended December 31, 2019, 2018 and 2017, (iii) the Consolidated balance sheets as of December 31, 2019 and 2018, (iv) the Consolidated statements of changes in stockholders' equity for the years ended December 31, 2019, 2018 and 2017, (v) the Consolidated statements of cash flows for the years ended December 31, 2019, 2018 and 2017, and (vi) the Notes to Consolidated Financial Statements.

page 38 not used

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Financial

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
	Diluted	10.72	9.00	6.31	6.19
Average shares:	Basic	3,221.5	3,396.4	3,551.6	3,658.8
	Diluted	3,230.4	3,414.0	3,576.8	3,690.0
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

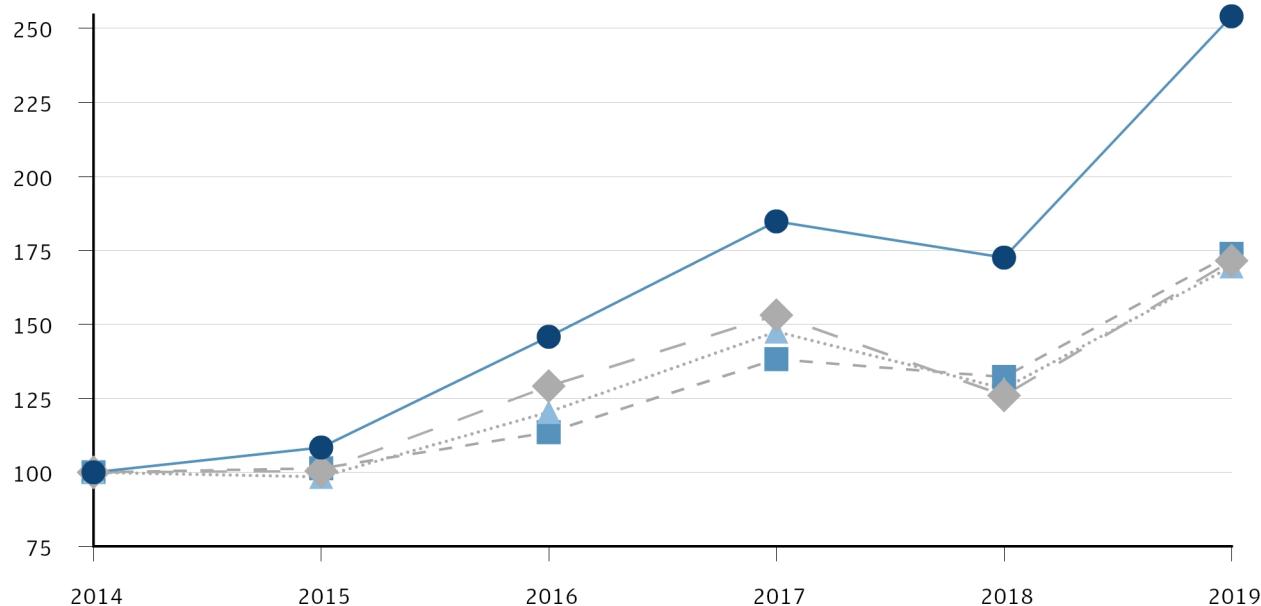
The following table and graph compare the five-year cumulative total return for JPMorgan Chase & Co. (“JPMorgan Chase” or the “Firm”) common stock with the cumulative return of the S&P 500 Index, the KBW Bank Index and the S&P Financials Index. The S&P 500 Index is a commonly referenced equity benchmark 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

December 31,
(in dollars)

— ● — JPMorgan Chase — ◆ — KBW Bank ▲ S&P Financials - ■ - S&P 500



Management's discussion and analysis

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.

EXECUTIVE OVERVIEW

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.

Management's discussion and analysis

Business segment highlights

Selected business metrics for each of the Firm's four LOBs are presented below for the full year of 2019.

CCB ROE 31%	<ul style="list-style-type: none">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%	<ul style="list-style-type: none">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%	<ul style="list-style-type: none">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%	<ul style="list-style-type: none">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:

\$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 by committing to facilitate \$200 billion in financing in 2020 that will align with the objectives of the United Nations Sustainable Development Goals. This new commitment includes \$50 billion in financing for 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.

Management's discussion and analysis

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.

Management's discussion and analysis

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.

Management's discussion and analysis

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.

Management's discussion and analysis

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.

(in millions)	Year ended December 31,		
	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

Management's discussion and analysis

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.

Year ended December 31, (in millions, except ratios)	2019			2018			2017		
	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
Total noninterest revenue	58,382	2,534	60,916	53,970	1,877		55,847	50,608	2,704
Net interest income	57,245	531	57,776	55,059	628	^(b)	55,687	50,097	1,313
Total net revenue	115,627	3,065	118,692	109,029	2,505		111,534	100,705	4,017
Pre-provision profit	50,130	3,065	53,195	45,635	2,505		48,140	41,190	4,017
Income before income tax expense	44,545	3,065	47,610	40,764	2,505		43,269	35,900	4,017
Income tax expense	8,114	3,065	11,179	8,290	2,505	^(b)	10,795	11,459	4,017
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.

Management's discussion and analysis

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.

(in millions, except per share and ratio data)	Period-end		Average		
	Dec 31, 2019	Dec 31, 2018	Year ended December 31,		
			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.

Management's discussion and analysis

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 <ul style="list-style-type: none"> • Consumer Banking/ Chase Wealth Management • Business Banking 	Home Lending <ul style="list-style-type: none"> • Home Lending Production • Home Lending Servicing • Real Estate Portfolios 	Card, Merchant Services & Auto <ul style="list-style-type: none"> • Card Services <ul style="list-style-type: none"> - Credit Card - Merchant Services^(a) - Auto 	Banking <ul style="list-style-type: none"> • Investment Banking • Treasury Services^(a) • Lending 	Markets & Securities Services <ul style="list-style-type: none"> • Fixed Income Markets • Equity Markets • Securities Services • Credit Adjustments & Other 	Middle Market Banking <ul style="list-style-type: none"> • Corporate Client Banking • Commercial Real Estate Banking 	Asset Management <ul style="list-style-type: none"> • Wealth Management

(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, (in millions, except ratios)	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking		
	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, (in millions, except ratios)	Asset & Wealth Management			Corporate			Total		
	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 Firm's 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.

Management's discussion and analysis

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, 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.

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.

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.

Management's discussion and analysis

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

(in millions)	Year ended December 31,		
	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%	
U.S.		2	9.4		2	8.9	
Equity and equity-related^(c)							
Global	1	9.4		1	9.0		
U.S.	1	13.4		1	12.3		
Long-term debt^(d)							
Global	1	7.8		1	7.2		
U.S.	1	12.0		1	11.2		
Loan syndications							
Global	1	10.1		1	9.7		
U.S.	1	12.8		1	12.3		
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.

Management's discussion and analysis

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

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.

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.

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.

Management's discussion and analysis

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 1 st or 2 nd 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%
Allowance for loan losses to period-end loans	0.22	0.22
Allowance for loan losses to nonaccrual loans	305	124
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.

Management's discussion and analysis

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.

Management's discussion and analysis

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

FIRMWIDE RISK MANAGEMENT

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.

The Firm's risk governance and oversight functions align to:



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

Management's discussion and analysis

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.

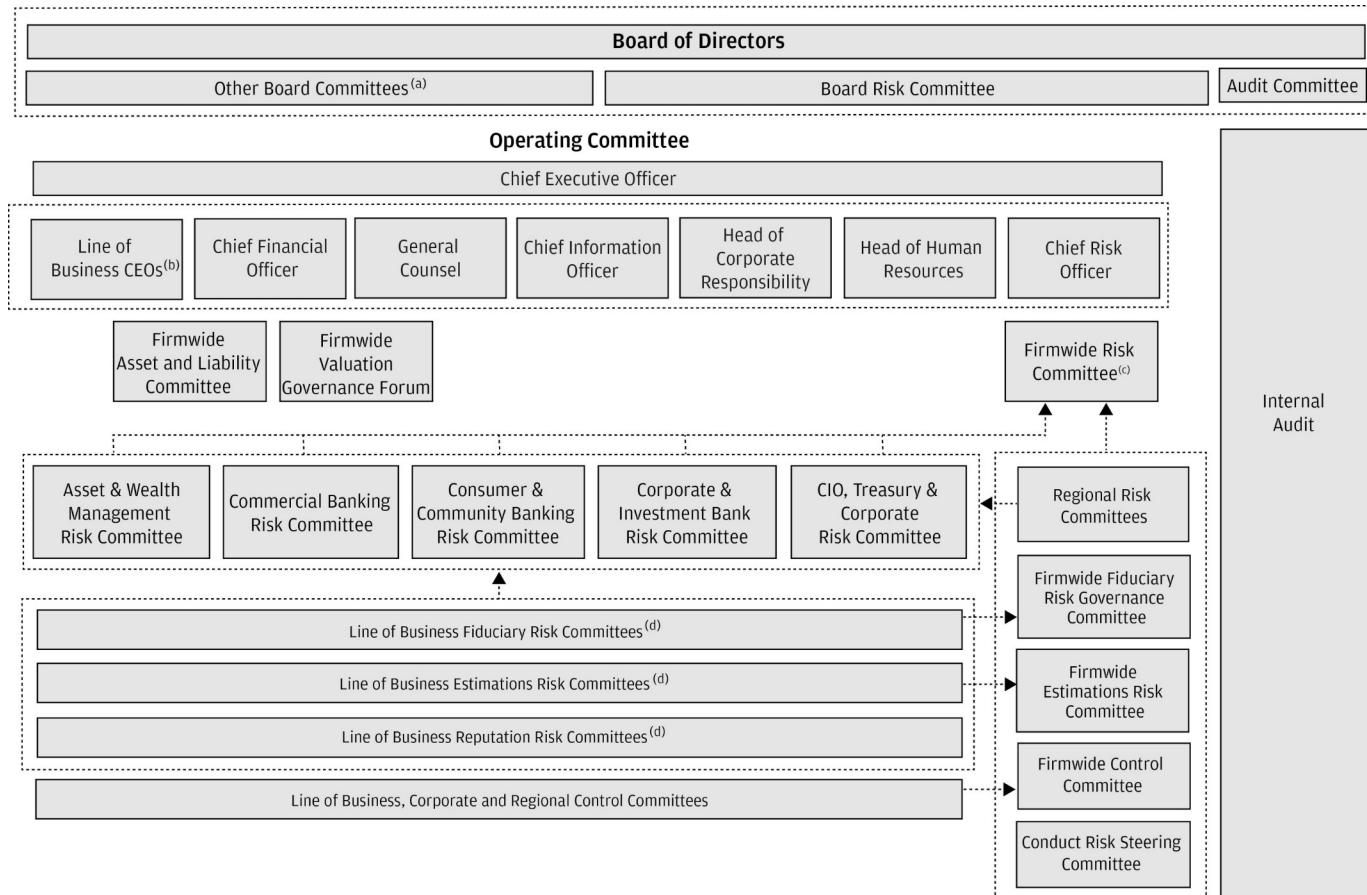
Risk appetite

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.

Management's discussion and analysis

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
Legal risk	134
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 MANAGEMENT

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.

Management's discussion and analysis

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.

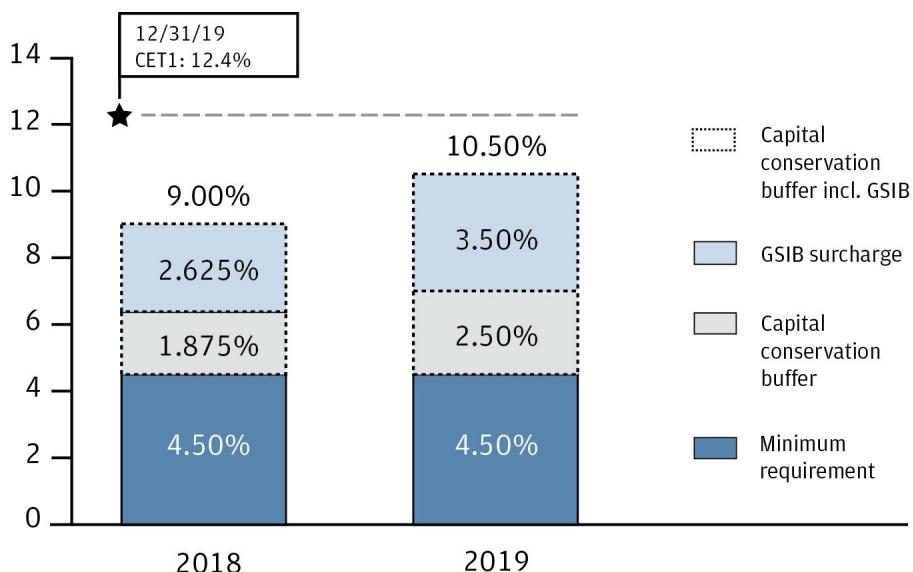
Basel III also includes a requirement for Advanced Approach banking organizations, including the Firm, to calculate the SLR. Refer to SLR on page 90 for additional information.

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

Management's discussion and analysis

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

The following tables present the Firm's risk-based and leverage-based capital measures under both the Basel III Standardized and Advanced approaches.

(in millions)	December 31, 2019			December 31, 2018		
	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.

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.

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.

Management's discussion and analysis

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,	December 31,	
	2019	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	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.

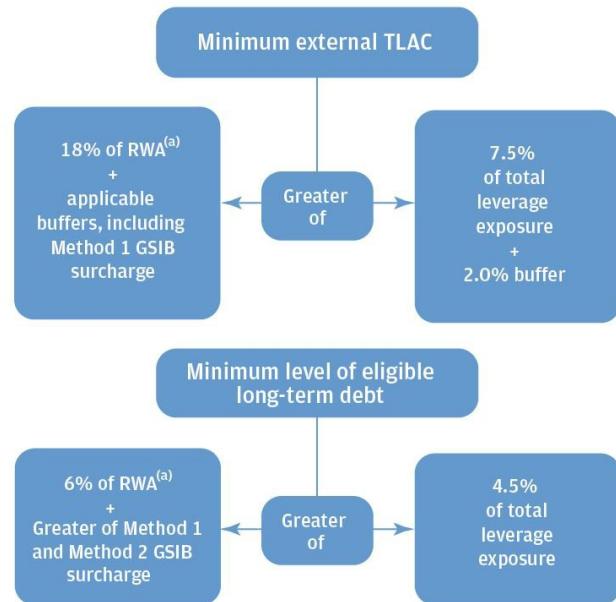
Refer to Part II, Item 5: Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities on page 30 of the 2019 Form 10-K for additional information regarding repurchases of the Firm's equity securities.

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	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.

Management's discussion and analysis

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		Actual	Minimum
(in millions)			
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 MANAGEMENT

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

Management's discussion and analysis

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, (in millions)	2019		2018		Average	
	2019	2018	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.

Management's discussion and analysis

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	2019	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, (Notional in millions)	2019	2018	2019	2018
	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, (in millions)	2019	2018	2019	2018
	Issuance		Maturities/Redemptions	
Credit card securitization				
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.

Management's discussion and analysis

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 MANAGEMENT

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.

Management's discussion and analysis

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.

Management's discussion and analysis

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.

Management's discussion and analysis

The following table provides a summary of lifetime principal loss estimates included in either the nonaccrable 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 nonaccrable 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 nonaccrable 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		2018	
	Retained loans	Nonaccrual retained loans ^(d)	Retained loans	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

December 31, 2019 (in millions, except ratios)	Maturity profile ^(d)				Ratings profile			
	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%

December 31, 2018 (in millions, except ratios)	Maturity profile ^(d)				Ratings profile			
	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.

Management's discussion and analysis

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)	Selected metrics									
	Noninvestment-grade					30 days or more past due and accruing loans	Net charge- offs/ (recoveries)	Credit derivative hedges ^(g)	(100) \$	Liquid securities and other cash collateral held against derivative receivables
	Credit exposure ^(f)	Investment- grade	Noncriticized	Criticized performing	Criticized nonperforming					
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)	Selected metrics										
	Noninvestment-grade						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	
	Credit exposure ^(f)	Investment- grade	Noncriticized	Criticized performing	Criticized nonperforming						
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.

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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.

(in millions, except ratios)	December 31, 2019					
	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	

(in millions, except ratios)	December 31, 2018					
	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

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(“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

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	
	Exposure net of all collateral	% of exposure net of all collateral	Exposure net of all collateral	% of exposure net of all collateral
December 31, (in millions, except ratios)				
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%

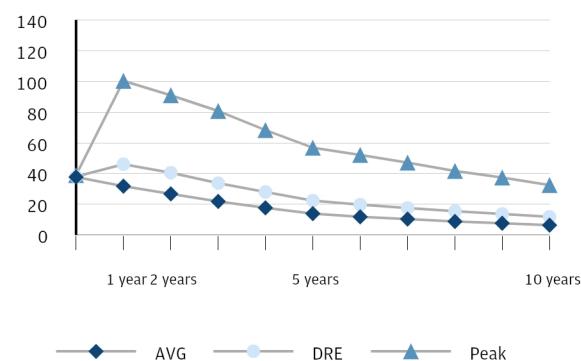
As previously noted, the Firm uses collateral agreements to mitigate counterparty credit risk. The percentage of the Firm's over-the-counter derivative transactions subject to collateral agreements – excluding foreign exchange spot trades, which are not typically covered by collateral agreements due to their short maturity and centrally cleared trades that are settled daily – was approximately 90% at both December 31, 2019 and 2018.

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)



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

December 31, (in millions)	Notional amount of protection purchased and sold ^(a)	
	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					2018				
	Consumer, excluding credit card	Credit card	Wholesale	Total	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	\$ 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 MANAGEMENT

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.

Management's discussion and analysis

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	<ul style="list-style-type: none"> Services mortgage loans Originates loans and takes deposits 	<ul style="list-style-type: none"> Risk from changes in the probability of newly originated mortgage commitments closing Interest rate risk and prepayment risk 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Retained loan portfolio Deposits 	
CIB	<ul style="list-style-type: none"> Makes markets and services clients across fixed income, foreign exchange, equities and commodities Originates loans and takes deposits 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> Retained loan portfolio Deposits 	<ul style="list-style-type: none"> Privately held equity and other investments measured at fair value Derivatives FVA and fair value option elected liabilities DVA
CB	<ul style="list-style-type: none"> Originates loans and takes deposits 	<ul style="list-style-type: none"> Interest rate risk and prepayment risk 	<ul style="list-style-type: none"> Marketable equity investments^(a) 	<ul style="list-style-type: none"> Retained loan portfolio Deposits 	
AWM	<ul style="list-style-type: none"> Provides initial capital investments in products such as mutual funds and capital invested alongside third-party investors Originates loans and takes deposits 	<ul style="list-style-type: none"> Risk from adverse movements in market factors (e.g., rates and credit spreads) Interest rate risk and prepayment risk 	<ul style="list-style-type: none"> Debt securities held in advance of distribution to clients, classified as trading assets - debt instruments^(a) 	<ul style="list-style-type: none"> Retained loan portfolio Deposits 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Manages the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks 	<ul style="list-style-type: none"> Structural interest rate risk from the Firm's traditional banking activities Structural non-USD foreign exchange risks 	<ul style="list-style-type: none"> Derivative positions measured at fair value through noninterest revenue in earnings Marketable equity investments 	<ul style="list-style-type: none"> Deposits with banks Investment securities portfolio and related interest rate hedges Long-term debt and related interest rate hedges 	<ul style="list-style-type: none"> 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.

Management's discussion and analysis

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, (in millions)	2019			2018		
	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.

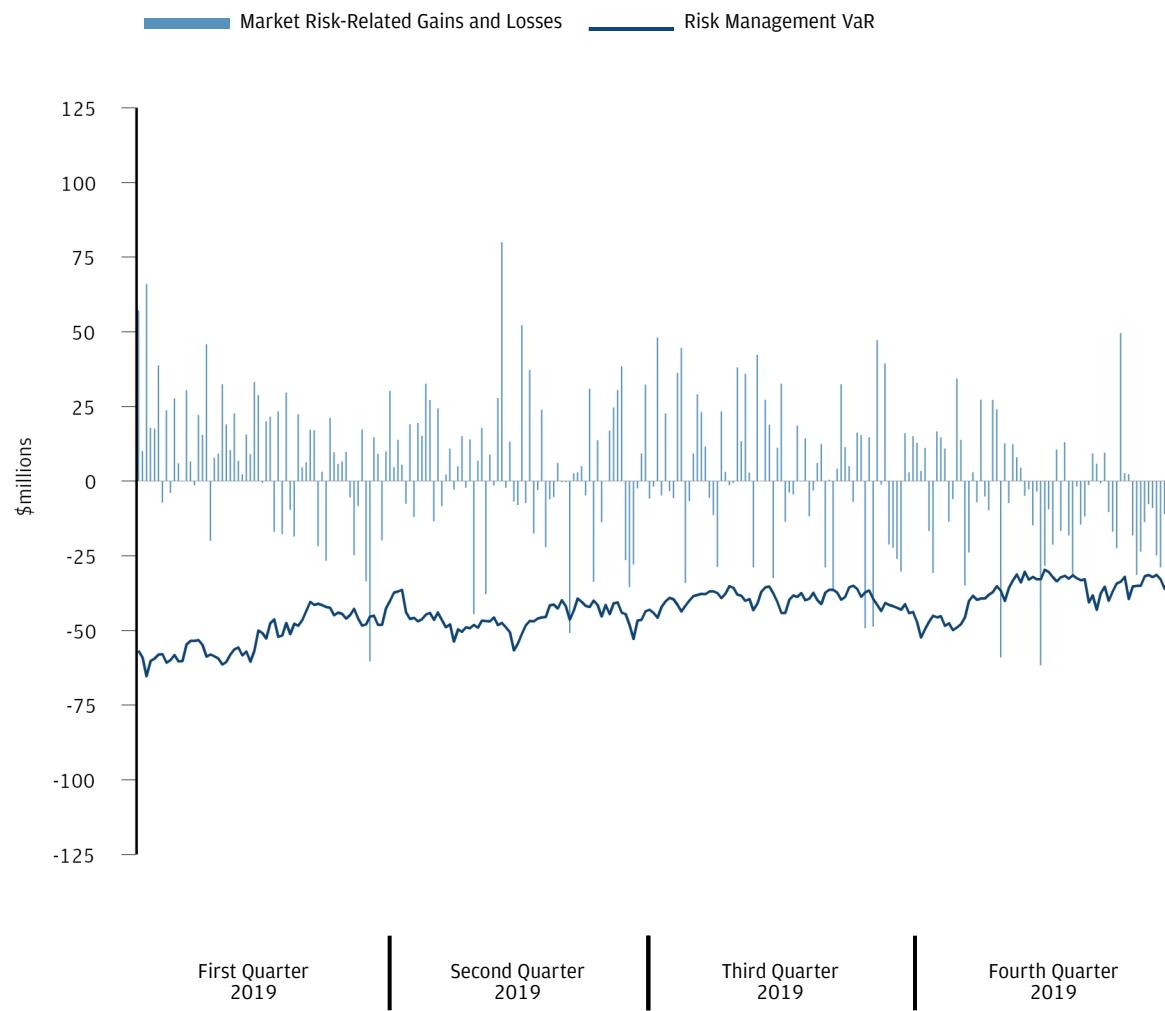
VaR back-testing

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)		Sensitivity measure	2019	2018
Activity	Description			
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.

COUNTRY RISK MANAGEMENT

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.

Management's discussion and analysis

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 MANAGEMENT

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's discussion and analysis

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 MANAGEMENT

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

Management's discussion and analysis

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.

ACCOUNTING AND REPORTING DEVELOPMENTS

Financial Accounting Standards Board (“FASB”) Standards Adopted during 2019

Standard	Summary of guidance	Effects on financial statements
Leases <i>Issued February 2016</i>	<p>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.</p> <p>Requires lessees and lessors to classify most leases using principles similar to existing lease accounting, but eliminates the “bright line” classification tests.</p> <p>Expands qualitative and quantitative leasing disclosures.</p>	<ul style="list-style-type: none"> • 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.

Management's discussion and analysis

FASB Standards Issued but not adopted as of December 31, 2019

Standard	Summary of guidance	Effects on financial statements
Financial Instruments - Credit Losses ("CECL") <i>Issued June 2016</i>	<ul style="list-style-type: none"> 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 nonaccrable 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. 	<ul style="list-style-type: none"> 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 <i>Issued January 2017</i>	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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

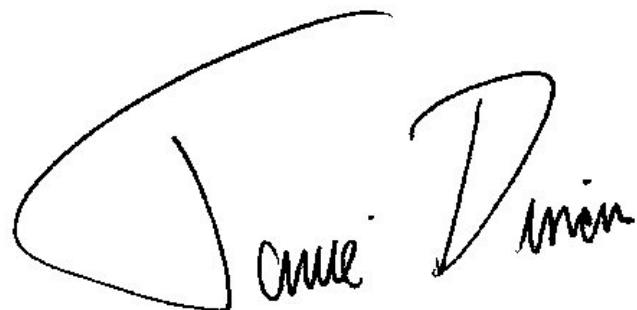
Management of JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm") is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed by, or under the supervision of, the Firm's principal executive and principal 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.

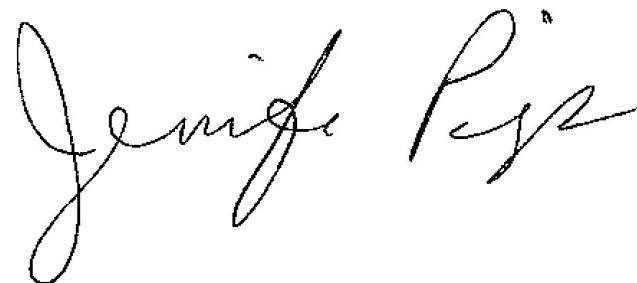
Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree 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.

A handwritten signature in black ink, appearing to read "James Dimon". The signature is fluid and cursive, with "James" on the left and "Dimon" on the right.

James Dimon
Chairman and Chief Executive Officer

A handwritten signature in black ink, appearing to read "Jennifer Piepszak". The signature is fluid and cursive, with "Jennifer" on the left and "Piepszak" on the right.

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.

Report of Independent Registered Public Accounting Firm

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

Report of Independent Registered Public Accounting Firm

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

Notes to consolidated financial statements

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:

	December 31, 2019 (in billions)	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)		<u>(0.8)</u>	
Total pre-tax impact		3.5	
Tax effect		<u>(0.8)</u>	
Decrease to retained earnings	\$	2.7	

(a) Represents the recognition of the nonaccrable 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

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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.

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Securities financing agreements	<p>Valuations are based on discounted cash flows, which consider:</p> <ul style="list-style-type: none"> • Derivative features: refer to the discussion of derivatives below for further information. • Market rates for the respective maturity • Collateral characteristics 	Predominantly level 2
Loans and lending-related commitments – wholesale	<p>Where observable market data is available, valuations are based on:</p> <ul style="list-style-type: none"> • Observed market prices (circumstances are infrequent) • Relevant broker quotes • Observed market prices for similar instruments <p>Where observable market data is unavailable or limited, valuations are based on discounted cash flows, which consider the following:</p> <ul style="list-style-type: none"> • 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 	Level 2 or 3
Loans – consumer	<p>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.</p>	Predominantly level 2
Investment and trading securities	<p>Quoted market prices</p> <p>In the absence of quoted market prices, securities are valued based on:</p> <ul style="list-style-type: none"> • Observable market prices for similar securities • Relevant broker quotes • Discounted cash flows <p>In addition, the following inputs to discounted cash flows are used for the following products:</p> <p>Mortgage- and asset-backed securities specific inputs:</p> <ul style="list-style-type: none"> • Collateral characteristics • Deal-specific payment and loss allocations • Current market assumptions related to yield, prepayment speed, conditional default rates and loss severity <p>Collateralized loan obligations (“CLOs”) specific inputs:</p> <ul style="list-style-type: none"> • Collateral characteristics • Deal-specific payment and loss allocations • Expected prepayment speed, conditional default rates, loss severity • Credit spreads • Credit rating data 	Level 1
Physical commodities	Valued using observable market prices or data.	Level 1 or 2

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Derivatives	<p>Exchange-traded derivatives that are actively traded and valued using the exchange price.</p> <p>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.</p> <p>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.</p>	Level 1
	<p>In addition, specific inputs used for derivatives that are valued based on models with significant unobservable inputs are as follows:</p> <ul style="list-style-type: none"> Structured credit derivatives specific inputs include: <ul style="list-style-type: none"> • CDS spreads and recovery rates • Credit correlation between the underlying debt instruments 	Level 2 or 3
	<ul style="list-style-type: none"> Equity option specific inputs include: <ul style="list-style-type: none"> • Forward equity price • Equity volatility • Equity correlation • Equity-FX correlation • Equity-IR correlation 	
	<ul style="list-style-type: none"> Interest rate and FX exotic options specific inputs include: <ul style="list-style-type: none"> • Interest rate volatility • Interest rate spread volatility • Interest rate correlation • Foreign exchange correlation • Interest rate-FX correlation 	
	<ul style="list-style-type: none"> Commodity derivatives specific inputs include: <ul style="list-style-type: none"> • Commodity volatility • Forward commodity price 	
	<p>Additionally, adjustments are made to reflect counterparty credit quality (CVA) and the impact of funding (FVA). Refer to page 171 of this Note.</p>	
Mortgage servicing rights	Refer to Mortgage servicing rights in Note 15.	Level 3
Private equity direct investments	<p>Fair value is estimated using all available information; the range of potential inputs include:</p> <ul style="list-style-type: none"> • 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. 	Level 2 or 3
Fund investments (e.g., mutual/collective investment funds, private equity funds, hedge funds, and real estate funds)	<p>Net asset value</p> <ul style="list-style-type: none"> • NAV is supported by the ability to redeem and purchase at the NAV level. • Adjustments to the NAV as required, for restrictions on redemption (e.g., lock-up periods or withdrawal limitations) or where observable activity is limited. 	Level 1
		Level 2 or 3 ^(a)
Beneficial interests issued by consolidated VIEs	<p>Valued using observable market information, where available.</p> <p>In the absence of observable market information, valuations are based on the fair value of the underlying assets held by the VIE.</p>	Level 2 or 3

(a) Excludes certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient.

Notes to consolidated financial statements

Product/instrument	Valuation methodology	Classification in the valuation hierarchy
Structured notes (included in deposits, short-term borrowings and long-term debt)	<ul style="list-style-type: none"> • 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

December 31, 2019 (in millions)	Fair value hierarchy				Derivative netting adjustments ^(f)	Total fair value
	Level 1	Level 2	Level 3			
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	

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December 31, 2018 (in millions)	Fair value hierarchy				Derivative netting adjustments ^(f)	Total fair value
	Level 1	Level 2	Level 3			
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 ^(g)	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.

Notes to consolidated financial statements

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%
		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%	
			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%	
Net foreign exchange derivatives	(469)	Market comparables	Price	\$1	-	\$115	
			IR-FX correlation	(58)%	-	65%	
Net equity derivatives	(3,395)	Option pricing	Prepayment speed	9%			
			Forward equity price ^(h)	92%	-	105%	
			Equity volatility	9%	-	93%	
			Equity correlation	10%	-	97%	
			Equity-FX correlation	(81)%	-	60%	
Net commodity derivatives	(16)	Option pricing	Equity-IR correlation	25%	-	35%	
			Forward commodity price	\$39	-	\$ 76 per barrel	
			Commodity volatility	5%	-	105%	
MSRs	4,699	Discounted cash flows	Commodity correlation	(48)%	-	95%	
			Refer to Note 15				
Other assets	222	Discounted cash flows	Credit spread		45bps		45bps
			Yield		12%		12%
			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%	
Other level 3 assets and liabilities, net ^(f)	265		Equity-IR correlation	25%	-	35%	

- (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.

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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.

Notes to consolidated financial statements

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)		
Fair value measurements using significant unobservable inputs											
Year ended December 31, 2019 (in millions)	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	Change in unrealized gains/(losses) related to financial instruments held 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)		
Fair value measurements using significant unobservable inputs											
Year ended December 31, 2018 (in millions)	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	Change in unrealized (gains)/losses related to financial instruments held 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)}	

Notes to consolidated financial statements

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)			
Fair value measurements using significant unobservable inputs												
Year ended December 31, 2017 (in millions)	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	Change in unrealized (gains)/losses related to financial instruments held 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.

Notes to consolidated financial statements

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,		2019	2018
(in millions)			
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.

Notes to consolidated financial statements

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.

(in billions)	December 31, 2019					December 31, 2018				
	Carrying value	Estimated fair value hierarchy			Total estimated fair value	Carrying value	Estimated fair value hierarchy			Total estimated fair value
		Level 1	Level 2	Level 3			Level 1	Level 2	Level 3	
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.

(in billions)	December 31, 2019					December 31, 2018				
	Carrying value ^(a)	Estimated fair value hierarchy			Total estimated fair value	Carrying value ^(a)	Estimated fair value hierarchy			Total estimated fair value ^(b)
		Level 1	Level 2	Level 3			Level 1	Level 2	Level 3	
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

Notes to consolidated financial statements

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.

December 31, (in millions)	2019			2018			2017		
	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.

December 31, (in millions)	2019			2018		
	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.

(in millions)	December 31, 2019				December 31, 2018			
	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.

December 31, (in millions)	2019				2018			
	Credit exposure ^(g)	On-balance sheet		Off-balance sheet ^(h)	Credit exposure ^(g)	On-balance sheet		Off-balance sheet ^(h)
		Loans	Derivatives			Loans	Derivatives	
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.

Notes to consolidated financial statements

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.

December 31, (in billions)	Notional amounts ^(b)	
	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.

Notes to consolidated financial statements

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)

December 31, 2019 (in millions)	Gross derivative receivables				Gross derivative payables				Net derivative payables ^(b)
	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables ^(b)	Not designated as hedges	Designated as hedges	Total derivative payables		
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	
Trading assets and liabilities									
December 31, 2018 (in millions)	Gross derivative receivables				Gross derivative payables				Net derivative payables ^(b)
	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables ^(b)	Not designated as hedges	Designated as hedges	Total derivative payables		
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.

December 31, (in millions)	2019			2018		
	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

Notes to consolidated financial statements

December 31, (in millions)	2019			2018		
	Gross derivative payables	Amounts netted on the Consolidated balance sheets	Net derivative payables	Gross derivative payables	Amounts netted on the Consolidated balance sheets	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

December 31, (in millions)	2019		2018	
	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.

Notes to consolidated financial statements

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.

Year ended December 31, 2019 (in millions)	Gains/(losses) recorded in income			Income statement impact of excluded components ^(f)		OCI impact	
	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	

Year ended December 31, 2018 (in millions)	Gains/(losses) recorded in income			Income statement impact of excluded components ^(f)		OCI impact	
	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)	

Year ended December 31, 2017 (in millions)	Gains/(losses) recorded in income		Income statement impact due to:		
	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.

Notes to consolidated financial statements

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.

Year ended December 31, 2019 (in millions)	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)			Total change in OCI for period
	Amounts reclassified from AOCI to income	Amounts recorded in OCI		
Contract type				
Interest rate ^(a)	\$ (28)	\$ (3)	\$ 25	
Foreign exchange ^(b)	(75)	125	200	
Total	\$ (103)	\$ 122	\$ 225	

Year ended December 31, 2018 (in millions)	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)			Total change in OCI for period
	Amounts reclassified from AOCI to income	Amounts recorded in OCI		
Contract type				
Interest rate ^(a)	\$ 44	\$ (44)	\$ (88)	
Foreign exchange ^(b)	(26)	(201)	(175)	
Total	\$ 18	\$ (245)	\$ (263)	

Year ended December 31, 2017 (in millions)	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)			Total change in OCI for period
	Amounts reclassified from AOCI to income	Amounts recorded in OCI ^(c)		
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.

Notes to consolidated financial statements

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

December 31, 2019 (in millions)	Maximum payout/Notional amount			
	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

December 31, 2018 (in millions)	Maximum payout/Notional amount			
	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.

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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.

Notes to consolidated financial statements

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

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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, (in millions)	Defined benefit pension plans		OPEB plans	
	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.

Notes to consolidated financial statements

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.

Year ended December 31, (in millions)	Pension plans			OPEB plans		
	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.

December 31,	Defined benefit pension plans ^(a)				OPEB plan ^(d)		
	Asset Allocation	% of plan assets		Asset Allocation	% of plan assets		
		2019	2018		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%	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

December 31, (in millions)	Defined benefit pension plans							
	2019				2018			
	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			Purchases, sales and settlements, net ^(b)	Transfers in and/or out of level 3	Fair value, Ending balance
		Realized gains/(losses)	Unrealized gains/(losses) ^(b)				
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			Aggregate intrinsic value
	Number of units	Weighted-average grant date fair value	Number of awards	Weighted-average exercise price	Weighted-average remaining contractual life (in years)	
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				2018			
	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value	Amortized cost	Gross unrealized gains	Gross unrealized losses	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.

Notes to consolidated financial statements

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						Total fair value	Total gross unrealized losses						
	Less than 12 months		12 months or more		Fair value	Gross unrealized losses								
	Fair value	Gross unrealized losses	Fair value	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		Total fair value	Total gross unrealized losses		
	Fair value	Gross unrealized losses	Fair value	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.

Notes to consolidated financial statements

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	\$ 17,782	\$ 107,158	\$ 48,745	\$ 171,621	\$ 345,306
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	\$ —	\$ 51	\$ 11,245	\$ 36,244	\$ 47,540
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.

Notes to consolidated financial statements

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.

December 31, (in millions)	Gross liability balance			
	2019		2018	
	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.

2019 (in millions)	Remaining contractual maturity of the agreements				
	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

2018 (in millions)	Remaining contractual maturity of the agreements				
	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.

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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.

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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)
<p>Residential real estate – excluding PCI</p> <ul style="list-style-type: none"> • Residential mortgage^(b) • Home equity^(c) <p>Other consumer loans^(d)</p> <ul style="list-style-type: none"> • Auto • Consumer & Business Banking^(e) <p>Residential real estate – PCI</p> <ul style="list-style-type: none"> • Home equity • Prime mortgage • Subprime mortgage • Option ARMs 	<ul style="list-style-type: none"> • Credit card loans 	<ul style="list-style-type: none"> • 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				Total
	Consumer, excluding credit card	Credit card	Wholesale		
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				Total
	Consumer, excluding credit card	Credit card	Wholesale		
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				Total
	Consumer, excluding credit card	Credit card	Wholesale		
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.

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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	5,872	7,175
Number of loans permanently modified	1,448	2,907	2,628	3,470	4,946		5,624	4,918	7,853
Concession granted:^(a)									
Interest rate reduction	66%	40%	63%	81%	62%		59%	77%	54%
Term or payment extension	90	55	72	64	66		69	71	62
Principal and/or interest deferred	26	44	15	7	20		10	13	29
Principal forgiveness	6	8	16	5	7		13	5	7
Other ^(b)	45	38	33	70	58		31	63	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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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 nonaccrable difference for principal losses (i.e., the lifetime credit loss estimate established as a purchase accounting adjustment at the acquisition date). When the nonaccrable 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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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	\$ 1,250
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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

Allowance for credit losses and related information

The table below summarizes information about the allowances for loan losses and lending-related 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)	—	—	1	\$ 4,146	\$ 5,184	\$ 4,115	\$ 13,445	\$ 4,579	\$ 4,884	\$ 4,141	\$ 13,604
\$ 196	\$ 440	\$ 297	\$ 933	\$ 246	\$ 383	\$ 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	\$ 33	\$ —	\$ 387,813	\$ 1,039,258	\$ 48,553	\$ 572,831	\$ 370,098	\$ 991,482
\$ —	\$ —	\$ 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								

Notes to consolidated financial statements

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)}				Total interests held by JPMorgan Chase
	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		
December 31, 2019 (in millions)								
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)}				Total interests held by JPMorgan Chase
	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		
December 31, 2018 (in millions)								
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.

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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

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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.

December 31, 2019 (in millions)	Assets			Liabilities			
	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

December 31, 2018 (in millions)	Assets			Liabilities			
	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 withhold 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.

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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		2018		2017	
	Residential mortgage ^(e)	Commercial and other ^(f)	Residential mortgage ^(e)	Commercial and other ^(f)	Residential mortgage ^(e)	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.

As of or for the year ended December 31, (in millions)	Securitized assets		90 days past due		Net liquidation losses ^(a)	
	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.

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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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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.

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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)		Issue date	Contractual rate in effect at December 31, 2019	Earliest redemption date ^(b)	Floating annualized rate of three-month LIBOR/Term SOFR plus:	Dividend declared per share ^(c)						
	December 31,								2019	2018	2017				
	2019	2018	2019	2018											
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	–	–				
Series GG	90,000	–	900	–	11/7/2019	4.750	12/1/2024	NA	–	–	–				
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				
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				
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	–	–				
Total preferred stock	2,699,250	2,606,750	\$ 26,993	\$ 26,068											

(a) Represented by depository 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-flooding 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-flooding 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-flooding rate non-cumulative perpetual preferred stock, Series I.

Notes to consolidated financial statements

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.

Management's discussion and analysis

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.

Notes to consolidated financial statements

The following table presents the pre-tax and after-tax changes in the components of OCI.

Year ended December 31, (in millions)	2019			2018			2017		
	Pre-tax	Tax effect	After-tax	Pre-tax	Tax effect	After-tax	Pre-tax	Tax effect	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.

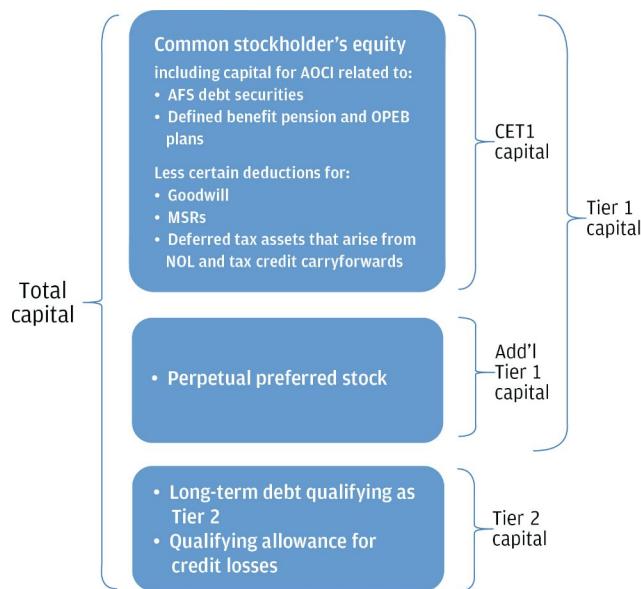
Notes to consolidated financial statements

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.

