JPMORGAN CHASE & CO
Form 10-K
February 26, 2019

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us-gaap:AdjustableRateResidentialMortgageMember 2018-12-31 0000019617
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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	**Commission file**
December 31, 2018	**number 1-5805**

JPMorgan Chase & Co.

(Exact name of registrant as specified in its charter)

Delaware	**13-2624428**
(State or other jurisdiction of	**(I.R.S. employer**

incorporation or organization)	**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:

Title of each class	**Name of each exchange on which registered**
Common stock	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 5.45% Non-Cumulative Preferred Stock, Series P	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.70% Non-Cumulative Preferred Stock, Series T	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.30% Non-Cumulative Preferred Stock, Series W	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.125% Non-Cumulative Preferred Stock, Series Y	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.10% Non-Cumulative Preferred Stock, Series AA	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.15% Non-Cumulative Preferred Stock, Series BB	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 5.75% Non-Cumulative Preferred Stock, Series DD	**The New York Stock Exchange**
Depositary Shares, each representing a one-four hundredth interest in a share of 6.00% Non-Cumulative Preferred Stock, Series EE	**The New York Stock Exchange**
Alerian MLP Index ETNs due May 24, 2024	**NYSE Arca, Inc.**
Guarantee of Callable Step-Up Fixed Rate Notes due April 26, 2028 of JPMorgan Chase Financial Company LLC	**The New York Stock Exchange**
Guarantee of Cushing 30 MLP Index ETNs due June 15, 2037 of JPMorgan Chase Financial Company LLC	**NYSE Arca, Inc.**

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. o **Yes** x **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. o **Yes** x **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. x **Yes** o **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). x **Yes** o **No**

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. x

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.

x **Large accelerated filer** o **Accelerated filer** o **Non-accelerated filer** o **Smaller reporting company** o **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. o

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

The aggregate market value of JPMorgan Chase & Co. common stock held by non-affiliates as of June 30, 2018: $347,963,159,674

Number of shares of common stock outstanding as of January 31, 2019: 3,274,241,726

Documents incorporated by reference: Portions of the registrant's Proxy Statement for the annual meeting of stockholders to be held onMay 21, 2019, are incorporated by reference in this Form 10-K in response to Items 10, 11, 12, 13 and 14 of Part III.

Form 10-K Index

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 $2.6 trillion in assets and $256.5 billion in stockholders' equity as of December 31, 2018. 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 subsidiaries are JPMorgan Chase Bank, National Association ("JPMorgan Chase Bank, N.A."), a national banking association with U.S. branches in 27 states and the District of Columbia as of December 31, 2018, and Chase Bank USA, National Association ("Chase Bank USA, N.A."), a national banking association that is the Firm's principal credit card-issuing bank. In January 2019, the OCC approved an application of merger which was filed by JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. in December 2018 and which contemplates that Chase Bank USA, N.A. will merge with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. For additional information refer to Supervision and Regulation on pages 1-6 in the 2018 Form 10-K. 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 in the U.K. is J.P. Morgan Securities plc, a 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, tax or investor relations role.

Business segments

JPMorgan Chase's activities are organized, for management reporting purposes, 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 31.

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. The Firm's ability to compete also depends upon its ability to attract and retain professional and other personnel, and on its reputation.

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. The Firm has experienced an extended period of significant change in regulation which has had and could continue to have significant consequences for how the Firm conducts business in the U.S. and other countries.

Part I

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 regulated directly by additional authorities based on the activities of those subsidiaries.

JPMorgan Chase's national bank subsidiaries, JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A., are 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"). In January 2019, the OCC approved an application of merger which was filed by JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. in December 2018 and which contemplates that Chase Bank USA, N.A. will merge with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. Completion of the merger, which is expected to occur in the second quarter of 2019, will be subject to customary closing conditions which will be set forth in an agreement and plan of merger to be entered into between the banks. The merger may be abandoned by JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. at any time before completion.

JPMorgan Chase's U.S. broker-dealers are supervised and regulated by the Securities and Exchange Commission ("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. bank licensed within the European Economic Area (the "EEA"), and is 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 and securities regulatory authorities in the countries in which they operate.

Permissible business activities. The Bank Holding Company Act generally 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 the Firm's national banking subsidiaries. Banking supervisors globally continue to refine and enhance the Basel III capital framework for financial institutions, including the finalization of post-crisis reforms.

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 October 2018, the U.S. banking regulators issued a notice of proposed rulemaking "Standardized Approach for Calculating the Exposure Amount of Derivatives" ("SA-CCR"), with an implementation date of July 1, 2020. This proposal reflects the U.S implementation of the Basel Committee's

equivalent standard, which was finalized in 2014 as part of the post-crisis reform package.
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 April 2016, the U.S. banking regulators issued a proposed rule for NSFR, but no final rule has been issued.
For more information concerning capital and liquidity requirements, refer to Capital Risk Management on pages 85-94 and Liquidity Risk Management on pages 95–100.
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 semi-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 Federal Reserve’s review of the Firm’s capital plan considers both quantitative and qualitative factors. 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. and Chase Bank USA, N.A. to perform separate, similar stress tests annually. The Firm publishes each year the results of its mid-cycle stress tests under the Firm's internally-developed "severely adverse" scenario and the results of the annual stress tests for the Firm and its principal banking subsidiaries under the supervisory "severely adverse" scenarios provided by the Federal Reserve and the OCC. The Firm is required to file its 2019 annual CCAR submission on April 5, 2019. Results will be published by the Federal Reserve by June 30, 2019, with disclosures of results by BHCs, including the Firm, to follow within 15 days. The mid-cycle capital stress test submissions are due on October 5, 2019 and BHCs, including the Firm, will publish results by November 4, 2019. For more information concerning the Firm's CCAR, refer to Capital Risk Management on pages 85-94.

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.

Orderly liquidation authority and 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"). The Firm's next resolution plan is due to be filed on or before July 1, 2019. The Firm also has a comprehensive recovery plan detailing the actions it would take to avoid failure by remaining well-capitalized and well-funded in the case of an adverse event.

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.

The FDIC has not formally adopted its proposed single point of entry strategy.

JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. are both required to provide resolution plans to the FDIC. The FDIC is expected to propose changes to its rules relating to the resolution plans of insured depository institutions ("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. and Chase Bank USA, N.A. have submitted their recovery plans to the OCC.

Certain of the Firm's non-U.S. subsidiaries are also subject to resolution and recovery planning requirements in the jurisdictions in which they operate.

Holding company as 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.

Consent orders. The Firm remains subject to consent orders entered into with its banking regulators between 2013 and 2016 concerning anti-money laundering, the CIO investigation, foreign exchange trading and referral hiring practices.

Part I

JPMorgan Chase's subsidiary banks:

The activities of the Firm's principal subsidiary banks, JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A., are limited to those specifically authorized under the National Bank Act and related interpretations of the OCC.

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. and Chase Bank USA, N.A.

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

Cross-guarantee. An FDIC-insured depository institution can be held liable for any loss incurred or expected to be incurred by the FDIC if another FDIC-insured institution that is under common control with such institution is in default or is deemed to be "in danger of default" (commonly referred to as "cross-guarantee" liability). An FDIC cross-guarantee claim against a depository institution is generally superior in right of payment to claims of the holding company and its affiliates against such depository institution.

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. and Chase Bank USA, 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. The bank subsidiaries of JPMorgan Chase (including subsidiaries of those banks) 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. and Chase Bank USA, N.A. Refer to Note 25 for the amount of dividends that the Firm's principal bank subsidiaries could pay, at January 1, 2019, to their respective BHCs without the approval of their banking regulators. The OCC and the Federal Reserve also have authority to prohibit or limit the payment of dividends of the bank subsidiaries 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 its national bank subsidiaries 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. These laws include the Truth-in-Lending, Equal Credit Opportunity Act ("ECOA"), Fair Credit Reporting, Fair Debt Collection Practice, Electronic Funds Transfer, Credit Card Accountability, Responsibility and Disclosure (“CARD”) and Home Mortgage Disclosure Acts. The CFPB also has jurisdiction over small business lending activities with respect to fair lending and ECOA. 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 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. For information concerning the capital of J.P. Morgan Securities LLC and J.P. Morgan Securities plc, refer to Broker-dealer regulatory capital on page 94.

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 proposed Regulation Best Interest and rules proposed or adopted by certain U.S. states relating to enhanced standards of conduct for broker-dealers and certain other market participants. In June 2018, the Department of Labor’s fiduciary rule, which would have significantly expanded the universe of persons viewed as investment advice fiduciaries to retirement plans and individual retirement accounts under the Employee Retirement Income Security Act of 1974, as amended, was vacated by the United States Court of Appeals for the Fifth Circuit.

In the European Union (“EU”), substantial revisions to the Markets in Financial Instruments Directive (“MiFID II”) became effective in EU member states beginning in January 2018. These revisions introduced expanded requirements for a broad range of investment management activities, including product governance, transparency on costs and charges, independent investment advice, inducements, record-keeping and client reporting. In addition, the Regulation on Money Market Funds has instituted new requirements to enhance the liquidity and stability of money market funds in the EU.

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 EU, the implementation of the European Market Infrastructure Regulation (“EMIR”) and 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 the 2015 Universal Resolution Stay Protocol (the “2015 Protocol”), the 2018 U.S. Resolution Stay Protocol (the “2018 Protocol”) and the Resolution Stay Jurisdictional Modular Protocol, each 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 the 2015 Protocol and 2018 Protocol, 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

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programs targeted at 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. In Europe, the EU Fourth Capital Requirements Directive ("CRD IV") includes compensation-related provisions, and 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.

Significant international regulatory initiatives:

The EU continues to implement an extensive and complex program of regulatory enhancement to address risks associated with global financial institutions. The EU operates a European Systemic Risk Board that monitors financial stability and encourages supervisory convergence across the EU's member states, and European Supervisory Authorities ("ESAs") are responsible for adopting and implementing related rules. The EU is currently reviewing the ESA framework and the European Commission (the "EC") has proposed legislation to change the roles and responsibilities of the ESAs. The EU has also created a Single Supervisory Mechanism for the euro-zone, under which the regulation of all banks in the zone are under the auspices of the European Central Bank, together with a Single Resolution Mechanism and Single Resolution Board, which has jurisdiction over the resolution of banks in the zone.

Significant regulatory initiatives affecting the Firm's businesses in the EU include EMIR and MiFID II. EMIR requires the central clearing of certain standardized derivatives and risk mitigation for uncleared OTC derivatives. EMIR is currently in the process of being amended as part of a legislative proposal known as "EMIR REFIT," which will introduce targeted changes to EMIR to make the rules more streamlined and proportionate. There is also a separate EMIR legislative proposal which includes provisions for third-country supervision of CCPs. MiFID II

requires that the trading of standardized OTC derivatives be effected on exchanges or electronic trading platforms, 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. MiFID II became effective across EU member states in January 2018 and will be subject to a review by the EC by March 2020.

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; resolution of banks, investment firms and market infrastructures; and capital and liquidity requirements for banks and investment firms. The EU capital and liquidity legislation for banks and investment firms is implementing 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. EU legislation also contemplates a requirement for certain non-EU banks operating in the EU to establish an intermediate parent undertaking ("IPU") located in the EU. The full impact of the IPU proposal on JPMorgan Chase's operations and legal entities in the EU will be heavily influenced by the outcome of the EU legislative process, including whether any flexibility is introduced to the requirement. The "trilogue" negotiations to determine the final legislation have concluded and the agreement is subject to a final vote by the European Council and European Parliament before becoming EU law.

The FSB's standard relating to total loss-absorbing capacity ("TLAC"), which was issued in November 2015, specified minimum TLAC requirements for global systemically important banks, including at the level of their material sub-groups. These requirements are being implemented in the EU in the form of a minimum requirement for own funds and eligible liabilities (“MREL”). The Bank of England published its updated Statement of Policy on its approach to setting MREL in June 2018. This included new requirements on the MREL resources to be held by U.K. material subsidiaries of overseas groups. These rules came into effect, on a transitional basis, from January 1, 2019.

U.K. regulators have adopted a range of policy measures that have significantly changed the markets and prudential regulatory environment in the U.K., and have also introduced measures to enhance accountability of individuals and promote forward-looking conduct risk identification and mitigation. There is significant uncertainty concerning future U.K. policy initiatives in light of the expected departure of the U.K. from the EU, as these initiatives will depend on the future relationship between the EU and U.K. For information concerning the expected departure of the U.K. from the EU, refer to Risk factors on pages 7–28 and Business developments on page 46.

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 and regulations that apply to its operations in all of the jurisdictions around the world in which it does business. The regulation of financial services is extensive and comprehensive.

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 during this period. The wave of 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 JPMorgan Chase's profitability. More specifically, existing and new laws and regulations could 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 assessments, levies or other governmental charges
- 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 types of 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
- 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.

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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.

Governments in some countries or regions in which JPMorgan Chase does business have adopted laws or regulations which require JPMorgan Chase subsidiaries that operate in those jurisdictions to maintain minimum amounts of capital or liquidity on a stand-alone basis. Some regulators outside the U.S. have also proposed that large banks which conduct certain businesses in their jurisdictions operate through separate subsidiaries located in those jurisdictions. These requirements, and any future laws or regulations that impose restrictions on the way JPMorgan Chase organizes its businesses or increase the capital or liquidity requirements that would apply to JPMorgan Chase subsidiaries, could hinder JPMorgan Chase's ability to efficiently manage its operations, increase its funding and liquidity costs, and result in lower 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 the heightened standards established by its regulators, it could be required to:
- enter into further resolutions
- 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.

The long-term impact of U.S. tax reform legislation is uncertain, and may be affected by regulatory implementation.

The long-term impact of the Tax Cuts & Jobs Acts ("TCJA") on JPMorgan Chase and the U.S. economy remains uncertain. While the enactment of the TCJA has had, and should continue to have, a positive impact on JPMorgan Chase's net income, the competitive environment and other factors will influence the extent to which these benefits are retained by JPMorgan Chase over the longer term, and the specific impact on JPMorgan Chase's businesses, products and geographies may vary. In addition, the Treasury Regulations governing certain TCJA provisions have not been finalized and their ultimate impact on JPMorgan Chase is uncertain.

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 established or 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 countries with less established or predictable legal and regulatory regimes:

- the absence of a statutory or regulatory basis or guidance for engaging in specific types of business or transactions
- the adoption of conflicting or ambiguous laws and regulations, or the inconsistent application or interpretation of existing laws and regulations
- uncertainty concerning the enforceability of contractual 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-developed legal and regulatory regimes often requires 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 conduct its business in compliance with laws and regulations in countries with less predictable legal and regulatory systems or that JPMorgan Chase will be able to develop effective working relationships with local regulators.

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 the Firm'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.

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.

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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 expected 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 expected 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 U.K. will depart from the EU in March 2019 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 the necessary 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 expected departure of the U.K. from the EU, including the possibility that the U.K. may depart from the EU in March 2019 without a withdrawal agreement in place. If the U.K. departs from the EU with no withdrawal agreement having been reached, the types of structural and operational changes that JPMorgan Chase is in the process of making to its European operations will 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. JPMorgan Chase may experience these types of inefficiencies in its business and operations even if a withdrawal agreement is reached, for example in the event that during the transition period contemplated by such an agreement, the U.K. and the EU fail to reach further agreement on future trade relationships between the U.K. and the EU, or if any other outcome persists that does not assure ongoing access for U.K.-based financial services firms to the EU market.

A disorderly departure of the U.K. from the EU, or the unexpected consequences of any departure, could have significant and immediate destabilizing effects on cross-border financial services activities, depending on circumstances that may exist following such a withdrawal, including:

- the possibility that clients and counterparties of financial institutions are not positioned to continue to do business through EU-based legal entities
- reduction or fragmentation of market liquidity that may be caused if trading venues or CCPs currently based in the U.K. have not completed arrangements to conduct operations from the EU either immediately or, if authorized to continue to operate from the U.K. on a transitional basis, after any transitional 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 capital markets 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, and

- lack of legal certainty concerning the treatment of existing transactions.

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 policy initiatives and proposals could cause a contraction in U.S. and global economic growth and higher volatility in the financial markets, including:

- inability to reach political consensus to keep the U.S. government open and funded
- isolationist foreign policies
- the introduction of tariffs and other protectionist trade policies, or
- the possible withdrawal or reduction of government support for the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation (together, the “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:

- greater market volatility
- large-scale sales of government debt and other debt and equity securities in the U.S. and other countries
- the widening of credit spreads
- inflationary pressures
- lower investment growth, and
- other market dislocations.

Any of these potential outcomes could cause JPMorgan Chase to suffer losses on its market-making positions or in its investment securities 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

JPMorgan Chase’s businesses are materially affected by economic and market events and conditions.

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 and credit
- 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
- trade policies implemented by governmental authorities
- the economic effects of natural disasters, severe weather conditions, health emergencies or pandemics, cyberattacks, outbreaks of hostilities, terrorism or other geopolitical instabilities, and
- the health of the U.S. and global economies.

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, 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,

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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 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
- dispose of portions of credit commitments, such as loan syndications or securities underwritings, 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 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.

JPMorgan Chase's investment securities portfolio and market-making positions can suffer losses due to adverse economic, market and political events and conditions.

JPMorgan Chase generally maintains positions in various fixed income instruments in its investment securities portfolio, and positions in various fixed income, currency, commodity, credit and equity instruments as part of its market-making activities. Market-making positions are intended to facilitate demand from JPMorgan Chase's clients for these instruments and to provide liquidity for clients. The value of the positions that JPMorgan Chase holds can be significantly affected by factors such as:

- JPMorgan Chase's ability to effectively hedge market and other risks on its positions
- changes in the levels and volatility of interest rates, credit spreads, and market prices for currencies, equities and commodities, and the duration of any changes in levels or volatility, and

- the availability of liquidity in the capital markets.

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

JPMorgan Chase's investment securities portfolio and market-making businesses can also 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), 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 securities 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.

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
- lower returns on JPMorgan Chase's investment securities portfolio
- the loss of deposits to the extent 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, and
- 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 interest rate environment may cause:

- net interest margins to be compressed, which could reduce the amounts that JPMorgan Chase earns on its investment securities portfolio to the extent that it is unable to reinvest contemporaneously in higher-yielding instruments, 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 financial instruments which JPMorgan Chase owns or in which it makes markets, which may have an adverse effect on JPMorgan Chase's results of operations.

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. Furthermore, under these conditions, market participants are particularly exposed to trading strategies employed by many market participants simultaneously and on a large scale. JPMorgan Chase's risk management and monitoring processes seek to quantify and mitigate risk to more extreme market moves. However, severe market events have historically been difficult to predict and JPMorgan Chase could realize significant losses if extreme market events were to occur.

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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. 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 in the event that 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 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.

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.