(in millions, except ratios)	December 31, 2019		December 31, 2018	
	Basel III Advanced 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. ^(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

	Contractual amount						Carrying value ^(g)					
	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						
By remaining maturity at December 31, (in millions)												
Lending-related												
Consumer, excluding credit card:												
Home equity	\$ 680	\$ 1,187	\$ 2,548	\$ 16,704	\$ 21,119	\$ 20,901	\$ 12	\$ 12	\$ 12			
Residential mortgage ^(a)	9,086	—	—	12	9,098	5,481	—	—	—			
Auto	8,296	600	197	195	9,288	8,011	2	2	2			
Consumer & Business Banking	9,994	646	105	1,162	11,907	11,673	19	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.

Notes to consolidated financial statements

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

December 31, (in millions)	2019		2018	
	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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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.

Notes to consolidated financial statements

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.

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

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.

(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.

Supplementary information

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				2018			
	4th quarter	3rd quarter	2nd quarter	1st quarter	4th quarter	3rd quarter	2nd quarter	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 ⁽ⁱ⁾	
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 ⁽ⁱ⁾	268,678	8,303	3.09 ⁽ⁱ⁾		
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:			
U.S.		\$ 57,776	2.46%
Non-U.S.		52,217	2.86
Percentage of total assets and liabilities attributable to non-U.S. operations:			
Assets		5,559	1.07
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) Year ended December 31, (On a taxable-equivalent basis; in millions)	2019 versus 2018			2018 versus 2017		
	Increase/(decrease) due to change in:			Increase/(decrease) due to change in:		
	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

Glossary of Terms and Acronyms

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

Glossary of Terms and Acronyms

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.

Glossary of Terms and Acronyms

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.

Glossary of Terms and Acronyms

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.

Glossary of Terms and Acronyms

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

Glossary of Terms and Acronyms

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.

Investment securities portfolio

Refer to Note 10 for information regarding the securities portfolio as of December 31, 2019 and 2018, and for the years ended December 31, 2019 and 2018.

(Unaudited) December 31, (in millions)	2017	
	Amortized cost	Fair value
Available-for-sale securities		
Mortgage-backed securities: U.S. GSEs and government agencies	\$ 69,879	\$ 70,280
U.S. Treasury and government agencies	22,510	22,745
All other AFS securities	106,352	109,200
Total available-for-sale securities	\$ 198,741	\$ 202,225
Held-to-maturity securities		
Mortgage-backed securities: U.S. GSEs and government agencies	27,577	28,095
All other HTM securities	20,156	20,557
Total held-to-maturity securities	\$ 47,733	\$ 48,652
Total investment securities	\$ 246,474	\$ 250,877

Loan portfolio

The table below presents loans by portfolio segment and loan class that are presented in Credit and Investment Risk Management on page 102, pages 103-107 and page 108, and in Note 12.

(Unaudited) December 31, (in millions)	2019	2018	2017	2016	2015
U.S. consumer, excluding credit card loans					
Residential mortgage	\$ 215,025	\$ 246,244	\$ 236,157	\$ 215,178	\$ 192,714
Home equity	31,294	37,303	44,249	51,965	60,548
Auto	61,522	63,573	66,242	65,814	60,255
Other	27,199	26,612	26,033	31,687	31,304
Total U.S. consumer, excluding credit card loans	335,040	373,732	372,681	364,644	344,821
Credit card Loans					
U.S. credit card loans	168,787	156,312	149,107	141,447	131,132
Non-U.S. credit card loans	137	320	404	369	331
Total credit card loans	168,924	156,632	149,511	141,816	131,463
Total consumer loans	503,964	530,364	522,192	506,460	476,284
U.S. wholesale loans					
Commercial and industrial	90,706	111,208	93,522	91,393	83,739
Real estate	117,949	115,401	112,562	104,268	90,836
Financial institutions	39,925	29,165	23,819	20,499	12,708
Governments & Agencies	10,510	11,037	12,603	12,655	9,838
Other	93,495	83,386	69,602	66,363	67,925
Total U.S. wholesale loans	352,585	350,197	312,108	295,178	265,046
Non-U.S. wholesale loans					
Commercial and industrial	29,423	30,450	29,233	31,340	30,385
Real estate	4,601	3,397	3,302	3,975	4,577
Financial institutions	16,894	18,563	16,845	15,196	17,188
Governments & Agencies	2,321	3,150	2,906	3,726	1,788
Other	49,981	48,433	44,111	38,890	42,031
Total non-U.S. wholesale loans	103,220	103,993	96,397	93,127	95,969
Total wholesale loans					
Commercial and industrial	120,129	141,658	122,755	122,733	114,124
Real estate	122,550	118,798	115,864	108,243	95,413
Financial institutions	56,819	47,728	40,664	35,695	29,896
Governments & Agencies	12,831	14,187	15,509	16,381	11,626
Other	143,476	131,819	113,713	105,253	109,956
Total wholesale loans	455,805	454,190	408,505	388,305	361,015
Total loans^(a)	\$ 959,769	\$ 984,554	\$ 930,697	\$ 894,765	\$ 837,299
Memo:					
Loans held-for-sale	\$ 7,064	\$ 11,988	\$ 3,351	\$ 2,628	\$ 1,646
Loans at fair value	7,104	3,151	2,508	2,230	2,861
Total loans held-for-sale and loans at fair value	\$ 14,168	\$ 15,139	\$ 5,859	\$ 4,858	\$ 4,507

(a) Loans (other than purchased credit-impaired loans and those for which the fair value option have 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, 2018, 2017, 2016 and 2015.

Maturities and sensitivity to changes in interest rates

The table below sets forth wholesale loan maturities and the distribution between fixed and floating interest rates based on the stated terms of the loan agreements. The table below also presents loans by loan class that are presented in Wholesale credit portfolio on pages 108-115 and Note 12. The table does not include the impact of derivative instruments.

(Unaudited) December 31, 2019 (in millions)	Within 1 year ^(a)	1-5 years	After 5 years	Total
U.S.				
Commercial and industrial	\$ 15,300	\$ 66,970	\$ 8,436	\$ 90,706
Real estate	5,922	25,976	86,051	117,949
Financial institutions	21,185	18,282	458	39,925
Governments & Agencies	1,106	3,541	5,863	10,510
Other	32,433	58,615	2,447	93,495
Total U.S.	75,946	173,384	103,255	352,585
Non-U.S.				
Commercial and industrial	10,537	15,991	2,895	29,423
Real estate	1,008	3,497	96	4,601
Financial institutions	9,367	7,503	24	16,894
Governments & Agencies	278	1,336	707	2,321
Other	33,194	15,411	1,376	49,981
Total non-U.S.	54,384	43,738	5,098	103,220
Total wholesale loans	\$ 130,330	\$ 217,122	\$ 108,353	\$ 455,805
Loans at fixed interest rates		\$ 15,090	\$ 11,393	
Loans at variable interest rates		202,032	96,960	
Total wholesale loans		\$ 217,122	\$ 108,353	

(a) Includes demand loans and overdrafts.

Risk elements

The following tables set forth nonperforming assets, contractually past-due assets, and accruing restructured loans by portfolio segment and loan class that are presented in Credit and Investment Risk Management on page 102, page 104 and page 108.

(Unaudited) December 31, (in millions)	2019	2018	2017	2016	2015
Nonperforming assets					
U.S. nonaccrual loans:					
Consumer, excluding credit card loans	\$ 3,142	\$ 3,461	\$ 4,209	\$ 4,820	\$ 5,413
Credit card loans	—	—	—	—	—
Total U.S. nonaccrual consumer loans	3,142	3,461	4,209	4,820	5,413
Wholesale:					
Commercial and industrial	636	624	703	1,145	315
Real estate	53	212	95	148	175
Financial institutions	3	4	2	4	4
Governments & Agencies	—	—	—	—	—
Other	34	89	137	198	86
Total U.S. wholesale nonaccrual loans	726	929	937	1,495	580
Total U.S. nonaccrual loans	3,868	4,390	5,146	6,315	5,993
Non-U.S. nonaccrual loans:					
Consumer, excluding credit card loans	—	—	—	—	—
Credit card loans	—	—	—	—	—
Total non-U.S. nonaccrual consumer loans	—	—	—	—	—
Wholesale:					
Commercial and industrial	207	358	654	454	314
Real estate	—	12	41	52	63
Financial institutions	—	—	—	5	6
Governments & Agencies	—	—	—	—	—
Other	5	71	102	57	53
Total non-U.S. wholesale nonaccrual loans	212	441	797	568	436
Total non-U.S. nonaccrual loans	212	441	797	568	436
Total nonaccrual loans	4,080	4,831	5,943	6,883	6,429
Derivative receivables	30	60	130	223	204
Assets acquired in loan satisfactions	387	299	353	429	401
Nonperforming assets	\$ 4,497	\$ 5,190	\$ 6,426	\$ 7,535	\$ 7,034
Memo:					
Loans held-for-sale	\$ 7	\$ —	\$ —	\$ 162	\$ 101
Loans at fair value	90	220	—	—	25
Total loans held-for-sale and loans at fair value	\$ 97	\$ 220	\$ —	\$ 162	\$ 126

(Unaudited) December 31, (in millions)	2019	2018	2017	2016	2015
Contractually past-due loans^(a)					
U.S. loans:					
Consumer, excluding credit card loans ^(b)	\$ —	\$ —	\$ —	\$ —	\$ —
Credit card loans	1,605	1,442	1,378	1,143	944
Total U.S. consumer loans	1,605	1,442	1,378	1,143	944
Wholesale:					
Commercial and industrial	34	167	107	86	6
Real estate	4	3	12	2	15
Financial institutions	2	8	14	12	1
Governments & Agencies	—	4	4	4	6
Other	1	2	2	19	28
Total U.S. wholesale loans	41	184	139	123	56
Total U.S. loans	1,646	1,626	1,517	1,266	1,000
Non-U.S. loans:					
Consumer, excluding credit card loans	—	—	—	—	—
Credit card loans	2	3	1	2	—
Total non-U.S. consumer loans	2	3	1	2	—
Wholesale:					
Commercial and industrial	1	1	1	—	1
Real estate	—	—	—	—	—
Financial institutions	—	2	1	9	10
Governments & Agencies	—	—	—	—	—
Other	—	1	—	—	—
Total non-U.S. wholesale loans	1	4	2	9	11
Total non-U.S. loans	3	7	3	11	11
Total contractually past due loans	\$ 1,649	\$ 1,633	\$ 1,520	\$ 1,277	\$ 1,011

- (a) Represents accruing loans past-due 90 days or more as to principal and interest, which are not characterized as nonaccrual loans. 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.
- (b) At December 31, 2019, 2018, 2017, 2016 and 2015, excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of \$193 million, \$1.6 billion, \$2.7 billion, \$2.7 billion and \$2.8 billion, respectively. At December 31, 2016 and 2015, student loans insured by U.S. government agencies under the Federal Family Education Loan Program of \$263 million and \$290 million, respectively, were also excluded prior to sale of the student loan portfolio in 2017. These amounts have been excluded from the nonaccrual loans based upon the government guarantee.

(Unaudited) December 31, (in millions)	2019	2018	2017	2016	2015
Accruing restructured loans^(a)					
U.S.:					
Consumer, excluding credit card loans	\$ 3,616	\$ 4,185	\$ 4,993	\$ 5,561	\$ 5,980
Credit card loans ^(b)	1,452	1,319	1,215	1,240	1,465
Total U.S. consumer loans	5,068	5,504	6,208	6,801	7,445
Wholesale:					
Commercial and industrial	32	50	32	34	12
Real estate	1	3	5	11	28
Financial institutions	—	—	79	—	—
Other	1	5	—	4	—
Total U.S. wholesale loans	34	58	116	49	40
Total U.S.	5,102	5,562	6,324	6,850	7,485
Non-U.S.:					
Consumer, excluding credit card loans	—	—	—	—	—
Credit card loans ^(b)	—	—	—	—	—
Total non-U.S. consumer loans	—	—	—	—	—
Wholesale:					
Commercial and industrial	32	45	10	17	—
Real estate	—	—	—	—	—
Financial institutions	—	—	11	—	—
Other	3	—	—	—	—
Total non-U.S. wholesale loans	35	45	21	17	—
Total non-U.S.	35	45	21	17	—
Total accruing restructured notes	\$ 5,137	\$ 5,607	\$ 6,345	\$ 6,867	\$ 7,485

- (a) Represents performing loans modified in TDRs in which an economic concession was granted by the Firm and the borrower has demonstrated its ability to repay the loans according to the terms of the restructuring. As defined in U.S. GAAP, concessions include the reduction of interest rates or the deferral of interest or principal payments, resulting from deterioration in the borrowers' financial condition. Excludes nonaccrual assets and contractually past-due assets, which are included in the sections above.

- (b) Includes credit card loans that have been modified in a TDR.

Refer to Credit and Investment Risk Management on pages 100–118, and Note 12 for a discussion of nonaccrual loans, past-due loan accounting policies, and accruing restructured loans.

Impact of nonaccrual loans and accruing restructured loans on interest income

The negative impact on interest income from nonaccrual loans represents the difference between the amount of interest income that would have been recorded on such nonaccrual loans according to their original contractual terms had they been performing and the amount of interest that actually was recognized on a cash basis. The negative impact on interest income from accruing restructured loans represents the difference between the amount of interest income that would have been recorded on such loans according to their original contractual terms and the amount of interest that actually was recognized under the modified terms. The following table sets forth this data for the years specified. The change in forgone interest income from 2017 through 2019 was primarily driven by the change in the levels of nonaccrual loans.

(Unaudited) Year ended December 31, (in millions)	2019	2018	2017
Nonaccrual loans			
U.S.:			
Consumer, excluding credit card:			
Gross amount of interest that would have been recorded at the original terms	\$ 266	\$ 318	\$ 367
Interest that was recognized in income	(176)	(187)	(175)
Total U.S. consumer, excluding credit card	90	131	192
Credit card:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total U.S. credit card	—	—	—
Total U.S. consumer	90	131	192
Wholesale:			
Gross amount of interest that would have been recorded at the original terms	53	51	46
Interest that was recognized in income	(24)	(16)	(30)
Total U.S. wholesale	29	35	16
Negative impact – U.S.	119	166	208
Non-U.S.:			
Consumer, excluding credit card:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total non-U.S. consumer, excluding credit card	—	—	—
Credit card:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total non-U.S. credit card	—	—	—
Total non-U.S. consumer	—	—	—
Wholesale:			
Gross amount of interest that would have been recorded at the original terms	12	13	24
Interest that was recognized in income	(5)	(3)	(12)
Total non-U.S. wholesale	7	10	12
Negative impact – non-U.S.	7	10	12
Total negative impact on interest income	\$ 126	\$ 176	\$ 220

(Unaudited) Year ended December 31, (in millions)	2019	2018	2017
Accruing restructured loans			
U.S.:			
Consumer, excluding credit card:			
Gross amount of interest that would have been recorded at the original terms	\$ 283	\$ 329	\$ 401
Interest that was recognized in income	(194)	(217)	(245)
Total U.S. consumer, excluding credit card	89	112	156
Credit card:			
Gross amount of interest that would have been recorded at the original terms	265	227	202
Interest that was recognized in income	(72)	(65)	(59)
Total U.S. credit card	193	162	143
Total U.S. consumer	282	274	299
Wholesale:			
Gross amount of interest that would have been recorded at the original terms	1	4	13
Interest that was recognized in income	(1)	(4)	(13)
Total U.S. wholesale	—	—	—
Negative impact – U.S.	282	274	299
Non-U.S.:			
Consumer, excluding credit card:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total non-U.S. consumer, excluding credit card	—	—	—
Credit card:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total non-U.S. credit card	—	—	—
Total non-U.S. consumer	—	—	—
Wholesale:			
Gross amount of interest that would have been recorded at the original terms	—	—	—
Interest that was recognized in income	—	—	—
Total non-U.S. wholesale	—	—	—
Negative impact – non-U.S.	—	—	—
Total negative impact on interest income	\$ 282	\$ 274	\$ 299

Cross-border outstandings

Cross-border disclosure is based on the FFIEC guidelines governing the determination of cross-border risk.

The reporting of country exposure under the FFIEC bank regulatory requirements provides information on the distribution, by country and sector, of claims on, and liabilities to, U.S. and foreign residents held by U.S. banks and bank holding companies and is used by the regulatory agencies to determine the presence of credit and related

risks, including transfer and country risk. Country location under the FFIEC bank regulatory reporting is based on where the entity or counterparty is legally established.

JPMorgan Chase's total cross-border exposures may fluctuate from period to period due to client activity and market flows. Refer to Country Risk Management on pages 127-128 for a further discussion of JPMorgan Chase's country risk exposure.

The following table lists all countries in which JPMorgan Chase's cross-border outstandings exceed 0.75% of consolidated assets as of the dates specified.

Cross-border outstandings exceeding 0.75% of total assets

(Unaudited) (in millions)	December 31,	Governments	Banks	Other ^(a)	Net local country assets	Total cross-border outstandings ^(c)	Commitments ^(d)	Total exposure
Germany	2019	\$ 9,757	\$ 4,175	\$ 8,709	\$ 12,143	\$ 34,784	\$ 54,817	\$ 89,601
	2018	12,793	7,769	15,393	30,054 ^(b)	66,009 ^(b)	67,973	133,982 ^(b)
	2017	17,751	5,357	12,320	20,117	55,545	65,333	120,878
Cayman Islands	2019	\$ 15	\$ 367	\$ 89,124	\$ —	\$ 89,506	\$ 114,398	\$ 203,904
	2018	1	308	105,857	20	106,186	45,073	151,259
	2017	5	462	61,268	58	61,793	12,361	74,154
Japan	2019	\$ 191	\$ 4,863	\$ 3,495	\$ 45,654	\$ 54,203	\$ 42,049	\$ 96,252
	2018	282	9,803	4,167	41,948 ^(b)	56,200 ^(b)	51,901	108,101 ^(b)
	2017	1,082	17,159	12,239	25,229	55,709	52,928	108,637
France	2019	\$ 9,445	\$ 5,294	\$ 12,746	\$ 2,697	\$ 30,182	\$ 107,178	\$ 137,360
	2018	12,556	3,499	21,571	2,771	40,397	105,845	146,242
	2017	12,975	7,083	15,329	2,471	37,858	83,572	121,430
Italy	2019	\$ 10,567	\$ 2,192	\$ 6,095	\$ 881	\$ 19,735	\$ 49,456	\$ 69,191
	2018	9,401	4,098	5,145	1,375	20,019	61,326	81,345
	2017	11,516	4,524	4,499	611	21,150	61,005	82,155
Ireland	2019	\$ 381	\$ 319	\$ 18,061	\$ —	\$ 18,761	\$ 9,520	\$ 28,281
	2018	185	45	19,439	—	19,669	5,585	25,254
	2017	630	318	19,630	—	20,578	5,728	26,306

(a) Consists primarily of non-banking financial institutions.

(b) The prior period amounts have been revised to conform with the current period presentation.

(c) Outstanding include loans and accrued interest receivable, interest-bearing deposits with banks, acceptances, resale agreements, other monetary assets, cross-border trading debt and equity instruments, fair value of foreign exchange and derivative contracts, and local country assets, net of local country liabilities. The amounts associated with foreign exchange and derivative contracts are presented after taking into account the impact of legally enforceable master netting agreements.

(d) Commitments include outstanding letters of credit, undrawn commitments to extend credit, and the gross notional value of credit derivatives where JPMorgan Chase is a protection seller.

The following tables summarize the changes in the allowance for loan losses and the allowance for lending-related commitments, as well as loan loss analysis during the periods indicated. Refer to Allowance for credit losses on pages 116-117, and Note 13 for a further discussion.

Allowance for loan losses

(Unaudited) Year ended December 31, (in millions)	2019	2018	2017	2016	2015
Balance at beginning of year	\$ 13,445	\$ 13,604	\$ 13,776	\$ 13,555	\$ 14,185
U.S. charge-offs					
U.S. consumer, excluding credit card	963	1,025	1,779	1,500	1,658
U.S. credit card	5,436	5,011	4,521	3,799	3,475
Total U.S. consumer charge-offs	6,399	6,036	6,300	5,299	5,133
U.S. wholesale:					
Commercial and industrial	273	161	87	240	63
Real estate	12	3	3	7	6
Financial institutions	–	–	–	–	5
Governments & Agencies	–	–	5	–	–
Other	16	97	19	13	6
Total U.S. wholesale charge-offs	301	261	114	260	80
Total U.S. charge-offs	6,700	6,297	6,414	5,559	5,213
Non-U.S. charge-offs					
Non-U.S. consumer, excluding credit card	–	–	–	–	–
Non-U.S. credit card	–	–	–	–	13
Total non-U.S. consumer charge-offs	–	–	–	–	13
Non-U.S. wholesale:					
Commercial and industrial	75	51	89	134	5
Real estate	–	–	–	1	–
Financial institutions	–	–	7	1	–
Governments & Agencies	–	–	–	–	–
Other	35	1	2	2	10
Total non-U.S. wholesale charge-offs	110	52	98	138	15
Total non-U.S. charge-offs	110	52	98	138	28
Total charge-offs	6,810	6,349	6,512	5,697	5,241
U.S. recoveries					
U.S. consumer, excluding credit card	(551)	(842)	(634)	(591)	(704)
U.S. credit card	(588)	(493)	(398)	(357)	(364)
Total U.S. consumer recoveries	(1,139)	(1,335)	(1,032)	(948)	(1,068)
U.S. wholesale:					
Commercial and industrial	(15)	(45)	(55)	(10)	(32)
Real estate	(1)	(23)	(6)	(15)	(20)
Financial institutions	–	–	–	(3)	(8)
Governments & Agencies	–	–	–	(1)	(8)
Other	(18)	(44)	(15)	(3)	(3)
Total U.S. wholesale recoveries	(34)	(112)	(76)	(32)	(71)
Total U.S. recoveries	(1,173)	(1,447)	(1,108)	(980)	(1,139)
Non-U.S. recoveries					
Non-U.S. consumer, excluding credit card	–	–	–	–	–
Non-U.S. credit card	–	–	–	–	(2)
Total non-U.S. consumer recoveries	–	–	–	–	(2)
Non-U.S. wholesale:					
Commercial and industrial	(4)	(2)	(4)	(18)	(10)
Real estate	–	–	(1)	–	–
Financial institutions	–	–	(1)	–	(2)
Governments & Agencies	–	–	–	–	–
Other	(4)	(44)	(11)	(7)	(2)
Total non-U.S. wholesale recoveries	(8)	(46)	(17)	(25)	(14)
Total non-U.S. recoveries	(8)	(46)	(17)	(25)	(16)
Total recoveries	(1,181)	(1,493)	(1,125)	(1,005)	(1,155)
Net charge-offs	5,629	4,856	5,387	4,692	4,086
Write-offs of PCI loans ^(a)	151	187	86	156	208
Provision for loan losses	5,449	4,885	5,300	5,080	3,663
Other	9	(1)	1	(11)	1
Balance at year-end	\$ 13,123	\$ 13,445	\$ 13,604	\$ 13,776	\$ 13,555

(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.

Summary of loan and lending-related commitments loss experience

Allowance for lending-related commitments

(Unaudited) Year ended December 31, (in millions)	2019	2018	2017	2016	2015
Balance at beginning of year	\$ 1,055	\$ 1,068	\$ 1,078	\$ 786	\$ 622
Provision for lending-related commitments	136	(14)	(10)	281	164
Other	—	1	—	11	—
Balance at year-end	\$ 1,191	\$ 1,055	\$ 1,068	\$ 1,078	\$ 786

Loan loss analysis

(Unaudited) As of or for the year ended December 31, (in millions, except ratios)	2019	2018	2017	2016	2015
Balances					
Loans - average	\$ 954,539	\$ 944,885	\$ 906,397	\$ 866,378	\$ 787,318
Loans - year-end	959,769	984,554	930,697	894,765	837,299
Net charge-offs	5,629	4,856	5,387	4,692	4,086
Allowance for loan losses:					
U.S.	\$ 12,303	\$ 12,692	\$ 12,552	\$ 12,738	\$ 12,704
Non-U.S.	820	753	1,052	1,038	851
Total allowance for loan losses	\$ 13,123	\$ 13,445	\$ 13,604	\$ 13,776	\$ 13,555
Nonaccrual loans	\$ 4,080	\$ 4,831	\$ 5,943	\$ 6,883	\$ 6,429
Ratios					
Net charge-offs to:					
Loans retained - average	0.60%	0.52%	0.60%	0.54%	0.52%
Allowance for loan losses	42.89	36.12	39.60	34.06	30.14
Allowance for loan losses to:					
Loans retained - year-end ^(a)	1.39	1.39	1.47	1.55	1.63
Nonaccrual loans retained	329	292	229	205	215

(a) The allowance for loan losses as a percentage of retained loans declined from 2015 to 2019, due to overall improvement in credit quality. Refer to Provision for credit losses on page 50 for a more detailed discussion of the 2018 through 2019 provision for credit losses.

Deposits

The following table provides a summary of the average balances and average interest rates of JPMorgan Chase's various deposits for the years indicated.

(Unaudited) Year ended December 31, (in millions, except interest rates)	Average balances			Average interest rates		
	2019	2018	2017	2019	2018	2017
U.S. offices						
Noninterest-bearing ^(a)	\$ 386,116	\$ 391,325	\$ 393,877	-%	-%	-%
Interest-bearing						
Demand ^(b)	195,350	177,403	162,985	1.42	1.09	0.50
Savings ^(c)	602,728	585,885	559,654	0.46	0.32	0.15
Time ^(a)	52,415	39,498	46,957	2.56	1.94	1.16
Total interest-bearing deposits^(a)	850,493	802,786	769,596	0.81	0.57	0.29
Total deposits in U.S. offices	1,236,609	1,194,111	1,163,473	0.56	0.38	0.19
Non-U.S. offices						
Noninterest-bearing ^(a)	21,103	20,099	17,325	—	—	—
Interest-bearing						
Demand	217,979	210,978	213,733	0.59	0.45	0.18
Savings	—	—	—	NM	NM	NM
Time ^(a)	47,376	31,273	22,855	1.64	1.48	1.11
Total interest-bearing deposits^(a)	265,355	242,251	236,588	0.78	0.58	0.27
Total deposits in non-U.S. offices	286,458	262,350	253,913	0.72	0.54	0.25
Total deposits	\$ 1,523,067	\$ 1,456,461	\$ 1,417,386	0.59%	0.41%	0.20%

(a) 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.

(b) Includes Negotiable Order of Withdrawal ("NOW") accounts, and certain trust accounts.

(c) Includes Money Market Deposit Accounts ("MMDAs").

At December 31, 2019, other U.S. time deposits in denominations of \$100,000 or more totaled \$15.0 billion, substantially all of which mature in three months or less. In addition, the table below presents the maturities for U.S. time certificates of deposit in denominations of \$100,000 or more.

(Unaudited) By remaining maturity at December 31, 2019 (in millions)	Three months or less	Over three months but within six months	Over six months but within 12 months	Over 12 months	Total
U.S. time certificates of deposit (\$100,000 or more)	\$ 15,759	\$ 15,249	\$ 7,252	\$ 1,294	\$ 39,554

Short-term and other borrowed funds

The following table provides a summary of JPMorgan Chase's short-term and other borrowed funds for the years indicated.

(Unaudited) As of or for the year ended December 31, (in millions, except rates)	2019	2018	2017
Federal funds purchased and securities loaned or sold under repurchase agreements:			
Balance at year-end	\$ 183,675	\$ 182,320	\$ 158,916
Average daily balance during the year	227,994	189,282	187,386
Maximum month-end balance	251,829	201,340	205,286
Weighted-average rate at December 31	1.77%	2.18%	1.03%
Weighted-average rate during the year	2.03	1.62	0.86
Commercial paper:			
Balance at year-end	\$ 14,754	\$ 30,059	\$ 24,186
Average daily balance during the year	22,977	27,834	19,920
Maximum month-end balance	30,007	30,470	24,934
Weighted-average rate at December 31	2.16%	2.71%	1.59%
Weighted-average rate during the year	2.66	2.27	1.39
Other borrowed funds:^(a)			
Balance at year-end	\$ 73,312	\$ 101,513	\$ 87,652
Average daily balance during the year	106,348	108,436	96,331
Maximum month-end balance	128,488	125,544	107,157
Weighted-average rate at December 31	1.85%	2.23%	2.09%
Weighted-average rate during the year	2.05	2.06	1.98
Short-term beneficial interests:^(b)			
Commercial paper and other borrowed funds:			
Balance at year-end	\$ 11,103	\$ 6,527	\$ 4,310
Average daily balance during the year	12,511	4,756	5,327
Maximum month-end balance	16,016	6,527	7,573
Weighted-average rate at December 31	1.92%	2.53%	1.50%
Weighted-average rate during the year	2.39	2.10	1.07

(a) Includes interest-bearing securities sold but not yet purchased of \$47.1 billion, \$62.3 billion and \$60.0 billion at December 31, 2019, 2018 and 2017, respectively.

(b) Included on the Consolidated balance sheets in beneficial interests issued by consolidated VIEs.

Federal funds purchased represent overnight funds. Securities loaned or sold under repurchase agreements generally mature between one and ninety days. Commercial paper generally is issued in amounts not less than \$100,000, and with maturities of 270 days or less. Other borrowed funds consist of demand notes, term federal funds purchased, and various other borrowings that generally have maturities of one year or less.

Signatures

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on behalf of the undersigned, thereunto duly authorized.

JPMorgan Chase & Co.
(Registrant)

By: /s/ JAMES DIMON

(James Dimon
Chairman and Chief Executive Officer)

February 25, 2020

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacity and on the date indicated. JPMorgan Chase & Co. does not exercise the power of attorney to sign on behalf of any Director.

	Capacity	Date
<u>/s/ JAMES DIMON</u> (James Dimon)	Director, Chairman and Chief Executive Officer (Principal Executive Officer)	
<u>/s/ LINDA B. BAMMANN</u> (Linda B. Bammann)	Director	
<u>/s/ JAMES A. BELL</u> (James A. Bell)	Director	
<u>/s/ STEPHEN B. BURKE</u> (Stephen B. Burke)	Director	
<u>/s/ TODD A. COMBS</u> (Todd A. Combs)	Director	
<u>/s/ JAMES S. CROWN</u> (James S. Crown)	Director	February 25, 2020
<u>/s/ TIMOTHY P. FLYNN</u> (Timothy P. Flynn)	Director	
<u>/s/ MELLODY HOBSON</u> (Mellody Hobson)	Director	
<u>/s/ LABAN P. JACKSON, JR.</u> (Laban P. Jackson, Jr.)	Director	
<u>/s/ MICHAEL A. NEAL</u> (Michael A. Neal)	Director	
<u>/s/ LEE R. RAYMOND</u> (Lee R. Raymond)	Director	
<u>/s/ JENNIFER PIEPSZAK</u> (Jennifer Piepszak)	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	
<u>/s/ NICOLE GILES</u> (Nicole Giles)	Managing Director and Firmwide Controller (Principal Accounting Officer)	

Exhibit 4.6

DESCRIPTION OF SECURITIES OF JPMORGAN CHASE & CO. REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

As of the filing date of the Annual Report on Form 10-K to which this Exhibit is attached (the “Form 10-K”), the following outstanding securities issued by JPMorgan Chase & Co. are registered pursuant to Section 12 of the Securities Exchange Act of 1934: (i) common stock; (ii) six series of preferred stock represented by depositary shares; (iii) the Alerian MLP Index ETN due May 24, 2024; and (iv) JPMorgan Chase & Co.’s guarantee of the Callable Step-Up Fixed Rate Notes due April 26, 2028 issued by JPMorgan Chase Financial Company LLC. All references herein to “JPMorgan Chase,” “we” or “us” are to JPMorgan Chase & Co.

DESCRIPTION OF COMMON STOCK

The following summary is not complete. You should refer to the applicable provisions of our Restated Certificate of Incorporation and our By-laws, each of which are incorporated by reference as Exhibits to the Form 10-K, and to the Delaware General Corporation Law (“DGCL”), for a complete statement of the terms and rights of our common stock, par value \$1.00 per share, which we refer to herein as common stock. We encourage you to read our Restated Certificate of Incorporation, which we refer to herein as our certificate of incorporation, By-laws and the relevant provisions of the DGCL for additional information.

Authorized Shares

We are authorized to issue up to 9,000,000,000 shares of common stock.

Dividends

Holders of common stock are entitled to receive dividends if, as and when declared by our board of directors out of funds legally available for payment, subject to the rights of holders of our preferred stock.

Voting Rights

Each holder of common stock is entitled to one vote per share. Subject to the rights, if any, of the holders of any series of preferred stock under its applicable certificate of designations and applicable law, all voting rights are vested in the holders of shares of our common stock. Holders of shares of our common stock have noncumulative voting rights, which means that the holders of more than 50% of the shares voting for the election of directors can elect 100% of the directors and the holders of the remaining shares will not be able to elect any directors.

Rights Upon Liquidation

In the event of our voluntary or involuntary liquidation, dissolution or winding-up, the holders of our common stock will be entitled to share equally in any of our assets available for distribution after we have paid in full all of our debts and after the holders of all series of our outstanding preferred stock have received their liquidation preferences in full.

Miscellaneous

The issued and outstanding shares of common stock are fully paid and nonassessable. Holders of shares of our common stock are not entitled to preemptive rights or to the benefit of any sinking funds. Our common stock is not convertible into shares of any other class of our capital stock. Computershare Inc. is the transfer agent, registrar and dividend disbursement agent for our common stock.

Listing

Our common stock is listed on the New York Stock Exchange (“NYSE”) under the trading symbol “JPM”.

DESCRIPTION OF LISTED PREFERRED STOCK

The following summary is not complete. You should refer to our certificate of incorporation and to the Certificate of Designations, Powers, Preferences and Rights relating to each series of Listed Preferred Stock (as defined below), which we refer to herein as a certificate of designations, for the complete terms of that series of preferred stock. Copies of our certificate of incorporation and the certificate of designations for each series of Listed Preferred Stock are incorporated by reference as Exhibits to the Form 10-K. We encourage you to read our certificate of incorporation and the relevant certificates of designations for additional information.

Authorized Shares

Under our certificate of incorporation, our board of directors is authorized, without further stockholder action, to issue up to 200,000,000 shares of preferred stock, \$1 par value per share, which we refer herein to as preferred stock, in one or more series, and to determine the voting powers and the designations, preferences and relative, participating, optional or other special rights, and

qualifications, limitations or restrictions of each series. We may amend our certificate of incorporation to increase or decrease the number of authorized shares of preferred stock in a manner permitted by our certificate of incorporation and the DGCL.

Outstanding Preferred Stock

As of the filing date of the Form 10-K, we have 18 series of preferred stock issued and outstanding. The shares of each series of our preferred stock are represented by depositary shares, with each depositary share representing a fractional interest in a share of preferred stock of the relevant series. Of the 18 series of our issued and outstanding preferred stock, depositary shares representing the following six series of preferred stock are registered pursuant to Section 12 of the Securities Exchange Act of 1934, with each depositary share representing a 1/400th interest in a share of preferred stock of the relevant series:

- 6.125% Non-Cumulative Preferred Stock, Series Y;
- 6.10% Non-Cumulative Preferred Stock, Series AA;
- 6.15% Non-Cumulative Preferred Stock, Series BB;
- 5.75% Non-Cumulative Preferred Stock, Series DD;
- 6.00% Non-Cumulative Preferred Stock, Series EE; and
- 4.75 Non-Cumulative Preferred Stock, Series GG.

We refer to the above six series of preferred stock herein collectively as the “Listed Preferred Stock”. On January 31, 2020, we announced that all of the outstanding shares of our 6.125% Non-Cumulative Preferred Stock, Series Y will be redeemed on March 1, 2020.

The Listed Preferred Stock is fully paid and nonassessable.

The terms of the depositary shares are summarized below under “Description of Depositary Shares”.

Ranking

The Listed Preferred Stock ranks, as to payment of dividends and distribution of assets upon our liquidation, dissolution or winding-up, on a parity with any series of preferred stock ranking on a parity with the Listed Preferred Stock and senior to our common stock and to any series of preferred stock ranking junior to the Listed Preferred Stock. The Listed Preferred Stock is subordinate to our existing and future indebtedness.

Dividend Rights

Holders of the Listed Preferred Stock are entitled to receive, when, as and if declared by our board of directors or any duly authorized committee of our board, cash dividends at the rates and on the dates described below under “Specific Terms of Listed Preferred Stock”. We will pay each dividend to the holders of record as they appear on our stock register on record dates determined by our board of directors or a duly authorized committee of our board. Dividends on the Listed Preferred Stock are noncumulative. If a dividend is not declared on any series of Listed Preferred Stock, because the dividends are noncumulative, then the right of holders of that series to receive that dividend will be lost, and we will have no obligation to pay the dividend for that dividend period, whether or not dividends are declared for any future dividend period.

We may not declare or pay or set aside for payment full dividends on any series of preferred stock ranking, as to dividends, equally with or junior to a series of Listed Preferred Stock unless we have previously declared and paid or set aside for payment, or we contemporaneously declare and pay or set aside for payment, full dividends on that series of Listed Preferred Stock for the most recently completed dividend period. When dividends are not paid in full on a particular series of Listed Preferred Stock and any other series of preferred stock ranking on a parity as to dividends with that series, all dividends declared and paid upon the shares of that series of Listed Preferred Stock and any other series of preferred stock ranking on a parity as to dividends with that series will be declared and paid pro rata. For purposes of calculating the pro rata allocation of partial dividend payments, we will allocate dividend payments based on the ratio between the then-current dividends due on shares of that Listed Preferred Stock and (i) in the case of any series of non-cumulative preferred stock ranking on a parity as to dividends with that Listed Preferred Stock, the aggregate of the current and unpaid dividends due on such series of preferred stock and (ii) in the case of any series of cumulative preferred stock ranking on a parity as to dividends with that Listed Preferred Stock, the aggregate of the current and accumulated and unpaid dividends due on such series of preferred stock.

In addition, unless full dividends on all outstanding shares of the Listed Preferred Stock have been declared and paid or a sum sufficient for the payment thereof set aside for such payment in respect of the applicable most recently completed dividend period, with respect to a particular series of Listed Preferred Stock:

- no dividend (other than a dividend in common stock or in any other capital stock ranking junior to that Listed Preferred Stock as to dividends and upon liquidation, dissolution or winding-up) will be declared or paid or a sum sufficient for the payment thereof set aside for such payment or other distribution declared or made upon our common stock or upon any other capital stock ranking junior to that Listed Preferred Stock as to dividends or upon liquidation, dissolution or winding-up, and

- no common stock or other capital stock ranking junior or equally with that Listed Preferred Stock as to dividends or upon liquidation, dissolution or winding-up will be redeemed, purchased or otherwise acquired for any consideration (or any moneys be paid to or made available for a sinking fund for the redemption of any shares of any such capital stock) by us, except:
 - (1) by conversion into or exchange for capital stock ranking junior to that Listed Preferred Stock;
 - (2) as a result of reclassification into capital stock ranking junior to that Listed Preferred Stock;
 - (3) through the use of the proceeds of a substantially contemporaneous sale of shares of capital stock ranking junior to that Listed Preferred Stock or, in the case of capital stock ranking on a parity with that Listed Preferred Stock, through the use of the proceeds of a substantially contemporaneous sale of other shares of capital stock ranking on a parity with that Listed Preferred Stock;
 - (4) in the case of capital stock ranking on a parity with that Listed Preferred Stock, pursuant to pro rata offers to purchase all or a pro rata portion of the shares of that Listed Preferred Stock and such capital stock ranking on a parity with that Listed Preferred Stock;
 - (5) in connection with the satisfaction of our obligations pursuant to any contract entered into in the ordinary course prior to the beginning of the most recently completed dividend period; or
 - (6) any purchase, redemption or other acquisition of capital stock ranking junior to that Listed Preferred Stock pursuant to any of our or our subsidiaries' employee, consultant or director incentive or benefit plans or arrangements (including any employment, severance or consulting arrangements) adopted before or after the issuance of that Listed Preferred Stock).

However, the foregoing will not restrict our ability or the ability of any of our affiliates to engage in underwriting, stabilization, market-making or similar transactions in our capital stock in the ordinary course of business. Subject to the conditions described above, and not otherwise, dividends (payable in cash, capital stock, or otherwise), as may be determined by our board of directors or a duly authorized committee of our board, may be declared and paid on our common stock and any other capital stock ranking junior to or on a parity with the Listed Preferred Stock from time to time out of any assets legally available for such payment, and the holders of the Listed Preferred Stock will not be entitled to participate in those dividends.

As used herein, "junior to a series of Listed Preferred Stock" and like terms refer to our common stock and any other class or series of our capital stock over which the Listed Preferred Stock has preference or priority, either as to dividends or upon liquidation, dissolution or winding-up, or both, as the context may require; "parity preferred stock" and "on a parity with a series of Listed Preferred Stock" and like terms refer to any class or series of our capital stock that ranks on a parity with the shares of a particular series of Listed Preferred Stock, either as to dividends or upon liquidation, dissolution or winding-up, or both, as the context may require; and "senior to a series of Listed Preferred Stock" and like terms refer to any class or series of our capital stock that ranks senior to a particular series of Listed Preferred Stock, either as to dividends or upon liquidation, dissolution or winding-up, or both, as the context may require.

We will compute the amount of dividends payable by annualizing the applicable dividend rate and dividing by the number of dividend periods in a year, except that the amount of dividends payable for any period greater or less than a full dividend period, other than the initial dividend period, will be computed on the basis of a 360-day year consisting of twelve 30-day months and, for any period less than a full month, the actual number of days elapsed in the period. Dollar amounts resulting from that calculation will be rounded to the nearest cent, with one-half cent being rounded upward.

Rights Upon Liquidation

In the event of our voluntary or involuntary liquidation, dissolution or winding-up, holders of each series of Listed Preferred Stock will be entitled to receive and to be paid out of our assets legally available for distribution to our stockholders the amount of \$10,000 per share, plus any declared and unpaid dividends, without accumulation of undeclared dividends, before we make any distribution of assets to the holders of our common stock or any other class or series of shares ranking junior to the Listed Preferred Stock of such series. After the payment to such holders of the full preferential amounts to which they are entitled, such holders will have no right or claim to any of our remaining assets.

If, upon our voluntary or involuntary liquidation, dissolution or winding-up, we fail to pay in full the amounts payable with respect to a particular series of Listed Preferred Stock, and any stock having the same rank as that series, the holders of that series and of that other stock will share ratably in any such distribution of our assets in proportion to the full respective distributions to which they are entitled. For any series of Listed Preferred Stock, neither the sale of all or substantially all of our property or business, nor our merger or consolidation into or with any other entity will be considered a liquidation, dissolution or winding-up, voluntary or involuntary, of us.