JPMorgan Chase’s businesses can be harmed by the insolvency of a significant market participant.

The 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. These risks could be magnified in the event of the default, insolvency or resolution of a major global financial counterparty, as JPMorgan Chase is likely to have significant interrelationships with, and credit exposure to, such a counterparty, 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’s clearing services business is exposed to the risk of client or counterparty default.

As part of its clearing services activities, JPMorgan Chase is a member of several CCPs. In the event that another member of such an organization defaults on its obligations to the CCP, JPMorgan Chase may be required to pay a portion of any losses incurred by the CCP as a result of that default. As a clearing member, 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 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 nondefault losses incurred by a CCP due to a business or operational failure affecting the CCP, including due to a cyberattack, litigation, fraud or a systems failure.

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 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.

Disruptions in the liquidity or transparency of the financial markets could cause JPMorgan Chase to be unable to sell, syndicate or realize the value of its positions in various debt instruments, loans, derivatives and other obligations, and thereby lead to increased risk concentrations. 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 increase JPMorgan Chase's capital requirements and funding costs and adversely affect the profitability of JPMorgan Chase's businesses.

Liquidity

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

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

- market-wide illiquidity or disruption
- unforeseen cash or capital requirements
- 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 diminution of JPMorgan Chase's liquidity may be caused by events over which it has little or no control. For example, during the 2008-2009 financial crisis, periods of low investor confidence and significant market illiquidity resulted in higher funding costs for JPMorgan Chase and limited its access to some of its traditional sources of liquidity, including securitized debt issuances. There is no assurance that severe conditions of this type will not occur in the future.

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 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 intercompany indebtedness owing 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

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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 regulation, reform and replacement of benchmark rates could have adverse consequences on JPMorgan Chase's securities issuances and its capital markets and investment activities.

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 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, the transition of a particular benchmark to a replacement rate could affect hedge accounting relationships between financial instruments linked to that benchmark and any related derivatives, which could adversely affect JPMorgan Chase's results.

On July 27, 2017, the Chief Executive of the U.K. Financial Conduct Authority (the "FCA"), which regulates the London interbank offered rate ("LIBOR"), announced that the FCA will no longer persuade or compel banks to submit rates for the calculation of the LIBOR benchmark after 2021. This announcement indicates that the continuation of LIBOR on the current basis cannot be guaranteed after 2021, and there is a substantial risk that LIBOR will be discontinued or modified by 2021. Vast amounts of loans, mortgages, securities, derivatives and other financial instruments are linked to the LIBOR benchmark, and any failure by market participants and regulators to successfully introduce benchmark rates to replace LIBOR and implement effective transitional arrangements to address the discontinuation of LIBOR could, as noted above, result in disruption in the financial markets, suppress capital markets activities and give rise to litigation claims, all of which could have a negative impact on JPMorgan Chase's results of operations and on LIBOR-linked securities or other instruments which are issued, funded or held by JPMorgan Chase.

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
- 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 continues 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 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

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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. For example, ineffective controls over newly-developed electronic trading platforms could inadvertently permit the rapid build-up of unexpected, abnormal or unusually large positions in securities or other financial instruments, or fail to anticipate or address a downturn in market liquidity which leads to sudden or severe changes in asset prices. Any significant failure to identify and mitigate operational risks associated with new products or services or new platforms for delivering or distributing products or services, or changes to existing products, services or delivery platforms, 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
- 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, 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.

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, and to offer products and services that meet the expectations of its clients and customers, is highly dependent on the competence and trustworthiness 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 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.

Recent, 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 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. 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.

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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 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, and
- third parties may seek to gain access to JPMorgan Chase's systems either directly or using equipment or security passwords belonging to employees, customers, third-party service providers or other users of JPMorgan Chase's systems.

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

JPMorgan Chase may not be able to immediately address the consequences of a security breach due to a cyberattack.

A successful breach of JPMorgan Chase's computer systems, software, networks or other technology assets due to a cyberattack could occur and persist for an extended period of time before being detected due to:

- the breadth of JPMorgan Chase's operations and the high volume of transactions that it processes
- the large number of customers, counterparties and third-party service providers with which JPMorgan Chase does business
- the proliferation and increasing sophistication of cyberattacks, and
- the possibility that a third party, after establishing a foothold on an internal network without being detected, might obtain access to other networks and systems.

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 and full and reliable information about the attack is known. 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. 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 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
- natural disasters or severe weather conditions

- health emergencies or pandemics, or
- events arising from local or larger-scale political events, including outbreaks of hostilities or terrorist acts.

JPMorgan Chase maintains a firm-wide resiliency and crisis management program that is intended to ensure the ability 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. Furthermore, 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 and procedures may not be effective in identifying and mitigating every risk to JPMorgan Chase.

JPMorgan Chase's risk management framework is intended to mitigate risk and loss. The framework includes both the "first line of defense," consisting of each line of business and Treasury and the Chief Investment Office, including their aligned Operations, Technology and Control Management groups, and the "second line of defense," consisting of Independent Risk Management. JPMorgan Chase has established processes and procedures to identify, measure, monitor, report and analyze the types of risk to which it is subject. However, there are inherent limitations to risk management strategies because there may be existing or future risks that JPMorgan Chase has not appropriately anticipated or identified.

Any inadequacy or lapse in JPMorgan Chase's risk management framework, governance structure, procedures and 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
- 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.

JPMorgan Chase establishes allowances for probable credit losses that are inherent in its credit exposures. It then employs stress testing and other techniques to determine the capital and liquidity necessary 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.

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 assess and implement mitigating 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

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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 standards for vendor risk management can result in higher costs and other potential exposures.

JPMorgan Chase must comply with enhanced standards for the assessment and management of risks associated with doing business with vendors and other third-party service providers. These requirements are contained both in bank regulatory regulations and guidance and in certain consent orders to which JPMorgan Chase has been subject. JPMorgan Chase incurs significant costs and expenses in connection with its initiatives to address the risks associated with oversight of its third party relationships. JPMorgan Chase's failure to appropriately assess and manage third-party 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
- increased operational costs, or
- harm to JPMorgan Chase's reputation.

Requirements for physical settlement and delivery in trading agreements could expose JPMorgan Chase to operational and other risks.

Certain of JPMorgan Chase's markets transactions require the physical settlement by delivery of securities or other obligations that JPMorgan Chase does not own. If JPMorgan Chase is unable to obtain the obligations within the required timeframe, JPMorgan Chase could forfeit payments otherwise due. Failures could also result in settlement delays, which could damage JPMorgan Chase's reputation and ability to transact business. Failure to timely settle and confirm transactions could also subject JPMorgan Chase to heightened credit and operational risk, and losses in the event of a default.

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 allowances 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 securities 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. 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.

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 material effect on JPMorgan Chase's financial statements and may adversely affect its financial results or investor perceptions of those results.

For example, on January 1, 2020, JPMorgan Chase and other U.S. companies will be required to implement a new accounting standard, commonly referred to as the Current Expected Credit Losses ("CECL") framework, which will require earlier recognition of expected credit losses on loans and certain other instruments, replacing the incurred loss model that is currently in use. JPMorgan Chase expects that under CECL, it will need to, among other things, increase the allowance for credit losses related to its loans and other lending-related commitments, which may have a negative impact on its capital levels.

This new accounting standard may result in greater volatility of JPMorgan Chase's earnings and capital levels over economic cycles and could potentially affect JPMorgan Chase's capital distribution plans, depending upon final guidance from the regulators. 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 new 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 results of 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 and 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
- effectively implement business decisions, including minimizing bureaucratic processes
- institute controls that appropriately address the risks associated with business activities and any changes in those activities
- offer products and services that are appropriately priced, meet the changing expectations of clients and customers and are delivered in ways that enhance client and customer satisfaction

- 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
- adequately respond to regulatory requirements
- appropriately address shareholder concerns

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- 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 strategic decisions, and a failure by the Board to perform this function could also impair JPMorgan Chase's results of operations.

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 regulatory scrutiny
- 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 or customer information
- not appropriately managing social and environmental risk issues associated with its business activities or those of its clients
- compliance or operational failures
- litigation or regulatory fines, penalties or other sanctions, and
- regulatory investigations or enforcement actions, or resolutions of these matters.

JPMorgan Chase's reputation could also be harmed by the failure or perceived failure of certain third 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 and other third parties with which JPMorgan Chase does business.

JPMorgan Chase's reputation or prospects may be significantly damaged by adverse publicity or negative information regarding JPMorgan Chase, whether or not true, that may be posted on social media, non-mainstream news services or other parts of the internet, and this 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 the health of consumers, 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.

Any of the above factors could negatively affect JPMorgan Chase's results of operations and its ability to maintain its competitive standing.

Actions by the financial services industry generally or by certain members of 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, the measures needed to address the associated reputational issues could increase JPMorgan Chase's operational and compliance costs and negatively affect its earnings.

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 has become increasingly complex as its business activities encompass more 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
- deliver appropriate standards of service and quality
- treat clients and customers with the appropriate standard of care
- 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

Adverse economic and political developments in a country or region, or globally, can have a negative impact on JPMorgan Chase's businesses.

JPMorgan Chase's businesses and earnings can be affected by the monetary, fiscal and other policies adopted by regulatory authorities and agencies in the countries in which JPMorgan Chase operates. Changes in fiscal policies by central banks or regulatory authorities, and the manner in which those policies are executed, are beyond JPMorgan Chase's control and may be difficult to predict. Consequently, unanticipated changes in these policies or the ways in which they are implemented could have a negative impact on JPMorgan Chase's businesses and results of operations.
Some countries or regions in which JPMorgan Chase operates or invests, or in which JPMorgan Chase may do business in the future, have in the past experienced severe

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economic disruptions particular to those countries or regions. Concerns regarding the fiscal condition of one or more countries, or the possibility that a particular country may decide to depart from a trade, monetary or political pact, can result in a deterioration of economic and market conditions within the affected countries or regions, including:

- slowing growth rates, rising inflation or recessionary economic conditions
- a contraction of available credit
- diminished investor and consumer confidence, including loss of confidence in local banking systems
- increased market volatility
- reduced commercial activity among trading partners, or
- the potential for currency redenomination or the dissolution of a political or economic alliance or treaty.

Any or all of these factors could have a negative impact on JPMorgan Chase's business and results of operations in the affected country or region.

These developments can also lead to a contagion which causes similar conditions to arise in other countries in the same region or beyond. Furthermore, governments in particular countries or regions in which JPMorgan Chase or its clients do business may choose to adopt protectionist economic or trade policies in response to concerns about domestic economic conditions or as countermeasures to policies or actions taken by other countries or regions. Any or all of these developments could lead to diminished cross-border trade and financing activity within that country or region, all of which could negatively affect JPMorgan Chase's business and earnings in those jurisdictions and increase its operational costs. If JPMorgan Chase takes steps to reduce its market and credit risk exposure within a particular country or region that is experiencing economic or political disruption, it may incur losses that are higher than expected because it will be disposing of assets when market conditions are likely to be highly unfavorable.

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 region 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, including the risks that a governmental entity may:

- default on or restructure its obligations
- claim that actions taken by government officials were beyond the legal authority of those officials, or
- repudiate 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, 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.

Competition

The financial services industry is highly competitive, and JPMorgan Chase's results of operations will suffer if it is not a strong, effective and forward-looking competitor.

JPMorgan Chase operates in a highly competitive environment and 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 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

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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.

Non-U.S. competitors of JPMorgan Chase's wholesale businesses outside the U.S. are typically subject to different, and in some cases, less stringent, legislative and regulatory regimes. The more restrictive laws and regulations applicable to JPMorgan Chase and other U.S. financial services institutions can put JPMorgan Chase and those firms at a competitive disadvantage to non-U.S. competitors. This could reduce the revenue and profitability of JPMorgan Chase's wholesale businesses, resulting from:

- prohibitions on engaging in certain transactions
- higher capital and liquidity requirements
- making JPMorgan Chase's pricing of certain transactions more expensive for clients, and
- adversely affecting JPMorgan Chase's cost structure for providing certain products.

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.

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 has commenced a project to demolish its former headquarters at 270 Park Avenue in New York City and to build a new headquarters on the same site.

The Firm owned or leased facilities in the following locations at December 31, 2018.

December 31, 2018 (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	9.7
Total New York City, New York	**10.8**
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	2.0
Jersey City, New Jersey	1.7
Dallas/Plano, Texas	1.4
All other U.S. locations	34.6
Total United States	**61.7**
Europe, the Middle East and Africa ("EMEA")	
25 Bank Street, London, U.K.	1.4
All other U.K. locations	3.1
All other EMEA locations	1.4
Total EMEA	**5.9**
Asia Pacific, Latin America and Canada	
India	3.4
All other locations	3.9
Total Asia Pacific, Latin America and Canada	**7.3**
Total	**74.9**

(a) At December 31, 2018, the Firm owned or leased 5,036 retail branches in 27 states and the District of Columbia.

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. For information on occupancy expense, refer to the Consolidated Results of Operations on pages 48–51.

Item 3. Legal Proceedings.

For a description of the Firm's material legal proceedings, refer to Note 29.

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. 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, 2018, refer to "Five-year stock performance," on page 41.

For information on the common dividend payout ratio, refer to Capital actions in the Capital Risk Management section of Management's discussion and analysis on pages 91-92. For a discussion of restrictions on dividend payments, refer to Note 20 and Note 25. On January 31, 2019, there were 195,417 holders of record of JPMorgan Chase common stock. For information regarding securities authorized for issuance under the Firm's employee share-based incentive plans, refer to Part III, Item 12 on page 33.

Repurchases under the common equity repurchase program

For information regarding repurchases under the Firm's common equity repurchase program, refer to Capital actions in the Capital Risk Management section of Management's discussion and analysis on pages 91-92.

Shares repurchased, on a settlement-date basis, pursuant to the common equity repurchase program during 2018 were as follows.

Year ended December 31, 2018	Total shares of common stock repurchased	Average price paid per share of common stock[(a)]	Aggregate repurchases of common equity (in millions)[(a)]	Dollar value of remaining authorized repurchase (in millions)[(a)]	
First quarter	41,419,035	$ 112.78	$ 4,671	$ 5,156	
Second quarter	45,299,370	109.67	4,968	188	(b)
Third quarter	39,282,276	112.41	4,416	16,309	
October	22,697,641	108.97	2,474	13,836	
November	15,389,818	109.25	1,681	12,155	
December	17,416,343	101.81	1,773	10,381	
Fourth quarter	55,503,802	106.80	5,928	10,381	
Year-to-date	181,504,483	$ 110.09	$ 19,983	$ 10,381	(c)

(a) Excludes commissions cost.

(b) The $188 million unused portion under the prior Board authorization was canceled when the $20.7 billion repurchase program was authorized by the Board of Directors on June 28, 2018.

(c) Represents the amount remaining under the $20.7 billion repurchase program.

Item 6. Selected Financial Data.

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

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 42–147. Such information should be read in conjunction with the Consolidated Financial Statements and Notes thereto, which appear on pages 150-286.

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

For a discussion of quantitative and qualitative disclosures about market risk, refer to the Market Risk Management section of Management’s discussion and analysis on pages 124–131.

Item 8. Financial Statements and Supplementary Data.

The Consolidated Financial Statements, together with the Notes thereto and the report thereon dated February 26, 2019, of PricewaterhouseCoopers LLP, the Firm’s independent registered public accounting firm, appear on pages 149-286.

Supplementary financial data for each quarter within the two years ended December 31, 2018, 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 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, 2018. Refer to "Management's report on internal control over financial reporting" on page 148.

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. For further information, refer to "Management's report on internal control over financial reporting" on page 148. 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, 2018, that has materially affected, or is reasonably likely to materially affect, the Firm's internal control over financial reporting.

Item 9B. Other Information.

None.

Part III

Item 10. Directors, Executive Officers and Corporate Governance.

Executive officers of the registrant

Name	Age (at December 31, 2018)	Positions and offices
James Dimon	62	Chairman of the Board and Chief Executive Officer; he had been President from July 2004 until January 2018.
Ashley Bacon	49	Chief Risk Officer since June 2013.
Lori A. Beer	51	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	51	Chief Executive Officer of Asset & Wealth Management since September 2009.
Stacey Friedman	50	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	49	Chief Financial Officer since January 2013.
Robin Leopold	54	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	53	Chief Executive Officer of Commercial Banking since January 2012.
Daniel E. Pinto	56	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	57	Head of Corporate Responsibility since 2011 and Chairman of the Mid-Atlantic Region since 2015.
Gordon A. Smith	60	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, 2018, 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 its2019 Annual Meeting of Stockholders to be held on May 21, 2019, which will be filed with the SEC within 120 days of the end of the Firm's fiscal year endedDecember 31, 2018.

Item 11. Executive Compensation.

Refer to Item 10.

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

For security ownership of certain beneficial owners and management, refer to Item 10.

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, 2018	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	12,462,572 [(a)]	$ 41.46	85,860,463 [(b)]
Total	12,462,572	$ 41.46	85,860,463

(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. For further discussion, refer to Note 9.

(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. For further discussion, refer to Note 9.

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 149.

2 Financial statement schedules

3 Exhibits

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).
3.2	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).
3.3	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).
3.4	Certificate of Designations for 5.45% Non-Cumulative Preferred Stock, Series P (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 5, 2013).
3.5	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).
3.6	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).
3.7	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).
3.8	Certificate of Designations for 6.70% Non-Cumulative Preferred Stock, Series T (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, 2014).
3.9	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).

3.10	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).
3.11	Certificate of Designations for 6.30% Non-Cumulative Preferred Stock, Series W (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 23, 2014).
3.12	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).
3.13	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).
3.14	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).
3.15	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).
3.16	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).
3.17	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).

3.18	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).
3.19	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).
3.20	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).
4.1(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).
4.1(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).
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).
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).
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).
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).
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).
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).

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.

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)
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)
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)
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)

Part IV

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)
10.7	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)
10.8	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)
10.9	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)
10.10	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)
10.11	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)
10.12	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)
10.13	Forms of JPMorgan Chase & Co. Long-Term Incentive Plan Terms & Conditions for restricted stock units for Operating Committee members (U.S., E.U. and U.K.), dated as of January 20, 2015 (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 March 31, 2015).(a)
10.14	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for restricted stock units for Operating Committee members, dated as of January 19, 2016 (incorporated by reference to Exhibit 10.21 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2015).(a)
10.15	Form of JPMorgan Chase & Co. Long-Term Incentive Plan Terms and Conditions for performance share units for Operating Committee members, dated as of January 19, 2016 (incorporated by reference to Exhibit 10.22 to the Annual Report on Form 10-K of JPMorgan Chase & Co. (File No. 1-5805) for the year ended December 31, 2015).(a)

10.16	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)
10.17	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)
10.18	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)(b)
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)
10.20	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.(b)
10.22	Plea Agreement dated May 20, 2015 between JPMorgan Chase & Co. and the U.S. Department of Justice (incorporated by reference to Exhibit 99.3 to the Current Report on Form 8-K of JPMorgan Chase & Co. (File No. 1-5805) filed May 20, 2015).
21	List of subsidiaries of JPMorgan Chase & Co.(b)

22	Annual Report on Form 11-K of The JPMorgan Chase 401(k) Savings Plan for the year ended December 31, 2018 (to be filed pursuant to Rule 15d-21 under the Securities Exchange Act of 1934).
23	Consent of independent registered public accounting firm.(b)
31.1	Certification.(b)
31.2	Certification.(b)
32	Certification pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.(c)
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)

(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 endedDecember 31, 2018, formatted in XBRL (eXtensible Business Reporting Language) interactive data files: (i) the Consolidated statements of income for the years ended December 31, 2018, 2017 and 2016, (ii) the Consolidated statements of comprehensive income for the years ended December 31, 2018, 2017 and 2016, (iii) the Consolidated balance sheets as of December 31, 2018 and 2017, (iv) the Consolidated statements of changes in stockholders' equity for the years ended December 31, 2018, 2017 and 2016, (v) the Consolidated statements of cash flows for the years ended December 31, 2018, 2017 and 2016, and (vi) the Notes to Consolidated Financial Statements.

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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)	**2018**	2017	2016	2015	2014
Selected income statement data					
Total net revenue	**$ 109,029**	$ 100,705	$ 96,569	$ 94,440	$ 95,994
Total noninterest expense	**63,394**	59,515	56,672	59,911	62,156
Pre-provision profit	**45,635**	41,190	39,897	34,529	33,838
Provision for credit losses	**4,871**	5,290	5,361	3,827	3,139
Income before income tax expense	**40,764**	35,900	34,536	30,702	30,699
Income tax expense	**8,290**	11,459	9,803	6,260	8,954
Net income	**$ 32,474**	$ 24,441 (f)	$ 24,733	$ 24,442	$ 21,745
Earnings per share data					
Net income: Basic	**$ 9.04**	$ 6.35	$ 6.24	$ 6.05	$ 5.33
Diluted	**9.00**	6.31	6.19	6.00	5.29
Average shares: Basic	**3,396.4**	3,551.6	3,658.8	3,741.2	3,808.3
Diluted	**3,414.0**	3,576.8	3,690.0	3,773.6	3,842.3
Market and per common share data					
Market capitalization	**$ 319,780**	$ 366,301	$ 307,295	$ 241,899	$ 232,472
Common shares at period-end	**3,275.8**	3,425.3	3,561.2	3,663.5	3,714.8
Book value per share	**70.35**	67.04	64.06	60.46	56.98
Tangible book value per share (“TBVPS”)[a]	**56.33**	53.56	51.44	48.13	44.60
Cash dividends declared per share	**2.72**	2.12	1.88	1.72	1.58
Selected ratios and metrics					
Return on common equity (“ROE”)	**13 %**	10 %	10 %	11 %	10 %
Return on tangible common equity (“ROTCE”)[a]	**17**	12	13	13	13
Return on assets (“ROA”)	**1.24**	0.96	1.00	0.99	0.89
Overhead ratio	**58**	59	59	63	65
Loans-to-deposits ratio	**67**	64	65	65	56
Liquidity coverage ratio (“LCR”) (average)[b]	**113**	119	N/A	N/A	N/A
Common equity tier 1 (“CET1”) capital ratio[c]	**12.0**	12.2	12.3	11.8	10.2
Tier 1 capital ratio[c]	**13.7**	13.9	14.0	13.5	11.6
Total capital ratio[c]	**15.5**	15.9	15.5	15.1	13.1
Tier 1 leverage ratio[c]	**8.1**	8.3	8.4	8.5	7.6
Supplementary leverage ratio (“SLR”)[d]	**6.4 %**	6.5 %	6.5 %	6.5 %	N/A
Selected balance sheet data (period-end)					
Trading assets	**$ 413,714**	$ 381,844	$ 372,130	$ 343,839	$ 398,988
Investment securities	**261,828**	249,958	289,059	290,827	348,004
Loans	**984,554**	930,697	894,765	837,299	757,336
Core Loans	**931,856**	863,683	806,152	732,093	628,785
Average core loans	**885,221**	829,558	769,385	670,757	596,823
Total assets	**2,622,532**	2,533,600	2,490,972	2,351,698	2,572,274
Deposits	**1,470,666**	1,443,982	1,375,179	1,279,715	1,363,427
Long-term debt	**282,031**	284,080	295,245	288,651	276,379
Common stockholders’ equity	**230,447**	229,625	228,122	221,505	211,664
Total stockholders’ equity	**256,515**	255,693	254,190	247,573	231,727
Headcount	**256,105**	252,539	243,355	234,598	241,359
Credit quality metrics					

Allowance for credit losses	**$14,500**	$14,672	$14,854	$14,341	$14,807
Allowance for loan losses to total retained loans	**1.39 %**	1.47 %	1.55 %	1.63 %	1.90 %
Allowance for loan losses to retained loans excluding purchased credit-impaired loans(e)	**1.23**	1.27	1.34	1.37	1.55
Nonperforming assets	**$5,190**	$6,426	$7,535	$7,034	$7,967
Net charge-offs	**4,856**	5,387	4,692	4,086	4,759
Net charge-off rate	**0.52 %**	0.60 %(g)	0.54 %	0.52 %	0.65 %

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

(a) TBVPS and ROTCE are non-GAAP financial measures. For a further discussion of these measures, refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57-59.

(b) For the years ended December 31, 2018 and 2017, the percentage represents the Firm's reported average LCR for the three months ended December 31, 2018 and 2017, per the U.S. LCR public disclosure requirements which became effective April 1, 2017. Refer to Liquidity Risk Management on pages 95–100 for additional information on the Firm's LCR.

(c) Ratios presented are calculated under the Basel III Transitional capital rules and for the capital ratios represent the lower of the Standardized or Advanced approach. As of December 31, 2018, the Firm's capital ratios were equivalent whether calculated on a transitional or fully phased-in basis. Refer to Capital Risk Management on pages 85-94 for additional information on Basel III.

(d) Effective January 1, 2018, the SLR was fully phased-in under Basel III. The SLR is defined as Tier 1 capital divided by the Firm's total leverage exposure. Ratios prior to 2018 were calculated under the Basel III Transitional rules, per the SLR public disclosure requirements which became effective January 1, 2015.

(e) Excluded the impact of residential real estate purchased credit-impaired ("PCI") loans, a non-GAAP financial measure. For further discussion of these measures, refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures onpages 57-59, and the Allowance for credit losses on pages 120–122.

(f) On December 22, 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. For additional information related to the impact of the TCJA, refer to Note 24.

(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 Financial 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 Financial 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, 2013, in JPMorgan Chase common stock and in each of the above indices. The comparison assumes that all dividends are reinvested.

December 31, (in dollars)	2013	2014	2015	2016	2017	**2018**
JPMorgan Chase	$100.00	$109.88	$119.07	$160.23	$203.07	**$189.57**
KBW Bank Index	100.00	109.36	109.90	141.23	167.49	**137.82**
S&P Financial Index	100.00	115.18	113.38	139.17	169.98	**147.82**
S&P 500 Index	100.00	113.68	115.24	129.02	157.17	**150.27**

December 31,
(in dollars)

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, 2018. The MD&A is included in both JPMorgan Chase's Annual Report for the year ended December 31, 2018 ("Annual Report") and its Annual Report on Form 10-K for the year ended December 31, 2018 ("2018 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 2018 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. 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, refer to Forward-looking Statements on page 147) and Part I, Item 1A: Risk factors in the 2018 Form 10-K.

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 $2.6 trillion in assets and $256.5 billion in stockholders' equity as of December 31, 2018. 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 subsidiaries are JPMorgan Chase Bank, National Association ("JPMorgan Chase Bank, N.A."), a national banking association with U.S. branches in 27 states and the District of Columbia as of December 31, 2018, and Chase Bank USA, National Association ("Chase Bank USA, N.A."), a national banking association that is the Firm's principal credit card-issuing bank. In January 2019, the OCC approved an application of merger which was filed by JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. in December 2018 and which contemplates that Chase Bank USA, N.A. will merge with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. For additional information refer to Supervision and Regulation on pages 1-6 in the 2018 Form 10-K. 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 in the U.K. is J.P. Morgan Securities plc, a 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"). For a description of the Firm's business segments, and the products and services they provide to their respective client bases, refer to Business Segment Results on pages 60-78, and Note 31.

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 2018 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, this 2018 Form 10-K should be read in its entirety.

Effective January 1, 2018, the Firm adopted several new accounting standards, of which the most significant to the Firm was the guidance related to revenue recognition, and recognition and measurement of financial assets. The revenue recognition guidance requires gross presentation of certain costs that were previously offset against revenue. This change was adopted retrospectively and, accordingly, prior period amounts were revised, resulting in both total net revenue and total noninterest expense increasing with no impact to net income. 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. For additional information, refer to Note 1.

Financial performance of JPMorgan Chase

Year ended December 31, (in millions, except per share data and ratios)	**2018**	2017	Change
Selected income statement data			
Total net revenue	**$109,029**	$100,705	8 %
Total noninterest expense	**63,394**	59,515	7
Pre-provision profit	**45,635**	41,190	11
Provision for credit losses	**4,871**	5,290	(8)
Net income	**32,474**	24,441	33
Diluted earnings per share	**9.00**	6.31	43
Selected ratios and metrics			
Return on common equity	**13 %**	10 %	
Return on tangible common equity	**17**	12	
Book value per share	**$70.35**	$67.04	5
Tangible book value per share	**56.33**	53.56	5
Capital ratios[(a)]			
CET1	**12.0 %**	12.2 %	
Tier 1 capital	**13.7**	13.9	
Total capital	**15.5**	15.9	

(a) Ratios presented are calculated under the Basel III Transitional rules. As of December 31, 2018, the Firm's capital ratios were equivalent whether calculated on a transitional or fully phased-in basis. Refer to Capital Risk Management on pages 85-94 for additional information on Basel III.

Comparisons noted in the sections below are for the full year of 2018 versus the full year of 2017, unless otherwise specified.

Firmwide overview

JPMorgan Chase reported strong results for 2018, with record net income and EPS of $32.5 billion and $9.00 per share, respectively, on net revenue of $109.0 billion. Excluding the impact of the Tax Cuts & Jobs Acts ("TCJA"), net income and EPS were still records for a full year. The Firm reported ROE of 13% and ROTCE of 17%. For additional information related to the impact of the TCJA, refer to the Consolidated Results of Operations on pages 48–51 and Note 24.

- Net income increased 33%, reflecting higher net revenue and the impact of the lower U.S. federal statutory income tax rate as a result of the TCJA, partially offset by an increase in noninterest expense.
- Total net revenue increased 8%. Net interest income was $55.1 billion, up 10%, driven by the impact of higher rates, loan growth and Card margin expansion, partially offset by lower CIB Markets net interest income. Noninterest revenue was $54.0 billion, up 7%, largely driven by higher CIB Markets noninterest revenue and auto lease income,

partially offset by markdowns on certain legacy private equity investments and the impact of higher funding spreads on derivatives.

- Noninterest expense was $63.4 billion, up 7%, predominantly driven by investments in the business, including technology, marketing, higher compensation expense on increased headcount, and real estate, as well as higher revenue-related costs, including auto lease depreciation and volume-related transaction costs.
- The provision for credit losses was $4.9 billion, down from $5.3 billion in the prior year, reflecting a decrease in the consumer provision driven by a lower addition to the credit card allowance for credit losses and lower net charge-offs. The lower net charge-offs were primarily driven by recoveries from loan sales in the residential real estate portfolio, predominantly offset by higher net charge-offs in the credit card portfolio, as anticipated. The prior year also included a net $218 million write-down recorded in connection with the sale of the student loan portfolio. The decrease in the consumer provision was partially offset by an increase in the wholesale provision, reflecting additions to the allowance for loan losses from select client downgrades.
- The total allowance for credit losses was $14.5 billion at December 31, 2018, and the Firm had a loan loss coverage ratio, excluding the PCI portfolio, of 1.23%, compared with 1.27% in the prior year. The Firm's nonperforming assets totaled $5.2 billion at December 31, 2018, a decrease from $6.4 billion in the prior year, reflecting improved credit performance in the consumer portfolio, and reductions in the wholesale portfolio including repayments and loan sales.
- Firmwide average core loans and core loans excluding CIB both increased 7%.

Selected capital-related metrics

- The Firm's Basel III Fully Phased-In CET1 capital was $183.5 billion, and the Standardized and Advanced CET1 ratios were 12.0% and 12.9%, respectively.
- The Firm's Fully Phased-In supplementary leverage ratio ("SLR") was 6.4%.
- The Firm continued to grow tangible book value per share ("TBVPS"), ending 2018 at $56.33, up 5%.

ROTCE and TBVPS are each non-GAAP financial measures. Core loans and each of the Fully Phased-In capital and certain leverage measures are all considered key performance measures. For a further discussion of each of these 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 85-94.

Management's discussion and analysis

Lines of business highlights

Selected business metrics for each of the Firm's four lines of business are presented below for the full year of 2018.

- Revenue of $52.1 billion, up 12%; record net income of $14.9 billion, up 58%
- Average core loans up 6%; average deposits of $670 billion, up 5%
- Client investment assets of $282 billion, up 3%
- Credit card sales volume up 11% and merchant processing volume up 15%
- Record revenue of $36.4 billion, up 5%; record net income of $11.8 billion, up 9%
- Maintained #1 ranking for Global Investment Banking fees with 8.7% wallet share
- Record Equity Markets revenue of $6.9 billion, up 21%
- Investment Banking revenue up 2%; Treasury Services revenue up 13%; and Securities Services revenue up 8%
- Record revenue of $9.1 billion, up 5%; record net income of $4.2 billion, up 20%
- Average loan balances of $205.5 billion, up 4%
- Strong credit quality with net charge-offs of 3 bps
- Record revenue of $14.1 billion, up 2%; record net income of $2.9 billion, up 22%
- Average loan balances of $139 billion, up 12%
- Assets under management ("AUM") of $2.0 trillion, down 2%

For a detailed discussion of results by line of business, refer to the Business Segment Results on pages 60–61.

Credit provided and capital raised

JPMorgan Chase continues to support consumers, businesses and communities around the globe. The Firm provided credit and raised capital for wholesale and consumer clients during 2018, consisting of:

$227 billion	Credit for consumers
$24 billion	Credit for U.S. small businesses
$937 billion	Credit for corporations
$1.3 trillion	Capital raised for corporate clients and non-U.S. government entities
$57 billion	Credit and capital raised for U.S. governments and nonprofit entities[(a)]

(a) Includes states, municipalities, hospitals and universities.

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. 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, refer to Forward-Looking Statements on page 147 *and the Risk Factors section on* pages 7–28 . *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 2019 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 lines of business. The Firm expects that it will continue to make appropriate adjustments to its businesses and operations in response to ongoing developments in the legal, regulatory, business and economic environments in which it operates.

Firmwide

- Management expects full-year 2019 net interest income, on a managed basis, to be in excess of $58 billion, reflecting the annualized impact of 2018 interest rate increases, as well as expected loan and deposit growth.
- The Firm takes a disciplined approach to managing its expenses, while investing for growth and innovation. As a result, management expects Firmwide adjusted expense for the full-year 2019 to be less than $66 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 2019 net charge-offs to be less than $5.5 billion, higher than 2018, driven by growth.

First-quarter 2019

- Management expects the first-quarter 2019 net interest income, on a managed basis, to be approximately flat compared with the fourth-quarter of 2018.
- Firmwide adjusted expense for the first-quarter 2019 is expected to be up mid-single digits compared with the first quarter of 2018.
- Markets revenue for the first-quarter 2019 is expected to be lower when compared with the prior-year quarter by high-teens percentage points on a reported basis, and by low double-digit percentage points excluding the impact of the recognition and measurement accounting standard in the first quarter of 2018, depending on market conditions.

Management’s discussion and analysis

In 2016, the U.K. voted to withdraw from the European Union (“EU”), and in March 2017, the U.K. invoked Article 50 of the Lisbon Treaty, which commenced withdrawal negotiations with the EU. As a result, the U.K. is scheduled to depart from the EU on March 29, 2019. Negotiations regarding the terms of the U.K.’s withdrawal continue between the U.K. and the EU, although the situation remains highly uncertain.

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 16,000 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.

The Firm has been preparing for and continues to make significant progress in its readiness for the U.K.’s expected withdrawal from the EU, which is commonly referred to as “Brexit.” JPMorgan Chase established a Firmwide Brexit Implementation program in 2017. The program covers strategic implementation across all impacted businesses and functions. The program’s objective is to deliver the Firm’s capabilities on “day one” of the U.K.’s withdrawal across all impacted legal entities. The program includes an ongoing assessment of implementation risks including political, legal and regulatory risks and plans for addressing and mitigating those risks. The Firm is also monitoring the expected macroeconomic developments associated with a no-deal scenario and has undertaken stress testing covering credit and market risk to assess potential impacts.

Significant uncertainty remains around the U.K.’s expected departure from the EU, including the possibility that the U.K. departs without any agreement being reached on how U.K. financial services firms will conduct business within the EU (i.e., “a no-deal scenario”).

The Firm is planning for a U.K. withdrawal in the event that an agreement is reached, as well as for a no-deal scenario. Significant uncertainties exist under either potential outcome. For example, in planning for the U.K. withdrawal from the EU under a no-deal scenario, 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.

Regulatory and legal entity readiness

The Firm intends to leverage its existing EU legal entities, in Germany, Luxembourg and Ireland to conduct broader financial service activities. These legal entities are in advanced stages of readiness, including governance,

infrastructure, capital, local regulatory licenses and branch authorizations, as needed. The Firm anticipates that its EU legal entities will be ready to service its EU clients in March 2019, if required. There are some dependencies on final authorizations from the European Central Bank and jurisdictional National Competent Authorities to carry out new activity in the EU legal entities.

Client readiness

Where required, agreements with the Firm’s EU clients are being re-documented from current U.K. legal entities to existing EU legal entities to ensure continuation of service. This process involves establishing new agreements such as ISDA master agreements between clients and the relevant EU legal entity. There is a risk that not all clients will have the appropriate legal and operational arrangements in place upon the U.K.’s withdrawal from the EU. The Firm continues to actively engage with its clients to ensure preparedness and, to the extent possible, minimize operational disruption.

Business and operational readiness

The Firm is expecting to add several hundred employee positions in its various EU locations, including individuals who the Firm expects to relocate from the U.K. The Firm is preparing to be operational in the EU across all in-scope businesses and functions, including the build-out of technology, processes and controls, and the necessary resourcing in the EU locations across first, second and third line of defense functions.