Because we are a holding company, our rights and the rights of our creditors and our stockholders, including the holders of the Listed Preferred Stock, to participate in the assets of any of our subsidiaries upon that subsidiary's liquidation, dissolution, winding-up or

recapitalization may be subject to the prior claims of that subsidiary's creditors, except to the extent that we are a creditor with recognized claims against the subsidiary.

Holders of the Listed Preferred Stock are subordinate to all of our indebtedness and to other non-equity claims on us and our assets, including in the event that we enter into a receivership, insolvency, liquidation or similar proceeding. In addition, holders of the Listed Preferred Stock may be fully subordinated to interests held by the U.S. government in the event that we enter into a receivership, insolvency, liquidation or similar proceeding.

Redemption

We may redeem each series of Listed Preferred Stock on the dates and at the redemption prices set forth below under "Specific Terms of Listed Preferred Stock". In addition, we may redeem each series of Listed Preferred Stock in whole, but not in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends, following the occurrence of a capital treatment event. For these purposes, "capital treatment event" means the good faith determination by JPMorgan Chase that, as a result of any:

- amendment to, or change or any announced prospective change in, the laws or regulations of the United States or any political subdivision of or in the United States that is enacted or becomes effective after the initial issuance of any shares of such series of Listed Preferred Stock;
- proposed change in those laws or regulations that is announced or becomes effective after the initial issuance of any shares of such series of Listed Preferred Stock; or
- official administrative decision or judicial decision or administrative action or other official pronouncement interpreting or applying those laws or regulations that is announced or becomes effective after the initial issuance of any shares of such series of Listed Preferred Stock,

there is more than an insubstantial risk that JPMorgan Chase will not be entitled to treat an amount equal to the full liquidation amount of all shares of such series of Listed Preferred Stock then outstanding as "additional Tier 1 capital" (or its equivalent) for purposes of the capital adequacy guidelines or regulations of the appropriate federal banking agency, as then in effect and applicable, for as long as any share of such series of Listed Preferred Stock is outstanding. Redemption of any Listed Preferred Stock is subject to our receipt of any required approvals from the Federal Reserve Board or any other regulatory authority.

If we elect to redeem shares of a series of Listed Preferred Stock, we will provide notice by first class mail, postage prepaid, addressed to the holders of record of such shares to be redeemed. Such mailing will be at least 30 days and not more than 60 days before the date fixed for redemption. Any notice so mailed will be conclusively presumed to have been duly given, whether or not the holder receives such notice, but failure to duly give such notice by mail, or any defect in such notice or in the mailing thereof, to any holder of shares of the series designated for redemption will not affect the validity of the proceedings for the redemption of any other shares of that series. Each notice of redemption will state:

- the redemption date;
- the number of shares of the series of Listed Preferred Stock to be redeemed and, if fewer than all the shares held by such holder are to be redeemed, the number of such shares to be redeemed from such holder;
- the redemption price;
- the place or places where the certificates representing such shares are to be surrendered for payment of the redemption price; and
- that dividends on the shares to be redeemed will cease to accrue on the redemption date.

Notwithstanding the foregoing, if the series of Listed Preferred Stock is held in book-entry form through The Depository Trust Company, or "DTC", we may give such notice in any manner permitted or required by DTC. For each series of Listed Preferred Stock, neither the holders of a series nor the holders of the related depositary shares have the right to require redemption of such series of Listed Preferred Stock.

In the case of any redemption of only part of the shares a series of Listed Preferred Stock at the time outstanding, the shares of the series to be redeemed will be selected either pro rata from the holders of record of that series in proportion to the number of shares held by such holders or by lot. From and after the redemption date, dividends will cease to accumulate on the shares of Listed Preferred Stock called for redemption up to the redemption date and all rights of the holders of those shares, except the right to receive the redemption price, will cease.

In the event that we fail to pay full dividends, including accumulated but unpaid dividends, if any, on any series of Listed Preferred Stock, we may not redeem that series in part and we may not purchase or acquire any shares of that series, except by a purchase or exchange offer made on the same terms to all holders of that series.

Preemptive and Conversion Rights

The Listed Preferred Stock is not subject to any preemptive rights and is not convertible into property or shares of any other class or series of our capital stock.

Depository, Transfer Agent, and Registrar

Computershare Inc. is the depository, transfer agent and registrar for each series of the Listed Preferred Stock and the related depository shares.

Voting Rights

Except as indicated below or except as expressly required by applicable law, the holders of the Listed Preferred Stock are not entitled to vote. Each share of Listed Preferred Stock a series is entitled to one vote on matters on which holders of that series are entitled to vote. The voting power of each series of Listed Preferred Stock depends on the number of shares in that series, and not on the aggregate liquidation preference or initial offering price of the shares of that series.

If, at any time or times, the equivalent of an aggregate of six quarterly dividends, whether or not consecutive, for any series of Listed Preferred Stock has not been paid, the number of directors constituting our board of directors will be automatically increased by two and the holders of each outstanding series of Listed Preferred Stock with such voting rights, together with holders of such other shares of any other class or series of parity preferred stock outstanding at the time upon which like voting rights have been conferred and are exercisable, which we refer to as "voting parity stock," voting together as a class, will be entitled to elect those additional two directors, which we refer to as "preferred directors," at that annual meeting and at each subsequent annual meeting of stockholders until full dividends have been paid for at least four quarterly consecutive dividend periods. At that time such right will terminate, except as expressly provided in the applicable certificate of designations or by law, subject to revesting. Upon any termination of the right of the holders of the Listed Preferred Stock and voting parity stock as a class to vote for directors as provided above, the preferred directors will cease to be qualified as directors, the term of office of all preferred directors then in office will terminate immediately and the authorized number of directors will be reduced by the number of preferred directors elected. Any preferred director may be removed and replaced at any time, with cause as provided by law or without cause by the affirmative vote of the holders of shares of the Listed Preferred Stock, voting together as a class with the holders of shares of voting parity stock, to the extent the voting rights of such holders described above are then exercisable. Any vacancy created by removal with or without cause may be filled only as described in the preceding sentence. If the office of any preferred director becomes vacant for any reason other than removal, the remaining preferred director may choose a successor who will hold office for the unexpired term in respect of which such vacancy occurred.

So long as any shares of a particular series of Listed Preferred Stock remains outstanding, we will not, without the affirmative vote of the holders of at least 66 2/3% in voting power of that series and any voting parity stock, voting together as a class, authorize, create or issue any capital stock ranking senior to that series as to dividends or upon liquidation, dissolution or winding-up, or reclassify any authorized capital stock into any such shares of such capital stock or issue any obligation or security convertible into or evidencing the right to purchase any such shares of capital stock. So long as any shares of a particular series of Listed Preferred Stock remain outstanding, we will not, without the affirmative vote of the holders of at least 66 2/3% in voting power of that series, amend, alter or repeal any provision of the applicable certificate of designations or our certificate of incorporation, including by merger, consolidation or otherwise, so as to adversely affect the powers, preferences or special rights of that series.

Notwithstanding the foregoing, none of the following will be deemed to adversely affect the powers, preferences or special rights of any series of Listed Preferred Stock:

- any increase in the amount of authorized common stock or authorized preferred stock, or any increase or decrease in the number of shares of any series of preferred stock, or the authorization, creation and issuance of other classes or series of capital stock, in each case ranking on a parity with or junior to that series of Listed Preferred Stock as to dividends or upon liquidation, dissolution or winding-up;
- a merger or consolidation of JPMorgan Chase with or into another entity in which the shares of that series remain outstanding; and
- a merger or consolidation of JPMorgan Chase with or into another entity in which the shares of the that series are converted into or exchanged for preference securities of the surviving entity or any entity, directly or indirectly, controlling such surviving entity and such new preference securities have powers, preferences and special rights that are not materially less favorable than that series;

provided that if the amendment would adversely affect such series but not any other series of preferred stock outstanding, then the amendment will only need to be approved by holders of at least two-thirds of the shares of the series of Listed Preferred Stock adversely affected.

In exercising the voting rights described above or when otherwise granted voting rights by operation of law or by us, each share of Listed Preferred Stock with respect to a series will be entitled to one vote (equivalent to 1/400th of a vote per relevant depository share).

If we redeem or call for redemption all outstanding shares of a series of Listed Preferred Stock and irrevocably deposit in trust sufficient funds to effect such redemption, at or prior to the time when the act with respect to which such vote would otherwise be required or upon which the holders of such series will be entitled to vote will be effected, the voting provisions described above will not apply.

Our board of directors may also from time to time, without notice to or consent of holders of a series of Listed Preferred Stock, issue additional shares of such series. Delaware law provides that the holders of preferred stock will have the right to vote separately as a class on any amendment to our certificate of incorporation (including any certificate of designations) that would increase or decrease the aggregate number of authorized shares of such class, increase or decrease the par value of such class or adversely affect the powers, preferences and special rights of the shares of preferred stock. Notwithstanding the foregoing, as permitted by law, our certificate of incorporation provides that any increase or decrease in our authorized capital stock may be adopted by the affirmative vote of holders of capital stock representing not less than a majority of the voting power represented by the outstanding shares of our capital stock entitled to vote. If any proposed amendment would alter or change the powers, preferences or special rights of one or more series of preferred stock so as to affect them adversely, but would not so affect the entire class of preferred stock, only the shares of the series so affected will be considered a separate class for purposes of this vote on the amendment. This right is in addition to any voting rights that may be provided for in our certificate of incorporation (including any certificate of designations).

Under regulations adopted by the Federal Reserve Board, if the holders of any series of our preferred stock become entitled to vote for the election of directors because dividends on that series are in arrears, that series may then be deemed a "class of voting securities." In such a case, a holder of 25% or more of the series, or a holder of 5% or more if that holder would also be considered to exercise a "controlling influence" over JPMorgan Chase, may then be subject to regulation as a bank holding company in accordance with the Bank Holding Company Act. In addition, (1) any other bank holding company may be required to obtain the prior approval of the Federal Reserve Board to acquire or retain 5% or more of that series, and (2) any person other than a bank holding company may be required to provide notice to the Federal Reserve Board prior to acquiring or retaining 10% or more of that series.

Description of Depositary Shares

The following summary of the terms of the depositary shares representing each series of the Listed Preferred Stock is not complete. You should refer to each of the deposit agreements among us, the depositary, and the holders from time to time of the depositary receipts evidencing the depositary shares relating to each series of the Listed Preferred Stock for the complete terms of those depositary shares. Each of those deposit agreements has been filed as an exhibit to a Current Report on Form 8-K filed in connection with the issuance of the depositary shares representing each series of the Listed Preferred Stock.

General. Each depositary share represents a 1/400th interest in a share of the relevant series of Listed Preferred Stock, and is evidenced by depositary receipts. In connection with the issuance of each series of Listed Preferred Stock, we deposited shares of that series of Listed Preferred Stock with Computershare Inc., as depositary under the deposit agreement relating to that series of Listed Preferred Stock. Subject to the terms of each deposit agreement, the depositary shares are entitled to all the powers, preferences and special rights of the relevant series of Listed Preferred Stock, as applicable, in proportion to the applicable fraction of a share of Listed Preferred Stock those depositary shares represent.

Dividends and Other Distributions. Each dividend payable on a depositary share will be in an amount equal to 1/400th of the dividend declared and payable on the related share of the Listed Preferred Stock.

The depositary will distribute all dividends and other cash distributions received on the relevant series of Listed Preferred Stock to the holders of record of the related depositary receipts in proportion to the number of depositary shares held by each holder. In the event of a distribution other than in cash, the depositary will distribute property received by it to the holders of record of the depositary receipts as nearly as practicable in proportion to the number of depositary shares held by each holder, unless the depositary determines that this distribution is not feasible, in which case the depositary may, with our approval, adopt a method of distribution that it deems practicable, including the sale of the property and distribution of the net proceeds of that sale to the holders of the depositary receipts.

Record dates for the payment of dividends and other matters relating to the depositary shares will be the same as the corresponding record dates for the related shares of Listed Preferred Stock.

The amount paid as dividends or otherwise distributable by the depositary with respect to the depositary shares or the underlying Listed Preferred Stock will be reduced by any amounts required to be withheld by us or the depositary on account of taxes or other governmental charges.

Redemption of Depositary Shares. If we redeem a series of Listed Preferred Stock, in whole or in part, the corresponding depositary shares also will be redeemed with the proceeds received by the depositary from the redemption of the Listed Preferred Stock held by the depositary. The redemption price per depositary share will be 1/400th of the redemption price per share payable with respect to the Listed Preferred Stock, plus any declared and unpaid dividends, without accumulation of undeclared dividends.

If we redeem shares of a series of Listed Preferred Stock held by the depositary, the depositary will redeem, as of the same redemption date, the number of depositary shares representing those shares of the Listed Preferred Stock so redeemed. If we redeem less than all of the outstanding depositary shares, the depositary will select pro rata or by lot those depositary shares to be redeemed. The depositary will mail notice of redemption to record holders of the depositary receipts not less than 30 and not more than 60 days prior to the date fixed for redemption of the Listed Preferred Stock and the related depositary shares.

The redemption of depositary shares that are held in book-entry form through DTC will be effected in accordance with the applicable procedures of DTC.

Voting the Listed Preferred Stock. Because each depositary share represents a 1/400th interest in a share of Listed Preferred Stock, holders of depositary receipts will be entitled to 1/400th of a vote per depositary share under those limited circumstances in which holders of the Listed Preferred Stock are entitled to a vote.

When the depositary receives notice of any meeting at which the holders of a series of Listed Preferred Stock are entitled to vote, the depositary will mail the information contained in the notice to the record holders of the depositary shares relating to that Listed Preferred Stock. Each record holder of the depositary shares on the record date, which will be the same date as the record date for the applicable Listed Preferred Stock, may instruct the depositary to vote the amount of the Listed Preferred Stock represented by the holder's depositary shares. To the extent practicable, the depositary will vote the amount of the Listed Preferred Stock represented by depositary shares in accordance with the instructions it receives. We will agree to take all actions that the depositary determines are necessary to enable the depositary to vote as instructed. If the depositary does not receive specific instructions from the holders of any depositary shares representing the Listed Preferred Stock, it will abstain from voting with respect to such shares.

Withdrawal of Listed Preferred Stock. Underlying shares of Listed Preferred Stock may be withdrawn from the depositary arrangement upon surrender of depositary receipts at the depositary's office and upon payment of the taxes, charges and fees provided for in the deposit agreement. Subject to the terms of the relevant deposit agreement, the holder of depositary receipts will receive the appropriate number of shares of Listed Preferred Stock represented by such depositary shares. Only whole shares of Listed Preferred Stock may be withdrawn; if a holder holds an amount other than a whole multiple of 400 depositary shares, the depositary will deliver along with the withdrawn shares of Listed Preferred Stock a new depositary receipt evidencing the excess number of depositary shares. Holders of withdrawn shares of Listed Preferred Stock will not be entitled to redeposit such shares or to receive depositary shares.

Form and Notices. Each series of Listed Preferred Stock was issued in registered form to the depositary, and the depositary shares representing that Listed Preferred Stock were issued in book-entry only form through DTC. The depositary will forward to the holders of depositary shares all reports, notices, and communications from us that are delivered to the depositary and that we are required to furnish to the holders of the Listed Preferred Stock.

Amendment and Termination of the Deposit Agreement. We and the depositary may amend any form of depositary receipt evidencing depositary shares and any provision of any deposit agreement at any time regarding any depositary shares. However, any amendment that materially and adversely alters the rights of the holders of depositary shares representing a particular series of Listed Preferred Stock or would be materially and adversely inconsistent with the rights granted to holders of that underlying Listed Preferred Stock pursuant to our certificate of incorporation will not be effective unless the amendment has been approved by the holders of at least a majority of the related depositary shares then outstanding. The deposit agreement relating to the depositary shares representing a particular series of Listed Preferred Stock may be terminated by us or by the depositary only if:

- all such outstanding depositary shares have been redeemed; or
- there has been a final distribution of the relevant underlying Listed Preferred Stock in connection with our liquidation, dissolution or winding up and the preferred stock has been distributed to the holders of depositary receipts.

Charges of Depositary. We will pay all transfer and other taxes and governmental charges arising solely from the existence of the depositary arrangements regarding any depositary shares. We also pay charges of the depositary in connection with the initial deposit of each series of Listed Preferred Stock and any redemption of the Listed Preferred Stock. Holders of depositary receipts will pay transfer and other taxes and governmental charges and other charges with respect to their depositary receipts as expressly provided in the deposit agreement.

Resignation and Removal of Depositary. With respect to the depositary shares representing each series of Listed Preferred Stock, the depositary may resign at any time by delivering a notice to us of its election to do so. We may remove the depositary at any time. Any such resignation or removal will take effect upon the appointment of a successor depositary and its acceptance of its appointment. We must appoint a successor depositary within 60 days after delivery of the notice of resignation or removal.

Miscellaneous. The depositary will forward to holders of applicable depositary receipts all reports and communications from us that we deliver to the depositary and that we are required to furnish to the holders of the relevant Listed Preferred Stock.

Neither we nor the depositary will be liable if either of us is prevented or delayed by law or any circumstance beyond our control in performing our respective obligations under any deposit agreement. Our obligations and those of the depositary will be limited to performing in good faith our respective duties under any deposit agreement. Neither we nor the depositary will be obligated to prosecute or defend any legal proceeding relating to any depositary shares or Listed Preferred Stock unless satisfactory indemnity is furnished. We and the depositary may rely upon written advice of counsel or accountants, or upon information provided by persons presenting preferred stock for deposit, holders of depositary receipts or other persons we believe to be competent, and on documents we believe to be genuine.

Specific Terms of Listed Preferred Stock

6.125% Non-Cumulative Preferred Stock, Series Y

On February 12, 2015, we issued an aggregate of 143,000 shares of 6.125% Non-Cumulative Preferred Stock, Series Y, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series Y Preferred Stock”). Shares of the Series Y Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series. On January 31, 2020, we announced that all of the outstanding shares of the Series Y Preferred Stock, and the depositary shares representing the Series Y Preferred Stock, will be redeemed on March 1, 2020.

Dividends. Dividends on the Series Y Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 6.125% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on June 1, 2015. Dividends on the Series Y Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series Y Preferred Stock may be redeemed on any dividend payment date on or after March 1, 2020, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series Y Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series Y Preferred Stock are listed on the NYSE under the trading symbol “JPM PR F”.

6.10% Non-Cumulative Preferred Stock, Series AA

On June 4, 2015, we issued an aggregate of 142,500 shares of 6.10% Non-Cumulative Preferred Stock, Series AA, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series AA Preferred Stock”). Shares of the Series AA Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series.

Dividends. Dividends on the Series AA Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 6.10% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on September 1, 2015. Dividends on the Series AA Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series AA Preferred Stock may be redeemed on any dividend payment date on or after September 1, 2020, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series AA Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series AA Preferred Stock are listed on the NYSE under the trading symbol “JPM PR G”.

6.15% Non-Cumulative Preferred Stock, Series BB

On July 29, 2015, we issued an aggregate of 115,000 shares of 6.15% Non-Cumulative Preferred Stock, Series BB, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series BB Preferred Stock”). Shares of the Series BB Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series.

Dividends. Dividends on the Series BB Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 6.15% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on December 1, 2015. Dividends on the Series BB Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series BB Preferred Stock may be redeemed on any dividend payment date on or after September 1, 2020, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series BB Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series BB Preferred Stock are listed on the NYSE under the trading symbol “JPM PR H”.

5.75% Non-Cumulative Preferred Stock, Series DD

On September 21, 2018, we issued an aggregate of 169,625 shares of 5.75% Non-Cumulative Preferred Stock, Series DD, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series DD Preferred Stock”). Shares of the Series DD Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series.

Dividends. Dividends on the Series DD Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 5.75% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on December 1, 2018. Dividends on the Series DD Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series DD Preferred Stock may be redeemed on any dividend payment date on or after December 1, 2023, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series DD Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series DD Preferred Stock are listed on the NYSE under the trading symbol “JPM PR D”.

6.00% Non-Cumulative Preferred Stock, Series EE

On January 24, 2019, we issued an aggregate of 185,000 shares of 6.00% Non-Cumulative Preferred Stock, Series EE, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series EE Preferred Stock”). Shares of the Series EE Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series.

Dividends. Dividends on the Series EE Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 6.00% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on June 1, 2019. Dividends on the Series EE Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series EE Preferred Stock may be redeemed on any dividend payment date on or after March 1, 2024, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series EE Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series EE Preferred Stock are listed on the NYSE under the trading symbol “JPM PR C”.

4.75% Non-Cumulative Preferred Stock, Series GG

On November 7, 2019, we issued an aggregate of 90,000 shares of 4.75% Non-Cumulative Preferred Stock, Series GG, \$1 par value, with a liquidation preference of \$10,000 per share (the “Series GG Preferred Stock”). Shares of the Series GG Preferred Stock are represented by depositary shares, each representing a 1/400th interest in a share of preferred stock of the series.

Dividends. Dividends on the Series GG Preferred Stock are payable when, as, and if declared by our board of directors or a duly authorized committee of our board, at a rate of 4.75% per annum, payable quarterly in arrears, on March 1, June 1, September 1 and December 1 of each year, beginning on March 1, 2020. Dividends on the Series GG Preferred Stock are neither mandatory nor cumulative.

Redemption. The Series GG Preferred Stock may be redeemed on any dividend payment date on or after December 1, 2024, in whole or in part, at a redemption price equal to \$10,000 per share (equivalent to \$25 per depositary share), plus any declared and unpaid dividends. We may also redeem the Series GG Preferred Stock following the occurrence of a “capital treatment event,” as described above.

Listing. The depositary shares representing the Series GG Preferred Stock are listed on the NYSE under the trading symbol “JPM PR J”.

DESCRIPTION OF THE ALERIAN MLP INDEX ETNS DUE MAY 24, 2024

The following description of our Alerian MLP Index ETNs due May 24, 2024 (the “Alerian ETNs”) is a summary and does not purport to be complete. It is subject to and qualified in its entirety by reference to the indenture dated May 25, 2001 (as may be amended or supplemented from time to time, the “2001 Indenture”), between JPMorgan Chase, as issuer, and Deutsche Bank Trust Company Americas (formerly known as Bankers Trust Company), as trustee (the “Trustee”), which is incorporated by reference as an Exhibit to the Form 10-K. We encourage you to read the 2001 Indenture for additional information.

General

In June 2012, the maximum number of Alerian ETNs authorized for issuance was set at 129,000,000, resulting in a maximum aggregate principal amount of \$2,455,722,690. All of the Alerian ETNs authorized for issuance were issued as of June 2012. 10,000,000 Alerian ETNs were retired on December 16, 2015. Accordingly, since the retirement of these notes, the maximum number of Alerian ETNs authorized for issuance is 119,000,000 with an aggregate principal amount of \$2,265,356,590, all of which has been issued and remain outstanding as of December 31, 2019.

The Alerian ETNs are linked to the Alerian MLP Index (the “Index”) and are our unsecured and unsubordinated obligations and will rank *pari passu* with all of our other unsecured and unsubordinated obligations. The Alerian ETNs do not guarantee any return of principal at, or prior to, maturity or upon early repurchase. **Any payment on the Alerian ETNs is subject to the credit risk of JPMorgan Chase & Co.**

The Alerian ETNs are part of a series of our debt securities entitled “Global Medium-Term Notes, Series E” (the “Series E Notes”) that we may issue under the 2001 Indenture from time to time. For more information about the Series E Notes, please see the section titled “General Terms of the Series E Notes” below.

The Alerian ETNs are not bank deposits and are not insured by the Federal Deposit Insurance Corporation or by any other governmental agency, nor are they obligations of, or guaranteed by, a bank.

Unless otherwise specified, references herein to “holders” mean those in whose names the Alerian ETNs are registered on the books that we or the Trustee, or any successor trustee, as applicable, maintain for this purpose, and not those who own beneficial interests in the Alerian ETNs (registered in street name or otherwise).

Please see “Certain Defined Terms” below for an explanation of any capitalized terms used herein that are not otherwise defined.

The Index

The return of the Alerian ETNs is linked to the performance of the Index. The Index measures the composite performance of energy-oriented Master Limited Partnerships, or MLPs, and is calculated and maintained by S&P Dow Jones Indices LLC (the “Index Calculation Agent”), in consultation with GKD Index Partners, LLC (the “Index Sponsor”), using a float-adjusted, market capitalization methodology. MLPs are limited partnerships primarily engaged in the exploration, marketing, mining, processing, production, refining, storage, or transportation of any mineral or natural resource.

Denominations

The Alerian ETNs are denominated in U.S. dollars in minimum denominations equal to the \$19.03661 per note (the “Principal Amount”), which is the amount equal to the Initial VWAP Level (defined below), divided by ten.

Coupon Payments and the Accrued Tracking Fee

For each Alerian ETN a holder holds on the applicable Coupon Record Date, holders will receive on each Coupon Payment Date the “Coupon Amount,” which is an amount in cash equal to the difference between (a) the Reference Distribution Amount (defined below), calculated as of the corresponding Coupon Valuation Date and (b) the Accrued Tracking Fee (defined below), calculated as of the corresponding Coupon Valuation Date.

The Accrued Tracking Fee accrues on a daily basis at a rate of 0.85% per annum, applied to the Daily Note Value as of the Index Business Day immediately preceding the corresponding Coupon Valuation Date. The Daily Note Value reflects the cumulative performance of the VWAP Level of the Index since April 1, 2009, which we refer to as the Inception Date. If the Daily Note Value increases, the Accrued Tracking Fee will increase, and if the Daily Note Value decreases, the Accrued Tracking Fee will decrease. The Daily Note Value is published on the Bloomberg Professional® service (“Bloomberg”) under the ticker symbol “AMJIVWAP” and on Bloomberg.com under the ticker symbol “AMJIVWAP:IND.”

On any Index Business Day, the VWAP Level reflects the weighted VWAPs of the Index Components, and the VWAP of each Index Component is the volume-weighted average price of one share of that Index Component as determined by the VWAP Calculation Agent based on the Primary Exchange for that Index Component.

To the extent the Reference Distribution Amount on any Coupon Valuation Date is less than the Accrued Tracking Fee on the corresponding Coupon Valuation Date, there will be no coupon payment made on the corresponding Coupon Payment Date, and an amount equal to the difference between the Accrued Tracking Fee and the Reference Distribution Amount (the “Tracking Fee Shortfall”) will be included in the Accrued Tracking Fee for the next Coupon Valuation Date. This will be in addition to the accrual at a rate of 0.85% per annum over the quarter that has elapsed since the previous date of determination. This process will be repeated to the extent necessary until the Reference Distribution Amount for a Coupon Valuation Date is greater than the Accrued Tracking Fee for the corresponding Coupon Valuation Date (which includes the accumulated Tracking Fee Shortfall from all prior quarters). This process may also restart as necessary on a subsequent Coupon Valuation Date. Coupon payments on the Alerian ETNs will be payable quarterly in arrears on the fifteenth Index Business Day following each Coupon Valuation Date, provided that the final Coupon Payment Date will be the Maturity Date. The final Coupon Amount will be included in the Cash Settlement Amount.

Holders will receive no coupon payment on a Coupon Payment Date if the Reference Distribution Amount on the relevant Coupon Valuation Date is less than the Accrued Tracking Fee on the relevant Coupon Valuation Date.

On each Index Business Day, the Note Calculation Agent will calculate the value of the Coupon Amount as of the immediately preceding Index Business Day (treating that immediately preceding Index Business Day as if it were a Coupon Valuation Date), which we refer to as the interim accrued Coupon Amount, and will publish the interim accrued Coupon Amount on Bloomberg under the ticker symbol “AMJEU” and on Bloomberg.com under the ticker symbol “AMJEU:IND.” While the interim accrued Coupon Amount is calculated and published in connection with each such Index Business Day, the actual Coupon Amount will be calculated and paid only once each quarter.

Payment Upon Early Repurchase

Subject to a holder's compliance with the procedures and the potential postponements and adjustments as described under “Market Disruption Events” below, that holder may submit a request once a week (generally on or before 11:00 a.m., New York City time, on Thursday) during the term of the Alerian ETNs to have us repurchase that holder's Alerian ETNs, provided that holder requests that we repurchase a minimum of 50,000 Alerian ETNs. If a holder requests that we repurchase that holder's Alerian ETNs, subject to the notification requirements and the other terms and conditions set forth under “Repurchase Requirements” below, for each Alerian ETN

that holder will receive a cash payment on the relevant Repurchase Date equal to the Repurchase Amount. If the Repurchase Amount is \$0 or less, the payment upon early repurchase will be \$0. Because the Repurchase Amount is based on the value of the Index at the end of a five-day measurement period that begins after a repurchase request is received, holders will not know the Repurchase Amount they will receive at the time they elect to request that we repurchase their Alerian ETNs.

The Repurchase Amount is calculated by adjusting the Principal Amount to reflect:

- the return of the Index from the Initial VWAP Level to the Final VWAP Level;
- the deduction of the Accrued Tracking Fee;
- the deduction of the Repurchase Fee;
- the addition of other adjustments representing accrued but unpaid coupons, which include the following:
 - the Coupon Amount with respect to the Coupon Valuation Date immediately preceding the applicable Repurchase Valuation Date (generally the last Index Business Day of the week in which a repurchase is requested) if, on the last Index Business Day in the Repurchase Measurement Period the Coupon Ex-Date with respect to that Coupon Amount has not yet occurred. The Repurchase Measurement Period is a five-Index Business Day period commencing on the Repurchase Valuation Date during which the Final VWAP Level will be determined;
 - an Adjusted Coupon Amount, if any, that reflects certain cash distributions on the Index Components with ex-dividend dates from and excluding the immediately preceding Coupon Valuation Date to and including the applicable Repurchase Valuation Date, less the Accrued Tracking Fee; and
 - certain cash distributions on the Index Components with ex-dividend dates during the Repurchase Measurement Period.

For purposes of determining the Cash Settlement Amount, the Final VWAP Level will be the arithmetic mean of the VWAP Levels measured on each Index Business Day in the Repurchase Measurement Period, as calculated by the VWAP Calculation Agent.

The Repurchase Fee Amount is equal to 0.125% of the Principal Amount, adjusted to reflect:

- the return of the Index from the Initial VWAP Level to the Final VWAP Level;
- the deduction of the Accrued Tracking Fee; and
- the addition of certain cash distributions on the Index Components with ex-dividend dates during the Repurchase Measurement Period.

Accordingly, the Repurchase Fee Amount will vary based on the performance of the Index, the Accrued Tracking Fee and certain cash distributions on the Index Components with ex-dividend dates during the Repurchase Measurement Period.

Holders may lose some or all of their investment upon early repurchase. Because the Accrued Tracking Fee reduces their final payment, holders will likely lose some or all of their principal amount upon early repurchase if the Final VWAP Level is less than the Initial VWAP Level or if the Final VWAP Level is not greater than the Initial VWAP Level by an amount that is sufficient to offset the negative effect of the Accrued Tracking Fee and the Repurchase Fee.

Repurchase Requirements

To exercise the right to have us repurchase a holder's Alerian ETNs on a weekly basis, that holder must instruct that holder's broker or other person through whom that holder holds the Alerian ETNs to take the following steps:

- Send a notice of repurchase, substantially in the specified form (a "Repurchase Notice"), to us via email at ETN_Repurchase@jpmorgan.com by no later than 11:00 a.m., New York City time, during the term of the Alerian ETNs, each week on the Business Day immediately preceding the applicable Repurchase Valuation Date (generally Thursday);
- If we receive that holder's Repurchase Notice by the time specified in the preceding bullet point, we will respond by sending that holder a confirmation of repurchase, substantially in the specified form (a "Repurchase Confirmation");
- Deliver the signed Repurchase Confirmation, in the specified form, to us via facsimile to (917) 456-3471, by 4:00 p.m., New York City time, on the Business Day on which that holder submitted that holder's Repurchase Notice. We or our affiliate must acknowledge receipt in order for that holder's Repurchase Confirmation to be effective;
- Instruct DTC custodian for that holder to book a delivery versus payment trade with respect to that holder's Alerian ETNs on the relevant Repurchase Valuation Date at a price equal to the applicable Repurchase Amount; and
- Cause that holder's DTC custodian to deliver the trade as booked for settlement via DTC at or prior to 10:00 a.m. New York City time on the relevant Repurchase Date.

Different brokerage firms may have different deadlines for accepting instructions from their customers. Accordingly, holders should consult the brokerage firm through which they own their interest in the offered Alerian ETNs in respect of such deadlines. If we do not receive a holder's Repurchase Notice by 11:00 a.m., or a holder's Repurchase Confirmation by 4:00 p.m., on the Business Day

immediately preceding the applicable Repurchase Valuation Date, that holder's Repurchase Notice will not be effective and we will not repurchase that holder's Alerian ETNs on the relevant Repurchase Date.

The Note Calculation Agent will, in its sole discretion, resolve any questions that may arise as to the validity of a Repurchase Notice and the timing of receipt of a Repurchase Notice or as to whether and when the required deliveries have been made. Once given, a Repurchase Notice may not be revoked.

Expiration of Repurchase Rights

If we do not receive a holder's Repurchase Notice by 11:00 a.m., New York City time (as described under the first bullet point in "Repurchase Requirements" above), or a holder's Repurchase Confirmation by 4:00 p.m., New York City time (as described under the third bullet point in "Repurchase Requirements" above) on the Business Day immediately preceding the applicable Repurchase Valuation Date (generally Thursday), that holder's Repurchase Notice will not be effective and we will not repurchase that holder's Alerian ETNs on the relevant Repurchase Date. Any Repurchase Notice for which we (or our affiliate) receive a valid Repurchase Confirmation in accordance with the procedures described above will be irrevocable.

Payment at Maturity

For each Alerian ETN, unless earlier repurchased, holders will receive at maturity a cash payment equal to the Cash Settlement Amount. If the Cash Settlement Amount is \$0 or less, the payment at maturity will be \$0.

The Cash Settlement Amount is calculated by adjusting the Principal Amount to reflect:

- the return of the Index from the Initial VWAP Level to the Final VWAP Level;
- the addition of the final Coupon Amount, if any,
- the deduction of the Accrued Tracking Fee; and
- the addition of certain cash distributions on the Index Components with ex-dividend dates during the Final Measurement Period.

The Final Measurement Period is a five Index Business Day period near the Maturity Date of the Alerian ETNs during which the Final VWAP Level will be determined.

For purposes of determining the Cash Settlement Amount, the Final VWAP Level will be the arithmetic mean of the VWAP Levels measured on each Index Business Day in the Final Measurement Period, as calculated by the VWAP Calculation Agent. The Initial VWAP Level is the arithmetic mean of the VWAP Levels measured on each Index Business Day over a three Index Business Day period ending on the Inception Date, as calculated by the VWAP Calculation Agent.

Holders may lose some or all of their investment at maturity. Because the Accrued Tracking Fee reduces their final payment, holders will likely lose some or all of their principal amount at maturity if the Final VWAP Level is less than the Initial VWAP Level or if the Final VWAP Level is not greater than the Initial VWAP Level by an amount that is sufficient to offset the negative effects of the Accrued Tracking Fee.

Note Calculation Agent

J.P. Morgan Securities LLC, or JPMS (the "Note Calculation Agent"), will make all necessary calculations and determinations in connection with the Alerian ETNs, including calculations and determinations relating to any payments on the Alerian ETNs, other those to be made by the VWAP Calculation Agent described below.

VWAP Calculation Agent

The JPMorgan Global Index Research Group (the "VWAP Calculation Agent"), one of our affiliates, will on each day that is not a Disrupted Day (as defined below) act as the VWAP Calculation Agent. The VWAP Calculation Agent will determine the VWAP of any Index Component, the VWAP Level and the Final VWAP Level on any Index Business Day on which such VWAP, VWAP Level and Final VWAP Level are to be determined during the term of the Alerian ETNs.

Market Disruption Events

To the extent a Disrupted Day (as defined below) exists with respect to an Index Component on an Averaging Date (as defined below), the VWAP and published share weighting with respect to such Index Component (and only with respect to such Index Component) for such Averaging Date will be determined by the Note Calculation Agent or one of its affiliates on the first succeeding Index Business Day that is not a Disrupted Day (the "Deferred Averaging Date") with respect to such Index Component irrespective of whether pursuant to such determination, the Deferred Averaging Date would fall on a date originally scheduled to be an Averaging Date. For the avoidance of doubt, if the postponement described in the preceding sentence results in the VWAP of a particular Index Component being calculated on a day originally scheduled to be an Averaging Date, for purposes of determining the VWAP Levels on the Index Business Days during the Final Measurement Period or during the Repurchase Measurement Period, as applicable, the Note

Calculation Agent or one of its affiliates, as the case may be, will apply the VWAP and the published share weighting with respect to such Index Component for such Deferred Averaging Date to the calculation of the VWAP Level (i) on the date(s) of the original disruption with respect to such Index Component and (ii) such Averaging Date.

In no event, however, will any postponement pursuant to the immediately preceding paragraph result in the final Averaging Date with respect to any Index Component occurring more than three Index Business Days following the day originally scheduled to be the final Averaging Date. If the third Index Business Day following the date originally scheduled to be the final Averaging Date is not an Index Business Day or is a Disrupted Day with respect to such Index Component, the Note Calculation Agent or one of its affiliates, will determine the VWAP and share weighting with respect to any Index Component required to be determined for the purpose of calculating the applicable VWAP Level based on its good faith estimate of the VWAP and share weighting of each such Index Component that would have prevailed on the Primary Exchange on such third Index Business Day but for such suspension or limitation.

An “Averaging Date” means each of the Index Business Days during the Final Measurement Period or the Repurchase Measurement Period, as applicable, subject to adjustment as described herein.

A “Disrupted Day” with respect to any Index Component is any Index Business Day on which the Primary Exchange or any Related Exchange fails to open for trading during its regular trading session or on which a Market Disruption Event has occurred and is continuing, and, in both cases, the occurrence of which is determined by the Note Calculation Agent to have a material effect on the VWAP Level.

With respect to an Index Component, a “Market Disruption Event,” means:

(a) the occurrence or existence of a condition specified below:

- (i) any suspension, absence or limitation of trading on the Primary Exchange for trading in the Index Component, whether by reason of movements in price exceeding limits permitted by the Primary Exchange or otherwise;
- (ii) any suspension, absence or limitation of trading on the Related Exchange for trading in futures or options contracts related to the Index Component, whether by reason of movements in price exceeding limits permitted by such Related Exchange or otherwise; or
- (iii) any event (other than an event described in (b) below) that disrupts or impairs (as determined by the Note Calculation Agent) the ability of market participants in general (A) to effect transactions in, or obtain market values for the relevant Index Component or (B) to effect transactions in, or obtain market values for, futures or options contracts relating to the relevant Index Component; or

(b) the closure on any Index Business Day of the Primary Exchange or any Related Exchange prior to its Scheduled Closing Time unless such earlier closing time is announced by the Primary Exchange or such Related Exchange at least one hour prior to the earlier of (i) the actual closing time for the regular trading session on the Primary Exchange or such Related Exchange on such Index Business Day and (ii) the submission deadline for orders to be entered into the Primary Exchange or such Related Exchange system for execution at the close of trading on such Index Business Day;

in each case determined by the Note Calculation Agent in its sole discretion; and

(c) a determination by the Note Calculation Agent in its sole discretion that the applicable event described above materially interfered with our ability or the ability of any of our affiliates to adjust or unwind all or a material portion of any hedge with respect to the Alerian ETNs.

For purposes of the above definition:

(a) a limitation on the hours or number of days of trading will not constitute a Market Disruption Event if it results from an announced change in the regular business hours of the Primary Exchange or Related Exchange, and

(b) for purposes of clause (a) above, limitations pursuant to the rules of any Primary Exchange or Related Exchange similar to NYSE Rule 80B or Nasdaq Rule 4120 (or any applicable rule or regulation enacted or promulgated by any other self-regulatory organization or any government agency of scope similar to NYSE Rule 80B or Nasdaq Rule 4120 as determined by the Note Calculation Agent) on trading during significant market fluctuations will constitute a suspension, absence or material limitation of trading.

“Scheduled Closing Time” means, with respect to the Primary Exchange or the Related Exchange, on any Index Business Day, the scheduled weekday closing time of the Primary Exchange or such Related Exchange on such Index Business Day, without regard to after hours or any other trading outside of the regular trading session hours.

Discontinuation of the Index; Alteration of Method of Calculation

If the Index Calculation Agent discontinues publication of or otherwise fails to publish the Index, or the Index Calculation Agent does not make the Index Components, their share weighting and/or the Index Divisor available to the VWAP Calculation Agent, and the Index Sponsor, the Index Calculation Agent or another entity publishes a successor or substitute index that the Note Calculation Agent determines to be comparable to the discontinued Index and for which the Index Components, their share weighting, and/or the Index Divisor are available to the VWAP Calculation Agent (such index being referred to herein as a “successor index”), then the VWAP Level for such successor index will be determined by the VWAP Calculation Agent by reference to the sum of the products of the VWAPs of the components underlying such successor index on the Primary Exchanges and each such component’s respective weighting within the successor index (which sum will be adjusted by any index divisor used by such successor index) on the dates and at the times as of which the VWAP Levels for such successor index are to be determined.

Upon any selection by the Note Calculation Agent of a successor Index, the Note Calculation Agent will cause written notice thereof to be furnished to the Trustee, to us and to the holders of the Alerian ETNs.

If the Index Calculation Agent discontinues publication of the Index or does not make the Index Components, their share weightings and/or Index Divisor available to the VWAP Calculation Agent prior to, and such discontinuation or unavailability is continuing on the Calculation Date or any Index Business Day during the Final Measurement Period or during the Repurchase Measurement Period, as applicable, or any other relevant date on which the VWAP Level is to be determined and the Note Calculation Agent determines that no successor index is available at such time, or the Note Calculation Agent has previously selected a successor index and publication of such successor index is discontinued prior to, and such discontinuation is continuing on the Calculation Date or any Index Business Day during the Final Measurement Period or during the Repurchase Measurement Period, as applicable, or any other relevant date on which the VWAP Level is to be determined, then the Note Calculation Agent will determine the relevant VWAP Levels using the VWAP and published share weighting of each Index Component included in the Index or successor index, as applicable, immediately prior to such discontinuation or unavailability, as adjusted for certain corporate actions. In such event, the Note Calculation Agent will cause notice thereof to be furnished to the Trustee, to us and to the holders of the Alerian ETNs.

Notwithstanding these alternative arrangements, discontinuation of the publication of the Index or successor index, as applicable, may adversely affect the value of the Alerian ETNs.