The Firm and its EU legal entities’ access to market infrastructures such as trading venues, central counterparties (“CCPs”) and central settlement systems (“CSDs”) will need to be adjusted to comply with the evolving regulatory framework. Some uncertainty remains with respect to the readiness of the overall market ecosystem and connectivity between participants. The Firm continues to monitor the regulatory landscape and is preparing to take mitigating action, as needed, specifically in areas such as “contract continuity” that would allow U.K. entities to continue servicing trade lifecycle events.

In the event that the U.K.’s withdrawal from the EU is delayed through a transition deal or another mechanism, the Firm would have the required operational capabilities to conduct business from its EU legal entities, but the timing of any changes would be re-assessed to ensure that a strategic approach is taken. The Firm continues to closely monitor all negotiations and legislative developments and has developed an implementation plan that allows for flexibility given the continued uncertainty.

The Financial Stability Board (“FSB”) and the Financial Stability Oversight Council (“FSOC”) have observed that the secular decline in interbank short-term funding poses structural risks for unsecured benchmark interest rates such as Interbank Offered Rates (“IBORs”), and therefore 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.

IBORs are referenced in approximately $370 trillion of wholesale and consumer transactions globally spanning a broad range of financial products and contracts. Without advance transition planning for alternative benchmarks, sudden cessation of those broadly referenced rates could cause significant disruptions to gross flows of floating-rate payments and receipts. An abrupt cessation could also impair the normal functioning of a variety of markets, including commercial and consumer lending.

JPMorgan Chase established a Firmwide LIBOR Transition program in early 2018. The Firmwide CFO and the CEO of the CIB oversee the program as senior sponsors. When assessing risks associated with IBOR transition, the program considers three possible scenarios: disorderly transition, measured/regulated transition, and IBOR in continuity. These risks will continue to be monitored, along with any new risks that emerge as the program progresses. Plans to mitigate the risks associated with IBOR transition have been identified, with some already in the early stages of implementation. Model risk, for example, will be mitigated by the identification and migration of swap curves based on IBORs to new alternative reference rates.

Market participants are working closely with public sector representation as part of National Working Groups (“NWGs”) towards the common goal of facilitating an orderly transition from IBORs. Current NWG efforts include the 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 rates to use in various IBOR-indexed contracts when a particular IBOR ceases to be produced. The Firm is encouraging its clients to actively participate in industry consultations on fallback language in order to ensure the broadest possible industry engagement in and understanding of IBOR transition. The Firm continues to monitor the transition by clients from the current IBOR-referencing products to products referencing the new alternative reference rates.

NWGs are also working with accounting standard setters to manage the accounting implications of amending existing contracts to add fallback language and to change reference rates. Current efforts include the identification of potential accounting impacts and potential alternatives to mitigate those impacts through interpretation of existing accounting rules, or through transition relief from FASB and IASB standard setting.

The Firm continues to develop and implement plans to appropriately mitigate the risks associated with IBOR discontinuation as identified alternative reference rates develop, and liquidity in the markets referencing them increases. The Firm will continue to engage with regulators as the transition 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 three-year period ended December 31, 2018, unless otherwise specified. Factors that relate primarily to a single business segment are discussed in more detail within that business segment. For a discussion of the Critical Accounting Estimates Used by the Firm that affect the Consolidated Results of Operations, refer to pages 141-143.

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

Revenue

Year ended December 31, (in millions)	2018	2017	2016
Investment banking fees	**$7,550**	$7,412	$6,572
Principal transactions	**12,059**	11,347	11,566
Lending- and deposit-related fees	**6,052**	5,933	5,774
Asset management, administration and commissions	**17,118**	16,287	15,364
Investment securities gains/(losses)	**(395)**	(66)	141
Mortgage fees and related income	**1,254**	1,616	2,491
Card income	**4,989**	4,433	4,779
Other income[(a)]	**5,343**	3,646	3,799
Noninterest revenue	**53,970**	50,608	50,486
Net interest income	**55,059**	50,097	46,083
Total net revenue	**$109,029**	$100,705	$96,569

(a) Included operating lease income of $4.5 billion, $3.6 billion and $2.7 billion for the years ended December 31, 2018, 2017 and 2016, respectively.

2018 compared with 2017

Investment banking fees increased from a strong prior year, with overall share gains, reflecting:

- higher advisory fees driven by a higher number of large completed transactions, and
- higher equity underwriting fees driven by a higher share of fees, reflecting strong performance across products

predominantly offset by

- lower debt underwriting fees primarily driven by declines in industry-wide fee levels.

For additional information, refer to CIB segment results on pages 66-70 and Note 6.

Principal transactions revenue increased primarily reflecting higher revenue in CIB driven by:

- Equity Markets with strength across products, primarily in derivatives and prime brokerage, reflecting strong client activity, and
- Fixed Income Markets reflecting strong performance in Currencies & Emerging Markets, and higher revenue in Commodities compared to a challenging prior year, largely offset by lower revenue in Credit,

- the results also reflect a loss in Credit Adjustments & Other, largely driven by higher funding spreads on derivatives.

The increase in CIB was partially offset by private equity losses reflecting markdowns on certain legacy private equity investments compared with gains in the prior year in Corporate.

For additional information, refer to CIB and Corporate segment results on pages 66-70 and pages 77–78, respectively, and Note 6.

Asset management, administration and commissions revenue increased reflecting:

- higher asset management fees in AWM and CCB driven by higher average market levels and the cumulative impact of net inflows. For AWM, these were partially offset by fee compression and lower performance fees
- higher brokerage commissions driven by higher volumes in CIB and AWM, and higher asset-based fees in CIB.

For additional information, refer to AWM, CCB and CIB segment results on pages 74–76, pages 62–65 and pages 66-70, respectively, and Note 6.

For information on lending- and deposit-related fees, refer to the segment results for CCB on pages 62–65, CIB on pages 66-70, and CB on pages 71-73 and Note 6; on securities gains, refer to the Corporate segment discussion on pages 77–78.

Investment securities losses increased due to sales related to repositioning the investment securities portfolio.

Mortgage fees and related income decreased driven by:

- lower net production revenue reflecting lower production margins and volumes, as well as the impact of a loan sale,

partially offset by

- higher net mortgage servicing revenue reflecting higher MSR risk management results, predominantly offset by lower servicing revenue on a lower level of third-party loans serviced.

For further information, refer to CCB segment results on pages 62–65, Note 6 and 15.

Card income increased driven by:

- lower new account origination costs, and higher merchant processing fees on higher volumes,

largely offset by

- lower net interchange income reflecting higher rewards costs and partner payments, largely offset by higher card sales volumes. The rewards costs included an adjustment to the credit card rewards liability of approximately $330 million, recorded in the second quarter of 2018, driven by an increase in redemption rate assumptions.

For further information, refer to CCB segment results on pages 62–65 and Note 6.

Other income increased reflecting:

- higher operating lease income from growth in auto operating lease volume in CCB
- fair value gains of $505 million recognized in the first quarter of 2018 related to the adoption of the new recognition and measurement accounting guidance for certain equity investments previously held at cost
- the absence of the impact related to the enactment of the TCJA, which reduced the value of certain of CIB's tax-oriented investments by $520 million in the prior year

partially offset by

- lower investment valuations in AWM, and
- the absence of a legal benefit of $645 million that was recorded in the prior year in Corporate related to a settlement with the FDIC receivership for Washington Mutual and with Deutsche Bank as trustee of certain Washington Mutual trusts.

For further information, refer to Note 6.

Net interest income increased driven by the impact of higher rates, loan growth across the businesses, and Card margin expansion, partially offset by lower CIB Markets net interest income. The Firm's average interest-earning assets were $2.2 trillion, up $49 billion from the prior year, and the net interest yield on these assets, on an FTE basis, was 2.50%, an increase of 14 basis points from the prior year. The net interest yield excluding CIB Markets was 3.25%, an increase of 40 basis points. Net interest yield excluding CIB markets is a non-GAAP financial measure. For a further discussion of this measure, refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57-59.

2017 compared with 2016

Investment banking fees increased reflecting higher debt and equity underwriting fees in CIB. The increase in debt underwriting fees was driven by a higher share of fees and an overall increase in industry-wide fees; and the increase in equity underwriting fees was driven by growth in industry-wide issuance, including a strong initial public offering ("IPO") market.

Principal transactions revenue decreased compared with a strong prior year in CIB, primarily reflecting:

- lower Fixed Income-related revenue driven by sustained low volatility and tighter credit spreads

partially offset by

- higher Equity-related revenue primarily in Prime Services, and
- higher Lending-related revenue reflecting lower fair value losses on hedges of accrual loans.

Asset management, administration and commissions revenue increased as a result of higher asset management fees in AWM and CCB, and higher asset-based fees in CIB, both driven by higher market levels

Mortgage fees and related income decreased driven by lower MSR risk management results, lower net production revenue on lower margins and volumes, and lower servicing revenue on lower average third-party loans serviced.

Card income decreased predominantly driven by higher credit card new account origination costs, largely offset by higher card-related fees, primarily annual fees.

Other income decreased primarily due to:

- lower other income in CIB largely driven by a $520 million impact related to the enactment of the TCJA, which reduced the value of certain of CIB's tax-oriented investments, and
- the absence in the current year of gains from
  - the sale of Visa Europe interests in CCB,
  - the redemption of guaranteed capital debt securities ("trust preferred securities"), and
  - the disposal of an asset in AWM

partially offset by

- higher operating lease income reflecting growth in auto operating lease volume in CCB, and
- a legal benefit of $645 million recorded in the second quarter of 2017 in Corporate related to a settlement with the FDIC receivership for Washington Mutual and with Deutsche Bank as trustee of certain Washington Mutual trusts.

Net interest income increased primarily driven by the net impact of higher rates and loan growth across the businesses, partially offset by declines in Markets net interest income in CIB. The Firm's average interest-earning assets were $2.2 trillion, up $79 billion from the prior year, and the net interest yield on these assets, on a fully taxable equivalent ("FTE") basis, was 2.36%, an increase of 11 basis points from the prior year. The net interest yield excluding CIB Markets was 2.85%, an increase of 26 basis points from the prior year.

Management's discussion and analysis

Provision for credit losses

Year ended December 31, (in millions)	**2018**	2017	2016
Consumer, excluding credit card	**$(63)**	$620	$467
Credit card	**4,818**	4,973	4,042
Total consumer	**4,755**	5,593	4,509
Wholesale	**116**	(303)	852
Total provision for credit losses	**$4,871**	$5,290	$5,361

2018 compared with 2017

The **provision for credit losses** decreased as a result of a decline in the consumer provision, partially offset by an increase in the wholesale provision

- the decrease in the **consumer, excluding credit card** portfolio in CCB was due to
  - lower net charge-offs in the residential real estate portfolio, largely driven by recoveries from loan sales, and
  - lower net charge-offs in the auto portfolio

  partially offset by

  - a $250 million reduction in the allowance for loan losses in the residential real estate portfolio — PCI, reflecting continued improvement in home prices and lower delinquencies; the reduction was $75 million lower than the prior year for the residential real estate portfolio — non credit-impaired
- the prior year also included a net $218 million write-down recorded in connection with the sale of the student loan portfolio, and
- the decrease in the **credit card** portfolio was due to
  - a $300 million addition to the allowance for loan losses, reflecting loan growth and higher loss rates, as anticipated; the addition was $550 million lower than the prior year,

  largely offset by

  - higher net charge-offs due to seasoning of more recent vintages, as anticipated, and
- in **wholesale** , the current period expense of $116 million reflected additions to the allowance for loan losses from select client downgrades,

  largely offset by

  - other net portfolio activity, including a reduction in the allowance for loan losses related to a single name in the Oil & Gas portfolio in the first quarter of 2018, compared to a net benefit of $303 million in the prior year. The prior year benefit reflected a reduction in the allowance for loan losses on credit quality improvements in the Oil & Gas, Natural Gas Pipelines, and Metals and Mining portfolios.

For a more detailed discussion of the credit portfolio and the allowance for credit losses, 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 120–122 and Note 13.

2017 compared with 2016

The **provision for credit losses** decreased as a result of:

- a net $422 million reduction in the wholesale allowance for credit losses, reflecting credit quality improvements in the Oil & Gas, Natural Gas Pipelines, and Metals & Mining portfolios, compared with an addition of $511 million in the prior year driven by downgrades in the same portfolios

predominantly offset by

- a higher consumer provision driven by
  - $450 million of higher net charge-offs, primarily in the credit card portfolio due to growth in newer vintages which, as anticipated, have higher loss rates than the more seasoned portion of the portfolio, partially offset by a decrease in net charge-offs in the residential real estate portfolio reflecting continued improvement in home prices and delinquencies,
  - a $416 million higher addition to the allowance for credit losses related to the credit card portfolio driven by higher loss rates and loan growth, and a lower reduction in the allowance for the residential real estate portfolio

predominantly driven by continued improvement in home prices and delinquencies, and
a net $218 million write-down recorded in connection with the sale of the student loan portfolio.

Noninterest expense

Year ended December 31, (in millions)	2018	2017	2016
Compensation expense	**$33,117**	$31,208	$30,203
Noncompensation expense:			
Occupancy	**3,952**	3,723	3,638
Technology, communications and equipment	**8,802**	7,715	6,853
Professional and outside services	**8,502**	7,890	7,526
Marketing	**3,290**	2,900	2,897
Other[a][b]	**5,731**	6,079	5,555
Total noncompensation expense	**30,277**	28,307	26,469
Total noninterest expense	**$63,394**	$59,515	$56,672

(a) Included Firmwide legal expense/(benefit) of $72 million, $(35) million and $(317) million for the years ended December 31, 2018, 2017 and 2016, respectively.

(b) Included FDIC-related expense of $1.2 billion, $1.5 billion and $1.3 billion for the years ended December 31, 2018, 2017 and 2016, respectively.

2018 compared with 2017

Compensation expense increased driven by investments in headcount across the businesses, including bankers and advisors, as well as technology and other support staff, and higher revenue-related compensation expense largely in CIB.

Noncompensation expense increased as a result of:

- higher depreciation expense due to growth in auto operating lease volume in CCB
- higher outside services expense primarily due to higher volume-related transaction costs in CIB and higher external fees on revenue growth in AWM
- higher investments in technology in the businesses and marketing in CCB
- a loss of $174 million on the liquidation of a legal entity, recorded in other expense in Corporate, in the second quarter of 2018, and
- higher legal expense, with a net benefit in the prior year

partially offset by

- lower FDIC-related expense as a result of the elimination of the surcharge at the end of the third quarter of 2018, and
- the absence of an impairment in CB on certain leased equipment

For additional information on the liquidation of a legal entity, refer to Note 23.

2017 compared with 2016

Compensation expense increased predominantly driven by investments in headcount in most businesses, including bankers and business-related support staff, and higher performance-based compensation expense, predominantly in AWM.

Noncompensation expense increased as a result of:

- higher depreciation expense from growth in auto operating lease volume in CCB
- contributions to the Firm’s Foundation
- a lower legal net benefit compared to the prior year
- higher FDIC-related expense, and
- an impairment in CB on certain leased equipment, the majority of which was sold subsequent to year-end

partially offset by

- the absence in the current year of two items totaling $175 million in CCB related to liabilities from a merchant in bankruptcy and mortgage servicing reserves

For a discussion of legal expense, refer to Note 29.

Income tax expense

Year ended December 31, (in millions, except rate)	2018	2017	2016

Income before income tax expense	**$40,764**	$35,900	$34,536
Income tax expense	**8,290**	11,459	9,803
Effective tax rate	**20.3 %**	31.9 %	28.4 %

2018 compared with 2017

The **effective tax rate** decreased in 2018 driven by

- the impact of the TCJA, including the reduction in the U.S. federal statutory income tax rate, a $302 million net tax benefit resulting from changes in the prior year estimates related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings, and the absence of the initial $1.9 billion impact from the TCJA's enactment in December 2017

the reduction in the effective tax rate was partially offset by

- the impact of higher pre-tax income, and the change in mix of income and expense subject to U.S. federal, state and local taxes. For further information, refer to Note 24.

2017 compared with 2016

The **effective tax rate** increased in 2017 driven by:

- a $1.9 billion increase to income tax expense representing the initial impact of the enactment of the TCJA. The increase was driven by the 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 incremental expense resulted in a 5.4 percentage point increase in the Firm's effective tax rate

partially offset by

- benefits resulting from the vesting of employee share-based awards related to the appreciation of the Firm's stock price upon vesting above their original grant price, and the release of a valuation allowance.

Management's discussion and analysis

CONSOLIDATED BALANCE SHEETS AND CASH FLOWS ANALYSIS

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

Consolidated balance sheets analysis

The following is a discussion of the significant changes between December 31, 2018 and 2017.

Selected Consolidated balance sheets data

December 31, (in millions)	2018	2017	Change
Assets			
Cash and due from banks	**$22,324**	$25,898	(14)%
Deposits with banks	**256,469**	405,406	(37)
Federal funds sold and securities purchased under resale agreements	**321,588**	198,422	62
Securities borrowed	**111,995**	105,112	7
Trading assets	**413,714**	381,844	8
Investment securities	**261,828**	249,958	5
Loans	**984,554**	930,697	6
Allowance for loan losses	**(13,445)**	(13,604)	(1)
Loans, net of allowance for loan losses	**971,109**	917,093	6
Accrued interest and accounts receivable	**73,200**	67,729	8
Premises and equipment	**14,934**	14,159	5
Goodwill, MSRs and other intangible assets	**54,349**	54,392	—
Other assets	**121,022**	113,587	7
Total assets	**$2,622,532**	$2,533,600	4 %

Cash and due from banks and deposits with banks decreased primarily as a result of a shift in the deployment of excess cash in Treasury and Chief Investment Office ("CIO") from deposits with Federal Reserve Banks to other short-term instruments (as noted below), based on market opportunities. 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 increased primarily due to a shift in the deployment of excess cash in Treasury and CIO from deposits with banks to securities purchased under resale agreements, and higher client-driven market-making activities in CIB. For additional information on the Firm's Liquidity Risk Management, refer to pages 95–100.

Securities borrowed increased driven by higher demand for securities to cover short positions related to client-driven market-making activities in CIB.

Trading assets increased as a result of a shift in the deployment of excess cash in Treasury and CIO from deposits with banks into short-term instruments as well as client-driven market-making activities in CIB. For additional information, refer to Derivative contracts on pages 117–118, and Notes 2 and 5.

Investment securities increased primarily due to purchases of U.S. Treasury Bills, reflecting a shift in the deployment of excess cash in Treasury and CIO from deposits with banks. The increase was partially offset by net sales, paydowns and maturities largely of obligations of U.S. states and municipalities, commercial MBS and non-U.S. government debt securities. For additional information on investment

securities, refer to Corporate segment results on pages 77–78, Investment Portfolio Risk Management on page 123 and Notes 2 and 10.