If at any time the method of calculating the Index or a successor index, or the value thereof, is changed in a material respect, or if the Index or a successor index is in any other way modified so that the VWAP Level of the Index or such successor index does not, in the opinion of the Note Calculation Agent, fairly represent the VWAP Level of the Index or such successor index had such changes or modifications not been made, then the Note Calculation Agent will make such calculations and adjustments as, in the good faith judgment of the Note Calculation Agent, may be necessary in order to arrive at a VWAP level of an index comparable to the Index or such successor index, as the case may be, as if such changes or modifications had not been made, and the Note Calculation Agent will calculate the VWAP Levels for the Index or such successor index with reference to the Index or such successor index, as adjusted. The Note Calculation Agent will accordingly calculate any values that reference the VWAP Levels based on the relevant VWAP Levels calculated by the Note Calculation Agent, as adjusted. Accordingly, if the method of calculating the Index or a successor index is modified so that the level of the Index or such successor index is a fraction of what it would have been if there had been no such modification (e.g., due to a split in the index), which, in turn, causes the VWAP Level of the Index or such successor index to be a fraction of what it would have been if there had been no such modification, then the Note Calculation Agent will make such calculations and adjustments in order to arrive at a VWAP Level for the Index or such successor index as if it had not been modified (e.g., as if such split had not occurred).

Payment upon an Event of Default

In case an event of default with respect to the Alerian ETNs shall have occurred and be continuing, the amount declared due and payable per Alerian ETN upon any acceleration of the Alerian ETNs will be determined by the Note Calculation Agent and will be an amount in cash equal to the Repurchase Amount, calculated as if the date of acceleration were the first Index Business Day in the Repurchase Measurement Period and the four Index Business Days immediately succeeding the date of acceleration were the corresponding Index Business Days in the accelerated Repurchase Measurement Period. For purposes of this calculation the Repurchase Fee Amount shall be zero.

If the maturity of the Alerian ETNs is accelerated because of an event of default as described above, we will, or will cause the Note Calculation Agent to, provide written notice to the Trustee at its New York office, on which notice the Trustee may conclusively rely, and to DTC, as holder of the Alerian ETNs, of the cash amount due with respect to the Alerian ETNs as promptly as possible and in no event later than two Business Days after the date of acceleration.

Listing

The Alerian ETNs have been listed on the NYSE Arca under the ticker symbol “AMJ.” No assurance can be given as to the continued listing of the Alerian ETNs for their term or of the liquidity or trading market for the Alerian ETNs.

DTC will act as securities depositary for the Alerian ETNs. The Alerian ETNs have been issued only as fully registered securities registered in the name of Cede & Co. (DTC's nominee). One or more fully registered global note certificates, representing the total aggregate principal amount of the Alerian ETNs, have been issued and have been deposited with DTC. We will not issue definitive notes in exchange for the global notes except in limited circumstances.

Registrar, Transfer Agent and Paying Agent

The Bank of New York Mellon or one of its affiliates will act as registrar and transfer agent for the Alerian ETNs. The Bank of New York Mellon will also act as paying agent and may designate additional paying agents.

Reissuances or Reopening Issuances

We may in our sole discretion, “reopen” or reissue the Alerian ETNs based upon market conditions and VWAP Levels at that time. These further issuances, if any, will be consolidated to form a single sub-series with the originally issued Alerian ETNs and will have the same CUSIP number and will trade interchangeably with the Alerian ETNs immediately upon settlement. Any Alerian ETNs bearing the same CUSIP number that are issued pursuant to any future additional issuances of Alerian ETNs bearing the same CUSIP number will increase the aggregate principal amount of the outstanding Alerian ETNs. The price of any additional offering will be determined at the time of pricing of that offering.

Certain Defined Terms

Key Defined Terms

A “Business Day” means any day other than a day on which the banking institutions in The City of New York are authorized or required by law, regulation or executive order to close or a day on which transactions in dollars are not conducted.

The “Calculation Date” is May 15, 2024, unless such day is not an Index Business Day, in which case the Calculation Date will be the next Index Business Day, subject to adjustments and subject to postponement in the event of a Market Disruption Event as described under “Market Disruption Events.”

The “Daily Note Value” means, as of any date of determination, an amount per Alerian ETN equal to the product of:

- the Principal Amount; and
- a fraction, the numerator of which is equal to the VWAP Level as of such date and the denominator of which is equal to the Initial VWAP Level.

An “ex-dividend date” means, with respect to a distribution on an Index Component, the first Business Day on which transactions in such Index Component trade on the Primary Exchange without the right to receive such distribution.

An “Exchange Business Day” means any day on which the primary exchange or market for trading of the Alerian ETNs is scheduled to be open for trading.

The “Final Measurement Period” means the five Index Business Days from and including the Calculation Date, subject to adjustments and subject to postponement in the event of a Market Disruption Event as described under “Market Disruption Events.”

The “Final VWAP Level” is the arithmetic mean of the VWAP Levels measured on each Index Business Day in the Final Measurement Period or during any applicable Repurchase Measurement Period, as applicable, as calculated by the VWAP Calculation Agent.

An “Index Business Day” means any day on which each Primary Exchange and each Related Exchange are scheduled to be open for trading.

An “Index Component” means each energy-oriented Master Limited Partnership included in the Index (collectively, the “Index Components”).

The “Index Divisor,” as of any date of determination, is the divisor used by the Index Calculation Agent to calculate the level of the Index.

The “Initial Issue Date,” is April 6, 2009.

The “Initial VWAP Level” is 190.36605, which is the arithmetic mean of the VWAP Levels measured on each Index Business Day during the period from and including March 30, 2009 to and including April 1, 2009, as calculated by the VWAP Calculation Agent.

The “Maturity Date” is May 24, 2024, subject to postponement in the event of a Market Disruption Event as described under “Market Disruption Events.”

A “Primary Exchange” means, with respect to each Index Component, the primary exchange or market of trading of such Index Component.

The “Quarterly Tracking Fee” means, as of any date of determination, an amount per Alerian ETN equal to the product of:

- 0.2125% (equivalent to 0.85% per annum) and
- the Daily Note Value as of the immediately preceding Index Business Day.

A “record date” means, with respect to a distribution on an Index Component, the date on which a holder of the Index Component must be registered as a unitholder of such Index Component in order to be entitled to receive such distribution.

A “Related Exchange” means, with respect to each Index Component, each exchange or quotation system where trading has a material effect (as determined by the Note Calculation Agent) on the overall market for futures or options contracts relating to such Index Component.

Additional Key Coupon Payment Terms

The “Coupon Ex-Date” means, with respect to a Coupon Amount, the first Exchange Business Day on which the Alerian ETNs trade without the right to receive such Coupon Amount. Under current NYSE Arca practice, the Coupon Ex-Date will generally be the Exchange Business Day immediately preceding the applicable Coupon Record Date.

The “Coupon Payment Date” means the 15th Index Business Day following each Coupon Valuation Date, *provided* that the final Coupon Payment Date will be the Maturity Date.

The “Coupon Record Date” means the 9th Index Business Day following each Coupon Valuation Date.

The “Coupon Valuation Date” means the 15th of February, May, August and November of each calendar year during the term of the Alerian ETNs or if such date is not an Index Business Day, then the first Index Business Day following such date, beginning on May 15, 2009, provided that the final Coupon Valuation Date will be the Calculation Date.

The “Reference Distribution Amount” means:

- as of the first Coupon Valuation Date, an amount equal to the gross cash distributions that a Reference Holder would have been entitled to receive in respect of the Index Components held by such Reference Holder on the record date with respect to any Index Component, for those cash distributions whose ex-dividend date occurs during the period from and excluding the Initial Issue Date to and including the first Coupon Valuation Date; and
- as of any other Coupon Valuation Date, an amount equal to the gross cash distributions that a Reference Holder would have been entitled to receive in respect of the Index Components held by such Reference Holder on the record date with respect to any Index Component for those cash distributions whose ex-dividend date occurs during the period from and excluding the immediately preceding Coupon Valuation Date to and including such Coupon Valuation Date.

Notwithstanding the foregoing, with respect to cash distributions for an Index Component which is scheduled to be paid prior to the applicable Coupon Ex-Date, *if, and only if*, the issuer of such Index Component fails to pay the distribution to holders of such Index Component by the scheduled payment date for such distribution, such distribution will be assumed to be zero for the purposes of calculating the applicable Reference Distribution Amount.

The “Reference Holder” means, as of any date of determination, a hypothetical holder of a number of shares of each Index Component equal to:

- the published share weighting of that Index Component as of that date, *divided* by
- the product of:
 - the Index Divisor as of that date, and
 - ten.

Additional Key Early Repurchase Terms

The “Adjusted Coupon Amount” means, with respect to any applicable Repurchase Valuation Date, a coupon payment, if any, in an amount in cash equal to the difference between:

- the Adjusted Reference Distribution Amount, calculated as of the applicable Repurchase Valuation Date; and
- the Adjusted Tracking Fee, calculated as of such Repurchase Valuation Date.

The “Adjusted Reference Distribution Amount” means, as of any applicable Repurchase Valuation Date, an amount equal to the gross cash distributions that a Reference Holder would have been entitled to receive in respect of the Index Components held by such Reference Holder on the record date with respect to any Index Component, for cash distributions with the applicable ex-dividend date occurring during the period from and excluding the immediately preceding Coupon Valuation Date (or if the Repurchase Valuation Date occurs prior to the first Coupon Valuation Date, the period from and excluding the Initial Issue Date) to and including the applicable Repurchase Valuation Date.

The “Adjusted Tracking Fee” means, as of any applicable Repurchase Valuation Date, an amount equal to:

- the Tracking Fee Shortfall as of the immediately preceding Coupon Valuation Date plus
- the product of:
 - the Quarterly Tracking Fee as of such Repurchase Valuation Date; and
 - a fraction, the numerator of which is the total number of calendar days from and excluding the immediately preceding Coupon Valuation Date (or if the Repurchase Valuation Date occurs prior to the first Coupon Valuation Date, the period from and excluding the Initial Issue Date) to and including such Repurchase Valuation Date, and the denominator of which is 90.

The “Repurchase Date” means the third Calculation Date following the last Index Business Day in any applicable Repurchase Measurement Period, subject to postponement in the event of a Market Disruption Event as described under “Market Disruption Events.”

The “Repurchase Fee” is equal to 0.125%.

The “Repurchase Valuation Date” means the last Index Business Day of each week, generally Friday. This day is also the first Index Business Day following the date that the applicable Repurchase Notice and Repurchase Confirmation are delivered. Any applicable Repurchase Valuation Date is subject to adjustments as described under “Market Disruption Events.”

General Terms of the Series E Notes

In this “General Terms of the Series E Notes” section, all references to the “debt securities” refer to Series E Notes issued by JPMorgan Chase.

The following description of the terms of the debt securities contains certain general terms that may apply to the debt securities, including the Alerian ETNs.

We have summarized below the material provisions of the 2001 Indenture and the debt securities issued under the 2001 Indenture. These descriptions are only summaries, and each investor should refer to the 2001 Indenture, which describes completely the terms and definitions summarized below and contains additional information regarding the debt securities issued under it. Where appropriate, we use parentheses to refer you to the particular sections of the 2001 Indenture. Any reference to particular sections or defined terms of the 2001 Indenture in any statement under this heading qualifies the entire statement and incorporates by reference the applicable section or definition into that statement.

The debt securities will be our direct, unsecured general obligations and will have the same rank in liquidation as all of our other unsecured and unsubordinated debt.

We are a holding company and conduct substantially all of our operations through subsidiaries. As a result, claims of the holders of the debt securities will generally have a junior position to claims of creditors of our subsidiaries, except to the extent that JPMorgan Chase & Co. may be recognized, and receives payment, as a creditor of those subsidiaries. Claims of our subsidiaries' creditors other than JPMorgan Chase & Co. include substantial amounts of long-term debt, deposit liabilities, federal funds purchased, securities loaned or sold under repurchase agreements, commercial paper and other borrowed funds.

Events of Default and Waivers

An “Event of Default” with respect to a series of debt securities issued under the 2001 Indenture is defined in the 2001 Indenture as:

- default for 30 days in the payment of interest on any debt securities of that series;
- default in the payment of principal or other amounts payable on any debt securities of that series when due, at maturity, upon redemption, by declaration, or otherwise;
- failure by us for 90 days to perform any other covenants or warranties contained in the 2001 Indenture applicable to that series after written notice has been given by the trustee to us or given by holders of at least 25% in aggregate principal amount of the outstanding securities of all series affected thereby to us and the trustee;
- specified events of our bankruptcy, insolvency, winding up or liquidation, whether voluntary or involuntary; or
- any other event of default provided in the applicable supplemental indentures to the 2001 Indenture or form of security. (Section 5.01)

If a default in the payment of principal, interest or other amounts payable on the debt securities, or a failure in the performance of any covenant or agreement, or any other Event of Default provided in the applicable supplemental indentures to the 2001 Indenture or form of security, with respect to one or more (but in the case of a default in performance of a covenant or agreement, or in a manner provided in a supplemental indenture or form of security, less than all) series of debt securities occurs and is continuing, either the Trustee or the holders of not less than 25% in aggregate principal amount of the debt securities of such series then outstanding, treated as one class, by written notice, may declare the principal of all outstanding debt securities of such series and any

interest accrued thereon, to be due and payable immediately. If a default in the performance of any covenant or agreement with respect to all series of debt securities, or in a manner provided in a supplemental indenture or form of security with respect to all series of debt securities, or due to specified events of our bankruptcy, insolvency, winding up or liquidation, occurs and is continuing, either the Trustee or the holders of not less than 25% in aggregate principal amount of all debt securities then outstanding, treated as one class, by written notice, may declare the principal of all outstanding debt securities and any interest accrued thereon, to be due and payable immediately. Subject to certain conditions such declarations may be annulled and past defaults may be waived by the holders of a majority in aggregate principal amount of the outstanding debt securities of the series affected. (Sections 5.01 and 5.10)

An Event of Default with respect to one series of debt securities does not necessarily constitute an Event of Default with respect to any other series of debt securities. The 2001 Indenture requires the Trustee to provide notice of default with respect to the debt securities within 90 days, unless the default is cured, but provides that the Trustee may withhold notice to the holders of the debt securities of any default if the board of directors, the executive committee, or a trust committee of directors or Trustees and/or responsible officers of the Trustee determines in good faith that it is in the interest of the holders of the debt securities of the applicable series to do so. The Trustee may not withhold notice of a default in the payment of principal of, interest on or any other amounts due under, such debt securities. (Section 5.11)

The 2001 Indenture provides that the holders of a majority in aggregate principal amount of outstanding debt securities of each series affected, with all such series voting as a single class, may direct the time, method, and place of conducting any proceeding for any remedy available to the Trustee, or exercising any trust or power conferred on the Trustee. The Trustee may decline to act if the direction is contrary to law and in certain other circumstances set forth in the 2001 Indenture. (Section 5.09) The Trustee is not obligated to exercise any of its rights or powers under the 2001 Indenture at the request or direction of the holders of debt securities unless the holders offer the Trustee security or indemnity satisfactory to it against the costs, expenses and liabilities incurred therein or thereby. (Section 6.02(d))

No holder of any debt security of any affected series has the right to institute any action for remedy unless such holder has previously given to the Trustee written notice of default, the Trustee has failed to take action for 60 days after the holders of not less than 25% in aggregate principal amount of the debt securities of each affected series make written request upon the Trustee to institute such action and have offered reasonable indemnity in connection with the same and the holders of a majority in aggregate principal amount of the debt securities of each affected series (voting as a single class) have not given direction to the Trustee that is inconsistent with the written request referred to above. (Section 5.06)

However, the right of any holder of a debt security or coupon to receive payment of the principal of and interest on that debt security or coupon on or after its due date, or to institute suit for the enforcement of any such payment, may not be impaired or affected without the consent of that holder. (Section 5.07)

The 2001 Indenture requires us to file annually with the Trustee a written statement as to whether or not we have knowledge of a default. (Section 3.05)

Covenant Breach

Under the 2001 Indenture, a “Covenant Breach” would occur with respect to a series of debt securities if we fail to perform or breach any of the covenants contained in the 2001 Indenture (other than a failure to pay principal or interest on the debt securities) and that failure or breach continues for 90 days after the Trustee or the holders of at least 25% in aggregate principal amount of the outstanding debt securities give written notice of that failure or breach. Neither the Trustee nor the holders of the debt securities will be entitled to accelerate the maturity of the debt securities as a result of any Covenant Breach.

If a Covenant Breach or Event of Default with respect to the debt securities occurs and is continuing, the Trustee may in its discretion proceed to protect and enforce its rights and the rights of the holders of the debt securities by such appropriate judicial proceedings as the Trustee deems most effectual to protect and enforce any such rights, whether for the specific enforcement of any covenant or agreement in the 2001 Indenture or in aid of the exercise of any power granted in the 2001 Indenture, or to enforce any other proper remedy.

Modification of the 2001 Indenture

The 2001 Indenture contains provisions permitting us and the Trustee to modify the 2001 Indenture or the rights of the holders of debt securities with the consent of the holders of not less than a majority in aggregate principal amount of each outstanding series of debt securities affected by the modification. Each holder of an affected debt security must consent to a modification that would:

- extend the final maturity date of the principal of, or of any interest on, or other amounts payable under any debt security;
- reduce the principal amount of, rate of interest on, or any other amounts due under any debt security;
- change the currency or currency unit of payment of any debt security or certain provisions of the 2001 Indenture applicable to debt securities in foreign currencies;

- change the method in which amounts of payments of principal, interest or other amounts are determined on any debt security;
- reduce any amount payable upon redemption of any debt security;
- adversely affect the terms on which debt securities are convertible into or exchangeable or payable in other securities, instruments, contracts, currencies, commodities or other forms of property;
- impair the right of a holder to institute suit for the payment of a debt security or, if the debt securities provide, any right of repurchase at the option of the holder of a debt security; or
- reduce the percentage of debt securities of any series, the consent of the holders of which is required for any modification. (Section 8.02)

The 2001 Indenture also permits us and the Trustee to amend the 2001 Indenture in certain circumstances without the consent of the holders of debt securities to evidence our merger or the replacement of the Trustee, to cure any ambiguity or to correct or supplement any defective or inconsistent provision, to make any change to the 2001 Indenture or our debt securities that we deem necessary or desirable and that does not materially and adversely affect the interests of holders of the debt securities and for certain other purposes. (Section 8.01)

Consolidations, Mergers and Sales of Assets

We may not merge or consolidate with any other entity or sell, convey or transfer all or substantially all of our assets to any other entity (other than the sale, conveyance or transfer of all or substantially all of our assets to one or more of our direct or indirect subsidiaries), unless:

- either we are the continuing corporation or the successor entity or the entity to whom those assets are sold, conveyed or transferred is a United States corporation or limited liability company that expressly assumes the due and punctual payment of the principal of, any interest on, or any other amounts due under the debt securities issued under the 2001 Indenture and the due and punctual performance and observance of all the covenants and conditions of the 2001 Indenture binding upon us, and
- we or the successor entity will not, immediately after the merger or consolidation, sale, conveyance or transfer, be in default in the performance of any covenant or condition of the 2001 Indenture binding on us. (Section 9.01)

There are no covenants or other provisions in the 2001 Indenture that would afford holders of debt securities additional protection in the event of a recapitalization transaction, a change of control of JPMorgan Chase & Co. or a highly leveraged transaction. The merger covenant described above would apply only if the recapitalization transaction, change of control or highly leveraged transaction were structured to include a merger or consolidation of JPMorgan Chase & Co. or a sale or conveyance of all or substantially all of our assets. However, we may provide specific protections, such as a put right or increased interest, for particular debt securities, which we would describe in the applicable prospectus supplement.

Concerning the Trustee, Paying Agent, Registrar and Transfer Agent

Our subsidiaries and we have a wide range of banking relationships with Deutsche Bank Trust Company Americas, The Bank of New York Mellon and The Bank of New York Mellon, London Branch. The Bank of New York Mellon and, for notes settled through Euroclear Bank SA/NV or Clearstream Banking, S.A., Luxembourg, The Bank of New York Mellon, London Branch, will be the paying agents, registrars, authenticating agents and transfer agents for debt securities issued under the 2001 Indenture.

Deutsche Bank Trust Company Americas is initially serving as the trustee for other securities issued by us or JPMorgan Financial, including the debt securities issued under the 2001 Indenture, the debt securities issued under JPMorgan Financial's indenture for debt securities, to which we are a guarantor, and the warrants issued under JPMorgan Financial's warrant indenture, to which we are a guarantor. Consequently, if an actual or potential event of default occurs with respect to any of these securities, the Trustee may be considered to have a conflicting interest for purposes of the Trust Indenture Act of 1939, as amended. In that case, the Trustee may be required to resign under the 2001 Indenture, and we would be required to appoint a successor trustee. For this purpose, a "potential" event of default means an event that would be an event of default if the requirements for giving us default notice or for the default having to exist for a specific period of time were disregarded.

Governing Law and Judgments

The debt securities and the 2001 Indenture will be governed by, and construed in accordance with, the laws of the State of New York. (Section 11.08)

**DESCRIPTION OF JPMORGAN CHASE FINANCIAL COMPANY LLC'S CALLABLE STEP-UP FIXED RATE NOTES DUE APRIL 26, 2028,
FULLY AND UNCONDITIONALLY GUARANTEED BY JPMORGAN CHASE & CO.**

The following description of the Callable Step-Up Fixed Rate Notes due April 26, 2028 (the “Callable Notes”) is a summary and does not purport to be complete. It is subject to and qualified in its entirety by reference to the indenture dated February 19, 2016 (as may be amended or supplemented from time to time, the “2016 Indenture”), among JPMorgan Chase Financial Company LLC, as issuer (“JPMorgan Financial” or the “Issuer”), JPMorgan Chase, as guarantor (the “Guarantor”), and Deutsche Bank Trust Company Americas, as trustee (the “Trustee”), which is incorporated by reference as an Exhibit to the Form 10-K. We encourage you to read the 2016 Indenture for additional information.

General

As of December 31, 2019, \$5,000,000 aggregate principal amount of the Callable Notes were outstanding.

The Callable Notes are unsecured and unsubordinated obligations of JPMorgan Financial, the payment of which is fully and unconditionally guaranteed by JPMorgan Chase & Co. The Callable Notes will rank *pari passu* with all of the Issuer’s other unsecured and unsubordinated obligations. JPMorgan Chase & Co.’s guarantee of the Callable Notes will rank *pari passu* with all of JPMorgan Chase & Co.’s other unsecured and unsubordinated obligations. **Any payment on the Callable Notes issued by JPMorgan Financial is subject to the credit risk of JPMorgan Finance Callable Notes, and the credit risk of JPMorgan Chase & Co., as guarantor of the Callable Notes.**

The Callable Notes are part of a series of the Issuer’s debt securities entitled “Global Medium-Term Notes, Series A” (the “Series A Notes”) that the Issuer may issue under the 2016 Indenture from time to time. For more information about the Series A Notes, please see the section titled “– General Terms of the Series A Notes” below.

The Callable Notes are not bank deposits and are not insured by the Federal Deposit Insurance Corporation or by any other governmental agency, nor are they obligations of, or guaranteed by, a bank.

Unless otherwise specified, references herein to “holders” mean those in whose names the Callable Notes are registered on the books that the Issuer or the Trustee, or any successor trustee, as applicable, maintain for this purpose, and not those who own beneficial interests in the Callable Notes (registered in street name or otherwise).

Key Terms of the Callable Notes

We issued the Callable Notes on April 26, 2016, in minimum denominations of \$1,000 and in integral multiples of \$1,000 thereafter. The Maturity Date of the Callable Notes is April 26, 2028. Interest on the Callable Notes is payable semiannually on April 26th and October 26th of each year, beginning on October 26, 2016 to and including the Maturity Date (each, an “Interest Payment Date”), subject to any earlier redemption, at the Interest Rate specified below:

For the applicable interest period, the “Interest Rate” will be equal to:

From (and including)	To (but excluding)	Interest Rate
April 26, 2016	April 26, 2021	3.00% per annum
April 26, 2021	April 26, 2023	3.25% per annum
April 26, 2023	April 26, 2025	3.50% per annum
April 26, 2025	April 26, 2027	4.00% per annum
April 26, 2027	April 26, 2028	5.00% per annum

The dates above refer to originally scheduled Interest Payment Dates.

On April 26th and October 26th of each year, beginning on April 26, 2021 and ending on the Maturity Date (each, a “Redemption Date”), the Issuer may redeem the holders’ Callable Notes, in whole but not in part, at a price equal to the principal amount being redeemed *plus* any accrued and unpaid interest. Any accrued and unpaid interest on the Callable Notes redeemed will be paid to the person who is the holder of record on such Callable Notes at the close of business one (1) business day prior to the applicable Redemption Date. To redeem the Callable Notes, the Issuer will mail a notice of redemption to DTC, as holder of the Callable Notes, by first-class mail, postage prepaid, at least 5 business days and not more than 15 business days prior to the applicable Redemption Date.

Calculation Agent

JPMS (the “Calculation Agent”) will make all necessary calculations and determinations in connection with the Callable Notes, including calculations and determinations relating to any payments on the Callable Notes.

Payment upon an Event of Default

In case an event of default with respect to the Callable Notes shall have occurred and be continuing, the amount declared due and payable per \$1,000 principal amount note upon any acceleration of the Callable Notes will be determined by the Calculation Agent and will be an amount in cash equal to \$1,000 per \$1,000 principal amount note *plus* accrued and unpaid interest, calculated as if

the date of acceleration were the Maturity Date. In such case, interest will be calculated on the basis of a 360-day year and the actual number of days in such adjusted Interest Period and will be based on the Interest Rate on the applicable date immediately preceding such adjusted Interest Period.

If the maturity of the Callable Notes is accelerated because of an event of default as described above, the Issuer will, or will cause the Calculation Agent to, provide written notice to the Trustee at its New York office, on which notice the Trustee may conclusively rely, and to DTC of the cash amount due with respect to the Callable Notes as promptly as possible and in no event later than two business days after the date of acceleration.

Listing

The Callable Notes are listed and admitted to trading on the NYSE under the trading symbol “JPM/28.” No assurance can be given as to the continued listing for the term of the Callable Notes, or the liquidity or trading market for the Callable Notes.

Book-Entry Only Issuance – The Depository Trust Company

DTC will act as securities depositary for the Callable Notes. The Callable Notes have been issued only as fully registered securities registered in the name of Cede & Co. (DTC's nominee). One or more fully registered global note certificates, representing the total aggregate principal amount of the Callable Notes, have been issued and have been deposited with DTC. We will not issue definitive notes in exchange for the global notes except in limited circumstances.

Registrar, Transfer Agent and Paying Agent

The Bank of New York Mellon or one of its affiliates will act as registrar and transfer agent for the Callable Notes. The Bank of New York Mellon will also act as paying agent for the Callable Notes and may designate additional paying agents.

Reopening Issuances

The Issuer may, in its sole discretion, “reopen” the Callable Notes based upon market conditions at that time. These further issuances, if any, will be consolidated with, have the same CUSIP number as and trade interchangeably with the respective originally issued Callable Notes immediately upon settlement and, consequently, will increase the aggregate principal amount of such outstanding Callable Notes. The price of any additional offering will be determined at the time of pricing of that offering.

General Terms of the Series A Notes

In this “General Terms of the Series A Notes” section, all references to the “debt securities” refer to Series A Notes issued by JPMorgan Chase Financial Company LLC.

The following description of the terms of the debt securities contains certain general terms that may apply to the debt securities, including the Callable Notes.

We have summarized below the material provisions of the 2016 Indenture and the debt securities and guarantees issued under the 2016 Indenture.

These descriptions are only summaries, and each investor should refer to the 2016 Indenture, which describes completely the terms and definitions summarized below and contains additional information regarding the debt securities issued under it. Where appropriate, we use parentheses to refer you to the particular sections of the 2016 Indenture. Any reference to particular sections or defined terms of the 2016 Indenture in any statement under this heading qualifies the entire statement and incorporates by reference the applicable section or definition into that statement.

The debt securities will be the Issuer’s direct, unsecured general obligations, the payment on which is fully and unconditionally guaranteed by the Guarantor, and will have the same rank in liquidation as all of the Issuer’s other unsecured and unsubordinated debt.

The Guarantor is a holding company and conducts substantially all of its operations through subsidiaries. As a result, claims of the holders of the debt securities against the Guarantor under the guarantee will generally have a junior position to claims of creditors of the Guarantor’s subsidiaries, except to the extent that the Guarantor may be recognized, and receives payment, as a creditor of those subsidiaries. Claims of the Guarantor’s subsidiaries’ creditors other than the Guarantor include substantial amounts of long-term debt, deposit liabilities, federal funds purchased, securities loaned or sold under repurchase agreements, commercial paper and other borrowed funds.

Events of Default and Waivers

An “Event of Default” with respect to a series of debt securities issued under the 2016 Indenture is defined in the 2016 Indenture as:

- default in the payment of interest on any debt securities of that series and continuance of such default for 30 days;
- default in the payment of principal or other amounts payable on any debt securities of that series when due, at maturity, upon redemption, by declaration, or otherwise;

- default in the performance, or breach, of any other covenants or warranties applicable to the Issuer contained in the 2016 Indenture applicable to that series, and continuation of such default or breach for 90 days after written notice has been given by the Trustee to the Issuer and the Guarantor or given by holders of at least 25% in aggregate principal amount of the outstanding securities of all series affected thereby to the Issuer, the Guarantor and the Trustee;
- certain events of the Issuer's bankruptcy, insolvency, receivership, winding up or liquidation, whether voluntary or involuntary;
- the guarantee ceases to be in full force and effect, other than in accordance with the 2016 Indenture, or the Guarantor denies or disaffirms its obligations under the guarantee, *provided* that no Event of Default with respect to the guarantee will occur as a result of, or because it is related directly or indirectly to, the insolvency of the Guarantor or the commencement of proceedings under Title 11 of the United States Code, or the appointment of a receiver for the Guarantor under Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, or the Federal Deposit Insurance Corporation having separately repudiated the Guarantee in receivership, or the commencement of or certain other events of the Guarantor's bankruptcy, insolvency, resolution, receivership, winding up or liquidation; or
- any other event of default provided in the applicable supplemental indentures to the 2016 Indenture or form of security. (Section 5.01)

If an Event of Default occurs and is continuing because of a default in the payment of principal, interest or other amounts payable on the debt securities, a failure in the performance, or breach, of any covenant or agreement applicable to the Issuer, the guarantee ceasing to be in full force and effect, or any other event of default provided in the applicable supplemental indentures to the 2016 Indenture or form of security, either the Trustee or the holders of not less than 25% in aggregate principal amount of the debt securities of such series then outstanding, treated as one class, by written notice to the Issuer and the Guarantor, may declare the principal of all outstanding debt securities of such series and any interest accrued thereon, to be due and payable immediately. If a default due to specified events of the Issuer's bankruptcy, insolvency, receivership, winding up or liquidation, occurs and is continuing, the principal of all outstanding debt securities and any interest accrued thereon will automatically, and without any declaration or other action on the part of the Trustee or any holder, become immediately due and payable. Subject to certain conditions such declarations may be annulled and past defaults may be waived by the holders of a majority in aggregate principal amount of the outstanding debt securities of the series affected. (Sections 5.01 and 5.10)

Events of bankruptcy, insolvency, resolution, receivership, winding up or liquidation relating to the Guarantor will not constitute an Event of Default with respect to any series of debt securities. In addition, failure by the Guarantor to perform any of its covenants or warranties (other than a payment default) will not constitute an Event of Default with respect to any series of debt securities. Therefore, events of bankruptcy, resolution, receivership, insolvency, winding up or liquidation relating to the Guarantor (in the absence of any such event occurring with respect to the Issuer) will not permit any of the debt securities to be declared due and payable and the Trustee is not authorized to exercise any remedy against the Issuer or the Guarantor upon the occurrence or continuation of these events with respect to the Guarantor. Instead, even if an event of bankruptcy, insolvency, resolution, receivership, winding up or liquidation relating to the Guarantor has occurred, the Trustee and the holders of debt securities of a series will not be able to declare the relevant debt securities to be immediately due and payable unless there is an Event of Default with respect to that series as described above, such as the Issuer's bankruptcy, insolvency, receivership, winding up or liquidation or a payment default by the Issuer or the Guarantor on the relevant debt securities. **The value holders receive on any series of debt securities may be significantly less than what holders would have otherwise received had the Issuer's debt securities been declared due and payable immediately or the Trustee been authorized to exercise any remedy against the Issuer or the Guarantor upon the occurrence or continuation of these events with respect to the Guarantor.**

An Event of Default with respect to one series of debt securities does not necessarily constitute an Event of Default with respect to any other series of debt securities. The 2016 Indenture requires the Trustee to provide notice of default with respect to the debt securities within 90 days, unless the default is cured, but provides that the Trustee may withhold notice to the holders of the debt securities of any default if the board of directors, the executive committee, or a trust committee of directors or Trustees and/or responsible officers of the Trustee determines in good faith that it is in the interest of the holders of the debt securities of the applicable series to do so. The Trustee may not withhold notice of a default in the payment of principal of, interest on or any other amounts due under, such debt securities. (Section 5.11)

The 2016 Indenture provides that the holders of a majority in aggregate principal amount of outstanding debt securities of each series affected, with all such series voting as a single class, may direct the time, method, and place of conducting any proceeding for any remedy available to the Trustee, or exercising any trust or power conferred on the Trustee. The Trustee may decline to act if the direction is contrary to law and in certain other circumstances set forth in the 2016 Indenture. (Section 5.09) The Trustee is not obligated to exercise any of its rights or powers under the 2016 Indenture at the request or direction of the holders of debt securities unless the holders offer the Trustee security or indemnity satisfactory to it against the costs, expenses and liabilities incurred therein or thereby. (Section 6.02(d))

No holder of any debt security of any affected series has the right to institute any action for remedy unless such holder has previously given to the Trustee written notice of default, the Trustee has failed to take action for 60 days after the holders of not less than 25%

in aggregate principal amount of the debt securities of each affected series make written request upon the Trustee to institute such action and have offered reasonable indemnity in connection with the same and the holders of a majority in aggregate principal amount of the debt securities of each affected series (voting as a single class) have not given direction to the Trustee that is inconsistent with the written request referred to above. (Section 5.06)

However, the right of any holder of a debt security or coupon to receive payment of the principal of and interest on that debt security or coupon on or after its due date, or to institute suit for the enforcement of any such payment, may not be impaired or affected without the consent of that holder. (Section 5.07)

The 2016 Indenture requires the Issuer and the Guarantor to file annually with the Trustee a written statement as to whether or not the Issuer or the Guarantor, as the case may be, has knowledge of a default. (Section 3.05)

Modification of the 2016 Indenture

The 2016 Indenture contains provisions permitting the Issuer, the Guarantor and the Trustee to modify the 2016 Indenture or the rights of the holders of debt securities with the consent of the holders of not less than a majority in aggregate principal amount of each outstanding series of debt securities affected by the modification. Each holder of an affected debt security must consent to a modification that would:

- extend the final maturity date of the principal of, or of any interest on, or other amounts payable under any debt security;
- reduce the principal amount of, rate of interest on, or any other amounts due under any debt security;
- change the currency or currency unit of payment of any debt security or certain provisions of the 2016 Indenture applicable to debt securities in foreign currencies;
- change the method in which amounts of payments of principal, interest or other amounts are determined on any debt security;
- reduce any amount payable upon redemption of any debt security;
- impair the right of a holder to institute suit for the payment of a debt security or, if the debt securities provide, any right of repurchase at the option of the holder of a debt security;
- reduce the percentage of debt securities of any series, the consent of the holders of which is required for any modification; or
- make any change in the guarantee that would adversely affect the holders of the debt securities of such series or release the Guarantor from the guarantee other than pursuant to the terms of the 2016 Indenture. (Section 8.02)

The 2016 Indenture also permits the Issuer, the Guarantor and the Trustee to amend the 2016 Indenture in certain circumstances without the consent of the holders of debt securities to evidence the Issuer's or the Guarantor's merger or the replacement of the Trustee, to cure any ambiguity or to correct or supplement any defective or inconsistent provision, to make any change to the 2016 Indenture or the Issuer's debt securities that the Issuer deems necessary or desirable and that does not materially and adversely affect the interests of holders of the debt securities and for certain other purposes. (Section 8.01)

Consolidations, Mergers, Sales and Transfers of Assets

Neither the Issuer nor the Guarantor may merge or consolidate with any other entity or sell, convey or transfer all or substantially all of their respective assets to any other entity, unless:

- with respect to the Issuer:
 - either the Issuer is the continuing company in the case of a merger or consolidation or the successor entity in the case of a merger or consolidation (including an affiliate of the Guarantor) or the entity to whom those assets are sold, conveyed or transferred in the case of a sale, conveyance or transfer is a United States corporation or limited liability company that expressly assumes the due and punctual payment of the principal of, any interest on, or any other amounts due under the debt securities and the due and punctual performance and observance of all the covenants and conditions of the 2016 Indenture binding upon the Issuer, and
 - no Event of Default and no event which, with notice or lapse of time or both, would become an Event of Default has occurred or would be continuing, immediately after the merger or consolidation, or the sale, conveyance or transfer, and
- with respect to the Guarantor:
 - either the Guarantor is the continuing corporation in the case of a merger or consolidation or the successor corporation in the case of a merger or consolidation or the entity to whom those assets are sold, conveyed or transferred in the case of a sale, conveyance or transfer is a United States corporation that expressly assumes the full and unconditional guarantee of the full and punctual payment of the principal of, any interest on, or any other amounts due under the debt securities and the due and punctual performance and observance of all the covenants and conditions of the 2016 Indenture binding upon the Guarantor, and
 - no Event of Default and no event which, with notice or lapse of time or both, would become an Event of Default has occurred or would be continuing, immediately after the merger or consolidation, or the sale, conveyance or transfer. (Sections 9.01 and 9.02)

Any transfer of material assets of the Guarantor to any other entity that occurs as a result of, or because it is related directly or indirectly to, any proceedings relative to the Guarantor under Title 11 of the United States Code or under a receivership under Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 or under any other applicable federal or state bankruptcy, insolvency, resolution or other similar law will be deemed to be a sale, conveyance or transfer of all or substantially all of the Guarantor's assets.

There are no covenants or other provisions in the 2016 Indenture that would afford holders of debt securities additional protection in the event of a recapitalization transaction involving the Issuer or the Guarantor, a change of control of the Issuer or the Guarantor or a highly leveraged transaction involving the Issuer or the Guarantor. The merger covenant described above would apply only if the recapitalization transaction, change of control or highly leveraged transaction were structured to include a merger or consolidation of the Issuer or the Guarantor or a sale or conveyance of all or substantially all of the Issuer's or the Guarantor's assets. However, the Issuer may provide specific protections, such as a put right or increased interest, for particular debt securities, which the Issuer would describe in the applicable prospectus supplement.

JPMorgan Chase Guarantee

The Guarantor will fully and unconditionally guarantee the full and punctual payment of the principal of, interest on, and all other amounts payable under the debt securities when the same becomes due and payable, whether at maturity, upon redemption, repurchase at the option of the holders of the applicable debt securities or upon acceleration. If for any reason the Issuer does not make any required payment in respect of the Issuer's debt securities when due, the Guarantor will on demand pay the unpaid amount at the same place and in the same manner that applies to payments made by the Issuer under the 2016 Indenture. The guarantee is of payment and not of collection. (Section 14.01)

The Guarantor's obligations under the guarantee are unconditional and absolute. However, (1) the Guarantor will not be liable for any amount of payment that the Issuer is excused from making or any amount in excess of the amount actually due and owing by the Issuer, and (2) any defense or counterclaims available to the Issuer (except those resulting solely from, or on account of, the Issuer's insolvency or the Issuer's status as debtor or subject of a bankruptcy or insolvency proceeding) will also be available to the Guarantor to the same extent as these defense or counterclaims are available to the Issuer, whether or not asserted by the Issuer. (Section 14.02)

Concerning the Trustee, Paying Agent, Registrar and Transfer Agent

We, the Guarantor and certain of their affiliates have a wide range of banking relationships with Deutsche Bank Trust Company Americas, The Bank of New York Mellon and The Bank of New York Mellon, London Branch. The Bank of New York Mellon and, for notes settled through Euroclear Bank SA/NV or Clearstream Banking, S.A., Luxembourg, The Bank of New York Mellon, London Branch, will be the paying agents, authenticating agents, registrars and transfer agents for debt securities issued under the 2016 Indenture.

Deutsche Bank Trust Company Americas is initially serving as the Trustee for the debt securities issued under our 2016 Indenture, to which JPMorgan Chase acts as a guarantor, the warrants issued under our warrant indenture, to which JPMorgan Chase acts as a guarantor, and the debt securities issued under JPMorgan Chase's indenture. Consequently, if an actual or potential event of default occurs with respect to any of these securities, the Trustee may be considered to have a conflicting interest for purposes of the Trust Indenture Act of 1939, as amended. In that case, the Trustee may be required to resign under the 2016 Indenture, and the Issuer would be required to appoint a successor trustee. For this purpose, a "potential" event of default means an event that would be an event of default if the requirements for giving the Issuer default notice or for the default having to exist for a specific period of time were disregarded.

Governing Law and Judgments

The debt securities and the 2016 Indenture, including the guarantee, will be governed by, and construed in accordance with, the laws of the State of New York. (Section 11.08)

Exhibit 10.18

JPMORGAN CHASE & CO. LONG-TERM INCENTIVE PLAN TERMS AND CONDITIONS OF JANUARY 21, 2020 RESTRICTED STOCK UNIT AWARD OPERATING COMMITTEE

Award Agreement

These terms and conditions are made part of the Award Agreement dated as of January 21, 2020 ("Grant Date") awarding Restricted Stock Units ("RSUs") pursuant to the terms of the JPMorgan Chase & Co. Long-Term Incentive Plan ("Plan"). To the extent the terms of the Award Agreement (all references to which will include these terms and conditions) conflict with the Plan, the Plan will govern. The Award Agreement, the Plan and Prospectus supersede any other agreement, whether written or oral, that may have been entered into by the Firm and you relating to this award.

This award was granted on the Grant Date subject to the Award Agreement. **Unless you decline by the deadline and in the manner specified in the Award Agreement, you will have agreed to be bound by these terms and conditions, effective as of the Grant Date.** If you decline the award, it will be cancelled as of the Grant Date.

Capitalized terms that are not defined in "Definitions" below or elsewhere in the Award Agreement will have the same meaning as set forth in the Plan.

JPMorgan Chase & Co. will be referred to throughout the Award Agreement as "JPMorgan Chase" and together with its subsidiaries as the "Firm".

Form and Purpose of Award

Each RSU represents a non-transferable right to receive one share of Common Stock as of the applicable vesting date as set forth in your Award Agreement.