Loans increased reflecting:

- higher loans across the wholesale businesses, primarily driven by commercial and industrial and financial institution clients in CIB and Wealth Management clients globally in AWM, and
- higher consumer loans driven by retention of originated high-quality prime mortgages in CCB and AWM, and growth in credit card loans. These were predominantly offset by mortgage paydowns and loan sales, lower home equity loans, run-off of PCI loans, and lower auto loans.

The **allowance for loan losses** decreased driven by:

- a reduction in the consumer allowance due to a $250 million reduction in the CCB allowance for loan losses in the residential real estate PCI portfolio, reflecting continued improvement in home prices and lower delinquencies, as well as a $187 million reduction in the allowance for write-offs of PCI loans partially due to loan sales. These reductions were largely offset by a $300 million addition to the allowance in the credit card portfolio, due to loan growth and higher loss rates, as anticipated.

For a more detailed discussion of loans and the allowance for loan losses, refer to Credit and Investment Risk Management on pages 102-123, and Notes 2, 3, 12 and 13.

Accrued interest and accounts receivable increased primarily reflecting higher client receivables related to client-driven activities in CIB.

Other assets increased reflecting higher auto operating lease assets from growth in business volume in CCB and higher alternative energy investments in CIB.
For information on Goodwill and MSRs, refer to Note 15.

Selected Consolidated balance sheets data

December 31, (in millions)	2018	2017	Change
Liabilities			
Deposits	**$1,470,666**	$1,443,982	2
Federal funds purchased and securities loaned or sold under repurchase agreements	**182,320**	158,916	15
Short-term borrowings	**69,276**	51,802	34
Trading liabilities	**144,773**	123,663	17
Accounts payable and other liabilities	**196,710**	189,383	4
Beneficial interests issued by consolidated variable interest entities (“VIEs”)	**20,241**	26,081	(22)
Long-term debt	**282,031**	284,080	(1)
Total liabilities	**2,366,017**	2,277,907	4
Stockholders’ equity	**256,515**	255,693	—
Total liabilities and stockholders’ equity	**$2,622,532**	$2,533,600	4 %

Deposits increased in CIB and CCB, largely offset by decreases in AWM and CB.

- The increase in CIB was predominantly driven by growth in operating deposits related to client activity in CIB’s Treasury Services business, and in CCB reflecting the continuation of growth from new accounts.
- The decrease in AWM was driven by balance migration predominantly into the Firm’s higher-yielding investment-related products. The decrease in CB was driven by a reduction in non-operating deposits.

For more information, refer to the Liquidity Risk Management discussion on pages 95–100; and Notes 2 and 17.

Federal funds purchased and securities loaned or sold under repurchase agreements increased reflecting higher client-driven market-making activities and higher secured financing of trading assets-debt and equity instruments in CIB.

Short-term borrowings increased reflecting short-term advances from Federal Home Loan Banks (“FHLBs”) and the net issuance of commercial paper in Treasury and CIO primarily for short-term liquidity management. For additional information, refer to Liquidity Risk Management on pages 95–100.

Trading liabilities increased predominantly as a result of client-driven market-making activities in CIB, which resulted in higher levels of short positions in equity instruments in Equity Markets, including prime brokerage. For additional information, refer to Derivative contracts on pages 117–118, and Notes 2 and 5.

Accounts payable and other liabilities increased partly as a result of higher client payables related to prime brokerage activities in CIB.

Beneficial interests issued by consolidated VIEs decreased due to net maturities of credit card securitizations. For further information on Firm-sponsored VIEs and loan securitization trusts, refer to Off-Balance Sheet Arrangements on pages 55–56 and Note 14 and 27.

Long-term debt decreased primarily driven by lower FHLB advances, predominantly offset by net issuance of structured notes in CIB, as well as net issuance of senior debt in Treasury and CIO. For additional information on the Firm’s long-term debt activities, refer to Liquidity Risk Management on pages 95–100 and Note 19.

For information on changes in stockholders’ equity, refer to page 153, and on the Firm’s capital actions, refer to Capital actions on pages 91-92.

Management's discussion and analysis

Consolidated cash flows analysis

The following is a discussion of cash flow activities during the years ended December 31, 2018, 2017 and 2016.

(in millions)	Year ended December 31,		
	2018	2017	2016
Net cash provided by/(used in)			
Operating activities	**$14,187**	$(10,827)	$21,884
Investing activities	**(197,993)**	28,249	(89,202)
Financing activities	**34,158**	14,642	98,271
Effect of exchange rate changes on cash	**(2,863)**	8,086	(1,482)
Net increase/(decrease) in cash and due from banks	**$(152,511)**	$40,150	$29,471

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 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 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, net originations of loans held-for-sale, and higher securities borrowed and other assets.
- In 2017, cash used primarily reflected a decrease in trading liabilities and accounts payable and other liabilities, and an increase in accrued interest and accounts receivable, partially offset by net income excluding noncash adjustments and a decrease in trading assets.
- In 2016, cash provided primarily reflected net income excluding noncash adjustments, partially offset by an increase in trading assets.

Investing activities

The Firm's investing activities predominantly include originating held-for-investment loans and investing in the securities portfolio and other short-term instruments.

- In 2018, cash used reflected an increase in securities purchased under resale agreements, higher net originations of loans and net purchases of investment securities.
- In 2017, cash provided reflected net proceeds from paydowns, maturities, sales and purchases of investment securities and a decrease in securities purchased under resale agreements, partially offset by net originations of loans.
- In 2016, cash used reflected net originations of loans, and an increase in securities purchased under resale agreements.

Financing activities

The Firm's financing activities include acquiring customer deposits and issuing long-term debt, as well as preferred and common stock.

- In 2018, cash provided reflected higher deposits, short-term borrowings, and securities loaned or sold under repurchase agreements.
- In 2017, cash provided reflected higher deposits and short-term borrowings, partially offset by a net decrease in long-term borrowings.
- In 2016, cash provided reflected higher deposits, net proceeds from long-term borrowings, and an increase in securities loaned or sold under repurchase agreements.
- For all periods, cash was used for repurchases of common stock and cash dividends on common and preferred stock.

* * *

For a further discussion of the activities affecting the Firm's cash flows, refer to Consolidated Balance Sheets Analysis on pages 52–53 , Capital Risk Management on pages 85-94, and Liquidity Risk Management on pages 95–100.

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 off-balance sheet under accounting principles generally accepted in the U.S. (“U.S. GAAP”).

Special-purpose entities

The Firm is involved with 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 deemed 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 2018 Form 10-K a discussion of the Firm’s various off-balance sheet arrangements can be found. In addition, refer to Note 1 for 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	244–251
Off-balance sheet lending-related financial instruments, guarantees, and other commitments	Refer to Note 27	271–276

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, 2018. 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 below 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. For a discussion of mortgage repurchase liabilities and other obligations, refer to Note 27.

Contractual cash obligations

By remaining maturity at December 31, (in millions)	**2018** 2019	2020-2021	2022-2023	After 2023	**Total**	2017 Total
On-balance sheet obligations						
Deposits[a]	**$ 1,447,407**	**$ 8,958**	**$ 6,227**	**$ 5,439**	**$ 1,468,031**	$ 1,437,464
Federal funds purchased and securities loaned or sold under repurchase agreements	**181,491**	**458**	**—**	**371**	**182,320**	158,916
Short-term borrowings[a]	**62,393**	**—**	**—**	**—**	**62,393**	42,664
Beneficial interests issued by consolidated VIEs	**13,502**	**5,075**	**1,400**	**281**	**20,258**	26,036
Long-term debt[a]	**26,889**	**75,816**	**37,171**	**118,782**	**258,658**	260,895
Other[b][c]	**5,592**	**1,687**	**1,669**	**2,846**	**11,794**	13,613
Total on-balance sheet obligations	**1,737,274**	**91,994**	**46,467**	**127,719**	**2,003,454**	1,939,588
Off-balance sheet obligations						
Unsettled resale and securities borrowed agreements[d]	**102,008**	**—**	**—**	**—**	**102,008**	76,859
Contractual interest payments[e]	**10,960**	**11,501**	**8,295**	**27,496**	**58,252**	54,103
Operating leases[f]	**1,561**	**2,840**	**2,111**	**4,480**	**10,992**	9,877
Equity investment commitments[c][g]	**262**	**2**	**—**	**7**	**271**	117
Contractual purchases and capital expenditures[c]	**1,948**	**1,048**	**543**	**60**	**3,599**	3,743
Obligations under co-brand programs	**356**	**728**	**566**	**287**	**1,937**	1,434
Total off-balance sheet obligations	**117,095**	**16,119**	**11,515**	**32,330**	**177,059**	146,133
Total contractual cash obligations	**$ 1,854,369**	**$ 108,113**	**$ 57,982**	**$ 160,049**	**$ 2,180,513**	$ 2,085,721

(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) 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.

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

(d) For further information, refer to unsettled resale and securities borrowed agreements in Note 27.

(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.

(f) Includes noncancelable operating leases for premises and equipment used primarily for banking purposes. Excludes the benefit of noncancelable sublease rentals of $825 million and $1.0 billion at December 31, 2018 and 2017, respectively. Refer to Note 28 for more information on lease commitments.

(g) Included unfunded commitments of $40 million at both December 31, 2018 and 2017, to third-party private equity funds, and $231 million and $77 million of unfunded commitments at December 31, 2018 and 2017, respectively, to other equity investments.

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 150-154. 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 lines of business 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 lines of business.

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. For additional information on these non-GAAP measures, refer to Business Segment Results on pages 60-78. 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.

	2018			2017			2016		
Year ended December 31, (in millions, except ratios)	Reported Results	Fully taxable-equivalent adjustments[(a)]	Managed basis	Reported Results	Fully taxable-equivalent adjustments[(a)]	Managed basis	Reported Results	Fully taxable-equivalent adjustments[(a)]	Managed basis
Other income	**$ 5,343**	**$ 1,877** [(b)]	**$ 7,220**	$ 3,646	$ 2,704	$ 6,350	$ 3,799	$ 2,265	$ 6,064
Total noninterest revenue	**53,970**	**1,877**	**55,847**	50,608	2,704	53,312	50,486	2,265	52,751
Net interest income	**55,059**	**628** [(b)]	**55,687**	50,097	1,313	51,410	46,083	1,209	47,292
Total net revenue	**109,029**	**2,505**	**111,534**	100,705	4,017	104,722	96,569	3,474	100,043
Pre-provision profit	**45,635**	**2,505**	**48,140**	41,190	4,017	45,207	39,897	3,474	43,371
Income before income tax expense	**40,764**	**2,505**	**43,269**	35,900	4,017	39,917	34,536	3,474	38,010
Income tax expense	**8,290**	**2,505** [(b)]	**10,795**	11,459	4,017	15,476	9,803	3,474	13,277
Overhead ratio	**58 %**	**NM**	**57 %**	59 %	NM	57 %	59 %	NM	57 %

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

(a) Predominantly recognized in CIB and CB business segments 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 interest 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)	**2018**	2017	2016
Net interest income – managed basis[a][b]	**$55,687**	$51,410	$47,292
Less: CIB Markets net interest income[c]	**3,087**	4,630	6,334
Net interest income excluding CIB Markets[a]	**$52,600**	$46,780	$40,958
Average interest-earning assets	**$2,229,188**	$2,180,592	$2,101,604
Less: Average CIB Markets interest-earning assets[c]	**609,635**	540,835	520,307
Average interest-earning assets excluding CIB Markets	**$1,619,553**	$1,639,757	$1,581,297
Net interest yield on average interest-earning assets – managed basis	2.50 %	2.36 %	2.25 %
Net interest yield on average CIB Markets interest-earning assets[c]	0.51	0.86	1.22
Net interest yield on average interest-earning assets excluding CIB Markets	3.25 %	2.85 %	2.59 %

(a) Interest includes the effect of related hedges. Taxable-equivalent amounts are used where applicable.

(b) For a reconciliation of net interest income on a reported and managed basis, refer to reconciliation from the Firm's reported U.S. GAAP results to managed basis on page 57.

(c) For further information on CIB's Markets businesses, refer to page69.

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 these measures help investors understand the effect of these items on reported results and provide an alternate presentation of the Firm's performance. For additional information on credit metrics and ratios excluding PCI loans, refer to Credit and Investment Risk Management on pages 102-123.

Tangible common equity, ROTCE and TBVPS

Tangible common equity ("TCE"), ROTCE and TBVPS are each non-GAAP financial measures. TCE represents the Firm's common stockholders' equity (i.e., total stockholders' equity less preferred stock) less goodwill and identifiable intangible assets (other than MSRs), net of related deferred tax liabilities. ROTCE measures the Firm's net income applicable to common equity as a percentage of average TCE. TBVPS represents the Firm's TCE at period-end divided by common shares at period-end. TCE, ROTCE and TBVPS are utilized by the Firm, as well as investors and analysts, in assessing the Firm's use of equity.

The following summary table provides a reconciliation from the Firm's common stockholders' equity to TCE.

	Period-end		Average		
			Year ended December 31,		
(in millions, except per share and ratio data)	**Dec 31, 2018**	Dec 31, 2017	**2018**	2017	2016
Common stockholders' equity	**$230,447**	$229,625	**$229,222**	$230,350	$224,631
Less: Goodwill	**47,471**	47,507	**47,491**	47,317	47,310
Less: Other intangible assets	**748**	855	**807**	832	922
Add: Certain deferred tax liabilities(a)(b)	**2,280**	2,204	**2,231**	3,116	3,212
Tangible common equity	**$184,508**	$183,467	**$183,155**	$185,317	$179,611
Return on tangible common equity	**NA**	NA	**17%**	12%	13%
Tangible book value per share	**$56.33**	$53.56	**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.

(b) Amounts presented for December 31, 2017 and later periods include the effect from revaluation of the Firm's net deferred tax liability as a result of the TCJA.

Key performance measures

The Firm considers the following to be key regulatory capital measures:

- Capital, risk-weighted assets ("RWA"), and capital and leverage ratios presented under Basel III Standardized and Advanced Fully Phased-In rules, and
- SLR calculated under Basel III Advanced Fully Phased-In rules.

The Firm, as well as banking regulators, investors and analysts, use these measures to assess the Firm's regulatory capital position and to compare the Firm's regulatory capital to that of other financial services companies.

For additional information on these measures, refer to Capital Risk Management on pages 85-94.

Core loans is also 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 a line of business 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. For a definition of 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.

Consumer Businesses			**Wholesale Businesses**			
Consumer & Community Banking			**Corporate & Investment Bank**		**Commercial Banking**	**Asset & Wealth Management**
Consumer & Business Banking	Home Lending	Card, Merchant Services & Auto	Banking	Markets & Investor Services	• Middle Market Banking	• Asset Management
• Consumer Banking/Chase Wealth Management • Business Banking	• Home Lending Production • Home Lending Servicing • Real Estate Portfolios	• Card Services – Credit Card – Merchant Services • Auto	• Investment Banking • Treasury Services • Lending	• Fixed Income Markets • Equity Markets • Securities Services • Credit Adjustments & Other	• Corporate Client Banking • Commercial Term Lending • Real Estate Banking	• Wealth Management

Description of business segment reporting methodology

Results of the business segments are intended to present each segment as if it were essentially 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 line of business 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 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.

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 of a business segment as if it were operating independently. 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. On at least an annual basis, the assumptions and methodologies used in capital allocation are assessed and as a result, the capital allocated to lines of business may change. For additional information on business segment capital allocation, refer to Line of business equity on page 91.

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 other costs related to corporate support units, or to certain technology and operations, 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.

Segment Results – Managed Basis

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

Net income in 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 tables summarize the Firm's results by segment for the periods indicated.

Year ended December 31,	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking		
(in millions, except ratios)	**2018**	2017	2016	**2018**	2017	2016	**2018**	2017	2016
Total net revenue	**$52,079**	$46,485	$44,915	**$36,448**	$34,657	$35,340	**$9,059**	$8,605	$7,453
Total noninterest expense	**27,835**	26,062	24,905	**20,918**	19,407	19,116	**3,386**	3,327	2,934
Pre-provision profit/(loss)	**24,244**	20,423	20,010	**15,530**	15,250	16,224	**5,673**	5,278	4,519
Provision for credit losses	**4,753**	5,572	4,494	**(60)**	(45)	563	**129**	(276)	282
Net income/(loss)	**14,852**	9,395	9,714	**11,773**	10,813	10,815	**4,237**	3,539	2,657
Return on equity ("ROE")	**28%**	17%	18%	**16%**	14%	16%	**20%**	17%	16%

Year ended December 31,	Asset & Wealth Management			Corporate			Total		
(in millions, except ratios)	**2018**	2017	2016	**2018**	2017	2016	**2018**	2017	2016
Total net revenue	**$14,076**	$13,835	$12,822	**$(128)**	$1,140	$(487)	**$111,534**	$104,722	$100,043
Total noninterest expense	**10,353**	10,218	9,255	**902**	501	462	**63,394**	59,515	56,672
Pre-provision profit/(loss)	**3,723**	3,617	3,567	**(1,030)**	639	(949)	**48,140**	45,207	43,371
Provision for credit losses	**53**	39	26	**(4)**	—	(4)	**4,871**	5,290	5,361
Net income/(loss)	**2,853**	2,337	2,251	**(1,241)**	(1,643)	(704)	**32,474**	24,441	24,733
Return on equity ("ROE")	**31%**	25%	24%	**NM**	NM	NM	**13%**	10%	10%

The following sections provide a comparative discussion of the Firms results by segment as of or for the years ended December 31, 2018, 2017 and 2016.

Management's discussion and analysis

CONSUMER & COMMUNITY BANKING

Consumer & Community Banking offers services to consumers and businesses through bank branches, ATMs, digital (including online and mobile) 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)	**2018**	2017	2016
Revenue			
Lending- and deposit-related fees	**$ 3,624**	$ 3,431	$ 3,231
Asset management, administration and commissions	**2,402**	2,212	2,093
Mortgage fees and related income	**1,252**	1,613	2,490
Card income	**4,554**	4,024	4,364
All other income	**4,428**	3,430	3,077
Noninterest revenue	**16,260**	14,710	15,255
Net interest income	**35,819**	31,775	29,660
Total net revenue	**52,079**	46,485	44,915
Provision for credit losses	**4,753**	5,572	4,494
Noninterest expense			
Compensation expense[(a)]	**10,534**	10,133	9,697
Noncompensation expense[(a)(b)]	**17,301**	15,929	15,208
Total noninterest expense	**27,835**	26,062	24,905
Income before income tax expense	**19,491**	14,851	15,516
Income tax expense	**4,639**	5,456	5,802
Net income	**$ 14,852**	$ 9,395	$ 9,714
Revenue by line of business			
Consumer & Business Banking	**$ 24,805**	$ 21,104	$ 18,659
Home Lending	**5,484**	5,955	7,361
Card, Merchant Services & Auto	**21,790**	19,426	18,895
Mortgage fees and related income details:			
Net production revenue	**268**	636	853
Net mortgage servicing revenue[(c)]	**984**	977	1,637
Mortgage fees and related income	**$ 1,252**	$ 1,613	$ 2,490
Financial ratios			

Return on equity	**28 %**	17 %	18 %
Overhead ratio	**53**	56	55

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) Effective in the first quarter of 2018, certain operations staff were transferred from CCB to CB. The prior period amounts have been revised to conform with the current period presentation. For a further discussion of this transfer, refer to CB segment results on page 71.