The purpose of this award is to motivate your future performance for services to be provided during the vesting period and to align your interests with those of the Firm and its shareholders.

Dividend Equivalents

If dividends are paid on Common Stock while RSUs under this award are outstanding, you will be paid an amount equal to the dividend paid on one share of Common Stock, multiplied by the number of RSUs outstanding under this award as of the dividend record date.

Protection-Based Vesting

This award is intended and expected to vest on the vesting date(s), provided that you are continuously employed by the Firm through such vesting date, or you meet the requirements for continued vesting described under the subsections "--Job Elimination", "--Full Career Eligibility", "--Government Office" or "--Disability". However, vesting and the number of RSUs in which you vest are subject to these terms and conditions (including, but not limited to, sections captioned "Recapture Provisions", "Remedies" and the following protection-based vesting provision).

Up to a total of fifty percent of your award that would otherwise be distributable to you during the vesting period ("At Risk RSUs") may be cancelled if the Chief Executive Officer of JPMorgan Chase ("CEO") determines in his or her sole discretion that cancellation of all or portion of the At Risk RSUs is appropriate in light of any one or a combination of the following factors:

- Your performance in relation to the priorities for your position, or the Firm's performance in relation to the priorities for which you share responsibility as a member of the Operating Committee, have been unsatisfactory for a sustained period of time. Among the factors the CEO may consider in assessing performance are net income, total net revenue, return on equity, earnings per share and capital ratios of the Firm, both on an absolute basis and, as appropriate, relative to peer firms.
- For any calendar year ending during the vesting period, JPMorgan Chase's annual pre-tax pre-provision income at the Firm level is negative.
- Awards granted to participants in a Line of Business for which you exercise, or during the vesting period exercised, direct or indirect responsibility, were in whole or in part cancelled because the Line of Business did not meet its annual Line of Business Financial Threshold.
- The Firm does not meet the Firmwide Financial Threshold.

In the event that your employment terminates due to "Job Elimination", "Full Career Eligibility", "Government Office" or "Disability" thereby entitling you to continued vesting in your award (or potentially acceleration due to satisfaction of the Government Office Requirements), the cancellation circumstances described above will continue to apply to your At Risk RSUs pursuant to the subsection captioned "Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity".

Any determination above with respect to protection-based vesting provisions is subject to ratification by the Compensation and Management Development Committee of the Board of Directors of JPMorgan Chase ("Committee"). In the case of an award to the CEO, all such determinations shall be made by the Committee and ratified by the Board.

Vesting Period

The period from the Grant Date to the last vesting date is the “vesting period” (see subsections captioned “--Amendment” pursuant to which the Firm may extend the vesting period and “--No Ownership Rights/Other Limitations” pursuant to which the Firm may place restrictions on delivered shares of Common Stock following a vesting date).

Bonus Recoupment

In consideration of the grant of this award, you agree that you are subject to the JPMorgan Chase Bonus Recoupment Policy (or successor policy) as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year 2019 and to this award. You can access this policy as currently in effect through the following link:

<http://www.jpmorganchase.com/corporate/About-JPMC/corporate-governance-principles.htm#recoupment>

For the avoidance of doubt, nothing in these terms and conditions in any way limits the rights of the Firm under the JPMorgan Chase Bonus Recoupment Policy (or successor policy).

Recapture Provisions (Detrimental Conduct, Risk-Related and Other Recapture Provisions)

Notwithstanding any terms of this Award Agreement to the contrary, JPMorgan Chase reserves the right in its sole discretion to cancel up to 100% of your outstanding RSUs under this award and, to the extent set forth in “Remedies” below, to recover from you up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares of Common Stock previously distributed (including shares withheld for tax purposes) under this award if the Firm in its sole discretion determines that:

- you engaged in conduct detrimental to the Firm insofar as it causes material financial or reputational harm to the Firm or its business activities, or
- this award was based on materially inaccurate performance metrics, whether or not you were responsible for the inaccuracy, or
- this award was based on a material misrepresentation by you, or
- you improperly or with gross negligence failed to identify, raise or assess, in a timely manner and as reasonably expected, risks and/or concerns with respect to risks material to the Firm or its business activities, or
- your employment was terminated for Cause (see section captioned “Definitions” below) or, in the case of a determination after the termination of your employment, that your employment could have been terminated for Cause.

See section captioned “Remedies” for additional information.

JPMorgan Chase’s right to cancel and/or recover the value of this award (or any cash bonus) under the JPMorgan Chase Bonus Recoupment Policy and the other provisions of this award relate to the “organizational goals” of the Firm as that term is defined by regulations issued under Section 409A of the Internal Revenue Code (“Code”).

Termination of Employment

Except as explicitly set forth below under the subsections captioned “--Job Elimination”, “--Full Career Eligibility”, “--Government Office” or “--Disability” or under the section captioned “Death”, any RSUs outstanding under this award will be cancelled effective on the date your employment with the Firm terminates for any reason.

Subject to these terms and conditions (including, but not limited to, sections captioned “Protection-Based Vesting”, “Bonus Recoupment”, “Recapture Provisions”, “Your Obligations” and “Remedies”), you will be eligible to continue to vest (as you otherwise would vest if you were still employed by JPMorgan Chase) with respect to your award in accordance with its terms and conditions following the termination of your employment if one of the following circumstances applies to you:

Job Elimination

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- the Firm terminated your employment because your job was eliminated, and
- after you are notified that your job will be eliminated, you provided such services as requested by the Firm in a cooperative and professional manner, and
- you satisfied the Release/Certification Requirements set forth below.

• Full Career Eligibility

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- you voluntarily terminated your employment with the Firm, had completed at least five years of continuous service with the Firm immediately preceding your termination date, and
- the sum of your age and Recognized Service (as defined below) on your date of termination equaled or exceeded 60 and
- you provided at least 180 days advance written notice to the Firm of your intention to voluntarily terminate your employment under this provision, during which notice period you provided such services as requested by the Firm in a cooperative and professional manner and you did not perform any services for any other employer, and
- continued vesting shall be appropriate, which determination shall be made prior to your termination and will be based on your performance and conduct (before and after providing notice), and
- for 36 months from the date of grant of this award you do not either perform services in any capacity (including self-employment) for a Financial Services Company (as defined below) or work in your profession (whether or not for a Financial Services Company); provided that you may work for a government, education or Not-for-Profit Organization (as defined below), and
- you satisfied the Release/Certification Requirements set forth below.

After receipt of such advance written notice, the Firm may choose to have you continue to provide services during such 180-day period as a condition to continued vesting or shorten the length of the 180-day period at the Firm's sole discretion, but to a date no earlier than the date you would otherwise meet the age and service requirements.

Additional advance notice requirements may apply for employees subject to notice period policies (see "Notice Period" below).

• Government Office

In the event that you voluntarily terminate your employment with the Firm to accept a Government Office or become a candidate for an elective Government Office, as described at the end of these terms and conditions under the section captioned "Government Office Requirements". See also definition of Government Office in the section captioned "Definitions".

• Disability

In the event that

- your employment with the Firm terminates because (i) you are unable to return to work while you are receiving benefits under the JPMorgan Chase Long Term Disability Plan, or for non-U.S. employees, under the equivalent JPMorgan Chase sponsored local country plan (in either case, "LTD Plan"), or (ii) if you are not covered by a LTD Plan, you are unable to return to work due to a long-term disability that would qualify for benefits under the applicable LTD Plan, as determined by the Firm or a third-party designated by the Firm; provided that you (x) request in writing continued vesting due to such disability within 30 days of the date your employment terminates, and (y) provide any requested supporting documentation and (z) receive the Firm's written consent to such treatment, and
- you satisfied the Release/Certification Requirements set forth below.

Release/Certification

To qualify for continued vesting after termination of your employment under any of the foregoing circumstances:

- you must timely execute and deliver a release of claims in favor of the Firm, having such form and terms as the Firm shall specify,
- with respect to "Full Career Eligibility", prior to the termination of your employment, you must confirm with management that you meet the eligibility criteria (including providing at least 180 days advance written notification), advise that you are seeking to be treated as an individual eligible for "Full Career Eligibility", and receive written consent to such continued vesting,
- with respect to "Disability", you must satisfy the notice and documentation described above and receive written consent to such continued vesting,
- with respect to "Full Career Eligibility" and "Government Office", it is your responsibility to take the appropriate steps to certify to the Firm prior to each vesting date while the employment restrictions are outstanding, on the authorized form of the Firm, that you have complied with the employment restrictions applicable to you (as described herein) from your date of termination of employment through the applicable vesting date, and

- in all cases, complied with all other terms of the Award Agreement. (See section captioned “Your Obligations”.)

Death

If you die while you are eligible to vest in RSUs under this award, the RSUs will immediately vest and will be distributed in shares of Common Stock (after applicable tax withholding) to your designated beneficiary on file with the Firm’s Stock Administration Department, or if no beneficiary has been designated or survives you or if beneficiary designation is not recognized by local legislation, then to your estate. Any shares will be distributed no later than the end of the calendar year immediately following the calendar year which contains your date of death; however, our administrative practice is to register such shares in the name of your beneficiary or estate within 60 days of the Firm’s receipt of any required documentation.

Your Obligations

In consideration of the grant of this award, you agree to comply with and be bound by the obligations set forth below next to the subsections captioned “--Non-Solicitation of Employees and Customers”, “--Confidential Information”, “--Non-Disparagement”, “--Cooperation”, “--Compliance with Award Agreement” and “--Notice Period.”

• Non-Solicitation of Employees and Customers

During your employment by the Firm and for the longer of the (i) one year period following the termination of your employment or, (ii) if your award is not cancelled as of your termination date, the three year period from Grant Date, you will not directly or indirectly, whether on your own behalf or on behalf of any other party, without the prior written consent of the Director of Human Resources: (i) solicit, induce or encourage any of the Firm’s then current employees to leave the Firm or to apply for employment elsewhere, unless such current employee has received official, written notice that his or her employment will be terminated due to job elimination, (ii) hire any employee or former employee who was employed by the Firm at the date your employment terminated, unless the individual’s employment terminated because his or her job was eliminated, or the individual’s employment with the Firm has been terminated for more than six months, (iii) to the fullest extent enforceable under applicable law, solicit or induce or attempt to induce to leave the Firm, or divert or attempt to divert from doing business with the Firm, any then current customers, suppliers or other persons or entities that were serviced by you or whose names became known to you by virtue of your employment with the Firm, or otherwise interfere with the relationship between the Firm and such customers, suppliers or other persons or entities. This does not apply to publicly known institutional customers that you service after your employment with the Firm without the use of the Firm’s confidential or proprietary information.

These restrictions do not apply to authorized actions you take in the normal course of your employment with the Firm, such as employment decisions with respect to employees you supervise or business referrals in accordance with the Firm’s policies.

• Confidential Information

You will not, either during your employment with the Firm or thereafter, directly or indirectly (i) use or disclose to anyone any confidential information related to the Firm’s business, or (ii) communicate with the press or other media about matters related to the Firm, its customers or employees, including matters and activities relating to your employment, or the employment of others, by the Firm, in the case of either (i) or (ii), except as explicitly permitted by the JPMorgan Chase Code of Conduct and applicable policies or law or legal process. In addition, following your termination of employment, you will not, without prior written authorization, access the Firm’s private and internal information through telephonic, intranet or internet means. “Confidential information” shall have the same meaning for the Award Agreement as it has in the JPMorgan Chase Code of Conduct.

Nothing in this award precludes you from reporting to the Firm’s management or directors, the government, a regulator, a self-regulatory agency, your attorneys or a court, conduct you believe to be in violation of the law or concerns of any known or suspected Code of Conduct violation. It is also not intended to prevent you from responding truthfully to questions or requests from the government, a regulator or in a court of law.

• Non-Disparagement

You will not, either during your employment with the Firm or thereafter, make or encourage others to make any public statement or release any information in verbal, written, electronic or any other form, that is intended to, or reasonably could be foreseen to, disparage, embarrass or criticize the Firm or its employees, officers, directors or shareholders as a group. This shall not preclude you from reporting to the Firm’s management or directors or to the government or a regulator conduct you believe to be in violation of the law or the Firm’s Code of Conduct or responding truthfully

to questions or requests for information to the government, a regulator or in a court of law in connection with a legal or regulatory investigation or proceeding.

- **Cooperation**

You will cooperate fully with and provide full and accurate information to the Firm and its counsel with respect to any matter (including any audit, tax proceeding, litigation, investigation or governmental proceeding) with respect to which you may have knowledge or information, subject to reimbursement for actual, appropriate and reasonable out-of-pocket expenses incurred by you.

- **Compliance with Award Agreement**

You will provide the Firm with any information reasonably requested to determine compliance with the Award Agreement, and you authorize the Firm to disclose the terms of the Award Agreement to any third party who might be affected thereby, including your prospective employer.

- **Notice Period**

If you are subject to a notice period or become subject to a notice period after the Grant Date, whether by contract or by policy, that requires you to provide advance written notice of your intention to terminate your employment ("Notice Period"), then as consideration for this award and continued employment, you will provide the Firm with the necessary advance written notice that applies to you, as specified by such contract or policy.

After receipt of your notice, the Firm may choose to have you continue to provide services during the applicable Notice Period or may place you on a paid leave for all or part of the applicable Notice Period. During the Notice Period, you shall continue to devote your full time and loyalty to the Firm by providing services in a cooperative and professional manner and not perform any services for any other employer and shall receive your base salary and certain benefits until your employment terminates. You and the Firm may mutually agree to waive or modify the length of the Notice Period.

Regardless of whether a Notice Period applies to you, you must comply with the 180-day advance notice period described under the subsection captioned "--Full Career Eligibility" in the event you wish to terminate employment under that same subsection.

Remedies

- **Cancellation**

In addition to the cancellation provisions described under the sections captioned "Protection-Based Vesting", "Bonus Recoupment", "Recapture Provisions" and "Termination of Employment", your outstanding RSUs under this award may be cancelled if the Firm in its sole discretion determines that:

- you have failed to comply with any of the advance notice/cooperation requirements or employment restrictions applicable to your termination of employment, or
- you have failed to return the required forms specified under the section captioned "Release/Certification" by the specified deadline, or
- you have violated any of the provisions as set forth above in the section captioned "Your Obligations".

To the extent provided under the subsection captioned "--Amendment" below, JPMorgan Chase reserves the right to suspend vesting of this award and/or distribution of shares under this award, including, without limitation, during any period that JPMorgan Chase is evaluating whether this award is subject to cancellation and/or recovery and/or whether the conditions for distributions of shares under this award are satisfied. JPMorgan Chase is not responsible for any price fluctuations during any period of suspension and, if applicable, suspended units will be reinstated consistent with Plan administration procedures. See also subsection captioned "--No Ownership Rights/Other Limitations".

• Recovery

In addition, you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares of Common Stock previously distributed under this award as follows:

- Payment may be required with respect to any shares of Common Stock distributed within the three year period prior to a notice-of-recovery under this section, if the Firm in its sole discretion determines that:
 - you committed a fraudulent act, or engaged in knowing and willful misconduct related to your employment, or
 - you violated any of the provisions as set forth above in the section captioned “Your Obligations”, or
 - you violated the employment restrictions set forth in the subsection “--Full Career Eligibility” or “--Government Office” following the termination of your employment.
- In addition, payment may be required with respect to any shares distributed within the one year period prior to notice-of-recovery under this section, if the Firm in its sole discretion determines appropriate pursuant to the provisions in the section captioned “Recapture Provisions”.

Notice-of-recovery under this subsection is a written (including electronic) notice from the Firm to you either requiring payment under this subsection or stating that JPMorgan Chase is evaluating requiring payment under this subsection. Without limiting the foregoing, notice-of-recovery will be deemed provided if the Firm makes a good faith attempt to provide written (including electronic) notice at your last known address maintained in the Firm's employment records. For the avoidance of doubt, a notice-of-recovery that the Firm is evaluating requiring payment under this subsection shall preserve JPMorgan Chase's rights to require payment as set forth above in all respects and the Firm shall be under no obligation to complete its evaluation other than as the Firm may determine in its sole discretion.

For purposes of this subsection, shares distributed under this award include shares withheld for tax purposes. However, it is the Firm's intention that you only be required to pay the amounts under this subsection with respect to shares that are or may be retained by you following a determination of tax liability and that you will not be required to pay amounts with respect to shares representing irrevocable tax withholdings or tax payments previously made (whether by you or the Firm) that you will not be able to recover, recapture or reclaim (including as a tax credit, refund or other benefit). Accordingly, JPMorgan Chase will not require you to pay any amount that the Firm or its nominee in his or her sole discretion determines is represented by such withholdings or tax payments.

Payment may be made in shares of Common Stock or in cash. You agree that any repayment will be a lawful recovery under the terms and conditions of your Award Agreement and is not to be construed in any manner as a penalty.

Nothing in the section in any way limits your obligations under “Bonus Recoupment”.

• Right to an Injunction

You acknowledge that a violation or attempted violation of the obligations set forth herein will cause immediate and irreparable damage to the Firm, and therefore agree that the Firm shall be entitled as a matter of right to an injunction, from any court of competent jurisdiction, restraining any violation or further violation of such obligations; such right to an injunction, however, shall be cumulative and in addition to whatever other remedies the Firm may have under law or equity.

Administrative Provisions

Withholding Taxes: As a result of legal and/or tax obligations the Firm, in its sole discretion, may (i) retain from each distribution the number of shares of Common Stock required to satisfy applicable tax obligations or (ii) implement any other desirable or necessary procedures, so that appropriate withholding and other taxes are paid to the competent authorities with respect to the vested shares, dividend equivalents and the award. This may include but is not limited to (i) a market sale of a number of such shares on your behalf substantially equal to the withholding or other taxes, (ii) to the extent required by law, withhold from cash compensation, an amount equal to any withholding obligation with respect to the award, shares that vest under this award, and/or dividend equivalents, and (iii) retaining shares that vest under this award or dividend equivalents until you pay any taxes associated with the award, vested shares and/or the dividend equivalents directly to the competent authorities.

Right to Set Off: Although the Firm expects to settle this award in share(s) of Common Stock as of the applicable vesting date, as set forth in your Award Agreement, the Firm may, to the maximum extent permitted by applicable law (including Section 409A of the Code to the extent it is applicable to you), retain for itself funds or the Common Stock resulting from any vesting of this award to satisfy any obligation or debt that you owe to the Firm. Notwithstanding any account agreement with the Firm to the contrary, the Firm will not recoup or recover any amount owed from any funds or unrestricted securities held in your name and maintained at the Firm pursuant to such account agreement to satisfy any obligation or debt owed by you under this award without your consent. This restriction on the Firm does not apply to accounts described and authorized in “No Ownership Rights/Other Limitations” described below.

No Ownership Rights/Other Limitations: RSUs do not convey the rights of ownership of Common Stock and do not carry voting rights. No shares of Common Stock will be issued to you until after the RSUs have vested. Shares will be issued in accordance with JPMorgan Chase's procedures for issuing stock. By accepting this award, you authorize the Firm, in its sole discretion, to establish on your behalf a brokerage account in your name with the Firm or book-entry account with our stock plan administrator and/or transfer agent and deliver to that account any vested shares derived from the

award. You also acknowledge that should there be a determination that the cancellation provisions of this award apply during the period when the vesting of any outstanding RSUs has been suspended, then you agree that such RSUs may be cancelled in whole or part. (See Sections captioned “Protection-Based Vesting”, “Bonus Recoupment”, “Recapture Provisions”, “Termination of Employment” and “Remedies”, as well as the subsection captioned “--Amendment” permitting suspension of vesting.)

With respect to any applicable vesting date, JPMorgan Chase may impose for any reason, as of such vesting date for such period as it may specify in its sole discretion, such restrictions on the Common Stock to be issued to you as it may deem appropriate, including, but not limited to, restricting the sale, transfer, pledging, assignment, hedging or encumbrance of such shares of Common Stock. Such restrictions described in the last sentence shall not impact your right to vote or receive dividends with respect to the Common Stock. By accepting this award, you acknowledge that during such specified period should there be a determination that the recovery provisions of this award apply, then you agree that you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares subject to such restrictions (notwithstanding the limitation set forth in the “Right to Set Off” subsection above). (See Sections captioned “Bonus Recoupment” and “Remedies”.)

Binding Agreement: The Award Agreement will be binding upon any successor in interest to JPMorgan Chase, by merger or otherwise.

Not a Contract of Employment: Nothing contained in the Award Agreement constitutes a contract of employment or continued employment. Employment is “at-will” and may be terminated by either you or JPMorgan Chase for any reason at any time. This award does not confer any right or entitlement to, nor does the award impose any obligation on the Firm to provide, the same or any similar award in the future and its value is not compensation for purposes of determining severance.

Section 409A Compliance: To the extent that Section 409A of the Code is applicable to this award, distributions of shares and cash hereunder are intended to comply with Section 409A of the Code, and the Award Agreement, including these terms and conditions, shall be interpreted in a manner consistent with such intent.

Notwithstanding anything herein to the contrary, if you (i) are subject to taxation under the Code, (ii) are a specified employee as defined in the JPMorgan Chase 2005 Deferred Compensation Plan and (iii) have incurred a separation from service (as defined in that Plan with the exception of death) and if any units/shares under this award represent deferred compensation as defined in Section 409A and such shares are distributable (under the terms of this award) within six months following, and as a result of your separation from service, then those shares will be delivered to you during the first calendar month after the expiration of six full months from date of your separation from service. Further, if your award is not subject to a substantial risk of forfeiture as defined by regulations issued under Section 409A of the Code, then the remainder of each calendar year immediately following (i) each applicable vesting date set forth in your Award Agreement shall be a payment date for purposes of distributing the vested portion of the award and (ii) each date that JPMorgan Chase specifies for payment of dividends declared on its Common Stock, shall be the payment date(s) for purposes of distributing dividend equivalent payments.

Change in Outstanding Shares: In the event of any change in the outstanding shares of Common Stock by reason of any stock dividend or split, recapitalization, issuance of a new class of common stock, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to stockholders of Common Stock other than regular cash dividends, the Committee will make an equitable substitution or proportionate adjustment, in the number or kind of shares of Common Stock or other securities issued or reserved for issuance pursuant to the Plan and to any RSUs outstanding under this award for such corporate events.

Interpretation/Administration: The Committee has sole and complete authority to interpret and administer this Award Agreement, including, without limitation, the power to (i) interpret the Plan and the terms of this Award Agreement; (ii) determine the reason for termination of employment; (iii) determine application of the post-employment obligations and cancellation and recovery provisions; (iv) decide all claims arising with respect to this award; and (v) delegate such authority as it deems appropriate. Any determination contemplated hereunder by the Committee, the Firm, the Director of Human Resources or their respective delegates or nominees shall be binding on all parties.

Notwithstanding anything herein to the contrary, the determinations of the Director of Human Resources, the Firm, the Committee and their respective delegates and nominees under the Plan and the Award Agreements are not required to be uniform. By way of clarification, the Committee, the Firm, the Director of Human Resources and their respective delegates and nominees shall be entitled to make non-uniform and selective determinations and modifications under Award Agreements and the Plan.

Amendment: The Committee or its nominee reserves the right to amend this Award Agreement in any manner, at any time and for any reason; provided, however, that no such amendment shall materially adversely affect your rights under this Award Agreement without your consent except to the extent that the Committee or its delegate considers advisable to (x) comply with applicable laws or changes in or interpretation of applicable laws, regulatory requirements and accounting rules or standards and/or (y) make a change in a scheduled vesting date or impose the restrictions described above under “No Ownership Rights/Other Limitations”, in either case, to the extent permitted by Section 409A of the Code if it is applicable to you. This Award Agreement may not be amended except in writing signed by the Director of Human Resources of JPMorgan Chase.

Severability: If any portion of the Award Agreement is determined by the Firm to be unenforceable in any jurisdiction, any court or arbitrator of competent jurisdiction or the Director of Human Resources may reform the relevant provisions (e.g., as to length of service, time, geographical area or scope) to the extent the Firm (or court/arbitrator) considers necessary to make the provision enforceable under applicable law.

Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity: Upon receipt of satisfactory evidence that applicable United States federal, state, local, foreign or supranational ethics or conflict of interest laws or regulations require you to divest your interest in JPMorgan Chase RSUs, the Firm may accelerate the distribution of all or part of your outstanding award effective on or before the required

divestiture date; provided that no accelerated distribution shall occur if the Firm determines that such acceleration will violate Section 409A of the Code. Accelerated distribution under this paragraph does not impact the dates as set forth in the “Recovery” section above. The time period for recovery shall be determined by the originally scheduled vesting date or distribution date prior to any acceleration event.

If you have voluntarily terminated your employment and have satisfied the requirements of the section captioned “Government Office Requirements”, acceleration shall apply (to extent required) to the percentage of your outstanding award that would continue to vest under that section. In the case of a termination of employment where the award is outstanding as a result of the subsections entitled “--Job Elimination” or “--Full Career Eligibility”, then acceleration shall apply, to the extent required, to the full outstanding award.

Notwithstanding accelerated distribution pursuant to the foregoing, you will remain subject to the applicable terms of your Award Agreement as if your award had remained outstanding for the duration of the original vesting period and shares had been distributed as scheduled as of each applicable vesting date, including, but not limited to, repayment obligations set forth in the section captioned “Remedies” and the employment restrictions in the sections captioned “Protection-Based Vesting” and “Government Office Requirements” and the subsection “--Full Career Eligibility”.

Use of Personal Data: By accepting this award, you have acknowledged that the Firm may process your personal data (including sensitive personal data) for purposes, including but not limited to (i) determining your compensation, (ii) payroll activities, including, but not limited to, tax withholding and regulatory reporting, which tax and regulatory reporting and withholding may include, but is not limited to, the United States, your work country (including countries to which you travel on Firm business) and country of residence, (iii) registration of shares and units, (iv) establishing a brokerage account on your behalf, and (v) all other lawful purposes related to your employment and this award and that the Firm may provide such data to third party vendors with whom it has contracted to provide such services and/or other bodies, including regulators, supervisory bodies, law enforcement and other government agencies. You are acknowledging and agreeing that your personal data will be transferred to, and processed in, countries and locations that do not have the same data privacy laws and statutory protection for personal data as your work country, country of residence, or country of nationality. If your personal data is subject to data privacy laws or statutory protection for personal data and they so provide for termination of the foregoing authorization, you may terminate the authorization at any time except with respect to tax and regulatory reporting and subject always to the Firm’s legal and regulatory obligations. In the event you terminate this authorization, your award will be cancelled.

Governing Law: This award shall be governed by and construed in accordance with the laws of the State of New York, without regard to conflicts of law principles.

Choice of Forum: By accepting this award under the Plan, you agree (and have agreed) that to the extent not otherwise subject to arbitration under an arbitration agreement between you and the Firm, any dispute arising directly or indirectly in connection with this award or the Plan shall be submitted to arbitration in accordance with the rules of the American Arbitration Association if so elected by the Firm in its sole discretion. In the event such a dispute is not subject to arbitration for any reason, you agree to accept the exclusive jurisdiction and venue of the United States District Court for the Southern District of New York with respect to any judicial proceeding in connection with this award or the Plan. You waive, to the fullest extent permitted by law, any objection to personal jurisdiction or to the laying of venue of such dispute and further agree not to commence any action arising out of or relating to this award or the Plan in any other forum.

Waiver of Jury Trial/Class Claims: By accepting this award, you agree, with respect to any claim brought in connection with your employment with the Firm in any forum (i) to waive the right to a jury trial and (ii) that any judicial proceeding or arbitration claim will be brought on an individual basis, and you hereby waive any right to submit, initiate, or participate in a representative capacity or as a plaintiff, claimant or member in a class action, collective action, or other representative or joint action.

Litigation: By accepting any award under the Plan, you agree (and have agreed) that in any action or proceeding by the Firm (other than a derivative suit in the right of the Firm) to enforce the terms and conditions of this Award Agreement or any other Award Agreement where the Firm is the prevailing party, the Firm shall be entitled to recover from you its reasonable attorney fees and expenses incurred in such action or proceeding. In addition, you agree that you are not entitled to, and agree not to seek, advancement of attorney fees and indemnification under the Firm’s By-Laws in the event of such a suit by the Firm.

Non-transferability: Neither this award or any other outstanding awards of RSUs, nor your interests or rights in any such awards, shall be assigned, pledged, transferred, hedged, hypothecated or subject to any lien. An award may be transferred following your death by will, the laws of descent or by a beneficiary designation on file with the Firm.

Outstanding Awards: The Administrative provisions set forth above shall apply to any award of RSUs outstanding as of the date hereof, and such awards are hereby amended.

Definitions

“Cause” means a determination by the Firm that your employment terminated as a result of your (i) violation of any law, rule or regulation (including rules of self-regulatory bodies) related to the Firm’s business, (ii) indictment or conviction of a felony, (iii) commission of a fraudulent act, (iv) violation of the JPMorgan Chase Code of Conduct or other Firm policies or misconduct related to your duties to the Firm (other than immaterial and inadvertent violations or misconduct), (v) grossly inadequate performance of the duties associated with your position or job function or failure to follow reasonable directives of your manager, or (vi) any act or failure to act that is injurious to the interests of the Firm or its relationship with a customer, client or an employee.

“Financial Services Company” means a business enterprise that employs you in any capacity (such as an employee, contractor, consultant, advisor, or self-employed individual, whether paid or unpaid) and engages in:

- commercial or retail banking, including, but not limited to, commercial, institutional and personal trust, custody and/or lending and processing services, originating and servicing mortgages, issuing and servicing credit cards, payment servicing or processing or merchant services,
- insurance, including but not limited to, guaranteeing against loss, harm, damage, illness, disability or death, providing and issuing annuities, acting as principal, agent or broker for purpose of the forgoing,
- financial, investment or economic advisory services, including but not limited to, investment banking services (such as advising on mergers or dispositions, underwriting, dealing in, or making a market in securities or other similar activities), brokerage services, investment management services, asset management services, and hedge funds,
- issuing, trading or selling instruments representing interests in pools of assets or in derivatives instruments,
- advising on, or investing in, private equity or real estate, or
- any similar activities that the Director of Human Resources or nominee determines in his or her sole discretion constitute financial services.

“Firmwide Financial Threshold” means a cumulative return on tangible common equity for calendar years 2020, 2021 and 2022 of not less than 15%. Cumulative return on tangible common equity means (i) the sum of the Firm’s reported net income for all three calendar years, divided by (ii) reported year-end tangible equity averaged over the three years.

“Government Office” means (i) a full-time position in an elected or appointed office in local, state, or federal government (including equivalent positions outside the U.S. or in a supranational organization), not reasonably anticipated to be a full-career position, or (ii) conducting a bona fide full-time campaign for such an elective public office after formally filing for candidacy, where it is customary and reasonably necessary to campaign full-time for the office.

“Line of Business” means a business unit of the Firm (or one or more business units designated below under the definition “Line of Business Financial Threshold” of the Corporate Investment Bank). All Corporate Functions (including the functions of the Chief Investment Office) are considered a single Line of Business.

“Line of Business Financial Threshold” means the financial threshold set forth below for the following Lines of Business based on the Firm’s management reporting system:

Asset & Wealth Management	Annual negative pre-tax pre-provision income ¹
Card, Merchant Services and Auto	Annual negative pre-tax pre-loan loss reserve income ²
Commercial Banking	Annual negative pre-tax, pre-loan loss reserve income ²
	Annual negative pre-tax pre-provision income ¹ for CIB overall and/or annual negative allocated product revenues (excluding CVA and DVA) for: Macro Products: Currency and Emerging Markets Rates Commodities Spread Products Credit SPG Public Finance Equities Securities Services Global Banking
Corporate Investment Bank	
Consumer Banking, CWM and Business Banking	Annual negative pre-tax pre-loan loss reserve income ²
Corporate Functions (including Chief Investment Office)	Annual negative pre-tax pre-provision income ¹ at the Firm level
Home Lending	Annual negative pre-tax pre-loan loss reserve income ²

¹Pre-tax pre-provision income means Revenue less Expenses

²Pre-tax pre-loan loss reserve income means Revenue less (Expenses plus Net Charge-offs)

“Not-for-Profit Organization” means an entity exempt from tax under state law and under Section 501(c)(3) of the Code. Section 501(c)(3) only includes entities organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals. Not-for-Profit Organization shall also mean entities outside the United States exempt from local and national tax laws because they are organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals.

“Recognized Service” means the period of service as an employee set forth in the Firm’s applicable service-related policies.

Government Office Requirements

You may be eligible to continue vesting in all or part of your award if you voluntarily resign to accept a Government Office (as defined above) or to become a candidate for an elective Government Office.

Full Career Eligibility:

“Government Office Requirements” does not apply to you if you satisfy the subsection captioned “--Full Career Eligibility” as of the date that you voluntarily terminate your employment with the Firm.

Eligibility:

Eligibility for continued vesting is conditioned on your providing the Firm:

- At least 60 days’ advance written notice of your intention to resign to accept or pursue a Government Office (see section captioned “Definitions”), during which period you must perform in a cooperative and professional manner services requested by the Firm and not provide services for any other employer. The Firm may elect to shorten this notice period at the Firm’s sole discretion.
- Confirmation, in a form of satisfactory to the firm, that vesting in this award pursuant to this provision would not violate any applicable law, regulation or rule.
- Documentation in a form satisfactory to the Firm that your resignation is for the purpose of accepting a Government Office or becoming a candidate for a Government Office. (See Section captioned “Definitions”.)

Portion of Your Awards Subject to Continued Vesting:

Subject to the conditions below, the percentage of your outstanding awards that will continue to vest in accordance with this award’s original schedule will be based on your years of continuous service completed with the Firm immediately preceding your termination date, as follows:

- 50% if you have at least 3 but less than 4 years of continuous service,
- 75% if you have at least 4 but less than 5 years of continuous service, or
- 100% if you have 5 or more years of continuous service.

The portion of each award subject to continued vesting above is referred to as the “CV Award” and the portion not subject to continued vesting will be cancelled on the date your employment terminates.

Conditions for Continued Vesting of Awards:

- You must remain in a non-elective Government Office for two or more years after your employment with the Firm terminates to receive in full your CV Award; provided that if your non-elective Government Office is for a period less than two years, you will be entitled to retain any portion of the CV Award with a vesting date during your period of Government Service; or
- In the case of resignation from the Firm to campaign for an elective Government Office, your name must be on the primary or final public ballot for the election. (If you are not elected, see below for employment restrictions.)

Satisfaction of Conditions:

If your service in a Government Office ends two years or more after your employment with the Firm terminates, or in the case of resignation from the Firm to campaign for a Government Office, your name is on the primary or final public ballot for the election and you are not elected, any CV Awards then outstanding and any such awards that would have then been outstanding but for an accelerated distribution of shares (as described in the subsection captioned “Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”) will be subject for the remainder of the applicable vesting period to the same terms and conditions of this Award Agreement, including employment restrictions during the vesting period, as if you had resigned from the Firm having met the requirements for Full Career Eligibility.

Failure to Satisfy Conditions:

If you do not satisfy the above “Conditions for Continued Vesting of Awards”, any outstanding RSUs under each CV Award will be cancelled. You also will be required to repay the Fair Market Value of the number of shares (before tax and other withholdings) of Common Stock distributed to you that would have been outstanding as RSUs on the date you failed to satisfy the “Condition for Continued Vesting of Awards” but for their accelerated distribution (as described in the subsection captioned “Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”). Fair Market Value for this purpose will be determined as the date that the shares were distributed.

JPMORGAN CHASE & CO. LONG-TERM INCENTIVE PLAN
TERMS AND CONDITIONS OF JANUARY 21, 2020
RESTRICTED STOCK UNIT AWARD
OPERATING COMMITTEE

Award Agreement

These terms and conditions are made part of the Award Agreement dated as of January 21, 2020 (“Grant Date”) awarding Restricted Stock Units (“RSUs”) pursuant to the terms of the JPMorgan Chase & Co. Long-Term Incentive Plan (“Plan”). To the extent the terms of the Award Agreement (all references to which will include these terms and conditions) conflict with the Plan, the Plan will govern. The Award Agreement, the Plan and Prospectus supersede any other agreement, whether written or oral, that may have been entered into by the Firm and you relating to this award.

This award was granted on the Grant Date subject to the Award Agreement. **Unless you decline by the deadline and in the manner specified in the Award Agreement, you will have agreed to be bound by these terms and conditions, effective as of the Grant Date.** If you decline the award, it will be cancelled as of the Grant Date.

Capitalized terms that are not defined in “Definitions” below or elsewhere in the Award Agreement will have the same meaning as set forth in the Plan.

JPMorgan Chase & Co. will be referred to throughout the Award Agreement as “JPMorgan Chase” and together with its subsidiaries as the “Firm”.

Form and Purpose of Award

Each RSU represents a non-transferable right to receive one share of Common Stock as of the applicable vesting date as set forth in your Award Agreement.

The purpose of this award is to motivate your future performance for services to be provided during the vesting period and to align your interests with those of the Firm and its shareholders.

Dividend Equivalents

This award is not eligible for dividend equivalent payments.

Protection-Based Vesting

This award is intended and expected to vest on the vesting date(s), provided that you are continuously employed by the Firm through such vesting date, or you meet the requirements for continued vesting described under the subsections “--Job Elimination”, “--Full Career Eligibility”, “--Government Office” or “--Disability”. However, vesting and the number of RSUs in which you vest are subject to these terms and conditions (including, but not limited to, sections captioned “Recapture Provisions”, “Remedies” and the following protection-based vesting provision).

Up to a total of fifty percent of your award that would otherwise be distributable to you during the vesting period (“At Risk RSUs”) may be cancelled if the Chief Executive Officer of JPMorgan Chase (“CEO”) determines in his or her sole discretion that cancellation of all or portion of the At Risk RSUs is appropriate in light of any one or a combination of the following factors:

- Your performance in relation to the priorities for your position, or the Firm’s performance in relation to the priorities for which you share responsibility as a member of the Operating Committee, have been unsatisfactory for a sustained period of time. Among the factors the CEO may consider in assessing performance are net income, total net revenue, return on equity, earnings per share and capital ratios of the Firm, both on an absolute basis and, as appropriate, relative to peer firms.
- For any calendar year ending during the vesting period, JPMorgan Chase’s annual pre-tax pre-provision income at the Firm level is negative.
- Awards granted to participants in a Line of Business for which you exercise, or during the vesting period exercised, direct or indirect responsibility, were in whole or in part cancelled because the Line of Business did not meet its annual Line of Business Financial Threshold.
- The Firm does not meet the Firmwide Financial Threshold.

In the event that your employment terminates due to “Job Elimination”, “Full Career Eligibility”, “Government Office” or “Disability” thereby entitling you to continued vesting in your award (or potentially acceleration due to satisfaction of the Government Office Requirements), the cancellation circumstances described above will continue to apply to your At Risk RSUs pursuant to the subsection captioned “Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”.

Any determination above with respect to protection-based vesting provisions is subject to ratification by the Compensation and Management Development Committee of the Board of Directors of JPMorgan Chase (“Committee”). In the case of an award to the CEO, all such determinations shall be made by the Committee and ratified by the Board.

Vesting Period

The period from the Grant Date to the last vesting date is the “vesting period” (see subsections captioned “--Amendment” pursuant to which the Firm may extend the vesting period and “--No Ownership Rights/Other Limitations” pursuant to which the Firm may place restrictions on delivered shares of Common Stock following a vesting date).

Holding Requirement

As of each vesting date, you shall be entitled to a distribution equal to the Fair Market Value of the number of RSUs vesting on such date, less the number being withheld to satisfy tax withholding obligations. You agree that the distribution made to you will be held in an account in your name with restrictions preventing you from transferring, assigning, hedging, selling, pledging or otherwise encumbering such distribution for a twelve month period commencing with the vesting date. Such restrictions shall lapse in event of your death.

Bonus Recoupment

In consideration of the grant of this award, you agree that you are subject to the JPMorgan Chase Bonus Recoupment Policy (or successor policy) as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year 2019 and to this award. You can access this policy as currently in effect through the following link:

<http://www.jpmorganchase.com/corporate/About-JPMC/corporate-governance-principles.htm#recouptment>

For the avoidance of doubt, nothing in these terms and conditions in any way limits the rights of the Firm under the JPMorgan Chase Bonus Recoupment Policy (or successor policy).

EMEA Malus and Clawback Policy - Identified Staff

In consideration of grant of this award, and without prejudice to any other provision of this Award Agreement, you agree that you are subject to the JPMorgan Chase EMEA Malus and Clawback Policy - Identified Staff (and any applicable supplement(s) to that policy) or successor policy as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year 2018 and to this award. You can access this policy as currently in effect in My Rewards through the following link: <https://myrewards.jpmorganchase.com>

See section captioned “Administrative Provisions” for additional information.

Recapture Provisions (Detrimental Conduct, Risk-Related and Other Recapture Provisions)

Notwithstanding any terms of this Award Agreement to the contrary, JPMorgan Chase reserves the right in its sole discretion to cancel up to 100% of your outstanding RSUs under this award and, to the extent set forth in “Remedies” below, to recover from you up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares of Common Stock previously distributed (including shares withheld for tax purposes) under this award if the Firm in its sole discretion determines that:

- you engaged in conduct detrimental to the Firm insofar as it causes material financial or reputational harm to the Firm or its business activities, or
- this award was based on materially inaccurate performance metrics, whether or not you were responsible for the inaccuracy, or
- this award was based on a material misrepresentation by you, or
- you improperly or with gross negligence failed to identify, raise or assess, in a timely manner and as reasonably expected, risks and/or concerns with respect to risks material to the Firm or its business activities, or
- your employment was terminated for Cause (see section captioned “Definitions” below) or, in the case of a determination after the termination of your employment, that your employment could have been terminated for Cause.

See section captioned “Remedies” for additional information.

JPMorgan Chase’s right to cancel and/or recover the value of this award (or any cash bonus) under the JPMorgan Chase Bonus Recoupment Policy and the other provisions of this award relate to the “organizational goals” of the Firm as that term is defined by regulations issued under Section 409A of the Internal Revenue Code (“Code”).

Termination of Employment

Except as explicitly set forth below under the subsections captioned “--Job Elimination”, “--Full Career Eligibility”, “--Government Office” or “--Disability” or under the section captioned “Death”, any RSUs outstanding under this award will be cancelled effective on the date your employment with the Firm terminates for any reason.