(b) Included operating lease depreciation expense of $3.4 billion, $2.7 billion and $1.9 billion for the years ended December 31, 2018, 2017 and 2016, respectively.

(c) Included MSR risk management results of $(111) million, $(242) million and $217 million for the years ended December 31, 2018, 2017 and 2016, respectively.

2018 compared with 2017

Net income was $14.9 billion, an increase of 58%.

Net revenue was $52.1 billion, an increase of 12%.

Net interest income was $35.8 billion, up 13%, driven by:

- higher deposit margins and growth in deposit balances in CBB, as well as margin expansion and higher loan balances in Card,

partially offset by

- higher rates driving loan spread compression in Home Lending and Auto.

Noninterest revenue was $16.3 billion, up 11%, driven by:

- higher auto lease volume,
- higher card income due to
  - lower new account origination costs, and higher merchant processing fees on higher volumes,

  largely offset by

  - lower net interchange income reflecting higher rewards costs and partner payments, largely offset by higher card sales volumes. The rewards costs included an adjustment to the credit card rewards liability of approximately $330 million in the second quarter of 2018, driven by an increase in redemption rate assumptions
- higher deposit-related fees, as well as higher asset management fees reflecting an increase in client investment assets,

partially offset by

- lower net production revenue reflecting lower mortgage production margins and volumes, as well as the impact of a loan 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 $27.8 billion, up 7%, driven by:

- investments in technology and marketing, and
- higher auto lease depreciation.

The provision for credit losses was $4.8 billion, a decrease of 15%, reflecting:

- a decrease in the consumer, excluding credit card portfolio due to
  - lower net charge-offs in the residential real estate portfolio, largely driven by recoveries from loan sales, and
  - lower net charge-offs in the auto portfolio

  partially offset by

  - a $250 million reduction in the allowance for loan losses in the residential real estate portfolio — PCI, reflecting continued improvement in home prices and lower delinquencies; the reduction was $75 million lower than the prior year for the residential real estate portfolio — non credit-impaired
- the prior year included a net $218 million write-down recorded in connection with the sale of the student loan portfolio, and
- a decrease in the credit card portfolio due to
  - a $300 million addition to the allowance for loan losses, reflecting loan growth and higher loss rates, as anticipated; the addition was $550 million lower than the prior year,

  largely offset by

  - higher net charge-offs due to seasoning of more recent vintages, as anticipated.

2017 compared with 2016

Net income was $9.4 billion, a decrease of 3%.

Net revenue was $46.5 billion, an increase of 3%.

Net interest income was $31.8 billion, up 7%, driven by:

- growth in deposit balances and higher deposit margins in CBB, as well as higher loan balances in Card,

partially offset by

- loan spread compression from higher rates, including the impact of higher funding costs in Home Lending and Auto,

and
- the impact of the sale of the student loan portfolio.

Noninterest revenue was $14.7 billion, down 4%, driven by:
- higher new account origination costs in Card,
- lower MSR risk management results,
- the absence in the current year of a gain on the sale of Visa Europe interests,
- lower net production revenue reflecting lower mortgage production margins and volumes, and
- lower mortgage servicing revenue as a result of a lower level of third-party loans serviced

largely offset by
- higher auto lease volume and
- higher card- and deposit-related fees.

Noninterest expense was $26.1 billion, up 5%, driven by:
- higher auto lease depreciation, and
- continued business growth

partially offset by
- two items totaling $175 million included in the prior year related to liabilities from a merchant bankruptcy and mortgage servicing reserves.

The provision for credit losses was $5.6 billion, an increase of 24%, reflecting:
- $445 million of higher net charge-offs, primarily in the credit card portfolio due to growth in newer vintages which, as anticipated, have higher loss rates than the more seasoned portion of the portfolio, partially offset by a decrease in net charge-offs in the residential real estate portfolio reflecting continued improvement in home prices and delinquencies,
- a $415 million higher addition to the allowance for credit losses related to the credit card portfolio driven by higher loss rates and loan growth, and a lower reduction in the allowance for the residential real estate portfolio predominantly driven by continued improvement in home prices and delinquencies, and
- a net $218 million impact in connection with the sale of the student loan portfolio.

The sale of the student loan portfolio during 2017 did not have a material impact on the Firm’s Consolidated Financial Statements.

Management's discussion and analysis

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2018	2017	2016
Selected balance sheet data (period-end)			
Total assets	**$557,441**	$552,601	$535,310
Loans:			
Consumer & Business Banking	**26,612**	25,789	24,307
Home equity	**36,013**	42,751	50,296
Residential mortgage	**203,859**	197,339	181,196
Home Lending	**239,872**	240,090	231,492
Card	**156,632**	149,511	141,816
Auto	**63,573**	66,242	65,814
Student	**—**	—	7,057
Total loans	**486,689**	481,632	470,486
Core loans	**434,466**	415,167	382,608
Deposits	**678,854**	659,885	618,337
Equity	**51,000**	51,000	51,000
Selected balance sheet data (average)			
Total assets	**$547,368**	$532,756	$516,354
Loans:			
Consumer & Business Banking	**26,197**	24,875	23,431
Home equity	**39,133**	46,398	54,545
Residential mortgage	**202,624**	190,242	177,010
Home Lending	**241,757**	236,640	231,555
Card	**145,652**	140,024	131,165
Auto	**64,675**	65,395	63,573
Student	**—**	2,880	7,623
Total loans	**478,281**	469,814	457,347
Core loans	**419,066**	393,598	361,316
Deposits	**670,388**	640,219	586,637
Equity	**51,000**	51,000	51,000
Headcount[(a)(b)]	**129,518**	133,721	132,384

(a) Effective in the first quarter of 2018, certain operations staff were transferred from CCB to CB. The prior period amounts have been revised to conform with the current period presentation. For a further discussion of this transfer, refer to CB segment results on page 71.
(b) During the third quarter of 2018, approximately 1,200 employees transferred from CCB to CIB as part of the reorganization of the Commercial Card business.

Selected metrics

As of or for the year ended December 31, (in millions, except ratio data)	2018	2017	2016
Credit data and quality statistics			
Nonaccrual loans[(a)(b)]	**$3,339**	$4,084	$4,708
Net charge-offs/(recoveries)[(c)]			
Consumer & Business Banking	**236**	257	257
Home equity	**(7)**	63	184
Residential mortgage	**(287)**	(16)	14
Home Lending	**(294)**	47	198
Card	**4,518**	4,123	3,442

Auto	**243**	331	285
Student	**—**	498 (g)	162
Total net charge-offs/(recoveries)	**$4,703**	$5,256 (g)	$4,344
Net charge-off/(recovery) rate(c)			
Consumer & Business Banking	**0.90 %**	1.03 %	1.10 %
Home equity(d)	**(0.02)**	0.18	0.45
Residential mortgage(d)	**(0.16)**	(0.01)	0.01
Home Lending(d)	**(0.14)**	0.02	0.10
Card	**3.10**	2.95	2.63
Auto	**0.38**	0.51	0.45
Student	**—**	NM	2.13
Total net charge-offs/(recovery) rate(d)	**1.04**	1.21 (g)	1.04
30+ day delinquency rate			
Home Lending(e)(f)	**0.77 %**	1.19 %	1.23 %
Card	**1.83**	1.80	1.61
Auto	**0.93**	0.89	1.19
Student	**—**	—	1.60 (h)
90+ day delinquency rate - Card	**0.92**	0.92	0.81
Allowance for loan losses			
Consumer & Business Banking	**$796**	$796	$753
Home Lending, excluding PCI loans	**1,003**	1,003	1,328
Home Lending — PCI loans(c)	**1,788**	2,225	2,311
Card	**5,184**	4,884	4,034
Auto	**464**	464	474
Student	**—**	—	249
Total allowance for loan losses(c)	**$9,235**	$9,372	$9,149

(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, 2018, 2017 and 2016, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $2.6 billion, $4.3 billion and $5.0 billion, respectively. At December 31, 2016, nonaccrual loans also excluded student loans insured by U.S. government agencies under the Federal Family Education Loan Program ("FFELP") of $263 million. 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, 2018, 2017 and 2016, excluded $187 million, $86 million and $156 million, respectively, of write-offs in the PCI portfolio. These write-offs decreased the allowance for loan losses for PCI loans. For further information on PCI write-offs, refer to Summary of changes in the allowance for credit losses on page 121.

(d) Excludes the impact of PCI loans. For the years ended December 31, 2018, 2017 and 2016, the net charge-off/(recovery) rates including the impact of PCI loans were as follows: (1) home equity of (0.02)%, 0.14% and 0.34%, respectively; (2) residential mortgage of (0.14)%, (0.01)% and 0.01%, respectively; (3) Home Lending of (0.12)%, 0.02% and 0.09%, respectively; and (4) total CCB of 0.98%, 1.12% and 0.95%, respectively.

(e) At December 31, 2018, 2017 and 2016, excluded mortgage loans insured by U.S. government agencies of $4.1 billion, $6.2 billion and $7.0 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 9.16%, 10.13% and 9.82% at December 31, 2018, 2017 and 2016, 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%.

(h) Excluded student loans insured by U.S. government agencies under FFELP of $468 million at December 31, 2016 that are 30 or more days past due. This amount has been excluded based upon the government guarantee.

Selected metrics

As of or for the year ended December 31, (in billions, except ratios and where otherwise noted)	2018		2017		2016	
Business Metrics						
CCB households (in millions)[(a)]	**61.7**		61.1		60.5	
Number of branches	**5,036**		5,130		5,258	
Active digital customers (in thousands)[(b)]	**49,254**		46,694		43,836	
Active mobile customers (in thousands)[(c)]	**33,260**		30,056		26,536	
Debit and credit card sales volume	**$ 1,016.9**		$ 916.9		$ 821.6	
Consumer & Business Banking						
Average deposits	**$ 656.5**		$ 625.6		$ 570.8	
Deposit margin	**2.38**	**%**	1.98	%	1.81	%
Business banking origination volume	**$ 6.7**		$ 7.3		$ 7.3	
Client investment assets	**282.5**		273.3		234.5	
Home Lending						
Mortgage origination volume by channel						
Retail	**$ 38.3**		$ 40.3		$ 44.3	
Correspondent	**41.1**		57.3		59.3	
Total mortgage origination volume[(d)]	**$ 79.4**		$ 97.6		$ 103.6	
Total loans serviced (period-end)	**$ 789.8**		$ 816.1		$ 846.6	
Third-party mortgage loans serviced (period-end)	**519.6**		553.5		591.5	
MSR carrying value (period-end)	**6.1**		6.0		6.1	
Ratio of MSR carrying value (period-end) to third-party mortgage loans serviced (period-end)	**1.17**	**%**	1.08	%	1.03	%
MSR revenue multiple[(e)]	**3.34**	**x**	3.09	x	2.94	x
Card, excluding Commercial Card						
Credit card sales volume	**$ 692.4**		$ 622.2		$ 545.4	
New accounts opened (in millions)	**7.8**		8.4		10.4	
Card Services						
Net revenue rate	**11.27**	**%**	10.57	%	11.29	%
Merchant Services						
Merchant processing volume	**$ 1,366.1**		$ 1,191.7		$ 1,063.4	

Auto			
Loan and lease origination volume	**$ 31.8**	$ 33.3	$ 35.4
Average Auto operating lease assets	**18.8**	15.2	11.0

(a) The prior period amounts have been revised to conform with the current period presentation.
(b) Users of all web and/or mobile platforms who have logged in within the past 90 days.
(c) Users of all mobile platforms who have logged in within the past 90 days.
(d) Firmwide mortgage origination volume was $86.9 billion, $107.6 billion and $117.4 billion for the years ended December 31, 2018, 2017 and 2016, respectively.
(e) 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).

Management's discussion and analysis

CORPORATE & INVESTMENT BANK

The Corporate & Investment Bank, which consists of Banking and Markets & Investor 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 & Investor Services is a global market-maker in cash securities and derivative instruments, and also offers sophisticated risk management solutions, prime brokerage, and research. Markets & Investor 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.

Effective January 1, 2018, the Firm adopted several new accounting standards; the guidance which had the most significant impact on the CIB segment results was revenue recognition, and recognition and measurement of financial assets. The revenue recognition guidance was applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

Selected income statement data

Year ended December 31, (in millions)	2018	2017	2016
Revenue			
Investment banking fees	**$7,473**	$7,356	$6,548
Principal transactions	**12,271**	10,873	11,089
Lending- and deposit-related fees	**1,497**	1,531	1,581
Asset management, administration and commissions	**4,488**	4,207	4,062
All other income	**1,239**	572	1,169
Noninterest revenue	**26,968**	24,539	24,449
Net interest income	**9,480**	10,118	10,891
Total net revenue[(a)(b)]	**36,448**	34,657	35,340
Provision for credit losses	**(60)**	(45)	563
Noninterest expense			
Compensation expense	**10,215**	9,531	9,540
Noncompensation expense	**10,703**	9,876	9,576
Total noninterest expense	**20,918**	19,407	19,116
Income before income tax expense	**15,590**	15,295	15,661
Income tax expense	**3,817**	4,482	4,846
Net income[(a)]	**$11,773**	$10,813	$10,815

(a) The full year 2017 results reflect the impact of the enactment of the TCJA including a decrease to net revenue of $259 million and a benefit to net income of $141 million. For additional information related to the impact of the TCJA, refer to Note 24.

(b) Included 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 $1.7 billion, $2.4 billion and $2.0 billion for the years ended December 31, 2018, 2017 and 2016, respectively.

Selected income statement data

Year ended December 31, (in millions, except ratios)	2018	2017	2016
Financial ratios			
Return on equity	**16 %**	14 %	16 %
Overhead ratio	**57**	56	54
Compensation expense as percentage of total net revenue	**28**	28	27
Revenue by business			
Investment Banking	**$ 6,987**	$ 6,852	$ 6,074
Treasury Services	**4,697**	4,172	3,643
Lending	**1,298**	1,429	1,208
Total Banking	**12,982**	12,453	10,925
Fixed Income Markets	**12,706**	12,812	15,259
Equity Markets	**6,888**	5,703	5,740
Securities Services	**4,245**	3,917	3,591
Credit Adjustments & Other[(a)]	**(373)**	(228)	(175)
Total Markets & Investor Services	**23,466**	22,204	24,415
Total net revenue	**$ 36,448**	$ 34,657	$ 35,340

(a) Consists primarily of credit valuation adjustments ("CVA") managed centrally within CIB and funding valuation adjustments ("FVA") on derivatives. Results 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. For additional information, refer to Notes 2, 3 and 23.

2018 compared with 2017

Net income was $11.8 billion, up 9%.

Net revenue was $36.4 billion, up 5%.

Banking revenue was $13.0 billion, up 4%. Investment Banking revenue was $7.0 billion, up 2% compared to a strong prior year, predominantly driven by higher advisory and equity underwriting fees, predominantly offset by lower debt underwriting fees. The Firm maintained its #1 ranking for Global Investment Banking fees with overall share gains, according to Dealogic. Advisory fees were $2.5 billion, up 17%, driven by a higher number of large completed transactions. Equity underwriting fees were $1.7 billion, up 15% driven by a higher share of fees reflecting strong performance across products. Debt underwriting fees were $3.3 billion, down 12%, compared to a strong prior year, primarily driven by declines in industry-wide fee levels. Treasury Services revenue was $4.7 billion, up 13%, driven by the impact of higher interest rates and growth in operating deposits as well as higher fees on increased payments volume. Lending revenue was $1.3 billion, down

9%, driven by lower net interest income primarily reflecting a change in the portfolio mix and overall spread compression, and higher gains in the prior year on securities received from restructurings.
Markets & Investor Services revenue was $23.5 billion, up 6%. The results included a reduction of approximately $620 million in tax-equivalent adjustments as a result of the TCJA, and approximately $500 million of fair value gains in the first quarter of 2018 related to the adoption of the new recognition and measurement accounting guidance for certain equity investments previously held at cost. Prior year results included a reduction of $259 million resulting from the enactment of the TCJA. Fixed Income Markets revenue was $12.7 billion, down 1%. Excluding the impact of the TCJA and fair value gains mentioned above, Fixed Income Markets revenue was down 2%. Rates and Credit revenue declined reflecting challenging market conditions in the fourth quarter of 2018 while lower revenue in Fixed Income Financing was driven by compressed margins. This decline was predominantly offset by strong performance including higher client activity in Currencies & Emerging Markets, and higher Commodities revenue compared to a challenging prior year. Equity Markets revenue was $6.9 billion, up 21%, or up 18% excluding the fair value loss of $143 million on a margin loan to a single client in the prior year, driven by strength across derivatives, prime brokerage and cash equities, reflecting strong client activity. Securities Services revenue was $4.2 billion, up 8%, driven by fee growth, higher interest rates and operating deposit growth partially offset by the impact of a business exit. Credit Adjustments & Other was a loss of $373 million, largely driven by higher funding spreads on derivatives.
The provision for credit losses was a benefit of $60 million, driven by a reduction in the allowance for credit losses in the first quarter of 2018 related to a single name in the Oil & Gas portfolio, predominantly offset by other net portfolio activity, which includes additions to the allowance for credit losses from select client downgrades. The prior year was a benefit of $45 million primarily driven by a net reduction in the allowance for credit losses in the Oil & Gas and Metals & Mining portfolios partially offset by a net increase in the allowance for credit losses for a single client.
Noninterest expense was $20.9 billion, up 8%, predominantly driven by investments in technology and bankers, higher performance-related compensation expense, volume-related transaction costs, and legal expense.

2017 compared with 2016

Net income was $10.8 billion, flat compared with the prior year, reflecting lower net revenue and higher noninterest expense, offset by a lower provision for credit losses, and a tax benefit resulting from the vesting of employee share-based awards. The current year included a $141 million benefit to net income as a result of the enactment of the TCJA.
Net revenue was $34.7 billion, down 2%.
Banking revenue was $12.5 billion, up 14% compared with the prior year. Investment banking revenue was $6.9 billion, up 13% from the prior year, driven by higher debt and equity underwriting fees. The Firm maintained its #1 ranking for Global Investment Banking fees, according to Dealogic. Debt underwriting fees were $3.7 billion, up 16% driven by a higher share of fees and an overall increase in industry-wide fees; the Firm maintained its #1 ranking globally in fees across high-grade, high-yield, and loan products. Equity underwriting fees were $1.5 billion, up 21% driven by growth in industry-wide issuance including a strong IPO market; the Firm ranked #2 in equity underwriting fees globally. Advisory fees were $2.2 billion, up 2%; the Firm maintained its #2 ranking for M&A. Treasury Services revenue was $4.2 billion, up 15%, driven by the impact of higher interest rates and growth in operating deposits. Lending revenue was $1.4 billion, up 18% from the prior year, reflecting lower fair value losses on hedges of accrual loans.
Markets & Investor Services revenue was $22.2 billion, down 9% from the prior year. Fixed Income Markets revenue was $12.8 billion, down 16%, as lower revenue across products was driven by sustained low volatility, tighter credit spreads, and the impact from the TCJA on tax-oriented investments of $259 million, against a strong prior year. Equity Markets revenue was $5.7 billion, down 1% from the prior year, and included a fair value loss of $143 million on a margin loan to a single client. Excluding the fair value loss, Equity Markets revenue was higher driven by higher revenue in Prime Services and cash equities, partially offset by lower revenue in derivatives. Securities Services revenue was $3.9 billion, up 9%, driven by the impact of higher interest rates and deposit growth, as well as higher asset-based fees driven by higher market levels. Credit Adjustments & Other was a loss of $228 million, driven by

valuation adjustments.

The provision for credit losses was a benefit of $45 million, which included a net reduction in the allowance for credit losses driven by the Oil & Gas and Metals & Mining portfolios partially offset by a net increase in the allowance for credit losses for a single client. The prior year was an expense of $563 million, which included an addition to the allowance for credit losses driven by the Oil & Gas and Metals & Mining portfolios.

Noninterest expense was $19.4 billion, up 2% compared with the prior year.

Management's discussion and analysis

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	**2018**	2017	2016
Selected balance sheet data (period-end)			
Assets	**$903,051**	$826,384	$803,511
Loans:			
Loans retained[(a)]	**129,389**	108,765	111,872
Loans held-for-sale and loans at fair value	**13,050**	4,321	3,781
Total loans	**142,439**	113,086	115,653
Core loans	**142,122**	112,754	115,243
Equity	**70,000**	70,000	64,000
Selected balance sheet data (average)			
Assets	**$922,758**	$857,060	$815,321
Trading assets-debt and equity instruments	**349,169**	342,124	300,606
Trading assets-derivative receivables	**60,552**	56,466	63,387
Loans:			
Loans retained[(a)]	**114,417**	108,368	111,082
Loans held-for-sale and loans at fair value	**6,412**	4,995	3,812
Total loans	**120,829**	113,363	114,894
Core loans	**120,560**	113,006	114,455
Equity	**70,000**	70,000	64,000
Headcount[(b)]	**54,480**	51,181	48,748

(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.
(b) During the third quarter of 2018 approximately 1,200 employees transferred from CCB to CIB as part of the reorganization of the Commercial Card business.

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	**2018**	2017	2016
Credit data and quality statistics			
Net charge-offs/(recoveries)	**$93**	$71	$168
Nonperforming assets:			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	**443**	812	467
Nonaccrual loans held-for-sale and loans at fair value	**220**	—	109
Total nonaccrual loans	**663**	812	576
Derivative receivables	**60**	130	223
Assets acquired in loan satisfactions	**57**	85	79
Total nonperforming assets	**780**	1,027	878
Allowance for credit losses:			
Allowance for loan losses	**1,199**	1,379	1,420
Allowance for lending-related commitments	**754**	727	801
Total allowance for credit losses	**1,953**	2,106	2,221
Net charge-off/(recovery) rate[(b)]	**0.08%**	0.07%	0.15 %
Allowance for loan losses to period-end loans retained	**0.93**	1.27	1.27
Allowance for loan losses to period-end loans retained, excluding trade finance and conduits[(c)]	**1.24**	1.92	1.86
Allowance for loan losses to nonaccrual loans retained[(a)]	**271**	170	304

Nonaccrual loans to total period-end loans	**0.47**	0.72	0.50

(a) Allowance for loan losses of $174 million, $316 million and $113 million were held against these nonaccrual loans at December 31, 2018, 2017 and 2016, respectively.
(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.
(c) Management uses allowance for loan losses to period-end loans retained, excluding trade finance and conduits, a non-GAAP financial measure, to provide a more meaningful assessment of CIB's allowance coverage ratio.

Investment banking fees

	Year ended December 31,		
(in millions)	**2018**	2017	2016
Advisory	**$2,509**	$2,150	$2,110
Equity underwriting	**1,684**	1,468	1,213
Debt underwriting[(a)]	**3,280**	3,738	3,225
Total investment banking fees	**$7,473**	$7,356	$6,548

(a) Includes loan syndications.

League table results – wallet share

Year ended December 31,	2018		2017		2016	
Based on fees[(a)]	**Rank**	**Share**	Rank	Share	Rank	Share
Long-term debt[(b)]						
Global	**#1**	**7.3 %**	#1	7.8 %	#1	6.8 %
U.S.	**1**	**11.2**	2	11.1	1	11.1
Equity and equity-related						
Global[(c)]	**1**	**9.1**	2	7.1	1	7.4
U.S.	**1**	**12.3**	1	11.6	1	13.4
M&A[(d)]						
Global	**2**	**8.9**	2	8.4	2	8.3
U.S.	**2**	**9.1**	2	9.1	2	9.8
Loan syndications						
Global	**1**	**9.5**	1	9.3	1	9.3
U.S.	**1**	**12.1**	1	11.0	2	11.9
Global investment banking fees [(e)]	**#1**	**8.7 %**	#1	8.1 %	#1	7.9 %

(a) Source: Dealogic as of January 1, 2019. Reflects the ranking of revenue wallet and market share.
(b) 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.
(c) Global equity and equity-related ranking includes rights offerings and Chinese A-Shares.
(d) Global M&A reflects the removal of any withdrawn transactions. U.S. M&A revenue wallet represents wallet from client parents based in the U.S.
(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. For a description of the composition of these income statement line items, refer to Notes 6 and 7.

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 to sell an instrument to the Firm and the price at which another market participant is willing 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)	2018			2017			2016		
	Fixed Income Markets	**Equity Markets**	**Total Markets**	Fixed Income Markets	Equity Markets	Total Markets	Fixed Income Markets	Equity Markets	Total Markets
Principal transactions	**$ 7,560**	**$ 5,566**	**$ 13,126**	$ 7,393	$ 3,855	$ 11,248	$ 8,347	$ 3,130	$ 11,477

Lending- and deposit-related fees	**197**	**6**	**203**	191	6	197	220	2	222
Asset management, administration and commissions	**410**	**1,794**	**2,204**	390	1,635	2,025	388	1,551	1,939
All other income	**952**	**22**	**974**	436	(21)	415	1,014	13	1,027
Noninterest revenue	**9,119**	**7,388**	**16,507**	8,410	5,475	13,885	9,969	4,696	14,665
Net interest income[a]	**3,587**	**(500)**	**3,087**	4,402	228	4,630	5,290	1,044	6,334
Total net revenue	**$ 12,706**	**$ 6,888**	**$ 19,594**	$ 12,812	$ 5,703	$ 18,515	$ 15,259	$ 5,740	$ 20,999
Loss days[b]	5			4			0		

(a) Declines in Markets net interest income in 2018 and 2017 were 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 126-128.

Management's discussion and analysis

Selected metrics

As of or for the year ended December 31, (in millions, except where otherwise noted)	**2018**	2017	2016
Assets under custody ("AUC") by asset class (period-end) (in billions):			
Fixed Income	**$ 12,440**	$ 13,043	$ 12,166
Equity	**8,078**	7,863	6,428
Other[a]	**2,699**	2,563	1,926
Total AUC	**$ 23,217**	$ 23,469	$ 20,520
Client deposits and other third party liabilities (average)[b]	**$ 434,422**	$ 408,911	$ 376,287

(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

Year ended December 31, (in millions, except where otherwise noted)	**2018**	2017	2016
Total net revenue[a]			
Europe/Middle East/Africa	**$ 12,102**	$ 11,328	$ 10,786
Asia/Pacific	**5,219**	4,525	4,915
Latin America/Caribbean	**1,394**	1,125	1,225
Total international net revenue	**18,715**	16,978	16,926
North America	**17,733**	17,679	18,414
Total net revenue	**$ 36,448**	$ 34,657	$ 35,340
Loans retained (period-end)[a]			
Europe/Middle East/Africa	**$ 26,524**	$ 25,931	$ 26,696
Asia/Pacific	**16,778**	15,248	14,508
Latin America/Caribbean	**5,060**	6,546	7,607
Total international loans	**48,362**	47,725	48,811
North America	**81,027**	61,040	63,061
Total loans retained	**$ 129,389**	$ 108,765	$ 111,872
Client deposits and other third-party liabilities (average)[a][b]			
Europe/Middle East/Africa	**$ 162,846**	$ 154,582	$ 135,979
Asia/Pacific	**82,867**	76,744	68,110
Latin America/Caribbean	**26,668**	25,419	22,914
Total international	**$ 272,381**	$ 256,745	$ 227,003
North America	**162,041**	152,166	149,284
Total client deposits and other third-party liabilities	**$ 434,422**	$ 408,911	$ 376,287
AUC (period-end)[a] (in billions)			
North America	**$ 14,359**	$ 13,971	$ 12,290
All other regions	**8,858**	9,498	8,230
Total AUC	**$ 23,217**	$ 23,469	$ 20,520

(a) Total net revenue is based predominantly on the domicile of the client or location of the trading desk, as applicable. Loans outstanding (excluding loans held-for-sale and loans at fair value), client deposits and other third-party liabilities, and AUC are based predominantly on the domicile of the client.
(b) Client deposits and other third party liabilities pertain to the Treasury Services and Securities Services businesses.

COMMERCIAL BANKING

Commercial Banking delivers extensive industry knowledge, local expertise and dedicated service to U.S. and U.S. multinational clients, including corporations, municipalities, financial institutions and nonprofit entities with annual revenue generally ranging from $20 million to $2 billion. In addition, CB provides financing to real estate investors and owners. Partnering with the Firm's other businesses, CB provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management to meet its clients' domestic and international financial needs.

Selected income statement data

Year ended December 31, (in millions)	**2018**	2017	2016
Revenue			
Lending- and deposit-related fees	**$870**	$919	$917
Asset management, administration and commissions	**73**	68	69
All other income[(a)]	**1,400**	1,535	1,334
Noninterest revenue	**2,343**	2,522	2,320
Net interest income	**6,716**	6,083	5,133
Total net revenue[(b)]	**9,059**	8,605	7,453
Provision for credit losses	**129**	(276)	282
Noninterest expense			
Compensation expense[(c)]	**1,694**	1,534	1,396
Noncompensation expense[(c)]	**1,692**	1,793	1,538
Total noninterest expense	**3,386**	3,327	2,934
Income before income tax expense	**5,544**	5,554	4,237
Income tax expense	**1,307**	2,015	1,580
Net income	**$4,237**	$3,539	$2,657

(a) Includes revenue from investment banking products and commercial card transactions.

(b) Total net revenue included tax-equivalent adjustments from income tax credits related to equity investments in designated community development entities that provide loans to qualified businesses in low-income communities, as well as tax-exempt income related to municipal financing activities of $444 million, $699 million and $505 million for the years ended December 31, 2018, 2017 and 2016, respectively. The decrease in taxable-equivalent adjustments reflects the impact of TCJA.

(c) Effective in the first quarter of 2018, certain Operations and Compliance staff were transferred from CCB and Corporate, respectively, to CB. As a result, expense for this staff is now reflected in CB's compensation expense with a corresponding adjustment for expense allocations reflected in noncompensation expense. CB's, Corporate's and CCB's previously reported headcount, compensation expense and noncompensation expense have been revised to reflect this transfer.

2018 compared with 2017

Net income was $4.2 billion, an increase of 20%.

Net revenue was $9.1 billion, an increase of 5%. Net interest income was $6.7 billion, an increase of 10%, reflecting higher deposit margins and loan growth, partially offset by lower loan spreads. Noninterest revenue was $2.3 billion, a decrease of 7%, reflecting lower Community Development Banking revenue, which was also impacted by the absence of the TCJA benefit in the prior year, and lower deposit fees, partially offset by higher investment banking revenue.

Noninterest expense was $3.4 billion, an increase of 2%, with continued investments in banker coverage and technology in the current year predominantly offset by the absence of an impairment on certain leased equipment in the prior year.

The provision for credit losses was an expense of $129 million, driven by select client downgrades. The prior year provision for credit losses was a benefit of $276 million.

2017 compared with 2016

Net income was $3.5 billion, an increase of 33%, driven by higher net revenue and a lower provision for credit losses, partially offset by higher noninterest expense.

Net revenue was $8.6 billion, an increase of 15%. Net interest income was $6.1 billion, an increase of 19%, driven by higher deposit spreads and loan growth. Noninterest revenue was $2.5 billion, an increase of 9%, predominantly driven by higher Community Development Banking revenue, including a $115 million benefit for the impact of the TCJA on certain investments, and higher investment banking revenue.

Noninterest expense was $3.3 billion, an increase of 13% driven by hiring of bankers and business-related support staff, investments in technology, and an impairment of approximately $130 million on certain leased equipment, the majority of which was sold subsequent to year-end.

The provision for credit losses was a benefit of $276 million, driven by net reductions in the allowance for credit losses, including in the Oil & Gas, Natural Gas Pipelines and Metals & Mining portfolios. The prior year provision for credit losses was $282 million driven by downgrades in the Oil & Gas portfolio and select client downgrades in other industries.

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.

CB is divided into four primary client segments: Middle Market Banking, Corporate Client Banking, Commercial Term Lending, and Real Estate

Banking.
Middle Market Banking covers corporate, municipal and nonprofit clients, with annual revenue generally ranging between $20 million and $500 million.
Corporate Client Banking covers clients with annual revenue generally ranging between $500 million and $2 billion and focuses on clients that have broader investment banking needs.
Commercial Term Lending primarily provides term financing to real estate investors/owners for multifamily properties as well as office, retail and industrial properties.
Real Estate Banking provides full-service banking to investors and developers of institutional-grade real estate investment properties.
Other primarily includes lending and investment-related activities within the Community Development

Banking business.

Selected income statement data (continued)

Year ended December 31, (in millions, except ratios)	**2018**	2017	2016
Revenue by product			
Lending	**$ 4,049**	$ 4,094	$ 3,795
Treasury services	**4,074**	3,444	2,797
Investment banking[(a)]	**852**	805	785
Other	**84**	262	76
Total Commercial Banking net revenue	**$ 9,059**	$ 8,605	$ 7,453
Investment banking revenue, gross[(b)]	**$ 2,491**	$ 2,385	$ 2,331
Revenue by client segment			
Middle Market Banking	**$ 3,708**	$ 3,341	$ 2,848
Corporate Client Banking	**2,984**	2,727	2,429
Commercial Term Lending	**1,366**	1,454	1,408
Real Estate Banking	**681**	604	456
Other	**320**	479	312
Total Commercial Banking net revenue	**$ 9,059**	$ 8,605	$ 7,453
Financial ratios			
Return on equity	**20 %**	17 %	16 %
Overhead ratio	**37**	39	39

(a) Includes total Firm revenue from investment banking products sold to CB clients, net of revenue sharing with the CIB.

(b) Represents total Firm revenue from investment banking products sold to CB clients. As a result of the adoption of the revenue recognition guidance, prior period amounts have been revised to conform with the current period presentation. For additional information, refer to Note 1.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	**2018**	2017	2016
Selected balance sheet data (period-end)			
Total assets	**$220,229**	$221,228	$214,341
Loans:			
Loans retained	**204,219**	202,400	188,261
Loans held-for-sale and loans at fair value	**1,978**	1,286	734
Total loans	**$206,197**	$203,686	$188,995
Core loans	**206,039**	203,469	188,673
Equity	**20,000**	20,000	16,000
Period-end loans by client segment			
Middle Market Banking	**$56,656**	$56,965	$53,929
Corporate Client Banking	**48,343**	46,963	43,027
Commercial Term Lending	**76,720**	74,901	71,249
Real Estate Banking	**17,563**	17,796	14,722
Other	**6,915**	7,061	6,068
Total Commercial Banking loans	**$206,197**	$203,686	$188,995
Selected balance sheet data (average)			
Total assets	**$218,259**	$217,047	$207,532
Loans:			
Loans retained	**204,243**	197,203	178,670
Loans held-for-sale and loans at fair value	**1,258**	909	723
Total loans	**$205,501**	$198,112	$179,393
Core loans	**205,320**	197,846	178,875
Client deposits and other third-party liabilities	**170,901**	177,018	174,396
Equity	**20,000**	20,000	16,000
Average loans by client segment			
Middle Market Banking	**$57,092**	$55,474	$52,242
Corporate Client Banking	**47,780**	46,037	41,756
Commercial Term Lending	**75,694**	73,428	66,700
Real Estate Banking	**17,808**	16,525	13,063
Other	**7,127**	6,648	5,632
Total Commercial Banking loans	**$205,501**	$198,112	$179,393
Headcount[(a)]	**11,042**	10,061	9,352

(a) Effective in the first quarter of 2018, certain Operations and Compliance staff were transferred from CCB and Corporate, respectively, to CB. The prior period amounts have been revised to conform with the current period presentation. For a further discussion of this transfer, refer to page 71, Selected income statement data, footnote (c).

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	**2018**	2017	2016
Credit data and quality statistics			
Net charge-offs/(recoveries)	**$53**	$39	$163
Nonperforming assets			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	**511**	617	1,149

Nonaccrual loans held-for-sale and loans at fair value	**—**	—	—
Total nonaccrual loans	**511**	617	1,149
Assets acquired in loan satisfactions	**2**	3	1
Total nonperforming assets	**513**	620	1,150
Allowance for credit losses:			
Allowance for loan losses	**2,682**	2,558	2,925
Allowance for lending-related commitments	**254**	300	248
Total allowance for credit losses	**2,936**	2,858	3,173
Net charge-off/(recovery) rate[b]	**0.03%**	0.02%	0.09 %
Allowance for loan losses to period-end loans retained	**1.31**	1.26	1.55
Allowance for loan losses to nonaccrual loans retained[a]	**525**	415	255
Nonaccrual loans to period-end total loans	**0.25**	0.30	0.61

(a) Allowance for loan losses of $92 million, $92 million and $155 million was held against nonaccrual loans retained at December 31, 2018, 2017 and 2016, respectively.
(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.