Subject to these terms and conditions (including, but not limited to, sections captioned “Protection-Based Vesting”, “Bonus Recoupment”, “EMEA Malus and Clawback Policy - Identified Staff”, “Recapture Provisions”, “Your Obligations” and “Remedies”), you will be eligible to continue to vest (as you

otherwise would vest if you were still employed by JPMorgan Chase) with respect to your award in accordance with its terms and conditions following the termination of your employment if one of the following circumstances applies to you:

- **Job Elimination**

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- the Firm terminated your employment because your job was eliminated, and
- after you are notified that your job will be eliminated, you provided such services as requested by the Firm in a cooperative and professional manner, and
- you satisfied the Release/Certification Requirements set forth below.

- **Full Career Eligibility**

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- you voluntarily terminated your employment with the Firm, had completed at least five years of continuous service with the Firm immediately preceding your termination date, and
- your Recognized Service (as defined below) on your date of termination equaled or exceeded 15 years, or your combined Recognized Service with the Firm and external professional experience (as attested by you to the Firm) equaled or exceeded 30 years, and
- you provided at least 180 days advance written notice to the Firm of your intention to voluntarily terminate your employment under this provision, during which notice period you provided such services as requested by the Firm in a cooperative and professional manner and you did not perform any services for any other employer, and
- continued vesting shall be appropriate, which determination shall be made prior to your termination and will be based on your performance and conduct (before and after providing notice), and
- for 36 months from the date of grant of this award you do not either perform services in any capacity (including self-employment) for a Financial Services Company (as defined below) or work in your profession (whether or not for a Financial Services Company); provided that you may work for a government, education or Not-for-Profit Organization (as defined below), and
- you satisfied the Release/Certification Requirements set forth below.

After receipt of such advance written notice, the Firm may choose to have you continue to provide services during such 180-day period as a condition to continued vesting or shorten the length of the 180-day period at the Firm's sole discretion, but to a date no earlier than the date you would otherwise meet the service requirement.

Additional advance notice requirements may apply for employees subject to notice period policies (see "Notice Period" below).

- **Government Office**

In the event that you voluntarily terminate your employment with the Firm to accept a Government Office or become a candidate for an elective Government Office, as described at the end of these terms and conditions under the section captioned "Government Office Requirements". See also definition of Government Office in the section captioned "Definitions".

- **Disability**

In the event that

- your employment with the Firm terminates because (i) you are unable to return to work while you are receiving benefits under the JPMorgan Chase Long Term Disability Plan, or for non-U.S. employees, under the equivalent JPMorgan Chase sponsored local country plan (in either case, "LTD Plan"), or (ii) if you are not covered by a LTD Plan, you are unable to return to work due to a long-term disability that would qualify for benefits under the applicable LTD Plan, as determined by the Firm or a third-party designated by the Firm; provided that you (x) request in writing continued vesting due to such disability within 30 days of the date your employment terminates, and (y) provide any requested supporting documentation and (z) receive the Firm's written consent to such treatment, and

- you satisfied the Release/Certification Requirements set forth below.

Release/Certification

To qualify for continued vesting after termination of your employment under any of the foregoing circumstances:

- you must timely execute and deliver a release of claims in favor of the Firm, having such form and terms as the Firm shall specify,
- with respect to “Full Career Eligibility”, prior to the termination of your employment, you must confirm with management that you meet the eligibility criteria (including providing at least 180 days advance written notification), advise that you are seeking to be treated as an individual eligible for “Full Career Eligibility”, and receive written consent to such continued vesting,
- with respect to “Disability”, you must satisfy the notice and documentation described above and receive written consent to such continued vesting,
- with respect to “Full Career Eligibility” and “Government Office”, it is your responsibility to take the appropriate steps to certify to the Firm prior to each vesting date while the employment restrictions are outstanding, on the authorized form of the Firm, that you have complied with the employment restrictions applicable to you (as described herein) from your date of termination of employment through the applicable vesting date, and
- in all cases, complied with all other terms of the Award Agreement. (See section captioned “Your Obligations”.)

Death

If you die while you are eligible to vest in RSUs under this award, the RSUs will immediately vest and will be distributed in shares of Common Stock (after applicable tax withholding) to your designated beneficiary on file with the Firm’s Stock Administration Department, or if no beneficiary has been designated or survives you or if beneficiary designation is not recognized by local legislation, then to your estate. Any shares will be distributed no later than the end of the calendar year immediately following the calendar year which contains your date of death; however, our administrative practice is to register such shares in the name of your beneficiary or estate within 60 days of the Firm’s receipt of any required documentation.

Your Obligations

In consideration of the grant of this award, you agree to comply with and be bound by the obligations set forth below next to the subsections captioned “--Non-Solicitation of Employees and Customers”, “--Confidential Information”, “--Non-Disparagement”, “--Cooperation”, “--Compliance with Award Agreement” and “--Notice Period.”

Non-Solicitation of Employees and Customers

During your employment by the Firm and for the longer of the (i) one year period following the termination of your employment or, (ii) if your award is not cancelled as of your termination date, the three year period from Grant Date, you will not directly or indirectly, whether on your own behalf or on behalf of any other party, without the prior written consent of the Director of Human Resources: (i) solicit, induce or encourage any of the Firm’s then current employees to leave the Firm or to apply for employment elsewhere, unless such current employee has received official, written notice that his or her employment will be terminated due to job elimination, (ii) hire any employee or former employee who was employed by the Firm at the date your employment terminated, unless the individual’s employment terminated because his or her job was eliminated, or the individual’s employment with the Firm has been terminated for more than six months, (iii) to the fullest extent enforceable under applicable law, solicit or induce or attempt to induce to leave the Firm, or divert or attempt to divert from doing business with the Firm, any then current customers, suppliers or other persons or entities that were serviced by you or whose names became known to you by virtue of your employment with the Firm, or otherwise interfere with the relationship between the Firm and such customers, suppliers or other persons or entities. This does not apply to publicly known institutional customers that you service after your employment with the Firm without the use of the Firm’s confidential or proprietary information.

These restrictions do not apply to authorized actions you take in the normal course of your employment with the Firm, such as employment decisions with respect to employees you supervise or business referrals in accordance with the Firm’s policies.

Confidential Information

You will not, either during your employment with the Firm or thereafter, directly or indirectly (i) use or disclose to anyone any confidential information related to the Firm’s business, or (ii) communicate with the press or other media about matters related to the Firm, its customers or employees, including matters and activities relating to your employment, or the employment of others, by the Firm, in the case of either (i) or (ii), except as explicitly permitted by the JPMorgan Chase Code of Conduct and applicable policies or law or legal process. In addition, following your termination of employment, you will not, without prior written authorization, access the Firm’s private and internal information through telephonic,

intranet or internet means. “Confidential information” shall have the same meaning for the Award Agreement as it has in the JPMorgan Chase Code of Conduct.

Nothing in this award precludes you from reporting to the Firm’s management or directors, the government, a regulator, a self-regulatory agency, your attorneys or a court, conduct you believe to be in violation of the law or concerns of any known or suspected Code of Conduct violation. It is also not intended to prevent you from responding truthfully to questions or requests from the government, a regulator or in a court of law.

- **Non-Disparagement**

You will not, either during your employment with the Firm or thereafter, make or encourage others to make any public statement or release any information in verbal, written, electronic or any other form, that is intended to, or reasonably could be foreseen to, disparage, embarrass or criticize the Firm or its employees, officers, directors or shareholders as a group. This shall not preclude you from reporting to the Firm’s management or directors or to the government or a regulator conduct you believe to be in violation of the law or the Firm’s Code of Conduct or responding truthfully to questions or requests for information to the government, a regulator or in a court of law in connection with a legal or regulatory investigation or proceeding.

- **Cooperation**

You will cooperate fully with and provide full and accurate information to the Firm and its counsel with respect to any matter (including any audit, tax proceeding, litigation, investigation or governmental proceeding) with respect to which you may have knowledge or information, subject to reimbursement for actual, appropriate and reasonable out-of-pocket expenses incurred by you.

- **Compliance with Award Agreement**

You will provide the Firm with any information reasonably requested to determine compliance with the Award Agreement, and you authorize the Firm to disclose the terms of the Award Agreement to any third party who might be affected thereby, including your prospective employer.

- **Notice Period**

If you are subject to a notice period or become subject to a notice period after the Grant Date, whether by contract or by policy, that requires you to provide advance written notice of your intention to terminate your employment (“Notice Period”), then as consideration for this award and continued employment, you will provide the Firm with the necessary advance written notice that applies to you, as specified by such contract or policy.

After receipt of your notice, the Firm may choose to have you continue to provide services during the applicable Notice Period or may place you on a paid leave for all or part of the applicable Notice Period. During the Notice Period, you shall continue to devote your full time and loyalty to the Firm by providing services in a cooperative and professional manner and not perform any services for any other employer and shall receive your base salary and certain benefits until your employment terminates. You and the Firm may mutually agree to waive or modify the length of the Notice Period.

Regardless of whether a Notice Period applies to you, you must comply with the 180-day advance notice period described under the subsection captioned “--Full Career Eligibility” in the event you wish to terminate employment under that same subsection.

Remedies

- **Cancellation**

In addition to the cancellation provisions described under the sections captioned “Protection-Based Vesting”, “Bonus Recoupment”, “EMEA Malus and Clawback Policy - Identified Staff”, “Recapture Provisions” and “Termination of Employment”, your outstanding RSUs under this award may be cancelled if the Firm in its sole discretion determines that:

- you have failed to comply with any of the advance notice/cooperation requirements or employment restrictions applicable to your termination of employment, or
- you have failed to return the required forms specified under the section captioned “Release/Certification” by the specified deadline, or
- you have violated any of the provisions as set forth above in the section captioned “Your Obligations”.

To the extent provided under the subsection captioned “--Amendment” below, JPMorgan Chase reserves the right to suspend vesting of this award and/or distribution of shares under this award, including, without limitation, during any period that JPMorgan Chase is evaluating whether this award is subject to cancellation and/or recovery and/or whether the conditions for distributions of shares under this award are satisfied. JPMorgan Chase is not responsible for any price fluctuations during any period of suspension and, if applicable, suspended units will be reinstated consistent with Plan administration procedures. See also subsection captioned “--No Ownership Rights/Other Limitations”.

• Recovery

In addition, you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares of Common Stock previously distributed under this award as follows:

- Payment may be required with respect to any shares of Common Stock distributed within the three year period prior to a notice-of-recovery under this section, if the Firm in its sole discretion determines that:
 - you committed a fraudulent act, or engaged in knowing and willful misconduct related to your employment, or
 - you violated any of the provisions as set forth above in the section captioned “Your Obligations”, or
 - you violated the employment restrictions set forth in the subsection “--Full Career Eligibility” or “--Government Office” following the termination of your employment.
- In addition, payment may be required with respect to any shares distributed within the one year period prior to notice-of-recovery under this section, if the Firm in its sole discretion determines appropriate pursuant to the provisions in the section captioned “Recapture Provisions”.

Notice-of-recovery under this subsection is a written (including electronic) notice from the Firm to you either requiring payment under this subsection or stating that JPMorgan Chase is evaluating requiring payment under this subsection. Without limiting the foregoing, notice-of-recovery will be deemed provided if the Firm makes a good faith attempt to provide written (including electronic) notice at your last known address maintained in the Firm’s employment records. For the avoidance of doubt, a notice-of-recovery that the Firm is evaluating requiring payment under this subsection shall preserve JPMorgan Chase’s rights to require payment as set forth above in all respects and the Firm shall be under no obligation to complete its evaluation other than as the Firm may determine in its sole discretion.

For purposes of this subsection, shares distributed under this award include shares withheld for tax purposes. However, it is the Firm’s intention that you only be required to pay the amounts under this subsection with respect to shares that are or may be retained by you following a determination of tax liability and that you will not be required to pay amounts with respect to shares representing irrevocable tax withholdings or tax payments previously made (whether by you or the Firm) that you will not be able to recover, recapture or reclaim (including as a tax credit, refund or other benefit). Accordingly, JPMorgan Chase will not require you to pay any amount that the Firm or its nominee in his or her sole discretion determines is represented by such withholdings or tax payments.

Payment may be made in shares of Common Stock or in cash. You agree that any repayment will be a lawful recovery under the terms and conditions of your Award Agreement and is not to be construed in any manner as a penalty.

Nothing in the section in any way limits your obligations under “Bonus Recoupment” and “EMEA Malus and Clawback Policy - Identified Staff”.

• Right to an Injunction

You acknowledge that a violation or attempted violation of the obligations set forth herein will cause immediate and irreparable damage to the Firm, and therefore agree that the Firm shall be entitled as a matter of right to an injunction, from any court of competent jurisdiction, restraining any violation or further violation of such obligations; such right to an injunction, however, shall be cumulative and in addition to whatever other remedies the Firm may have under law or equity.

Administrative Provisions

EMEA Malus and Clawback Policy: The provisions of the JPMorgan Chase EMEA Malus and Clawback Policy - Identified Staff set out the terms and conditions applying to the grant of this award which ensure that the Firm is able to meet its regulatory obligations to operate malus (reduce) and/or

clawback (recover) to awards in certain circumstances. These include, but are not limited to, where (i) there is a material downturn in the Firm's financial performance or (ii) where the Firm is required to hold more capital. The circumstances in which the events at (i) and (ii) would occur are analogous to some of the circumstances considered under the existing Firmwide terms and conditions, in particular the Bonus Recoupment Policy and the Protection Based Vesting provisions.

Withholding Taxes: As a result of legal and/or tax obligations the Firm, in its sole discretion, may (i) retain from each distribution the number of shares of Common Stock required to satisfy applicable tax obligations or (ii) implement any other desirable or necessary procedures, so that appropriate withholding and other taxes are paid to the competent authorities with respect to the vested shares and the award. This may include but is not limited to (i) a market sale of a number of such shares on your behalf substantially equal to the withholding or other taxes, (ii) to the extent required by law, withhold from cash compensation, an amount equal to any withholding obligation with respect to the award and shares that vest under this award, and (iii) retaining shares that vest under this award until you pay any taxes associated with the award and/or vested shares directly to the competent authorities.

Right to Set Off: Although the Firm expects to settle this award in share(s) of Common Stock as of the applicable vesting date, as set forth in your Award Agreement, the Firm may, to the maximum extent permitted by applicable law (including Section 409A of the Code to the extent it is applicable to you), retain for itself funds or the Common Stock resulting from any vesting of this award to satisfy any obligation or debt that you owe to the Firm. Notwithstanding any account agreement with the Firm to the contrary, the Firm will not recoup or recover any amount owed from any funds or unrestricted securities held in your name and maintained at the Firm pursuant to such account agreement to satisfy any obligation or debt owed by you under this award without your consent. This restriction on the Firm does not apply to accounts described and authorized in "No Ownership Rights/Other Limitations" described below.

No Ownership Rights/Other Limitations: RSUs do not convey the rights of ownership of Common Stock and do not carry voting rights. No shares of Common Stock will be issued to you until after the RSUs have vested. Shares will be issued in accordance with JPMorgan Chase's procedures for issuing stock. By accepting this award, you authorize the Firm, in its sole discretion, to establish on your behalf a brokerage account in your name with the Firm or book-entry account with our stock plan administrator and/or transfer agent and deliver to that account any vested shares derived from the award. You also acknowledge that should there be a determination that the cancellation provisions of this award apply during the period when the vesting of any outstanding RSUs has been suspended, then you agree that such RSUs may be cancelled in whole or part. (See Sections captioned "Protection-Based Vesting", "Bonus Recoupment", "EMEA Malus and Clawback Policy - Identified Staff", "Recapture Provisions", "Termination of Employment" and "Remedies", as well as the subsection captioned "--Amendment" permitting suspension of vesting.)

With respect to any applicable vesting date, JPMorgan Chase may impose for any reason, as of such vesting date for such period as it may specify in its sole discretion, such restrictions on the Common Stock to be issued to you as it may deem appropriate, including, but not limited to, restricting the sale, transfer, pledging, assignment, hedging or encumbrance of such shares of Common Stock. Such restrictions described in the last sentence shall not impact your right to vote or receive dividends with respect to the Common Stock. By accepting this award, you acknowledge that during such specified period should there be a determination that the recovery provisions of this award apply, then you agree that you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares subject to such restrictions (notwithstanding the limitation set forth in the "Right to Set Off" subsection above). (See Sections captioned "Bonus Recoupment" and "Remedies".)

Binding Agreement: The Award Agreement will be binding upon any successor in interest to JPMorgan Chase, by merger or otherwise.

Not a Contract of Employment: Nothing contained in the Award Agreement constitutes a contract of employment or continued employment. Employment is "at-will" and may be terminated by either you or JPMorgan Chase for any reason at any time. This award does not confer any right or entitlement to, nor does the award impose any obligation on the Firm to provide, the same or any similar award in the future and its value is not compensation for purposes of determining severance.

Section 409A Compliance: To the extent that Section 409A of the Code is applicable to this award, distributions of shares hereunder are intended to comply with Section 409A of the Code, and the Award Agreement, including these terms and conditions, shall be interpreted in a manner consistent with such intent.

Notwithstanding anything herein to the contrary, if you (i) are subject to taxation under the Code, (ii) are a specified employee as defined in the JPMorgan Chase 2005 Deferred Compensation Plan and (iii) have incurred a separation from service (as defined in that Plan with the exception of death) and if any units/shares under this award represent deferred compensation as defined in Section 409A and such shares are distributable (under the terms of this award) within six months following, and as a result of your separation from service, then those shares will be delivered to you during the first calendar month after the expiration of six full months from date of your separation from service. Further, if your award is not subject to a substantial risk of forfeiture as defined by regulations issued under Section 409A of the Code, then the remainder of each calendar year immediately following each applicable vesting date set forth in your Award Agreement shall be a payment date for purposes of distributing the vested portion of the award.

Change in Outstanding Shares: In the event of any change in the outstanding shares of Common Stock by reason of any stock dividend or split, recapitalization, issuance of a new class of common stock, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to stockholders of Common Stock other than regular cash dividends, the Committee will make an equitable substitution or proportionate adjustment, in the number or kind of shares of Common Stock or other securities issued or reserved for issuance pursuant to the Plan and to any RSUs outstanding under this award for such corporate events.

Interpretation/Administration: The Committee has sole and complete authority to interpret and administer this Award Agreement, including, without limitation, the power to (i) interpret the Plan and the terms of this Award Agreement; (ii) determine the reason for termination of employment; (iii)

determine application of the post-employment obligations and cancellation and recovery provisions; (iv) decide all claims arising with respect to this award; and (v) delegate such authority as it deems appropriate. Any determination contemplated hereunder by the Committee, the Firm, the Director of Human Resources or their respective delegates or nominees shall be binding on all parties.

Notwithstanding anything herein to the contrary, the determinations of the Director of Human Resources, the Firm, the Committee and their respective delegates and nominees under the Plan and the Award Agreements are not required to be uniform. By way of clarification, the Committee, the Firm, the Director of Human Resources and their respective delegates and nominees shall be entitled to make non-uniform and selective determinations and modifications under Award Agreements and the Plan.

Amendment: The Committee or its nominee reserves the right to amend this Award Agreement in any manner, at any time and for any reason; provided, however, that no such amendment shall materially adversely affect your rights under this Award Agreement without your consent except to the extent that the Committee or its delegate considers advisable to (x) comply with applicable laws or changes in or interpretation of applicable laws, regulatory requirements and accounting rules or standards and/or (y) make a change in a scheduled vesting date or impose the restrictions described above under "No Ownership Rights/Other Limitations", in either case, to the extent permitted by Section 409A of the Code if it is applicable to you. This Award Agreement may not be amended except in writing signed by the Director of Human Resources of JPMorgan Chase.

Severability: If any portion of the Award Agreement is determined by the Firm to be unenforceable in any jurisdiction, any court or arbitrator of competent jurisdiction or the Director of Human Resources may reform the relevant provisions (e.g., as to length of service, time, geographical area or scope) to the extent the Firm (or court/arbitrator) considers necessary to make the provision enforceable under applicable law.

Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity: Upon receipt of satisfactory evidence that applicable United States federal, state, local, foreign or supranational ethics or conflict of interest laws or regulations require you to divest your interest in JPMorgan Chase RSUs, the Firm may accelerate the distribution of all or part of your outstanding award effective on or before the required divestiture date; provided that no accelerated distribution shall occur if the Firm determines that such acceleration will violate Section 409A of the Code. Accelerated distribution under this paragraph does not impact the dates as set forth in the "Recovery" section above. The time period for recovery shall be determined by the originally scheduled vesting date or distribution date prior to any acceleration event.

If you have voluntarily terminated your employment and have satisfied the requirements of the section captioned "Government Office Requirements", acceleration shall apply (to extent required) to the percentage of your outstanding award that would continue to vest under that section. In the case of a termination of employment where the award is outstanding as a result of the subsections entitled "--Job Elimination" or "--Full Career Eligibility", then acceleration shall apply, to the extent required, to the full outstanding award.

Notwithstanding accelerated distribution pursuant to the foregoing, you will remain subject to the applicable terms of your Award Agreement as if your award had remained outstanding for the duration of the original vesting period and shares had been distributed as scheduled as of each applicable vesting date, including, but not limited to, repayment obligations set forth in the section captioned "Remedies" and the employment restrictions in the sections captioned "Protection-Based Vesting" and "Government Office Requirements" and the subsection "--Full Career Eligibility".

Use of Personal Data: By accepting this award, you have acknowledged that the Firm may process your personal data (including sensitive personal data) for purposes, including but not limited to (i) determining your compensation, (ii) payroll activities, including, but not limited to, tax withholding and regulatory reporting, which tax and regulatory reporting and withholding may include, but is not limited to, the United States, your work country (including countries to which you travel on Firm business) and country of residence, (iii) registration of shares and units, (iv) establishing a brokerage account on your behalf, and (v) all other lawful purposes related to your employment and this award and that the Firm may provide such data to third party vendors with whom it has contracted to provide such services and/or other bodies, including regulators, supervisory bodies, law enforcement and other government agencies. You are acknowledging and agreeing that your personal data will be transferred to, and processed in, countries and locations that do not have the same data privacy laws and statutory protection for personal data as your work country, country of residence, or country of nationality. If your personal data is subject to data privacy laws or statutory protection for personal data and they so provide for termination of the foregoing authorization, you may terminate the authorization at any time except with respect to tax and regulatory reporting and subject always to the Firm's legal and regulatory obligations. In the event you terminate this authorization, your award will be cancelled.

Governing Law: This award shall be governed by and construed in accordance with the laws of the State of New York, without regard to conflicts of law principles.

Choice of Forum: By accepting this award under the Plan, you agree (and have agreed) that to the extent not otherwise subject to arbitration under an arbitration agreement between you and the Firm, any dispute arising directly or indirectly in connection with this award or the Plan shall be submitted to arbitration in accordance with the rules of the American Arbitration Association if so elected by the Firm in its sole discretion. In the event such a dispute is not subject to arbitration for any reason, you agree to accept the exclusive jurisdiction and venue of the United States District Court for the Southern District of New York with respect to any judicial proceeding in connection with this award or the Plan. You waive, to the fullest extent permitted by law, any objection to personal jurisdiction or to the laying of venue of such dispute and further agree not to commence any action arising out of or relating to this award or the Plan in any other forum.

Waiver of Jury Trial/Class Claims: By accepting this award, you agree, with respect to any claim brought in connection with your employment with the Firm in any forum (i) to waive the right to a jury trial and (ii) that any judicial proceeding or arbitration claim will be brought on an individual basis, and you hereby waive any right to submit, initiate, or participate in a representative capacity or as a plaintiff, claimant or member in a class action, collective action, or other representative or joint action.

Litigation: By accepting any award under the Plan, you agree (and have agreed) that in any action or proceeding by the Firm (other than a derivative suit in the right of the Firm) to enforce the terms and conditions of this Award Agreement or any other Award Agreement where the Firm is the prevailing party, the Firm shall be entitled to recover from you its reasonable attorney fees and expenses incurred in such action or proceeding. In addition, you agree that you are not entitled to, and agree not to seek, advancement of attorney fees and indemnification under the Firm's By-Laws in the event of such a suit by the Firm.

Non-transferability: Neither this award or any other outstanding awards of RSUs, nor your interests or rights in any such awards, shall be assigned, pledged, transferred, hedged, hypothecated or subject to any lien. An award may be transferred following your death by will, the laws of descent or by a beneficiary designation on file with the Firm.

Outstanding Awards: The Administrative provisions set forth above shall apply to any award of RSUs outstanding as of the date hereof, and such awards are hereby amended.

Definitions

"Cause" means a determination by the Firm that your employment terminated as a result of your (i) violation of any law, rule or regulation (including rules of self-regulatory bodies) related to the Firm's business, (ii) indictment or conviction of a felony, (iii) commission of a fraudulent act, (iv) violation of the JPMorgan Chase Code of Conduct or other Firm policies or misconduct related to your duties to the Firm (other than immaterial and inadvertent violations or misconduct), (v) grossly inadequate performance of the duties associated with your position or job function or failure to follow reasonable directives of your manager, or (vi) any act or failure to act that is injurious to the interests of the Firm or its relationship with a customer, client or an employee.

"Financial Services Company" means a business enterprise that employs you in any capacity (such as an employee, contractor, consultant, advisor, or self-employed individual, whether paid or unpaid) and engages in:

- commercial or retail banking, including, but not limited to, commercial, institutional and personal trust, custody and/or lending and processing services, originating and servicing mortgages, issuing and servicing credit cards, payment servicing or processing or merchant services,
- insurance, including but not limited to, guaranteeing against loss, harm, damage, illness, disability or death, providing and issuing annuities, acting as principal, agent or broker for purpose of the forgoing,
- financial, investment or economic advisory services, including but not limited to, investment banking services (such as advising on mergers or dispositions, underwriting, dealing in, or making a market in securities or other similar activities), brokerage services, investment management services, asset management services, and hedge funds,
- issuing, trading or selling instruments representing interests in pools of assets or in derivatives instruments,
- advising on, or investing in, private equity or real estate, or
- any similar activities that the Director of Human Resources or nominee determines in his or her sole discretion constitute financial services.

"Firmwide Financial Threshold" means a cumulative return on tangible common equity for calendar years 2020, 2021 and 2022 of not less than 15%. Cumulative return on tangible common equity means (i) the sum of the Firm's reported net income for all three calendar years, divided by (ii) reported year-end tangible equity averaged over the three years.

"Government Office" means (i) a full-time position in an elected or appointed office in local, state, or federal government (including equivalent positions outside the U.S. or in a supranational organization), not reasonably anticipated to be a full-career position, or (ii) conducting a bona fide full-time campaign for such an elective public office after formally filing for candidacy, where it is customary and reasonably necessary to campaign full-time for the office.

"Line of Business" means a business unit of the Firm (or one or more business units designated below under the definition "Line of Business Financial Threshold" of the Corporate Investment Bank). All Corporate Functions (including the functions of the Chief Investment Office) are considered a single Line of Business.

"Line of Business Financial Threshold" means the financial threshold set forth below for the following Lines of Business based on the Firm's management reporting system:

Asset & Wealth Management	Annual negative pre-tax pre-provision income ¹
Card, Merchant Services and Auto	Annual negative pre-tax pre-loan loss reserve income ²
Commercial Banking	Annual negative pre-tax, pre-loan loss reserve income ²
Corporate Investment Bank	Annual negative pre-tax pre-provision income ¹ for CIB overall and/or annual negative allocated product revenues (excluding CVA and DVA) for: Macro Products: Currency and Emerging Markets Rates Commodities Spread Products Credit SPG Public Finance Equities Securities Services Global Banking
Consumer Banking, CWM and Business Banking	Annual negative pre-tax pre-loan loss reserve income ²
Corporate Functions (including Chief Investment Office)	Annual negative pre-tax pre-provision income ¹ at the Firm level
Home Lending	Annual negative pre-tax pre-loan loss reserve income ²

¹Pre-tax pre-provision income means Revenue less Expenses

²Pre-tax pre-loan loss reserve income means Revenue less (Expenses plus Net Charge-offs)

“Not-for-Profit Organization” means an entity exempt from tax under state law and under Section 501(c)(3) of the Code. Section 501(c)(3) only includes entities organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals. Not-for-Profit Organization shall also mean entities outside the United States exempt from local and national tax laws because they are organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals.

“Recognized Service” means the period of service as an employee set forth in the Firm’s applicable service-related policies.

Government Office Requirements

You may be eligible to continue vesting in all or part of your award if you voluntarily resign to accept a Government Office (as defined above) or to become a candidate for an elective Government Office.

Full Career Eligibility:

“Government Office Requirements” does not apply to you if you satisfy the subsection captioned “--Full Career Eligibility” as of the date that you voluntarily terminate your employment with the Firm.

Eligibility:

Eligibility for continued vesting is conditioned on your providing the Firm:

- At least 60 days’ advance written notice of your intention to resign to accept or pursue a Government Office (see section captioned “Definitions”), during which period you must perform in a cooperative and professional manner services requested by the Firm and not provide services for any other employer. The Firm may elect to shorten this notice period at the Firm’s sole discretion.
- Confirmation, in a form of satisfactory to the firm, that vesting in this award pursuant to this provision would not violate any applicable law, regulation or rule.
- Documentation in a form satisfactory to the Firm that your resignation is for the purpose of accepting a Government Office or becoming a candidate for a Government Office. (See Section captioned “Definitions”.)

Portion of Your Awards Subject to Continued Vesting:

Subject to the conditions below, the percentage of your outstanding awards that will continue to vest in accordance with this award’s original schedule will be based on your years of continuous service completed with the Firm immediately preceding your termination date, as follows:

- 50% if you have at least 3 but less than 4 years of continuous service,
- 75% if you have at least 4 but less than 5 years of continuous service, or
- 100% if you have 5 or more years of continuous service.

The portion of each award subject to continued vesting above is referred to as the “CV Award” and the portion not subject to continued vesting will be cancelled on the date your employment terminates.

Conditions for Continued Vesting of Awards:

- You must remain in a non-elective Government Office for two or more years after your employment with the Firm terminates to receive in full your CV Award; provided that if your non-elective Government Office is for a period less than two years, you will be entitled to retain any portion of the CV Award with a vesting date during your period of Government Service; or
- In the case of resignation from the Firm to campaign for an elective Government Office, your name must be on the primary or final public ballot for the election. (If you are not elected, see below for employment restrictions.)

Satisfaction of Conditions:

If your service in a Government Office ends two years or more after your employment with the Firm terminates, or in the case of resignation from the Firm to campaign for a Government Office, your name is on the primary or final public ballot for the election and you are not elected, any CV Awards then outstanding and any such awards that would have then been outstanding but for an accelerated distribution of shares (as described in the subsection captioned "Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity") will be subject for the remainder of the applicable vesting period to the same terms and conditions of this Award Agreement, including employment restrictions during the vesting period, as if you had resigned from the Firm having met the requirements for Full Career Eligibility.

Failure to Satisfy Conditions:

If you do not satisfy the above "Conditions for Continued Vesting of Awards", any outstanding RSUs under each CV Award will be cancelled. You also will be required to repay the Fair Market Value of the number of shares (before tax and other withholdings) of Common Stock distributed to you that would have been outstanding as RSUs on the date you failed to satisfy the "Condition for Continued Vesting of Awards" but for their accelerated distribution (as described in the subsection captioned "Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity"). Fair Market Value for this purpose will be determined as the date that the shares were distributed.

JPMORGAN CHASE & CO. LONG-TERM INCENTIVE PLAN
TERMS AND CONDITIONS OF _____, 20____
PERFORMANCE SHARE UNIT AWARD
OPERATING COMMITTEE
(Protection-Based Vesting Provisions)

Award Agreement

These terms and conditions are made part of the Award Agreement dated as of _____, 20____ ("Grant Date") awarding performance share units ("PSUs") pursuant to the terms of the JPMorgan Chase & Co. Long-Term Incentive Plan ("Plan"). To the extent the terms of the Award Agreement (all references to which will include these terms and conditions) conflict with the Plan, the Plan will govern. The Award Agreement, the Plan and Prospectus supersede any other agreement, whether written or oral, that may have been entered into by the Firm and you relating to this award.

This award was granted on the Grant Date subject to the Award Agreement and Plan. **Unless you decline by the deadline and in the manner specified in the Award Agreement, you will have agreed to be bound by these terms and conditions, effective as of the Grant Date.** If you decline the award, it will be cancelled as of the Grant Date.

Capitalized terms that are not defined in "Definitions" below or elsewhere in the Award Agreement will have the same meaning as set forth in the Plan.

JPMorgan Chase & Co. will be referred to throughout the Award Agreement as "JPMorgan Chase", and together with its subsidiaries as the "Firm".

Form and Purpose of Award

Each PSU represents a non-transferable right to receive one share of Common Stock as of the vesting date as set forth in your Award Agreement.

The purpose of this award is to further emphasize sustained long-term performance and to align your interests with those of the Firm and its shareholders.

Protection-Based Vesting

This award is intended and expected to vest on the vesting date, provided that you are continuously employed by the Firm through such vesting date, or you meet the requirements for continued vesting described under the subsections "--Job Elimination", "--Full Career Eligibility", "--Government Office" or "--Disability". However, vesting and the number of PSUs that will vest are subject to these terms and conditions (including, but not limited to, sections captioned "Number to Vest on Vesting Date", "Capital Ratio Performance Threshold", "Recapture Provisions", "Remedies" and the following protection-based vesting provision).

Up to a total of fifty percent of your award (including any associated Reinvested Dividend Equivalent Share Units) that would otherwise be distributable to you on the vesting date ("At Risk PSUs") may be cancelled if the Chief Executive Officer of JPMorgan Chase ("CEO") determines in his or her sole discretion that cancellation of all or portion of the At Risk PSUs is appropriate in light of any one or a combination of the following factors:

- Your performance in relation to the priorities for your position, or the Firm's performance in relation to the priorities for which you share responsibility as a member of the Operating Committee, have been unsatisfactory for a sustained period of time. Among the factors the CEO may consider in assessing performance are: net income, total net revenue, earnings per share and capital ratios of the Firm, both on an absolute basis and, as appropriate, relative to peer firms.
- For any calendar year ending during the vesting period, JPMorgan Chase's annual pre-tax pre-provision income at the Firm level is negative.
- RSU awards granted to participants in a Line of Business for which you exercise, or during the vesting period exercised, direct or indirect responsibility, were in whole or in part cancelled because the Line of Business did not meet its annual Line of Business Financial Threshold.
- The Firm does not meet the Firmwide Financial Threshold.

For avoidance of doubt, cancellation of the At Risk PSUs, in whole or part, for one or more of the above factors may occur prior to the end of the Performance Period and the maximum number of At Risk PSUs subject to cancellation prior to the end of the Performance Period will be up to fifty percent of the Target Award Number.

In the event that your employment terminates due to "Job Elimination", "Full Career Eligibility", "Government Office" or "Disability" thereby entitling you to continued vesting in your award, (or potentially acceleration due to satisfaction of the Government Office Requirements), the cancellation circumstances described above will continue to apply.

Any determination above with respect to protection-based vesting provisions is subject to ratification by the Compensation and Management Development Committee of the Board of Directors of JPMorgan Chase ("Committee"). In the case of an award to any current or former CEO, all such determinations shall be made by the Committee and ratified by the Board.

Number to Vest on the Vesting Date

Subject to any cancellation in whole or part of your award pursuant to these terms and conditions:

Performance calculation: On the vesting date, you will vest in a number of PSUs derived by multiplying the Target Award Number by the Award Payout Percentage determined using the Performance Table. See sections captioned "Calculation of Performance Ranking" and "Definitions".

You will also vest in additional shares of Common Stock as calculated under the section captioned, "Reinvested Dividend Equivalent Share Units". Delivery of vested shares to your account will be made not later than the date specified in the last sentence of the subsection captioned "Section 409A Compliance".

Reinvested Dividend Equivalent Share Units

If dividends are paid on Common Stock during the Vesting Period while the award is outstanding, you will receive on the vesting date additional units representing shares of Common Stock as calculated in this section. The number, if any, will be based on the dividends that would have been paid during the Vesting Period as of each dividend payment date on the actual number of shares of Common Stock distributable to you resulting from the vesting of the PSUs, if any, and treated as reinvested in additional shares of Common Stock on each dividend payment based on the Fair Market Value of one share of Common Stock on each dividend payment date ("Reinvested Dividend Equivalent Share Units").

Holding Requirement

As of the vesting date set forth in your Award Agreement, you shall be entitled to be issued a number of shares of the Common Stock of JPMorgan Chase equal to the number of PSUs, if any, plus any additional Reinvested Dividend Equivalent Share Units, vesting on such date, less the number withheld to satisfy tax withholding obligations. The net number of shares issued to you will be held in an account in your name with restrictions preventing you from transferring, assigning, hedging, selling, pledging or otherwise encumbering such shares for a two year period commencing as of the vesting date and ending as of the second anniversary of the vesting date. Such restrictions shall only lapse, prior to the expiration of the two year holding period, in the event of your death or for an accelerated distribution for ethics or conflict reasons. See section captioned, "Death" and subsection captioned, "Accelerated Distribution for Ethics or Conflict Reasons Resulting from Employment by a Government Entity".

Calculation of Performance Ranking

For purposes of the Performance Ranking, the ranking of the Firm and of each Performance Company for the Performance Period shall be determined and calculated by the Calculation Agent, using the definitions of "Average Tangible Common Equity" (if otherwise applicable), "Calculated PSUs", "Firm Reported ROTCE", "Performance Table" (including its footnote) and "ROTCE" as set forth in the "Definitions" section of these terms and conditions. See section captioned "Definitions". Except for Firm Reported ROTCE, calculations will be expressed as a decimal to the second place (i.e. xx.yy%), rounded to the nearest hundredth. See section captioned, "Definitions--Performance Table" in the event of a tie. All performance based calculations as set forth herein are binding and conclusive on you and your successors.

Capital Ratio Performance Threshold

Unvested PSUs are subject to reduction if the Firm's Common Equity Tier 1 (CET1) capital ratio at any year end falls below a predetermined threshold of ____ %.

If the Firm's CET1 capital ratio at any year end during the Performance Period is below this predetermined threshold, up to one-third of the Target Award Number of PSUs will be subject to downward adjustment by the CMDC for each such year.

Vesting Period

The period from the Grant Date to the vesting date is the "Vesting Period". (See "Administrative Provision--Amendment" pursuant to which the Firm may extend the vesting period and "No Ownership Rights/Other Limitations" pursuant to which the Firm may place restrictions on delivered shares of Common Stock following the vesting date and section captioned, "Holding Period" above.)

Bonus Recoupment

In consideration of the grant of this award, you agree that you are subject to the JPMorgan Chase Bonus Recoupment Policy (or successor policy) as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year 20____ and to this award. You can access this policy as currently in effect through the following link:

<http://www.jpmorganchase.com/corporate/About-JPMC/corporate-governance-principles.htm#recoupm>

For the avoidance of doubt, nothing in these terms and conditions in any way limits the rights of the Firm under the JPMorgan Chase Bonus Recoupment Policy (or successor policy).

Recapture Provisions (Detrimental Conduct, Risk-Related and Other Recapture Provisions)

Notwithstanding any terms of this Award Agreement to the contrary, JPMorgan Chase reserves the right in its sole discretion to cancel up to 100% of your award (for the avoidance of doubt, including any associated Reinvested Dividend Equivalent Share Units as well as the Calculated PSUs) and, to the extent set forth in "Remedies" below, to recover from you up to an amount equal to the Fair Market Value (determined as of the vesting date) of the gross number of shares of Common Stock previously distributed (including vested shares subject to the Holding Requirements and shares withheld for tax purposes) under this award if the Firm in its sole discretion determines that:

- you engaged in conduct detrimental to the Firm insofar as it causes material financial or reputational harm to the Firm or its business activities, or
- this award was based on materially inaccurate performance metrics, whether or not you were responsible for the inaccuracy, or
- this award was based on a material misrepresentation by you, or
- you improperly or with gross negligence failed to identify, raise or assess, in a timely manner and as reasonably expected, risks and/or concerns with respect to risks material to the Firm or its business activities, or
- your employment was terminated for Cause (see section captioned "Definitions" below) or, in the case of a determination after the termination of your employment, that your employment could have been terminated for Cause.

See section captioned "Remedies" for additional information.

JPMorgan Chase's right to cancel and/or recover the value of this award (or any cash bonus) under the JPMorgan Chase Bonus Recoupment Policy and the other provisions of this award relate to the "organizational goals" of the Firm as that term is defined by regulations issued under Section 409A of the Internal Revenue Code ("Code").

Termination of Employment

Except as explicitly set forth below under the subsections captioned "--Job Elimination", "--Full Career Eligibility", "--Government Office" or "--Disability" or under the section captioned "Death", this award (for avoidance of doubt, including any associated Reinvested Dividend Equivalent Share Units) will be cancelled in full effective on the date your employment with the Firm terminates for any reason.

Subject to these terms and conditions (including, but not limited to, sections captioned "Protection-Based Vesting", "Number to Vest on Vesting Date", "Bonus Recoupment", "Recapture Provisions", "Your Obligations" and "Remedies") you will be eligible to continue to vest (as you otherwise would vest if you were still employed by JPMorgan Chase) with respect to your award in accordance with its terms and conditions following the termination of your employment if one of the following circumstances applies to you:

• **Job Elimination**

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- the Firm terminated your employment because your job was eliminated, and
- after you are notified that your job will be eliminated, you provided such services as requested by the Firm in a cooperative and professional manner, and
- you satisfied the Release/Certification Requirements set forth below.

• **Full Career Eligibility**

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- you voluntarily terminated your employment with the Firm, had completed at least five years of continuous service with the Firm immediately preceding your termination date, and
- the sum of your age and Recognized Service (as defined below) on your date of termination equaled or exceeded 60, and
- you provided at least 180 days advance written notice to the Firm of your intention to voluntarily terminate your employment under this provision, during which notice period you provided such services as requested by the Firm in a cooperative and professional manner and you did not perform any services for any other employer, and
- continued vesting shall be appropriate, which determination shall be made prior to your termination and will be based on your performance and conduct (before and after providing notice), and
- for 36 months from the date of grant of this award, you do not either perform services in any capacity (including self-employment) for a Financial Services Company (as defined below) or work in your profession (whether or not for a Financial Services Company); provided that you may work for a government, education or Not-for-Profit Organization (as defined below), and
- you satisfied the Release/Certification Requirements set forth below.

After receipt of such advance written notice, the Firm may choose to have you continue to provide services during such 180-day period as a condition to continued vesting or shorten the length of the 180-day period at the Firm's sole discretion, but to a date no earlier than the date you would otherwise meet the age and service requirements.

Additional advance notice requirements may apply for employees subject to notice period policies. (See "Notice Period" below.)

• Government Office

In the event that you voluntarily terminate your employment with the Firm to accept a Government Office or become a candidate for an elective Government Office, as described at the end of these terms and conditions under the section captioned "Government Office Requirements". See also definition of Government Office in the section captioned "Definitions".

• Disability

In the event that

- your employment with the Firm terminates because (i) you are unable to return to work while you are receiving benefits under the JPMorgan Chase Long Term Disability Plan, or for non-U.S. employees, under the equivalent JPMorgan Chase-sponsored local country plan (in either case, "LTD Plan"), or (ii) if you are not covered by a LTD Plan, you are unable to return to work due to a long-term disability that would qualify for benefits under the applicable LTD Plan, as determined by the Firm or a third-party designated by the Firm; provided that you (x) request in writing continued vesting due to such disability within 30 days of the date your employment terminates, and (y) provide any requested supporting documentation and (z) receive the Firm's written consent to such treatment, and
- you satisfied the Release/Certification Requirements set forth below.

Release/Certification

To qualify for continued vesting after termination of your employment under any of the foregoing circumstances:

- you must timely execute and deliver a release of claims in favor of the Firm, having such form and terms as the Firm shall specify,
- with respect to Full Career Eligibility, prior to the termination of your employment, you must confirm with management that you meet the eligibility criteria (including providing at least 180 days advance written notification), advise that you are seeking to be treated as an individual eligible for Full Career Eligibility, and receive written consent to such continued vesting,
- with respect to Disability, you must satisfy the notice and documentation described above and receive written consent to such continued vesting,
- with respect to "Full Career Eligibility" and "Government Office", it is your responsibility to take the appropriate steps to certify to the Firm prior to the vesting date while the employment restrictions are outstanding on the authorized form of the Firm that you have complied with the employment restrictions applicable to you (as described herein) from your date of termination of employment through the applicable vesting date, and
- in all cases, otherwise complied with all other terms of the Award Agreement. (See section captioned "Your Obligations" below.)

Death

If you die while you are eligible to vest in this award, your designated beneficiary on file with the Firm's Stock Administration Department (or your estate or if no beneficiary has been designated or survives you or if beneficiary designation is not recognized by local legislation) may be entitled to receive a distribution of a number of shares of Common Stock associated with your award. The Award Payout Percentage in the case of death is based on the Number to Vest on the Vesting Date calculation described above using the average performance of all completed calendar years, multiplied by one-third of the Target Award Number of PSUs for each completed calendar year in the Performance Period, and using the Award Payout Percentage equal to 100 percent for any remaining calendar years in the Performance Period.

In addition, your beneficiary or your estate shall receive additional shares of Common Stock, i.e. Reinvested Dividend Equivalent Share Units, as set forth in the section captioned, "Reinvested Dividend Equivalent Share Units" but based on dividend equivalents up to the date of your death.

Any shares will be distributed no later than the end of the calendar year immediately following the calendar year which contains your date of death; however, our administrative practice is to register such shares in the name of your beneficiary or estate within 60 days of the Firm's receipt of any required documentation.

Your Obligations

In consideration of the grant of this award, you agree to comply with and be bound by the obligations set forth below next to the subsections captioned "--Non-Solicitation of Employees and Customers", "--Confidential Information", "--Non-Disparagement", "--Cooperation", "--Compliance with Award Agreement", and "--Notice Period".

• Non-Solicitation of Employees and Customers

During your employment by the Firm and for the longer of the (i) one year period following the termination of your employment or, (ii) if your award is not cancelled as of your termination date, the three year period from Grant Date, you will not directly or indirectly, whether on your own behalf or on behalf of any other party, without the prior written consent of the Director of Human Resources: (i) solicit, induce or encourage any of the Firm's then current employees to leave the Firm or to apply for employment elsewhere, unless such current employee has received official, written notice that his or her employment will be terminated due to job elimination (ii) hire any employee or former employee who was employed by the Firm at the date your employment terminated, unless the individual's employment terminated because his or her job was eliminated, or the individual's employment with the Firm has been terminated for more than six months, (iii) to the fullest extent enforceable under applicable

law, solicit or induce or attempt to induce to leave the Firm, or divert or attempt to divert from doing business with the Firm, any then current customers, suppliers or other persons or entities that were serviced by you or whose names became known to you by virtue of your employment with the Firm, or otherwise interfere with the relationship between the Firm and such customers, suppliers or other persons or entities. This does not apply to publicly known institutional customers that you service after your employment with the Firm without the use of the Firm's confidential or proprietary information.

These restrictions do not apply to authorized actions you take in the normal course of your employment with the Firm, such as employment decisions with respect to employees you supervise or business referrals in accordance with the Firm's policies.

Confidential Information

You will not, either during your employment with the Firm or thereafter, directly or indirectly (i) use or disclose to anyone any confidential information related to the Firm's business, or (ii) communicate with the press or other media about matters related to the Firm, its customers or employees, including matters and activities relating to your employment, or the employment of others, by the Firm, in the case of either (i) or (ii), except as explicitly permitted by the JPMorgan Chase Code of Conduct and applicable policies or law or legal process. In addition, following your termination of employment, you will not, without prior written authorization, access the Firm's private and internal information through telephonic, intranet or internet means. "Confidential information" shall have the same meaning for the Award Agreement as it has in the JPMorgan Chase Code of Conduct.

Nothing in this award precludes you from reporting to the Firm's management or directors, the government, a regulator, a self-regulatory agency, your attorneys or a court, conduct you believe to be in violation of the law or concerns of any known or suspected Code of Conduct violation. It is also not intended to prevent you from responding truthfully to questions or requests from the government, a regulator or in a court of law.

Non-Disparagement

You will not, either during your employment with the Firm or thereafter, make or encourage others to make any public statement or release any information in verbal, written, electronic or any other form, that is intended to, or reasonably could be foreseen to, disparage, embarrass or criticize the Firm or its employees, officers, directors or shareholders as a group. This shall not preclude you from reporting to the Firm's management or directors or to the government or a regulator conduct you believe to be in violation of the law or the Firm's Code of Conduct or responding truthfully to questions or requests for information to the government, a regulator or in a court of law in connection with a legal or regulatory investigation or proceeding.

Cooperation

You will cooperate fully with and provide full and accurate information to the Firm and its counsel with respect to any matter (including any audit, tax proceeding, litigation, investigation or governmental proceeding) with respect to which you may have knowledge or information, subject to reimbursement for actual, appropriate and reasonable out-of-pocket expenses incurred by you.

Compliance with Award Agreement

You will provide the Firm with any information reasonably requested to determine compliance with the Award Agreement, and you authorize the Firm to disclose the terms of the Award Agreement to any third party who might be affected thereby, including your prospective employer.

Notice Period

If you are subject to a notice period or become subject to a notice period after the Grant Date, whether by contract or by policy, that requires you to provide advance written notice of your intention to terminate your employment ("Notice Period"), then as consideration for this award and continued employment, you will provide the Firm with the necessary advance written notice that applies to you, as specified by such contract or policy.

After receipt of your notice, the Firm may choose to have you continue to provide services during the applicable Notice Period or may place you on a paid leave for all or part of the applicable Notice Period. During the Notice Period, you shall continue to devote your full time and loyalty to the Firm by providing services in a cooperative and professional manner and not perform any services for any other employer and shall receive your base salary and certain benefits until your employment terminates. You and the Firm may mutually agree to waive or modify the length of the Notice Period.

Regardless of whether a Notice Period applies to you, you must comply with the 180-day advance notice period described under the subsection captioned "-- Full Career Eligibility" in the event you wish to terminate employment under that same subsection.

Remedies

Cancellation

In addition to the cancellation provisions described under the sections captioned "Protection-Based Vesting", "Bonus Recoupment", "Recapture Provisions" and "Termination of Employment", your outstanding PSUs under this award may be cancelled if the Firm in its sole discretion determines that:

- you have failed to comply with any of the advance notice/cooperation requirements or employment restrictions applicable to your termination of employment, or

- you have failed to return the required forms specified under the section captioned “Release/Certification” by the specified deadline, or
- you have violated any of the provisions as set forth above in the section captioned “Your Obligations”.

To the extent provided under the subsection captioned “--Amendment” below, JPMorgan Chase reserves the right to suspend vesting of this award and/or distribution of shares under this award, including, without limitation, during any period that JPMorgan Chase is evaluating whether this award is subject to cancellation and/or recovery and/or whether the conditions for distributions of shares under this award are satisfied. The Firm is not responsible for any price fluctuations during any period of suspension and, if applicable, suspended units will be reinstated consistent with Plan administration procedures. See also “Administrative Provisions-No Ownership Rights/Other Limitations”.

• **Recovery**

In addition, you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date or acceleration date) of the gross number of shares of Common Stock previously distributed, including vested shares subject to the Holding Requirements, under this award as follows:

- Payment may be required with respect to any shares of Common Stock distributed within the three year period prior to a notice-of-recovery under this section, if the Firm in its sole discretion determines that:
 - you committed a fraudulent act, or engaged in knowing and willful misconduct related to your employment;
 - you violated any of the provisions as set forth above in the section captioned “Your Obligations;” or
 - you violated the employment restrictions set forth in the subsection “Full Career Eligibility” or “Government Office” following the termination of your employment.
- In addition, payment may be required with respect to any shares distributed within the one year period prior to notice-of-recovery under this section, if the Firm in its sole discretion determines appropriate pursuant to the provisions in the section captioned “Recapture Provisions”.

Notice-of-recovery under this subsection is a written (including electronic) notice from the Firm to you either requiring payment under this subsection or stating that JPMorgan Chase is evaluating requiring payment under this subsection. Without limiting the foregoing, notice-of-recovery will be deemed provided if the Firm makes a good faith attempt to provide written (including electronic) notice at your last known address maintained in the Firm’s employment records. For the avoidance of doubt, a notice-of-recovery that the Firm is evaluating requiring payment under this subsection shall preserve JPMorgan Chase’s rights to require payment as set forth above in all respects and the Firm shall be under no obligation to complete its evaluation other than as the Firm may determine in its sole discretion.

For purposes of this subsection, shares distributed under this award include shares withheld for tax purposes. However, it is the Firm’s intention that you only be required to pay the amounts under this subsection with respect to shares that are or may be retained by you following a determination of tax liability and that you will not be required to pay amounts with respect to shares representing irrevocable tax withholdings or tax payments previously made (whether by you or the Firm) that you will not be able to recover, recapture or reclaim (including as a tax credit, refund or other benefit). Accordingly, JPMorgan Chase will not require you to pay any amount that the Firm or its nominee in his or her sole discretion determines is represented by such withholdings or tax payments.

Payment may be made in shares of Common Stock or in cash. You agree that any repayment will be a lawful recovery under the terms and conditions of your Award Agreement and is not to be construed in any manner as a penalty.

Nothing in the section in any way limits your obligations under “Bonus Recoupment”.

• **Right to an Injunction**

You acknowledge that a violation or attempted violation of the obligations set forth herein will cause immediate and irreparable damage to the Firm, and therefore agree that the Firm shall be entitled as a matter of right to an injunction, from any court of competent jurisdiction, restraining any violation or further violation of such obligations; such right to an injunction, however, shall be cumulative and in addition to whatever other remedies the Firm may have under law or equity.

Administrative Provisions

Withholding Taxes: As a result of legal and/or tax obligations the Firm, in its sole discretion, may (i) retain from each distribution the number of shares of Common Stock required to satisfy applicable tax obligations or (ii) implement any other desirable or necessary procedures, so that appropriate withholding and other taxes are paid to the competent authorities with respect to the vested shares and the award. This may include but is not limited to (i) a market sale of a number of such shares on your behalf substantially equal to the withholding or other taxes, (ii) to the extent required by law, withhold from cash compensation, an amount equal to any withholding obligation with respect to the award and shares that vest under this award, and (iii) retaining shares that vest under this award until you pay any taxes associated with the award and vested shares directly to the competent authorities.

Right to Set Off: Although the Firm expects to settle this award in share(s) of Common Stock as of the applicable vesting date, as set forth in your Award Agreement, the Firm may, to the maximum extent permitted by applicable law (including Section 409A of the Code to the extent it is applicable to you), retain for itself funds or the Common Stock resulting from any vesting of this award to satisfy any obligation or debt that you owe to the Firm. Notwithstanding any account agreement with the Firm to the contrary, the Firm will not recoup or recover any amount owed from any funds or unrestricted securities held in your name and maintained at the Firm pursuant to such account agreement to satisfy any obligation or debt or obligation owed by you under this award without your consent. This restriction on the Firm does not apply to accounts described and authorized in “No Ownership Rights/Other Limitations” described below.

No Ownership Rights/Other Limitations: PSUs do not convey the rights of ownership of Common Stock and do not carry voting rights. No shares of Common Stock will be issued to you until after the number of PSUs have been determined, if any, and have vested. Shares will be issued in accordance with JPMorgan Chase's procedures for issuing stock. By accepting this award, you authorize the Firm, in its sole discretion, to establish on your behalf a brokerage account in your name with the Firm or book-entry account with our stock plan administrator and/or transfer agent and deliver to that account any vested shares derived from the award. You also acknowledge that should there be a determination that the cancellation provisions of this award apply during the period when the vesting of any outstanding PSUs has been suspended, then you agree that such PSUs may be cancelled in whole or part. (See Sections captioned "Protection-Based Vesting", "Bonus Recoupment", "Recapture Provisions", "Termination of Employment" and "Remedies", as well as the subsection captioned "--Amendment" permitting suspension of vesting.)

With respect to any applicable vesting date, JPMorgan Chase may impose for any reason, as of such vesting date for such period as it may specify in its sole discretion, such restrictions on the Common Stock to be issued to you as it may deem appropriate, including, but not limited to, restricting the sale, transfer, pledging, assignment, hedging or encumbrance of such shares of Common Stock. Such restrictions described in the last sentence shall not impact your right to vote or receive dividends with respect to the Common Stock. By accepting this award, you acknowledge that during such specified period should there be a determination that the recovery provisions of this award apply, then you agree that you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares subject to such restrictions (notwithstanding the limitation set forth in the "Right to Set Off" subsection above). (See sections captioned "Bonus Recoupment" and "Remedies".)

Binding Agreement: The Award Agreement will be binding upon any successor in interest to JPMorgan Chase, by merger or otherwise.

Not a Contract of Employment: Nothing contained in the Award Agreement constitutes a contract of employment or continued employment. Employment is "at-will" and may be terminated by either you or JPMorgan Chase for any reason at any time. This award does not confer any right or entitlement to, nor does the award impose any obligation on the Firm to provide, the same or any similar award in the future and its value is not compensation for purposes of determining severance.

Section 409A Compliance: To the extent that Section 409A of the Code is applicable to this award, distributions of shares hereunder are intended to comply with Section 409A of the Code, and the Award Agreement, including these terms and conditions, shall be interpreted in a manner consistent with such intent.

Notwithstanding anything herein to the contrary, if you (i) are subject to taxation under the Code, (ii) are a specified employee as defined in the JPMorgan Chase 2005 Deferred Compensation Plan and (iii) have incurred a separation from service (as defined in that Plan with the exception of death) and if any units/shares under this award represent deferred compensation as defined in Section 409A and such shares are distributable (under the terms of this award) within six months following, and as a result of your separation from service, then those shares will be delivered during the first calendar month after the expiration of six full months from date of your separation from service. Further, if your award is not subject to a substantial risk of forfeiture as defined by regulations issued under Section 409A of the Code, then the remainder of each calendar year immediately following the vesting date set forth in your Award Agreement shall be a payment date for purposes of distributing the vested portion of the award.

Change in Outstanding Shares: In the event of any change in the outstanding shares of Common Stock by reason of any stock dividend or split, recapitalization, issuance of a new class of common stock, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to stockholders of Common Stock other than regular cash dividends, the Committee will make an equitable substitution or proportionate adjustment, in the number or kind of shares of Common Stock or other securities issued or reserved for issuance pursuant to the Plan and to any PSUs outstanding under this award for such corporate events.

Other Equitable Adjustments: The Committee may make adjustments (up or down) to the award as it deems to be equitable, to maintain the intended economics of the award in light of changed circumstances, which may include unusual or non-recurring events affecting the Firm (or the Performance Companies) or its financial statements in each case resulting from changes in accounting methods, practices or policies, changes in capital structure by reason of legal or regulatory requirements and such other changed circumstances, as the Committee may deem appropriate.

Interpretation/Administration: The Committee has sole and complete authority to interpret and administer this Award Agreement, including, without limitation, the power to (i) interpret the Plan and the terms of this Award Agreement; (ii) determine the reason for termination of employment; (iii) determine application of the post-employment obligations and cancellation and recovery provisions; (iv) decide all claims arising with respect to this award; and (v) delegate such authority as it deems appropriate. Any determination contemplated hereunder by the Committee, the Firm, the Director of Human Resources or their respective delegates or nominees shall be binding on all parties.

Notwithstanding anything herein to the contrary, the determinations of the Director of Human Resources, the Firm, the Committee and their respective delegates and nominees under the Plan and the Award Agreements are not required to be uniform. By way of clarification, the Committee, the Firm, the Director of Human Resources and their respective delegates and nominees shall be entitled to make non-uniform and selective determinations and modifications under Award Agreements and the Plan.

Amendment: The Committee or its nominee reserves the right to amend this Award Agreement in any manner, at any time and for any reason; provided, however, that no such amendment shall materially adversely affect your rights under this Award Agreement without your consent except to the extent that the Committee or its delegate considers advisable to (x) comply with applicable laws or changes in or interpretation of applicable laws, regulatory requirements and accounting rules or standards and/or (y) make a change in a scheduled vesting date or impose the restrictions described above under "No Ownership Rights/Other Limitations", in either case, to the extent permitted by Section 409A of the Code if it is applicable to you. This Award Agreement may not be amended except in writing signed by the Director of Human Resources of JPMorgan Chase.

Severability: If any portion of the Award Agreement is determined by the Firm to be unenforceable in any jurisdiction, any court or arbitrator of competent jurisdiction or the Director of Human Resources may reform the relevant provisions (e.g., as to length of service, time, geographical area or scope) to the extent the Firm (or court/arbitrator) considers necessary to make the provision enforceable under applicable law.

Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity: Upon receipt of satisfactory evidence that applicable United States federal, state, local, foreign or supranational ethics or conflict of interest laws or regulations require you to divest your interest in JPMorgan Chase PSUs, the Firm may accelerate the distribution of all or part of your outstanding award, including Reinvested Dividend Equivalent Share Units, effective on or before the required divestiture date and waive the Holding Requirement; provided that no accelerated distribution shall occur if the Firm determines that such acceleration will violate Section 409A of the Code. Accelerated distribution under this paragraph does not impact the dates as set forth in the “Recovery” section above. The time period for recovery shall be determined by the originally scheduled vesting date or distribution date prior to any acceleration event.

If you have voluntarily terminated your employment and have satisfied the requirements of the section captioned “Government Office Requirements”, acceleration shall apply (to extent required) to the percentage of your outstanding award that would continue to vest under that section. In the case of a termination of employment where the award is outstanding as a result of the subsections entitled “Job Elimination” or “Full Career Eligibility”, then acceleration shall apply, to the extent required, to the full outstanding award. Subject to the two foregoing sections, the number of shares of Common Stock to be received on acceleration shall be determined using the methodology set forth under the section captioned “Death”.

To the extent you have vested shares under this award subject to the Holding Requirement and become subject to divestiture requirement as forth herein, the Firm may waive the holding period to the extent required.

Notwithstanding an accelerated distribution or waiver of the Holding Requirement pursuant to the foregoing, you will remain subject to the applicable terms of your Award Agreement as if your award had remained outstanding for the duration of the original vesting period and shares had been distributed as scheduled as of the vesting date, including, but not limited to, repayment obligations set forth in the section captioned “Remedies” and the employment restrictions in the sections captioned “Protection-Based Vesting” and “Government Office Requirements” and the subsection “Full Career Eligibility”.

Use of Personal Data: By accepting this award, you have acknowledged that the Firm may process your personal data (including sensitive personal data) for purposes, including but not limited to (i) determining your compensation, (ii) payroll activities, including, but not limited to, tax withholding and regulatory reporting, which tax and regulatory reporting and withholding may include, but is not limited to, the United States and its political subdivisions, (if not the United States) your work country and its political subdivisions (including countries to which you travel on Firm business) and your country of residence or nationality, (iii) registration of shares, (iv) establishing a brokerage account on your behalf, and (v) all other lawful purposes related to your employment and this award, and that the Firm may provide such data to third party vendors with whom it has contracted to provide such services and/or other bodies, including regulators, supervisory bodies, law enforcement and other government agencies. You are acknowledging and agreeing that your personal data will be transferred to and processed in countries and locations that do not have the same data privacy laws and statutory protection for personal data as your work country, country of residence, or country of nationality. If your personal data is subject to data privacy laws or statutory protection for personal data and they so provide for termination of the foregoing authorization, you may terminate the authorization at any time except with respect to tax and regulatory reporting and subject always to the Firm’s legal and regulatory obligations. In the event you terminate this authorization, your award will be cancelled.

Governing Law: This award shall be governed by and construed in accordance with the laws of the State of New York, without regard to conflicts of law principles.

Choice of Forum: By accepting this award under the Plan, you agree (and have agreed) that to the extent not otherwise subject to arbitration under an arbitration agreement between you and the Firm, any dispute arising directly or indirectly in connection with this award or the Plan shall be submitted to arbitration in accordance with the rules of the American Arbitration Association if so elected by the Firm in its sole discretion. In the event such a dispute is not subject to arbitration for any reason, you agree to accept the exclusive jurisdiction and venue of the United States District Court for the Southern District of New York with respect to any judicial proceeding in connection with this award or the Plan. You waive, to the fullest extent permitted by law, any objection to personal jurisdiction or to the laying of venue of such dispute and further agree not to commence any action arising out of or relating to this award or the Plan in any other forum.

Waiver of Jury Trial/Class Claims: By accepting this award, you agree, with respect to any claim brought in connection with your employment with the Firm in any forum (i) to waive the right to a jury trial and (ii) that any judicial proceeding or arbitration claim will be brought on an individual basis, and you hereby waive any right to submit, initiate, or participate in a representative capacity or as a plaintiff, claimant or member in a class action, collective action, or other representative or joint action.

Litigation: By accepting any award under the Plan, you agree (and have agreed) that in any action or proceeding by the Firm (other than a derivative suit in the right of the Firm) to enforce the terms and conditions of this Award Agreement or any other Award Agreement where the Firm is the prevailing party, the Firm shall be entitled to recover from you its reasonable attorney fees and expenses incurred in such action or proceeding. In addition, you agree that you are not entitled to, and agree not to seek, advancement of attorney fees and indemnification under the Firm’s By-Laws in the event of such a suit by the Firm.

Non-transferability: Neither this award or any other outstanding awards of restricted stock units or of performance based share units, nor your interests or rights in any such awards, shall be assigned, pledged, transferred, hedged hypothecated or subject to any lien. An award may be transferred following your death by will, the laws of descent or by a beneficiary designation on file with the Firm.

Definitions

“Average Tangible Common Equity” means annual average common stockholders’ equity less annual average goodwill and annual average identifiable intangible assets. Annual averages of the components of Average Tangible Common Equity will be calculated using quarterly balances as reported in publicly available financial disclosures. In the event that quarterly balances are not available, annual year end balances will be used. **This calculation is used solely for purposes of the Performance Ranking.**

“Award Payout Percentage” means the applicable percentage specified in the footnote to the Performance Table.

“Calculated PSUs” means the number of PSUs determined by multiplying the Target Award Number (after giving effect to any cancellation thereof, in whole or in part) by the Award Payout Percentage corresponding to the Firm’s Performance Ranking based on the three-year average performance for the Performance Period (both percentage and ranking, as set forth in the footnote to the Performance Table); provided that if the average of the Firm’s Reported ROTCE for the Performance Period either equals or exceeds ____ % or is less than ____ % (without taking into account any rounding conventions used), ____ percent or ____ , respectively as the case may be, shall be substituted for the Performance Period’s Award Payout Percentage in calculating the number of PSUs to distribute. For avoidance of doubt, any cancellation of this award (in whole or in part) during the Performance Period will reduce the Target Award Number.

“Calculation Agent” means a third party entity not owned or controlled by the Firm, such as an accounting or consulting firm, retained from time to time by the Director of Human Resources or his/her delegate.

“Cause” means a determination by the Firm that your employment terminated as a result of your (i) violation of any law, rule or regulation (including rules of self-regulatory bodies) related to the Firm’s business, (ii) indictment or conviction of a felony, (iii) commission of a fraudulent act, (iv) violation of the JPMorgan Chase Code of Conduct or other Firm policies or misconduct related to your duties to the Firm (other than immaterial and inadvertent violations or misconduct), (v) grossly inadequate performance of the duties associated with your position or job function or failure to follow reasonable directives of your manager, or (vi) any act or failure to act that is injurious to the interests of the Firm or its relationship with a customer, client or an employee.

“Financial Services Company” means a business enterprise that employs you in any capacity (such as an employee, contractor, consultant, advisor, or self-employed individual, whether paid or unpaid) and engages in:

- commercial or retail banking, including, but not limited to, commercial, institutional and personal trust, custody and/or lending and processing services, originating and servicing mortgages, issuing and servicing credit cards, payment servicing or processing or merchant services,
- insurance, including but not limited to, guaranteeing against loss, harm, damage, illness, disability or death, providing and issuing annuities, acting as principal, agent or broker for purpose of the forgoing,
- financial, investment or economic advisory services, including but not limited to, investment banking services (such as advising on mergers or dispositions, underwriting, dealing in, or making a market in securities or other similar activities), brokerage services, investment management services, asset management services, and hedge funds,
- issuing, trading or selling instruments representing interests in pools of assets or in derivatives instruments,
- advising on, or investing in, private equity or real estate, or
- any similar activities that the Director of Human Resources or nominee determines in his or her sole discretion constitute financial services.

“Firm Reported ROTCE” means the Firm’s percentage return on tangible common equity for each year in the Performance Period (as calculated for use in its publicly available year-end financial disclosures without taking into account any rounding conventions used for financial reporting purposes).

“Firmwide Financial Threshold” means a cumulative return on tangible common equity for calendar years 20____, 20____ and 20____ of not less than ____ %. Cumulative return on tangible common equity means (i) the sum of the Firm’s reported net income for all three calendar years, divided by (ii) reported year-end tangible equity averaged over the three years.

“Government Office” means (i) a full-time position in an elected or appointed office in local, state, or federal government (including equivalent positions outside the U.S. or in a supranational organization), not reasonably anticipated to be a full-career position, or (ii) conducting a bona fide full-time campaign for such an elective public office after formally filing for candidacy, where it is customary and reasonably necessary to campaign full-time for the office.

“Line of Business” means a business unit of the Firm (or one or more business units designated below under the definition “Line of Business Financial Threshold” of the Corporate Investment Bank). All Corporate Functions (including the functions of the Chief Investment Office) are considered a single Line of Business.

“Line of Business Financial Threshold” means the financial threshold set forth below: for the following Lines of Business based on the Firm’s management reporting system:

Asset & Wealth Management	Annual negative pre-tax pre-provision income ¹
Card, Merchant Services and Auto	Annual negative pre-tax pre-loan loss reserve income ²
Commercial Banking	Annual negative pre-tax, pre-loan loss reserve income ²
Corporate Investment Bank	<p>Annual negative pre-tax pre-provision income¹ for CIB overall and/or annual negative allocated product revenues (excluding CVA and DVA) for:</p> <p style="text-align: center;">Macro Products: Currency and Emerging Markets Rates Commodities Spread Products Credit SPG Public Finance Equities Securities Services Global Banking</p>
Consumer Banking, CWM and Business Banking	Annual negative pre-tax pre-loan loss reserve income ²
Corporate Functions (including Chief Investment Office)	Annual negative pre-tax pre-provision income ¹ at the Firm level
Home Lending	Annual negative pre-tax pre-loan loss reserve income ²

¹Pre-tax pre-provision income means Revenue less Expenses

²Pre-tax pre-loan loss reserve income means Revenue less (Expenses plus Net Charge-offs)

“Not-for-Profit Organization” means an entity exempt from tax under state law and under Section 501(c)(3) of the Code. Section 501(c)(3) only includes entities organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals. Not-for-Profit Organization shall also mean entities outside the United States exempt from local and national tax laws because they are organized and operated exclusively for purposes identical to those applicable to Section 501(c)(3) organization.

“Performance Companies” mean the following institutions which have business activities that overlap with a significant portion of the Firm’s revenue mix: _____ and _____.

If, during the Performance Period, one or more Performance Companies shall merge, engage in a spin-off or otherwise experience a material change in its revenue mix or business activities or its existence or its primary businesses shall terminate or cease due to receivership, bankruptcy, sale, or otherwise, then the Committee may eliminate such institution from the list of Performance Companies or make such other equitable adjustments, such as adding an acquirer or a new company to the list of Performance Companies, as it deems appropriate, with any such changes having effect for purposes of all calculations hereunder on a prospective basis from the date the applicable change is made.

“Performance Period” means calendar years 20____, 20____ and 20____.

“Performance Ranking” means the ranking of the average ROTCE of the Firm as compared to the ranking of the average ROTCE of the Performance Companies as specified in the footnote to the Performance Table for the Performance Period.

“Performance Table” means the table used in the calculation of PSUs for the Performance Period as set forth below:

Firm Reported ROTCE (average performance)	Award Payout Percentage	Performance Ranking ¹ (average performance)	Award Payout Percentage ¹
?____%	____%	_____	____% to ____%
____% to ____%	Pay by relative ROTCE scale	_____	____% to ____%
<____%	____%	_____	____% to ____%

- The following sets forth the precise Award Payout Percentage corresponding to the Firm's Performance Ranking (when compared to Performance Companies): #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; #____ = ____%; etc.

If, after the calculation of the Performance Ranking, there is a tie, the tie shall be disregarded for purposes of determining the Award Payout Percentage. For example, in the case of a tie for the _____ ranking between the Firm and a Performance Company, the Firm shall be treated as having satisfied that ranking. In the case of that same tie among Performance Companies, the _____ and _____ rankings will be deemed to have been satisfied.

“Recognized Service” means the period of service as an employee set forth in the Firm’s applicable service-related policies.

“ROTCE” means for the Firm and each of the Performance Companies a percentage derived by, for each year in the Performance Period, dividing (i) annual earnings from continuing operations less dividends on preferred stock as set forth in published financial disclosures by (ii) the Average Tangible

Common Equity for the year. If, prior to the end of the vesting period, the Firm or any Performance Company restates its published financial statements for any year in the Performance Period, ROTCE for that year shall be recalculated for the Firm or Performance Company with the Performance Ranking adjusted, if necessary. This calculation is used solely for purposes of the Performance Ranking.

“Target Award Number” means the number of PSUs designated as such in the Award Agreement.

Government Office Requirements

You may be eligible to continue vesting in all or part of your award if you voluntarily resign to accept a Government Office (as defined above) or to become a candidate for an elective Government Office.

Full Career Eligibility:

“Government Office Requirements” does not apply to you if you satisfy the subsection captioned “--Full Career Eligibility” as of the date that you voluntarily terminate your employment with the Firm.

Eligibility:

Eligibility for continued vesting is conditioned on your providing the Firm:

- At least 60 days’ advance written notice of your intention to resign to accept or pursue a Government Office (see section captioned “Definitions”), during which period you must perform in a cooperative and professional manner services requested by the Firm and not provide services for any other employer. The Firm may elect to shorten this notice period at the Firm’s sole discretion.
- Confirmation, in a form satisfactory to the Firm, that vesting in this award pursuant to this provision would not violate any applicable law, regulation or rule.
- Documentation in a form satisfactory to the Firm that your resignation is for the purpose of accepting a Government Office or becoming a candidate for a Government Office. (See section captioned “Definitions”.)

Portion of Your Award Subject to Continued Vesting:

Subject to the conditions below, the percentage of this award that will continue to vest in accordance with this award’s original schedule will be based on your years of continuous service completed with the Firm immediately preceding your termination date, as follows:

- 50% if you have at least 3 but less than 4 years of continuous service,
- 75% if you have at least 4 but less than 5 years of continuous service, or
- 100% if you have 5 or more years of continuous service.

The portion of this award subject to continued vesting above is referred to as the “CV Award” and the portion not subject to continued vesting will be cancelled as of the date your employment terminates.

Conditions for Continued Vesting of Award:

- You must remain in a non-elective Government Office for two or more years after your employment with the Firm terminates to be eligible to receive the CV Award; provided that if your non-elective Government Office is for a period less than two years, you will be eligible to receive the CV Award if it has a vesting date during your period of Government Service; or
- In the case of resignation from the Firm to campaign for an elective Government Office, your name must be on the primary or final public ballot for the election. (If you are not elected, see below for employment restrictions.)

For avoidance of doubt, the performance criteria and protection based vesting set forth in these terms and conditions continue to apply to a CV Award.

Satisfaction of Conditions:

If your service in a Government Office ends two years or more after your employment with the Firm terminates, or in the case of resignation from the Firm to campaign for a Government Office, your name is on the primary or final public ballot for the election and you are not elected, any CV Awards then outstanding and any such awards that would have then been outstanding but for an accelerated distribution of shares (as described in the subsection captioned “--Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”) will be subject for the remainder of the applicable vesting period to the same terms and conditions of this Award Agreement, including employment restrictions during the vesting period, as if you had resigned from the Firm having met the requirements for Full Career Eligibility.

Failure to Satisfy Conditions:

If you do not satisfy the above “Conditions for Continued Vesting of Awards”, any outstanding PSUs under the CV Award will be cancelled. You also will be required to repay the Fair Market Value of the number of shares (before tax and other withholdings) of Common Stock distributed to you that would have been outstanding as PSUs on the date you failed to satisfy the “Conditions for Continued Vesting of Award” but for their accelerated distribution (as described in subsection captioned, “Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”). Fair Market Value for this purpose will be determined as the date that the shares were distributed.

JPMORGAN CHASE & CO. LONG-TERM INCENTIVE PLAN
TERMS AND CONDITIONS OF _____, 20____
PERFORMANCE SHARE UNIT AWARD
OPERATING COMMITTEE
(Protection-Based Vesting Provisions)

Award Agreement

These terms and conditions are made part of the Award Agreement dated as of _____, 20__ ("Grant Date") awarding performance share units ("PSUs") pursuant to the terms of the JPMorgan Chase & Co. Long-Term Incentive Plan ("Plan"). To the extent the terms of the Award Agreement (all references to which will include these terms and conditions) conflict with the Plan, the Plan will govern. The Award Agreement, the Plan and Prospectus supersede any other agreement, whether written or oral, that may have been entered into by the Firm and you relating to this award.

This award was granted on the Grant Date subject to the Award Agreement and Plan. **Unless you decline by the deadline and in the manner specified in the Award Agreement, you will have agreed to be bound by these terms and conditions, effective as of the Grant Date.** If you decline the award, it will be cancelled as of the Grant Date.

Capitalized terms that are not defined in "Definitions" below or elsewhere in the Award Agreement will have the same meaning as set forth in the Plan.

JPMorgan Chase & Co. will be referred to throughout the Award Agreement as "JPMorgan Chase", and together with its subsidiaries as the "Firm".

Form and Purpose of Award

Each PSU represents a non-transferable right to receive one share of Common Stock following each vesting date as set forth in your Award Agreement.

The purpose of this award is to further emphasize sustained long-term performance and to align your interests with those of the Firm and its shareholders.

Protection-Based Vesting

This award is intended and expected to vest on each vesting date set forth in your Award Agreement, provided that you are continuously employed by the Firm through such vesting date, or you meet the requirements for continued vesting described under the subsections "--Job Elimination", "--Full Career Eligibility", "--Government Office" or "--Disability". However, vesting and the number of PSUs that will vest are subject to these terms and conditions (including, but not limited to, sections captioned "Number of Performance Share Units at the end of Performance Period", "Capital Ratio Performance Threshold", "Recapture Provisions", "Remedies" and the following protection-based vesting provision).

Up to a total of fifty percent of your award that would otherwise be distributable to you as of any vesting date ("At Risk PSUs") may be cancelled if the Chief Executive Officer of JPMorgan Chase ("CEO") determines in his or her sole discretion that cancellation of all or portion of the At Risk PSUs is appropriate in light of any one or a combination of the following factors:

- Your performance in relation to the priorities for your position, or the Firm's performance in relation to the priorities for which you share responsibility as a member of the Operating Committee, have been unsatisfactory for a sustained period of time. Among the factors the CEO may consider in assessing performance are: net income, total net revenue, earnings per share and capital ratios of the Firm, both on an absolute basis and, as appropriate, relative to peer firms.
- For any calendar year ending during the vesting period, JPMorgan Chase's annual pre-tax pre-provision income at the Firm level is negative.
- RSU awards granted to participants in a Line of Business for which you exercise, or during the vesting period exercised, direct or indirect responsibility, were in whole or in part cancelled because the Line of Business did not meet its annual Line of Business Financial Threshold.
- The Firm does not meet the Firmwide Financial Threshold.

For avoidance of doubt, cancellation of the At Risk PSUs, in whole or part, for one or more of the above factors may occur prior to the end of the Performance Period and the maximum number of At Risk PSUs subject to cancellation prior to the end of the Performance Period will be up to fifty percent of the Target Award Number.

In the event that your employment terminates due to "Job Elimination", "Full Career Eligibility", "Government Office" or "Disability" thereby entitling you to continued vesting in your award, (or potentially acceleration due to satisfaction of the Government Office Requirements), the cancellation circumstances described above will continue to apply.

Any determination above with respect to protection-based vesting provisions is subject to ratification by the Compensation and Management Development Committee of the Board of Directors of JPMorgan Chase ("Committee"). In the case of an award to any current or former CEO, all such determinations shall be made by the Committee and ratified by the Board.

Number of Performance Share Units at End of Performance Period

Subject to any cancellation in whole or part of your award pursuant to these terms and conditions:

Performance calculation: The number of PSUs at the end of the Performance Period will be derived by multiplying the Target Award Number by the Award Payout Percentage determined using the Performance Table.

The number of PSUs determined above will be subject to the Qualitative Performance Factor (as detailed below), which if the Committee determines that such an adjustment is appropriate, will be applied following the end of each year during the Performance Period, to adjust downward one-third of the Target Award Number of PSUs for each calendar year in the Performance Period. Additionally, the Committee, in its discretion, may make a qualitative performance assessment based on the entire three year Performance Period and apply the Qualitative Performance Factor to the entire number of PSUs determined above.

See sections captioned “Calculation of Performance Ranking” and “Definitions”.

Delivery of vested shares of common stock to your account will be made not later than the date specified in the last sentence of the subsection captioned “Section 409A Compliance”.

Reinvested Dividend Equivalent Share Units

This award is not eligible for reinvested dividend equivalent share units.

Holding Requirement

The net number of shares of Common Stock (after tax and all other lawful withholdings) in which you have vested, if any, as of the vesting date will be held in an account in your name with restrictions preventing you from transferring, assigning, hedging, selling, pledging or otherwise encumbering such shares for (i) a twelve month period measured from each vesting date; and (ii) a two year period for such shares vesting on _____, 20____, with the holding periods running concurrently. Such restrictions shall only lapse, prior to the expiration of the two year holding period, in the event of your death or for an accelerated distribution for ethics or conflict reasons. See section captioned, “Death” and subsection captioned, “Accelerated Distribution for Ethics or Conflict Reasons Resulting from Employment by a Government Entity”.

Calculation of Performance Ranking

For purposes of the Performance Ranking, the ranking of the Firm and of each Performance Company for the Performance Period shall be determined and calculated by the Calculation Agent, using the definitions of “Average Tangible Common Equity” (if otherwise applicable), “Calculated PSUs”, “Firm Reported ROTCE”, “Performance Table” (including its footnote) and “ROTCE” as set forth in the “Definitions” section of these terms and conditions. See section captioned “Definitions”. Except for Firm Reported ROTCE, calculations will be expressed as a decimal to the second place (i.e. xx.yy%), rounded to the nearest hundredth. See section captioned, “Definitions--Performance Table” in the event of a tie. All performance based calculations as set forth herein are binding and conclusive on you and your successors.

Capital Ratio Performance Threshold

Unvested PSUs are subject to reduction if the Firm’s Common Equity Tier 1 (CET1) capital ratio at any year end falls below a predetermined threshold of ____%.

If the Firm’s CET1 capital ratio at any year end during the Performance Period is below this predetermined threshold, up to one-third of the Target Award Number of PSUs will be subject to downward adjustment by the CMDC for each such year.

Qualitative Performance

Determination of Qualitative Performance Factor. Annually during the Performance Period, the Committee will formally assess your qualitative performance based on four broad categories: (1) Client/Customer Focus; (2) Risk, Controls & Conduct; (3) Teamwork & Leadership; and (4) Business Results. If the Committee determines that your performance “Meets” expectations, no downward adjustment to one-third of the Target Award Number of PSUs for that year shall take place (and the Qualitative Performance Factor shall be 100%). If the Committee determines that your performance did “Not Meet” expectations, the Committee shall determine whether a downward adjustment is appropriate, and if so, to what extent. A downward adjustment could result in a Qualitative Performance Factor of between 0% and 99%, depending on the circumstances. During the Performance Period, a 0% Performance Factor for each year in the Performance Period would reduce your Target Award Number of PSUs to zero, resulting in the cancellation of award with no shares vesting.

Additionally, the Committee may, in its sole discretion, make such assessment of your qualitative performance based on your performance during the entire three year Performance Period and apply the Qualitative Performance Factor to the entire number of PSUs determined under section captioned “Number of Performance Share Units at End of the Performance Period”. In the case of a Qualitative Performance Factor of 0%, the award would be cancelled.

The assessment will have regard to feedback solicited from the Chair of the UK Remuneration Committee to incorporate qualitative performance against local regulatory responsibilities as a “Senior Manager” of the relevant CIB UK-regulated entities.

The Qualitative Performance Factor shall only be applied, if applicable, in respect of a period of your employment with the Firm, or as soon as administratively practical.

Bonus Recoupment

In consideration of the grant of this award, you agree that you are subject to the JPMorgan Chase Bonus Recoupment Policy (or successor policy) as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year 20__ and to this award. You can access this policy as currently in effect through the following link:

<http://www.jpmorganchase.com/corporate/About-JPMC/corporate-governance-principles.htm#recouptment>

For the avoidance of doubt, nothing in these terms and conditions in any way limits the rights of the Firm under the JPMorgan Chase Bonus Recoupment Policy (or successor policy).

EMEA Malus and Clawback Policy - Identified Staff

In consideration of grant of this award, and without prejudice to any other provision of this Award Agreement, you agree that you are subject to the JPMorgan Chase EMEA Malus and Clawback Policy - Identified Staff (and any applicable supplement(s) to that policy) or successor policy as in effect from time to time as it applies both to the cash incentive compensation awarded to you for performance year __ and to this award. You can access this policy as currently in effect in My Rewards through the following link: <https://myrewards.jpmorganchase.com>

See section captioned "Administrative Provisions" for additional information.

Recapture Provisions (Detrimental Conduct, Risk-Related and Other Recapture Provisions)

Notwithstanding any terms of this Award Agreement to the contrary, JPMorgan Chase reserves the right in its sole discretion to cancel up to 100% of your award and, to the extent set forth in "Remedies" below, to recover from you up to an amount equal to the Fair Market Value (determined as of any vesting date) of the gross number of shares of Common Stock previously distributed (including vested shares subject to the Holding Requirements and shares withheld for tax or other lawful purposes) under this award if the Firm in its sole discretion determines that:

- you engaged in conduct detrimental to the Firm insofar as it causes material financial or reputational harm to the Firm or its business activities, or
- this award was based on materially inaccurate performance metrics, whether or not you were responsible for the inaccuracy, or
- this award was based on a material misrepresentation by you, or
- you improperly or with gross negligence failed to identify, raise or assess, in a timely manner and as reasonably expected, risks and/or concerns with respect to risks material to the Firm or its business activities, or
- your employment was terminated for Cause (see section captioned "Definitions" below) or, in the case of a determination after the termination of your employment, that your employment could have been terminated for Cause.

See section captioned "Remedies" for additional information.

JPMorgan Chase's right to cancel and/or recover the value of this award under the JPMorgan Chase Bonus Recoupment Policy and the other provisions of this award relate to the "organizational goals" of the Firm as that term is defined by regulations issued under Section 409A of the Internal Revenue Code ("Code").

Termination of Employment

Except as explicitly set forth below under the subsections captioned "--Job Elimination", "--Full Career Eligibility", "--Government Office" or "--Disability" or under the section captioned "Death", this award will be cancelled in full effective on the date your employment with the Firm terminates for any reason.

Subject to these terms and conditions (including, but not limited to, sections captioned "Protection-Based Vesting", "Bonus Recoupment", "EMEA Malus and Clawback Policy - Identified Staff", "Recapture Provisions", "Your Obligations" and "Remedies") you will be eligible to continue to vest (as you otherwise would vest if you were still employed by JPMorgan Chase) with respect to your award in accordance with its terms and conditions following the termination of your employment if one of the following circumstances applies to you:

• Job Elimination

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- the Firm terminated your employment because your job was eliminated, and
- after you are notified that your job will be eliminated, you provided such services as requested by the Firm in a cooperative and professional manner, and
- you satisfied the Release/Certification Requirements set forth below.

• Full Career Eligibility

In the event that the Director of Human Resources or nominee in his or her sole discretion determines that

- you voluntarily terminated your employment with the Firm, had completed at least five years of continuous service with the Firm immediately preceding your termination date, and
- your Recognized Service (as defined below) on your date of termination equaled or exceeded 15 years, or your combined Recognized Service with the Firm and external professional experience (as attested by you to the Firm) equaled or exceeded 30 years, and
- you provided at least 180 days advance written notice to the Firm of your intention to voluntarily terminate your employment under this provision, during which notice period you provided such services as requested by the Firm in a cooperative and professional manner and you did not perform any services for any other employer, and
- continued vesting shall be appropriate, which determination shall be made prior to your termination and will be based on your performance and conduct (before and after providing notice), and
- for 36 months from the date of grant of this award, you do not either perform services in any capacity (including self-employment) for a Financial Services Company (as defined below) or work in your profession (whether or not for a Financial Services Company); provided that you may work for a government, education or Not-for-Profit Organization (as defined below), and
- you satisfied the Release/Certification Requirements set forth below.

After receipt of such advance written notice, the Firm may choose to have you continue to provide services during such 180-day period as a condition to continued vesting or shorten the length of the 180-day period at the Firm's sole discretion, but to a date no earlier than the date you would otherwise meet the service requirement.

Additional advance notice requirements may apply for employees subject to notice period policies. (See "Notice Period" below.)

• Government Office

In the event that you voluntarily terminate your employment with the Firm to accept a Government Office or become a candidate for an elective Government Office, as described at the end of these terms and conditions under the section captioned "Government Office Requirements". See also definition of Government Office in the section captioned "Definitions".

• Disability

In the event that

- your employment with the Firm terminates because (i) you are unable to return to work while you are receiving benefits under the JPMorgan Chase Long Term Disability Plan, or for non-U.S. employees, under the equivalent JPMorgan Chase-sponsored local country plan (in either case, "LTD Plan"), or (ii) if you are not covered by a LTD Plan, you are unable to return to work due to a long-term disability that would qualify for benefits under the applicable LTD Plan, as determined by the Firm or a third-party designated by the Firm; provided that you (x) request in writing continued vesting due to such disability within 30 days of the date your employment terminates, and (y) provide any requested supporting documentation and (z) receive the Firm's written consent to such treatment, and
- you satisfied the Release/Certification Requirements set forth below.

Release/Certification

To qualify for continued vesting after termination of your employment under any of the foregoing circumstances:

- you must timely execute and deliver a release of claims in favor of the Firm, having such form and terms as the Firm shall specify,
- with respect to Full Career Eligibility, prior to the termination of your employment, you must confirm with management that you meet the eligibility criteria (including providing at least 180 days advance written notification), advise that you are seeking to be treated as an individual eligible for Full Career Eligibility, and receive written consent to such continued vesting,
- with respect to Disability, you must satisfy the notice and documentation described above and receive written consent to such continued vesting,
- with respect to "Full Career Eligibility" and "Government Office", it is your responsibility to take the appropriate steps to certify to the Firm prior to each vesting date while the employment restrictions are outstanding on the authorized form of the Firm that you have complied with the employment restrictions applicable to you (as described herein) from your date of termination of employment through the applicable vesting date, and
- in all cases, otherwise complied with all other terms of the Award Agreement. (See section captioned "Your Obligations" below.)

Death

If you die while you are eligible to vest in this award, your designated beneficiary on file with the Firm's Stock Administration Department (or your estate or if no beneficiary has been designated or survives you or if beneficiary designation is not recognized by local legislation) may be entitled to receive a distribution of a number of shares of Common Stock associated with your award.

Should you die after the end of the Performance Period, your beneficiary will receive shares of Common Stock equal to any outstanding PSUs.

Should you die during the Performance Period, your Beneficiary will receive shares of Common Stock based on the average performance of all completed calendar years, multiplied by one-third of the Target Award Number of PSUs for each completed calendar year in the Performance Period, and using the Award Payout Percentage equal to 100 percent for any remaining calendar years in the Performance Period.

Any shares will be distributed no later than the end of the calendar year immediately following the calendar year which contains your date of death; however, our administrative practice is to register such shares in the name of your beneficiary or estate within 60 days of the Firm's receipt of any required documentation.

Your Obligations

In consideration of the grant of this award, you agree to comply with and be bound by the obligations set forth below next to the subsections captioned “--Non-Solicitation of Employees and Customers”, “--Confidential Information”, “--Non-Disparagement”, “--Cooperation”, “--Compliance with Award Agreement”, and “--Notice Period”.

- Non-Solicitation of Employees and Customers**

During your employment by the Firm and for the longer of the (i) one year period following the termination of your employment or, (ii) if your award is not cancelled as of your termination date, the three year period from Grant Date, you will not directly or indirectly, whether on your own behalf or on behalf of any other party, without the prior written consent of the Director of Human Resources: (i) solicit, induce or encourage any of the Firm's then current employees to leave the Firm or to apply for employment elsewhere, unless such current employee has received official, written notice that his or her employment will be terminated due to job elimination (ii) hire any employee or former employee who was employed by the Firm at the date your employment terminated, unless the individual's employment terminated because his or her job was eliminated, or the individual's employment with the Firm has been terminated for more than six months, (iii) to the fullest extent enforceable under applicable law, solicit or induce or attempt to induce to leave the Firm, or divert or attempt to divert from doing business with the Firm, any then current customers, suppliers or other persons or entities that were serviced by you or whose names became known to you by virtue of your employment with the Firm, or otherwise interfere with the relationship between the Firm and such customers, suppliers or other persons or entities. This does not apply to publicly known institutional customers that you service after your employment with the Firm without the use of the Firm's confidential or proprietary information.

These restrictions do not apply to authorized actions you take in the normal course of your employment with the Firm, such as employment decisions with respect to employees you supervise or business referrals in accordance with the Firm's policies.

- Confidential Information**

You will not, either during your employment with the Firm or thereafter, directly or indirectly (i) use or disclose to anyone any confidential information related to the Firm's business, or (ii) communicate with the press or other media about matters related to the Firm, its customers or employees, including matters and activities relating to your employment, or the employment of others, by the Firm, in the case of either (i) or (ii), except as explicitly permitted by the JPMorgan Chase Code of Conduct and applicable policies or law or legal process. In addition, following your termination of employment, you will not, without prior written authorization, access the Firm's private and internal information through telephonic, intranet or internet means. “Confidential information” shall have the same meaning for the Award Agreement as it has in the JPMorgan Chase Code of Conduct.

Nothing in this award precludes you from reporting to the Firm's management or directors, the government, a regulator, a self-regulatory agency, your attorneys or a court, conduct you believe to be in violation of the law or concerns of any known or suspected Code of Conduct violation. It is also not intended to prevent you from responding truthfully to questions or requests from the government, a regulator or in a court of law.

- Non-Disparagement**

You will not, either during your employment with the Firm or thereafter, make or encourage others to make any public statement or release any information in verbal, written, electronic or any other form, that is intended to, or reasonably could be foreseen to, disparage, embarrass or criticize the Firm or its employees, officers, directors or shareholders as a group. This shall not preclude you from reporting to the Firm's management or directors or to the government or a regulator conduct you believe to be in violation of the law or the Firm's Code of Conduct or responding truthfully to questions or requests for information to the government, a regulator or in a court of law in connection with a legal or regulatory investigation or proceeding.

- Cooperation**

You will cooperate fully with and provide full and accurate information to the Firm and its counsel with respect to any matter (including any audit, tax proceeding, litigation, investigation or governmental proceeding) with respect to which you may have knowledge or information, subject to reimbursement for actual, appropriate and reasonable out-of-pocket expenses incurred by you.

- Compliance with Award Agreement**

You will provide the Firm with any information reasonably requested to determine compliance with the Award Agreement, and you authorize the Firm to disclose the terms of the Award Agreement to any third party who might be affected thereby, including your prospective employer.

• Notice Period

If you are subject to a notice period or become subject to a notice period after the Grant Date, whether by contract or by policy, that requires you to provide advance written notice of your intention to terminate your employment ("Notice Period"), then as consideration for this award and continued employment, you will provide the Firm with the necessary advance written notice that applies to you, as specified by such contract or policy.

After receipt of your notice, the Firm may choose to have you continue to provide services during the applicable Notice Period or may place you on a paid leave for all or part of the applicable Notice Period. During the Notice Period, you shall continue to devote your full time and loyalty to the Firm by providing services in a cooperative and professional manner and not perform any services for any other employer and shall receive your base salary and certain benefits until your employment terminates. You and the Firm may mutually agree to waive or modify the length of the Notice Period.

Regardless of whether a Notice Period applies to you, you must comply with the 180-day advance notice period described under the subsection captioned "-- Full Career Eligibility" in the event you wish to terminate employment under that same subsection.

Remedies

• Cancellation

In addition to the cancellation provisions described under the sections captioned "Protection-Based Vesting", "Qualitative Performance Factor", "Bonus Recoupment", "EMEA Malus and Clawback Policy - Identified Staff", "Recapture Provisions" and "Termination of Employment", your outstanding PSUs under this award may be cancelled if the Firm in its sole discretion determines that:

- you have failed to comply with any of the advance notice/cooperation requirements or employment restrictions applicable to your termination of employment, or
- you have failed to return the required forms specified under the section captioned "Release/Certification" by the specified deadline, or
- you have violated any of the provisions as set forth above in the section captioned "Your Obligations".

To the extent provided under the subsection captioned "--Amendment" below, JPMorgan Chase reserves the right to suspend vesting of this award and/or distribution of shares under this award, including, without limitation, during any period that JPMorgan Chase is evaluating whether this award is subject to cancellation and/or recovery and/or whether the conditions for distributions of shares under this award are satisfied. The Firm is not responsible for any price fluctuations during any period of suspension and, if applicable, suspended units will be reinstated consistent with Plan administration procedures. See also "Administrative Provisions-No Ownership Rights/Other Limitations".

• Recovery

In addition to cancellation of outstanding PSUs, you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date or acceleration date) of the gross number of shares of Common Stock previously distributed, including vested shares subject to the Holding Requirements, under this award as follows:

- Payment may be required with respect to any shares of Common Stock distributed within the three year period prior to a notice-of-recovery under this section, if the Firm in its sole discretion determines that:
 - you committed a fraudulent act, or engaged in knowing and willful misconduct related to your employment;
 - you violated any of the provisions as set forth above in the section captioned "Your Obligations"; or
 - you violated the employment restrictions set forth in the subsection "Full Career Eligibility" or "Government Office" following the termination of your employment.
- In addition, payment may be required with respect to any shares distributed within the one year period prior to notice-of-recovery under this section, if the Firm in its sole discretion determines appropriate pursuant to the provisions in the section captioned "Recapture Provisions".

Notice-of-recovery under this subsection is a written (including electronic) notice from the Firm to you either requiring payment under this subsection or stating that JPMorgan Chase is evaluating requiring payment under this subsection. Without limiting the foregoing, notice-of-recovery will be deemed provided if the Firm makes a good faith attempt to provide written (including electronic) notice at your last known address maintained in the Firm's employment records. For the avoidance of doubt, a notice-of-recovery that the Firm is evaluating requiring payment under this subsection shall preserve JPMorgan Chase's rights to require payment as set forth above in all respects and the Firm shall be under no obligation to complete its evaluation other than as the Firm may determine in its sole discretion.

For purposes of this subsection, shares distributed under this award include shares withheld for tax purposes. However, it is the Firm's intention that you only be required to pay the amounts under this subsection with respect to shares that are or may be retained by you following a determination of tax liability and that you will not be required to pay amounts with respect to shares representing irrevocable tax withholdings or tax payments previously made (whether by you or the Firm) that you will not be able to recover, recapture or reclaim (including as a tax credit, refund or other benefit). Accordingly, JPMorgan Chase will not require you to pay any amount that the Firm or its nominee in his or her sole discretion determines is represented by such withholdings or tax payments.

Payment may be made in shares of Common Stock or in cash. You agree that any repayment will be a lawful recovery under the terms and conditions of your Award Agreement and is not to be construed in any manner as a penalty.

Nothing in the section in any way limits your obligations under “Bonus Recoupment” and “EMEA Malus and Clawback Policy - Identified Staff”.

- **Right to an Injunction**

You acknowledge that a violation or attempted violation of the obligations set forth herein will cause immediate and irreparable damage to the Firm, and therefore agree that the Firm shall be entitled as a matter of right to an injunction, from any court of competent jurisdiction, restraining any violation or further violation of such obligations; such right to an injunction, however, shall be cumulative and in addition to whatever other remedies the Firm may have under law or equity.

Administrative Provisions

EMEA Malus and Clawback Policy: The provisions of the JPMorgan Chase EMEA Malus and Clawback Policy - Identified Staff set out the terms and conditions applying to the grant of this award which ensure that the Firm is able to meet its regulatory obligations to operate malus (reduce) and/or clawback (recover) to awards in certain circumstances. These include, but are not limited to, where (i) there is a material downturn in the Firm's financial performance or (ii) where the Firm is required to hold more capital. The circumstances in which the events at (i) and (ii) would occur are analogous to some of the circumstances considered under the existing Firmwide terms and conditions, in particular the Bonus Recoupment Policy and the Protection Based Vesting provisions.

Withholding Taxes: As a result of legal and/or tax obligations the Firm, in its sole discretion, may (i) retain from each distribution the number of shares of Common Stock required to satisfy applicable tax obligations or (ii) implement any other desirable or necessary procedures, so that appropriate withholding and other taxes are paid to the competent authorities with respect to the vested shares and the award. This may include but is not limited to (i) a market sale of a number of such shares on your behalf substantially equal to the withholding or other taxes, (ii) to the extent required by law, withhold from cash compensation, an amount equal to any withholding obligation with respect to the award and shares that vest under this award, and (iii) retaining shares that vest under this award until you pay any taxes associated with the award and vested shares directly to the competent authorities.

Right to Set Off: Although the Firm expects to settle this award in share(s) of Common Stock as of the applicable vesting date, as set forth in your Award Agreement, the Firm may, to the maximum extent permitted by applicable law (including Section 409A of the Code to the extent it is applicable to you), retain for itself funds or the Common Stock resulting from any vesting of this award to satisfy any obligation or debt that you owe to the Firm. Notwithstanding any account agreement with the Firm to the contrary, the Firm will not recoup or recover any amount owed from any funds or unrestricted securities held in your name and maintained at the Firm pursuant to such account agreement to satisfy any obligation or debt or obligation owed by you under this award without your consent. This restriction on the Firm does not apply to accounts described and authorized in “No Ownership Rights/Other Limitations” described below.

No Ownership Rights/Other Limitations: PSUs do not convey the rights of ownership of Common Stock and do not carry voting rights. No shares of Common Stock will be issued to you until after the number of PSUs have been determined, if any, and have vested. Shares will be issued in accordance with JPMorgan Chase's procedures for issuing stock. By accepting this award, you authorize the Firm, in its sole discretion, to establish on your behalf a brokerage account in your name with the Firm or book-entry account with our stock plan administrator and/or transfer agent and deliver to that account any vested shares derived from the award. You also acknowledge that should there be a determination that the cancellation provisions of this award apply during the period when the vesting of any outstanding PSUs has been suspended, then you agree that such PSUs may be cancelled in whole or part. (See Sections captioned “Protection-Based Vesting”, “Qualitative Performance Factor”, “Bonus Recoupment”, “EMEA Malus & Clawback Policy - Identified Staff”, “Recapture Provisions”, “Termination of Employment” and “Remedies”, as well as the subsection captioned “--Amendment” permitting suspension of vesting.)

With respect to any applicable vesting date, JPMorgan Chase may impose for any reason, as of such vesting date for such period as it may specify in its sole discretion, such restrictions on the Common Stock to be issued to you as it may deem appropriate, including, but not limited to, restricting the sale, transfer, pledging, assignment, hedging or encumbrance of such shares of Common Stock. Such restrictions described in the last sentence shall not impact your right to vote or receive dividends with respect to the Common Stock. By accepting this award, you acknowledge that during such specified period should there be a determination that the recovery provisions of this award apply, then you agree that you may be required to pay the Firm up to an amount equal to the Fair Market Value (determined as of the applicable vesting date) of the gross number of shares subject to such restrictions (notwithstanding the limitation set forth in the “Right to Set Off” subsection above). (See sections captioned “Bonus Recoupment” and “Remedies”.)

Binding Agreement: The Award Agreement will be binding upon any successor in interest to JPMorgan Chase, by merger or otherwise.

Not a Contract of Employment: Nothing contained in the Award Agreement constitutes a contract of employment or continued employment. Employment is “at-will” and may be terminated by either you or JPMorgan Chase for any reason at any time. This award does not confer any right or entitlement to, nor does the award impose any obligation on the Firm to provide, the same or any similar award in the future and its value is not compensation for purposes of determining severance.

Section 409A Compliance: To the extent that Section 409A of the Code is applicable to this award, distributions of shares hereunder are intended to comply with Section 409A of the Code, and the Award Agreement, including these terms and conditions, shall be interpreted in a manner consistent with such intent.

Notwithstanding anything herein to the contrary, if you (i) are subject to taxation under the Code, (ii) are a specified employee as defined in the JPMorgan Chase 2005 Deferred Compensation Plan and (iii) have incurred a separation from service (as defined in that Plan with the exception of death) and if any units/shares under this award represent deferred compensation as defined in Section 409A and such shares are distributable (under the terms of this award) within six months following, and as a result of your separation from service, then those shares will be delivered during the first calendar

month after the expiration of six full months from date of your separation from service. Further, if your award is not subject to a substantial risk of forfeiture as defined by regulations issued under Section 409A of the Code, then the remainder of each calendar year immediately following each vesting date set forth in your Award Agreement shall be a payment date for purposes of distributing the vested portion of the award.

Change in Outstanding Shares: In the event of any change in the outstanding shares of Common Stock by reason of any stock dividend or split, recapitalization, issuance of a new class of common stock, merger, consolidation, spin-off, combination or exchange of shares or other similar corporate change, or any distributions to stockholders of Common Stock other than regular cash dividends, the Committee will make an equitable substitution or proportionate adjustment, in the number or kind of shares of Common Stock or other securities issued or reserved for issuance pursuant to the Plan and to any PSUs outstanding under this award for such corporate events.

Other Equitable Adjustments: Except for the "Qualitative Performance Factor", the Committee may make adjustments (up or down) to the award as it deems to be equitable, to maintain the intended economics of the award in light of changed circumstances, which may include unusual or non-recurring events affecting the Firm (or the Performance Companies) or its financial statements in each case resulting from changes in accounting methods, practices or policies, changes in capital structure by reason of legal or regulatory requirements and such other changed circumstances, as the Committee may deem appropriate.

Interpretation/Administration: The Committee has sole and complete authority to interpret and administer this Award Agreement, including, without limitation, the power to (i) interpret the Plan and the terms of this Award Agreement; (ii) determine the reason for termination of employment; (iii) determine application of the post-employment obligations and cancellation and recovery provisions; (iv) decide all claims arising with respect to this award; and (v) delegate such authority as it deems appropriate. Any determination contemplated hereunder by the Committee, the Firm, the Director of Human Resources or their respective delegates or nominees shall be binding on all parties.

Notwithstanding anything herein to the contrary, the determinations of the Director of Human Resources, the Firm, the Committee and their respective delegates and nominees under the Plan and the Award Agreements are not required to be uniform. By way of clarification, the Committee, the Firm, the Director of Human Resources and their respective delegates and nominees shall be entitled to make non-uniform and selective determinations and modifications under Award Agreements and the Plan.

Amendment: The Committee or its nominee reserves the right to amend this Award Agreement in any manner, at any time and for any reason; provided, however, that no such amendment shall materially adversely affect your rights under this Award Agreement without your consent except to the extent that the Committee or its delegate considers advisable to (x) comply with applicable laws or changes in or interpretation of applicable laws, regulatory requirements and accounting rules or standards and/or (y) make a change in a scheduled vesting date or impose the restrictions described above under "No Ownership Rights/Other Limitations", in either case, to the extent permitted by Section 409A of the Code if it is applicable to you. This Award Agreement may not be amended except in writing signed by the Director of Human Resources of JPMorgan Chase.

Severability: If any portion of the Award Agreement is determined by the Firm to be unenforceable in any jurisdiction, any court or arbitrator of competent jurisdiction or the Director of Human Resources may reform the relevant provisions (e.g., as to length of service, time, geographical area or scope) to the extent the Firm (or court/arbitrator) considers necessary to make the provision enforceable under applicable law.

Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity: Upon receipt of satisfactory evidence that applicable United States federal, state, local, foreign or supranational ethics or conflict of interest laws or regulations require you to divest your interest in JPMorgan Chase PSUs, the Firm may accelerate the distribution of all or part of your outstanding award effective on or before the required divestiture date and waive the Holding Requirement; provided that no accelerated distribution shall occur if the Firm determines that such acceleration will violate Section 409A of the Code. Accelerated distribution under this paragraph does not impact the dates as set forth in the "Recovery" section above. The time period for recovery shall be determined by the originally scheduled vesting date or distribution date prior to any acceleration event.

If you have voluntarily terminated your employment and have satisfied the requirements of the section captioned "Government Office Requirements", acceleration shall apply (to extent required) to the percentage of your outstanding award that would continue to vest under that section. In the case of a termination of employment where the award is outstanding as a result of the subsections entitled "Job Elimination" or "Full Career Eligibility", then acceleration shall apply, to the extent required, to the full outstanding award. Subject to the two foregoing sections, the number of shares of Common Stock to be received on acceleration shall be determined using the methodology set forth under the section captioned "Death".

To the extent you have vested shares under this award subject to the Holding Requirement and become subject to divestiture requirement as forth herein, the Firm may waive the holding period to the extent required.

Notwithstanding an accelerated distribution or waiver of the Holding Requirement pursuant to the foregoing, you will remain subject to the applicable terms of your Award Agreement as if your award had remained outstanding for the duration of the vesting period and shares had been distributed as scheduled as of each vesting date, including, but not limited to, repayment obligations set forth in the section captioned "Remedies" and the employment restrictions in the sections captioned "Protection-Based Vesting" and "Government Office Requirements" and the subsection "Full Career Eligibility".

Use of Personal Data: By accepting this award, you have acknowledged that the Firm may process your personal data (including sensitive personal data) for purposes, including but not limited to (i) determining your compensation, (ii) payroll activities, including, but not limited to, tax withholding and regulatory reporting, which tax and regulatory reporting and withholding may include, but is not limited to, the United States and its political subdivisions, (if not the United States) your work country and its political subdivisions (including countries to which you travel on Firm business) and your country of residence or nationality, (iii) registration of shares, (iv) establishing a brokerage account on your behalf, and (v) all other lawful purposes related to your employment and this award, and that the Firm may provide such data to third party vendors with whom it has contracted to provide such services and/or other bodies, including regulators, supervisory bodies, law enforcement and other government agencies. You are acknowledging and agreeing that your personal data will be transferred to and processed in countries and locations that do not have the same data privacy laws and

statutory protection for personal data as your work country, country of residence, or country of nationality. If your personal data is subject to data privacy laws or statutory protection for personal data and they so provide for termination of the foregoing authorization, you may terminate the authorization at any time except with respect to tax and regulatory reporting and subject always to the Firm's legal and regulatory obligations. In the event you terminate this authorization, your award will be cancelled.

Governing Law: This award shall be governed by and construed in accordance with the laws of the State of New York, without regard to conflicts of law principles.

Choice of Forum: By accepting this award under the Plan, you agree (and have agreed) that to the extent not otherwise subject to arbitration under an arbitration agreement between you and the Firm, any dispute arising directly or indirectly in connection with this award or the Plan shall be submitted to arbitration in accordance with the rules of the American Arbitration Association if so elected by the Firm in its sole discretion. In the event such a dispute is not subject to arbitration for any reason, you agree to accept the exclusive jurisdiction and venue of the United States District Court for the Southern District of New York with respect to any judicial proceeding in connection with this award or the Plan. You waive, to the fullest extent permitted by law, any objection to personal jurisdiction or to the laying of venue of such dispute and further agree not to commence any action arising out of or relating to this award or the Plan in any other forum.

Waiver of Jury Trial/Class Claims: By accepting this award, you agree, with respect to any claim brought in connection with your employment with the Firm in any forum (i) to waive the right to a jury trial and (ii) that any judicial proceeding or arbitration claim will be brought on an individual basis, and you hereby waive any right to submit, initiate, or participate in a representative capacity or as a plaintiff, claimant or member in a class action, collective action, or other representative or joint action.

Litigation: By accepting any award under the Plan, you agree (and have agreed) that in any action or proceeding by the Firm (other than a derivative suit in the right of the Firm) to enforce the terms and conditions of this Award Agreement or any other Award Agreement where the Firm is the prevailing party, the Firm shall be entitled to recover from you its reasonable attorney fees and expenses incurred in such action or proceeding. In addition, you agree that you are not entitled to, and agree not to seek, advancement of attorney fees and indemnification under the Firm's By-Laws in the event of such a suit by the Firm.

Non-transferability: Neither this award or any other outstanding awards of restricted stock units or of performance based share units, nor your interests or rights in any such awards, shall be assigned, pledged, transferred, hedged hypothecated or subject to any lien. An award may be transferred following your death by will, the laws of descent or by a beneficiary designation on file with the Firm.

Definitions

"Average Tangible Common Equity" means annual average common stockholders' equity less annual average goodwill and annual average identifiable intangible assets. Annual averages of the components of Average Tangible Common Equity will be calculated using quarterly balances as reported in publicly available financial disclosures. In the event that quarterly balances are not available, annual year end balances will be used. **This calculation is used solely for purposes of the Performance Ranking.**

"Award Payout Percentage" means the applicable percentage specified in the footnote to the Performance Table.

"Calculated PSUs" means the number of PSUs determined by multiplying the Target Award Number (after giving effect to any cancellation thereof, in whole or in part) by the Award Payout Percentage corresponding to the Firm's Performance Ranking based on the three-year average performance for the Performance Period (both percentage and ranking, as set forth in the footnote to the Performance Table); provided that if the average of the Firm's Reported ROTCE for the Performance Period either equals or exceeds ____ % or is less than ____ % (without taking into account any rounding conventions used), ____ percent or ____ , respectively as the case may be, shall be substituted for the Performance Period's Award Payout Percentage in calculating the number of PSUs to distribute. For avoidance of doubt, any cancellation of this award (in whole or in part) during the Performance Period will reduce the Target Award Number.

"Calculation Agent" means a third party entity not owned or controlled by the Firm, such as an accounting or consulting firm, retained from time to time by the Director of Human Resources or his/her delegate.

"Cause" means a determination by the Firm that your employment terminated as a result of your (i) violation of any law, rule or regulation (including rules of self-regulatory bodies) related to the Firm's business, (ii) indictment or conviction of a felony, (iii) commission of a fraudulent act, (iv) violation of the JPMorgan Chase Code of Conduct or other Firm policies or misconduct related to your duties to the Firm (other than immaterial and inadvertent violations or misconduct), (v) grossly inadequate performance of the duties associated with your position or job function or failure to follow reasonable directives of your manager, or (vi) any act or failure to act that is injurious to the interests of the Firm or its relationship with a customer, client or an employee.

"Financial Services Company" means a business enterprise that employs you in any capacity (such as an employee, contractor, consultant, advisor, or self-employed individual, whether paid or unpaid) and engages in:

- commercial or retail banking, including, but not limited to, commercial, institutional and personal trust, custody and/or lending and processing services, originating and servicing mortgages, issuing and servicing credit cards, payment servicing or processing or merchant services,
- insurance, including but not limited to, guaranteeing against loss, harm, damage, illness, disability or death, providing and issuing annuities, acting as principal, agent or broker for purpose of the forgoing,

- financial, investment or economic advisory services, including but not limited to, investment banking services (such as advising on mergers or dispositions, underwriting, dealing in, or making a market in securities or other similar activities), brokerage services, investment management services, asset management services, and hedge funds,
- issuing, trading or selling instruments representing interests in pools of assets or in derivatives instruments,
- advising on, or investing in, private equity or real estate, or
- any similar activities that the Director of Human Resources or nominee determines in his or her sole discretion constitute financial services.

“Firm Reported ROTCE” means the Firm’s percentage return on tangible common equity for each year in the Performance Period (as calculated for use in its publicly available year-end financial disclosures without taking into account any rounding conventions used for financial reporting purposes).

“Firmwide Financial Threshold” means a cumulative return on tangible common equity for calendar years 20__, 20__ and 20__ of not less than __%. Cumulative return on tangible common equity means (i) the sum of the Firm’s reported net income for all three calendar years, divided by (ii) reported year-end tangible equity averaged over the three years.

“Government Office” means (i) a full-time position in an elected or appointed office in local, state, or federal government (including equivalent positions outside the U.S. or in a supranational organization), not reasonably anticipated to be a full-career position, or (ii) conducting a bona fide full-time campaign for such an elective public office after formally filing for candidacy, where it is customary and reasonably necessary to campaign full-time for the office.

“Line of Business” means a business unit of the Firm (or one or more business units designated below under the definition “Line of Business Financial Threshold” of the Corporate Investment Bank). All Corporate Functions (including the functions of the Chief Investment Office) are considered a single Line of Business.

“Line of Business Financial Threshold” means the financial threshold set forth below: for the following Lines of Business based on the Firm’s management reporting system:

Asset & Wealth Management	Annual negative pre-tax pre-provision income ¹
Card, Merchant Services and Auto	Annual negative pre-tax pre-loan loss reserve income ²
Commercial Banking	Annual negative pre-tax, pre-loan loss reserve income ²
Corporate Investment Bank	Annual negative pre-tax pre-provision income ¹ for CIB overall and/or annual negative allocated product revenues (excluding CVA and DVA) for: Macro Products: Currency and Emerging Markets Rates Commodities Spread Products Credit SPG Public Finance Equities Securities Services Global Banking
Consumer Banking, CWM and Business Banking	Annual negative pre-tax pre-loan loss reserve income ²
Corporate Functions (including Chief Investment Office)	Annual negative pre-tax pre-provision income ¹ at the Firm level
Home Lending	Annual negative pre-tax pre-loan loss reserve income ²

¹Pre-tax pre-provision income means Revenue less Expenses

²Pre-tax pre-loan loss reserve income means Revenue less (Expenses plus Net Charge-offs)

“Not-for-Profit Organization” means an entity exempt from tax under state law and under Section 501(c)(3) of the Code. Section 501(c)(3) only includes entities organized and operated exclusively for religious, charitable, scientific, testing for public safety, literary or educational purposes, or to foster national or international amateur sports competition or for the prevention of cruelty to children or animals. Not-for-Profit Organization shall also mean entities outside the United States exempt from local and national tax laws because they are organized and operated exclusively for purposes identical to those applicable to Section 501(c)(3) organization.

“Performance Companies” mean the following institutions which have business activities that overlap with a significant portion of the Firm’s revenue mix: _____, and _____.

If, during the Performance Period, one or more Performance Companies shall merge, engage in a spin-off or otherwise experience a material change in its revenue mix or business activities or its existence or its primary businesses shall terminate or cease due to receivership, bankruptcy, sale, or otherwise, then the Committee may eliminate such institution from the list of Performance Companies or make such other equitable adjustments, such as adding an acquirer or a new company to the list of Performance Companies, as it deems appropriate, with any such changes having effect for purposes of all calculations hereunder on a prospective basis from the date the applicable change is made.

“Performance Period” means calendar years 20__, 20__ and 20__.

“Performance Ranking” means the ranking of the average ROTCE of the Firm as compared to the ranking of the average ROTCE of the Performance Companies as specified in the footnote to the Performance Table for the Performance Period.

“Performance Table” means the table used in the calculation of PSUs for the Performance Period as set forth below:

Firm Reported ROTCE (average performance)	Award Payout Percentage	Performance Ranking ¹ (average performance)	Award Payout Percentage ¹
?__ %	__%	_____	__% to __%
__% to __%	Pay by relative ROTCE scale	_____	__% to __%
<__ %	__%	_____	__% to __%

1. The following sets forth the precise Award Payout Percentage corresponding to the Firm's Performance Ranking (when compared to Performance Companies): #__ = __%; #__ = __%; #__ = __%; #__ = __%; #__ = __%; #__ = __%; #__ = __%; #__ = __%; #__ = __%; etc.

If, after the calculation of the Performance Ranking, there is a tie, the tie shall be disregarded for purposes of determining the Award Payout Percentage. For example, in the case of a tie for the ____ ranking between the Firm and a Performance Company, the Firm shall be treated as having satisfied that ranking. In the case of that same tie among Performance Companies, the ____ and ____ rankings will be deemed to have been satisfied.

“Recognized Service” means the period of service as an employee set forth in the Firm's applicable service-related policies.

“ROTCE” means for the Firm and each of the Performance Companies a percentage derived by, for each year in the Performance Period, dividing (i) annual earnings from continuing operations less dividends on preferred stock as set forth in published financial disclosures by (ii) the Average Tangible Common Equity for the year. **If, prior to the end of the vesting period, the Firm or any Performance Company restates its published financial statements for any year in the Performance Period, ROTCE for that year shall be recalculated for the Firm or Performance Company with the Performance Ranking adjusted, if necessary. This calculation is used solely for purposes of the Performance Ranking.**

“Target Award Number” means the number of PSUs designated as such in the Award Agreement.

Government Office Requirements

You may be eligible to continue vesting in all or part of your award if you voluntarily resign to accept a Government Office (as defined above) or to become a candidate for an elective Government Office.

Full Career Eligibility:

“Government Office Requirements” does not apply to you if you satisfy the subsection captioned “--Full Career Eligibility” as of the date that you voluntarily terminate your employment with the Firm.

Eligibility:

Eligibility for continued vesting is conditioned on your providing the Firm:

- At least 60 days' advance written notice of your intention to resign to accept or pursue a Government Office (see section captioned “Definitions”), during which period you must perform in a cooperative and professional manner services requested by the Firm and not provide services for any other employer. The Firm may elect to shorten this notice period at the Firm's sole discretion.
- Confirmation, in a form satisfactory to the Firm, that vesting in this award pursuant to this provision would not violate any applicable law, regulation or rule.
- Documentation in a form satisfactory to the Firm that your resignation is for the purpose of accepting a Government Office or becoming a candidate for a Government Office. (See section captioned “Definitions”.)

Portion of Your Award Subject to Continued Vesting:

Subject to the conditions below, the percentage of this award that will continue to vest in accordance with this award's original schedule will be based on your years of continuous service completed with the Firm immediately preceding your termination date, as follows:

- 50% if you have at least 3 but less than 4 years of continuous service,
- 75% if you have at least 4 but less than 5 years of continuous service, or
- 100% if you have 5 or more years of continuous service.

The portion of this award subject to continued vesting above is referred to as the “CV Award” and the portion not subject to continued vesting will be cancelled as of the date your employment terminates.

Conditions for Continued Vesting of Award:

- You must remain in a non-elective Government Office for two or more years after your employment with the Firm terminates to be eligible to receive the CV Award; provided that if your non-elective Government Office is for a period less than two years, you will be eligible to receive the CV Award if it has a vesting date during your period of Government Service; or
- In the case of resignation from the Firm to campaign for an elective Government Office, your name must be on the primary or final public ballot for the election. (If you are not elected, see below for employment restrictions.)

For avoidance of doubt, the performance criteria and protection based vesting set forth in these terms and conditions continue to apply to a CV Award.

Satisfaction of Conditions:

If your service in a Government Office ends two years or more after your employment with the Firm terminates, or in the case of resignation from the Firm to campaign for a Government Office, your name is on the primary or final public ballot for the election and you are not elected, any CV Awards then outstanding and any such awards that would have then been outstanding but for an accelerated distribution of shares (as described in the subsection captioned “--Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”) will be subject for the remainder of the applicable vesting period to the same terms and conditions of this Award Agreement, including employment restrictions during the vesting period, as if you had resigned from the Firm having met the requirements for Full Career Eligibility.

Failure to Satisfy Conditions:

If you do not satisfy the above “Conditions for Continued Vesting of Awards”, any outstanding PSUs under the CV Award will be cancelled. You also will be required to repay the Fair Market Value of the number of shares (before tax and other withholdings) of Common Stock distributed to you that would have been outstanding as PSUs on the date you failed to satisfy the “Conditions for Continued Vesting of Award” but for their accelerated distribution (as described in subsection captioned, “Accelerated Distribution for Ethics or Conflict Reasons Resulting From Employment by a Government Entity”). Fair Market Value for this purpose will be determined as the date that the shares were distributed.

Exhibit 21
JPMorgan Chase & Co.

List of subsidiaries

While there are a number of subsidiaries that are required to be reported for various purposes to bank regulators, the following is a list of JPMorgan Chase & Co.'s significant legal entity subsidiaries as of December 31, 2019, as defined by SEC rules. The list includes the parent company of significant subsidiaries even if the parent company did not meet the definition of a significant subsidiary. Excluded from the list are subsidiaries that, if considered in the aggregate, would not constitute a significant subsidiary under SEC rules as of December 31, 2019.

Also included in the list are certain subsidiaries that have been designated as material legal entities for resolution planning purposes under the Dodd-Frank Act that did not meet the definition of a significant subsidiary under SEC rules.

December 31, 2019 Name	Organized Under The Laws Of
JPMorgan Chase Bank, National Association	United States
Paymentech, LLC	United States
J.P. Morgan International Finance Limited	United States
Chase Paymentech Europe Limited	Ireland
J.P. Morgan Bank Luxembourg S.A.	Luxembourg
JPMorgan Securities Japan Co., Ltd.	Japan
Chase Paymentech Solutions Inc.	Canada
J.P. Morgan Capital Holdings Limited	United Kingdom
J.P. Morgan Securities PLC	United Kingdom
J.P. Morgan AG	Germany
JPMorgan Chase Holdings LLC	United States
J.P. Morgan Services India Private Limited	India
JPMorgan Asset Management Holdings Inc.	United States
JPMorgan Distribution Services, Inc.	United States
JPMorgan Asset Management International Limited	United Kingdom
JPMorgan Asset Management Holdings (UK) Limited	United Kingdom
JPMorgan Asset Management (UK) Limited	United Kingdom
JPMorgan Asset Management Holdings (Luxembourg) S.à r.l.	Luxembourg
JPMorgan Asset Management (Europe) S.à r.l.	Luxembourg
J.P. Morgan Investment Management Inc.	United States
J.P. Morgan Broker-Dealer Holdings Inc.	United States
J.P. Morgan Securities LLC	United States

Exhibit 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on:

Form S-3
(No. 333-222672)
(No. 333-222672-01)
(No. 333-230098)

Form S-8
(No. 333-219702)
(No. 333-219701)
(No. 333-219699)
(No. 333-185584)
(No. 333-185582)
(No. 333-185581)
(No. 333-175681)
(No. 333-158325)
(No. 333-142109)
(No. 333-125827)
(No. 333-112967)

of JPMorgan Chase & Co. or its affiliates of our report dated February 25, 2020 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP
New York, New York
February 25, 2020

Exhibit 31.1
JPMorgan Chase & Co.

CERTIFICATION

I, James Dimon, certify that:

1. I have reviewed this Annual Report on Form 10-K of JPMorgan Chase & Co.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent function):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ James Dimon

James Dimon
Chairman and Chief Executive Officer

Exhibit 31.2
JPMorgan Chase & Co.

CERTIFICATION

I, Jennifer Piepszak, certify that:

1. I have reviewed this Annual Report on Form 10-K of JPMorgan Chase & Co.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;
 - (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent function):
 - (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 25, 2020

/s/ Jennifer Piepszak

Jennifer Piepszak
Executive Vice President and Chief Financial Officer

Exhibit 32
JPMorgan Chase & Co.

**CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of JPMorgan Chase & Co. on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), each of the undersigned officers of JPMorgan Chase & Co., certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of JPMorgan Chase & Co.

Date: February 25, 2020

By: /s/ James Dimon

James Dimon
Chairman and Chief Executive Officer

Date: February 25, 2020

By: /s/ Jennifer Piepszak

Jennifer Piepszak
Executive Vice President and Chief Financial Officer

This certification accompanies this Annual Report and shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that Section.

A signed original of this written statement required by Section 906 has been provided to, and will be retained by, JPMorgan Chase & Co. and furnished to the Securities and Exchange Commission or its staff upon request.