Management's discussion and analysis

ASSET & WEALTH MANAGEMENT

Asset & Wealth Management, with client assets of $2.7 trillion, is a global leader in investment and wealth management. AWM clients include institutions, high-net-worth individuals and retail investors in many 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.

Effective January 1, 2018, the Firm adopted several new accounting standards; the guidance which had the most significant impact on the AWM segment results was revenue recognition. The revenue recognition guidance was applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

Selected income statement data

Year ended December 31, (in millions, except ratios and headcount)	2018	2017	2016
Revenue			
Asset management, administration and commissions	**$10,171**	$9,856	$9,187
All other income	**368**	600	602
Noninterest revenue	**10,539**	10,456	9,789
Net interest income	**3,537**	3,379	3,033
Total net revenue	**14,076**	13,835	12,822
Provision for credit losses	**53**	39	26
Noninterest expense			
Compensation expense	**5,495**	5,317	5,063
Noncompensation expense	**4,858**	4,901	4,192
Total noninterest expense	**10,353**	10,218	9,255
Income before income tax expense	**3,670**	3,578	3,541
Income tax expense	**817**	1,241	1,290
Net income	**$2,853**	$2,337	$2,251
Revenue by line of business			
Asset Management	**$7,163**	$7,257	$6,747
Wealth Management	**6,913**	6,578	6,075
Total net revenue	**$14,076**	$13,835	$12,822
Financial ratios			
Return on common equity	**31%**	25%	24%
Overhead ratio	**74**	74	72
Pre-tax margin ratio:			
Asset Management	**26**	22	27
Wealth Management	**26**	30	28
Asset & Wealth Management	**26**	26	28

Headcount	**23,920**	22,975	21,082
Number of Wealth Management client advisors	**2,865**	2,605	2,504

2018 compared with 2017

Net income was $2.9 billion, an increase of 22%.

Net revenue was $14.1 billion, an increase of 2%. Net interest income was $3.5 billion, up 5%, driven by deposit margin expansion and loan growth. Noninterest revenue was $10.5 billion, up 1%, driven by higher management fees on higher average market levels and the cumulative impact of net inflows, predominantly offset by fee compression, lower investment valuations and lower performance fees.

Revenue from Asset Management was $7.2 billion, down 1%, driven by lower investment valuations, fee compression and lower performance fees, predominantly offset by higher management fees on higher average market levels and the cumulative impact of net inflows.

Revenue from Wealth Management was $6.9 billion, up 5%, reflecting higher management fees on the cumulative impact of net inflows and higher average market levels as well as higher net interest income from deposit margin expansion and continued loan growth, partially offset by fee compression.

Noninterest expense was $10.4 billion, an increase of 1%, driven by investments in advisors and technology and higher external fees on revenue growth, largely offset by lower legal expense.

2017 compared with 2016

Net income was $2.3 billion, an increase of 4% compared with the prior year, reflecting higher revenue and a tax benefit resulting from the vesting of employee share-based awards, offset by higher noninterest expense.

Net revenue was $13.8 billion, an increase of 8%. Net interest income was $3.4 billion, up 11%, driven by higher deposit spreads. Noninterest revenue was $10.5 billion, up 7%, driven by higher market levels, partially offset by the absence of a gain in the prior year on the disposal of an asset.

Revenue from Asset Management was $7.3 billion, up 8% from the prior year, driven by higher market levels, partially offset by the absence of a gain in prior year on the disposal of an asset.

Revenue from Wealth Management was $6.6 billion, up 8% from the prior year, reflecting higher net interest income from higher deposit spreads.

Noninterest expense was $10.2 billion, an increase of 10%, predominantly driven by higher legal expense and compensation expense on higher revenue and headcount.

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 (c). 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, at a "primary share class" level to represent the quartile ranking of the U.K., Luxembourg and Hong Kong funds and at the 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 (applies to "Offshore Territories" and "HK SFC Authorized" funds only). 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)	2018	2017	2016
% of JPM mutual fund assets rated as 4- or 5-star[(a)]	**58** %	60 %	63 %
% of JPM mutual fund assets ranked in 1st or 2nd quartile:[(b)]			
1 year	**68**	64	54
3 years	**73**	75	72
5 years	**85**	83	79
Selected balance sheet data (period-end)			
Total assets	**$ 170,024**	$ 151,909	$ 138,384
Loans	**147,632**	130,640	118,039
Core loans	**147,632**	130,640	118,039
Deposits	**138,546**	146,407	161,577
Equity	**9,000**	9,000	9,000
Selected balance sheet data (average)			
Total assets	**$ 160,269**	$ 144,206	$ 132,875
Loans	**138,622**	123,464	112,876
Core loans	**138,622**	123,464	112,876
Deposits	**137,272**	148,982	153,334
Equity	**9,000**	9,000	9,000
Credit data and quality statistics			
Net charge-offs	**$ 10**	$ 14	$ 16
Nonaccrual loans	**263**	375	390
Allowance for credit losses:			
Allowance for loan losses	**326**	290	274
Allowance for lending-related commitments	**16**	10	4
Total allowance for credit losses	**342**	300	278
Net charge-off rate	**0.01** %	0.01 %	0.01 %
Allowance for loan losses to period-end loans	**0.22**	0.22	0.23
Allowance for loan losses to nonaccrual loans	**124**	77	70
Nonaccrual loans to period-end loans	**0.18**	0.29	0.33

(a) Represents the "overall star rating" derived from Morningstar for the U.S., the U.K., Luxembourg, Hong Kong and Taiwan domiciled funds; and Nomura "star rating" for Japan 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 for the U.S. and Taiwan domiciled funds; Morningstar for the U.K., Luxembourg and Hong Kong domiciled funds; Nomura for Japan domiciled funds and Fund Doctor for South Korea domiciled funds. 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.

Management's discussion and analysis

Client assets

2018 compared with 2017

Client assets were $2.7 trillion, a decrease of 2%. Assets under management were $2.0 trillion, a decrease of 2% reflecting lower spot market levels, largely offset by net inflows into liquidity and long-term products.

2017 compared with 2016

Client assets were $2.8 trillion, an increase of 14% compared with the prior year. Assets under management were $2.0 trillion, an increase of 15% from the prior year reflecting higher market levels, and net inflows into long-term and liquidity products.

Client assets

December 31, (in billions)	**2018**	2017	2016
Assets by asset class			
Liquidity	**$480**	$459	$436
Fixed income	**464**	474	420
Equity	**384**	428	351
Multi-asset and alternatives	**659**	673	564
Total assets under management	**1,987**	2,034	1,771
Custody/brokerage/ administration/deposits	**746**	755	682
Total client assets	**$2,733**	$2,789	$2,453
Memo:			
Alternatives client assets[(a)]	**$171**	$166	$154
Assets by client segment			
Private Banking	**$552**	$526	$435
Institutional	**926**	968	869
Retail	**509**	540	467
Total assets under management	**$1,987**	$2,034	$1,771
Private Banking	**$1,274**	$1,256	$1,098
Institutional	**946**	990	886
Retail	**513**	543	469
Total client assets	**$2,733**	$2,789	$2,453

(a) Represents assets under management, as well as client balances in brokerage accounts.

Client assets (continued)

Year ended December 31, (in billions)	**2018**	2017	2016
Assets under management rollforward			
Beginning balance	**$2,034**	$1,771	$1,723
Net asset flows:			
Liquidity	**31**	9	24
Fixed income	**(1)**	36	30
Equity	**2**	(11)	(29)
Multi-asset and alternatives	**24**	43	22
Market/performance/other impacts	**(103)**	186	1
Ending balance, December 31	**$1,987**	$2,034	$1,771

Client assets rollforward

Beginning balance	**$2,789**	$2,453	$2,350
Net asset flows	**88**	93	63
Market/performance/other impacts	**(144)**	243	40
Ending balance, December 31	**$2,733**	$2,789	$2,453

International metrics

Year ended December 31, (in billions, except where otherwise noted)	**2018**	2017	2016
Total net revenue (in millions)[(a)]			
Europe/Middle East/Africa	**$2,721**	$2,715	$2,425
Asia/Pacific	**1,518**	1,385	1,278
Latin America/Caribbean	**904**	844	726
Total international net revenue	**5,143**	4,944	4,429
North America	**8,933**	8,891	8,393
Total net revenue	**$14,076**	$13,835	$12,822
Assets under management			
Europe/Middle East/Africa	**$355**	$384	$309
Asia/Pacific	**162**	160	123
Latin America/Caribbean	**63**	61	45
Total international assets under management	**580**	605	477
North America	**1,407**	1,429	1,294
Total assets under management	**$1,987**	$2,034	$1,771
Client assets			
Europe/Middle East/Africa	**$414**	$441	$359
Asia/Pacific	**222**	225	177
Latin America/Caribbean	**155**	154	114
Total international client assets	**791**	820	650
North America	**1,942**	1,969	1,803
Total client assets	**$2,733**	$2,789	$2,453

(a) Regional revenue is based on the domicile of the client.

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.

Selected income statement and balance sheet data

Year ended December 31, (in millions, except headcount)	**2018**	2017	2016
Revenue			
Principal transactions	**$(426)**	$284	$210
Securities gains/(losses)	**(395)**	(66)	140
All other income/(loss)[(a)]	**558**	867	588
Noninterest revenue	**(263)**	1,085	938
Net interest income	**135**	55	(1,425)
Total net revenue[(b)]	**(128)**	1,140	(487)
Provision for credit losses	**(4)**	—	(4)
Noninterest expense[(c)]	**902**	501	462
Income/(loss) before income tax benefit	**(1,026)**	639	(945)
Income tax expense/(benefit)	**215**	2,282	(241)
Net income/(loss)	**$(1,241)**	$(1,643)	$(704)
Total net revenue			
Treasury and CIO	**510**	566	(787)
Other Corporate	**(638)**	574	300
Total net revenue	**$(128)**	$1,140	$(487)
Net income/(loss)			
Treasury and CIO	**(69)**	60	(715)
Other Corporate	**(1,172)**	(1,703)	11
Total net income/(loss)	**$(1,241)**	$(1,643)	$(704)
Total assets (period-end)	**$771,787**	$781,478	$799,426
Loans (period-end)	**1,597**	1,653	1,592
Core loans[(d)]	**1,597**	1,653	1,589
Headcount[(e)]	**37,145**	34,601	31,789

(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 bond investments, of $382 million, $905 million and $885 million for the years ended December 31, 2018, 2017 and 2016, respectively. The decrease in taxable-equivalent adjustments reflects the impact of the TCJA.

(c) Included legal expense/(benefit) of $(241) million, $(593) million and $(385) million for the years ended December 31, 2018, 2017 and 2016, respectively.

(d) Average core loans were $1.7 billion, $1.6 billion and $1.9 billion for the years ended December 31, 2018, 2017 and 2016, respectively.

(e) Effective in the first quarter of 2018, certain Compliance staff were transferred from Corporate to CB. The prior period amounts have been revised to conform with the current period presentation. For a further discussion of this transfer, refer to CB segment results on page 71.

2018 compared with 2017

Net loss was $1.2 billion.

Net revenue was a loss of $128 million, compared with net revenue of $1.1 billion in the prior year. The current year includes markdowns on certain legacy private equity investments and investment securities losses related to the

repositioning of the investment securities portfolio, partially offset by higher net interest income primarily driven by higher rates. The prior year included a $645 million benefit from a legal settlement.
Noninterest expense of $902 million includes a pre-tax loss of $174 million on the liquidation of a legal entity recorded in the second quarter of 2018, as well as investments in technology and real estate.
Current period income tax expense reflects 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. This amount was more than offset by changes to certain tax reserves and other tax adjustments. The prior year income tax expense included a $2.7 billion expense related to the impact of the TCJA.

2017 compared with 2016

Net loss was $1.6 billion, compared with a net loss of $704 million in the prior year. The current year net loss included a $2.7 billion increase to income tax expense related to the impact of the TCJA.
Net revenue was $1.1 billion, compared with a loss of $487 million in the prior year. The increase in current year net revenue was driven by a $645 million benefit from a legal settlement with the FDIC receivership for Washington Mutual and with Deutsche Bank as trustee of certain Washington Mutual trusts and by the net impact of higher interest rates.
Net interest income was $55 million, compared with a loss of $1.4 billion in the prior year. The gain in the current year was primarily driven by higher interest income on deposits with banks due to higher interest rates and balances, partially offset by higher interest expense on long-term debt primarily driven by higher interest rates.

Management's discussion and analysis

CIO

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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. For further information on derivatives, refer to Note 5. In addition, Treasury and CIO manage the Firm's cash position primarily through depositing at central banks and investing in short-term instruments. For further information on liquidity and funding risk, refer to Liq n on interest rate, foreign exchange and other risks, refer to

The investment securities portfolio primarily consists of 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, 2018, the investment securities portfolio was $260.1 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 ratings that correspond to ratings as defined by S&P and Moody's). Refer to Note 10 for further information on the Firm's investment securities portfolio.

Selected income statement and balance sheet data

As of or for the year ended December 31, (in millions)	**2018**	2017	2016
Investment securities gains/(losses)	**$ (395)**	$ (78)	$ 132
Available-for-sale ("AFS") investment securities (average)	**203,449**	219,345	226,892
Held-to-maturity ("HTM") investment securities (average)	**31,747**	47,927	51,358
Investment securities portfolio (average)	**235,197**	267,272	278,250
AFS investment securities (period-end)	**228,681**	200,247	236,670
HTM investment securities (period-end)	**31,434**	47,733	50,168
Investment securities portfolio (period–end)	**260,115**	247,980	286,838

As permitted by the new hedge accounting guidance, the Firm elected to transfer certain investment securities from HTM to AFS in the first quarter of 2018. For additional information, refer to Notes 1 and 10.

ENTERPRISE-WIDE RISK MANAGEMENT

Risk is an inherent part of JPMorgan Chase's business activities. When the Firm extends a consumer or wholesale loan, advises customers 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:

- 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 lines of business and Corporate; and
- Firmwide structures for risk governance.

The Firm strives for continual improvement through 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 Board oversight. The impact of risk and control issues are carefully considered in the Firm's performance evaluation and incentive compensation processes.

Firmwide Risk Management is overseen and managed on an enterprise-wide basis. The Firm's risk management governance and oversight framework involves understanding drivers of risks, types of risks, and impacts of risks.

Drivers of Risks

Drivers of risks include, but are not limited to, the economic environment, regulatory or government policy, competitor or market evolution, business decisions, process or judgment error, deliberate wrongdoing, dysfunctional markets, and natural disasters.

Types of Risks

The Firm's risks are generally categorized in the following four risk types:

- Strategic risk is the risk associated with the Firm's current and future business plans and objectives, including capital risk, liquidity risk, and the impact to the Firm's reputation.
- 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 inadequate or failed internal processes, people and systems, or from external events and includes compliance risk, conduct risk, legal risk, and estimations and model risk.

Impacts of Risks

There may be many consequences of risks manifesting, including quantitative impacts such as reduction in earnings and capital, liquidity outflows, and fines or penalties, or qualitative impacts, such as reputation damage, loss of clients, and regulatory and enforcement actions.

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 discusses the risk governance and oversight functions in place to manage the risks inherent in the Firms business activities.

Management's discussion and analysis

Governance and oversight

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 Chief Executive Officer ("CEO"), Chief Financial Officer ("CFO") and Chief Risk Officer ("CRO"). LOB-level risk appetite is set by the respective LOB CEO, CFO and CRO and is approved by the Firm's CEO, 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. Quantitative parameters have been established to assess select strategic risks, credit risks and market risks. Qualitative factors have been established to assess select operational risks, and impact to the Firm's reputation. Risk Appetite results are reported quarterly to the Board of Directors' Risk Policy Committee ("DRPC").

The Firm has an Independent Risk Management ("IRM") function, which consists of the Risk Management and Compliance organizations. The CEO appoints, subject to DRPC approval, the Firm's CRO to lead the IRM organization and manage the risk governance structure of the Firm. The framework is subject to approval by the DRPC 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"). The CCO oversees and delegates authorities to the LOB CCOs, and is responsible for the creation and effective execution of the Global Compliance Program.

The Firm places reliance on each of its LOBs and other functional 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 and CIO, inclusive of their aligned Operations, Technology and Control Management are considered the "first line of defense" and owns the identification of risks, as well as the design and execution of controls, inclusive of IRM-specified controls, to manage those risks. The first line of defense is responsible for adherence to applicable laws, rules, and regulations and for the implementation of the risk management structure (which may include policy, standards, limits, thresholds and controls) established by IRM.

The IRM function is independent of the businesses and is "the 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, 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 entire enterprise as the Firm's "third line of defense". The Internal Audit Function is headed by the General Auditor, who reports to the Audit Committee.

In addition, there are other functions that contribute to the firmwide control environment including Finance, Human Resources, Legal, and Control Management.

The independent status of the IRM function is supported by a governance structure that provides for escalation of risk issues to senior management, the Firmwide Risk Committee, 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.
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 to escalate to the Board the information necessary to facilitate the Board's exercise of its duties.
The Board of Directors provides oversight of risk. The DRPC 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 reputation risk and/or conduct risk issues within its scope of responsibility.

The Directors' Risk Policy Committee of the Board assists the board in its oversight of the Firm's global risk management framework and approves the primary risk management policies of the Firm. The Committee's responsibilities include oversight of management's exercise of its responsibility to assess and manage the Firm's risks, and its capital and liquidity planning and analysis. Breaches in risk appetite, capital and liquidity issues that may have a material adverse impact on the Firm and other significant risk-related matters are escalated to the DRPC.

Management's discussion and analysis

The Audit Committee of the Board assists the Board in its oversight of management's responsibilities to assure that there is an effective system of controls reasonably designed to safeguard the assets and income of the Firm, assure 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. In addition, the Audit Committee 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") of the Board assists the Board in its oversight of the Firm's compensation programs and reviews and approves the Firm's overall compensation philosophy, incentive compensation pools, and compensation practices consistent with key business objectives and safety and soundness. The CMDC reviews Operating Committee members' performance against their goals, and approves their compensation awards. The CMDC also periodically reviews the Firm's diversity programs and management development and succession planning, and provides oversight of the Firm's culture, including reviewing management updates regarding significant conduct issues and any related employee actions, including but not limited to compensation actions.

The Public Responsibility Committee of the Board 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 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.

Among the Firm's senior management-level committees that are primarily responsible for key risk-related functions are:

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. The FRC is co-chaired by the Firm's CEO and CRO. The FRC serves as an escalation point for risk topics and issues raised by its members, the Line of Business Risk Committees, Firmwide Control Committee, Firmwide Fiduciary Risk Governance Committee, Firmwide Estimations Risk Committee, Conduct Risk Steering Committee and Regional Risk Committees, as appropriate. The FRC escalates significant issues to the DRPC, as appropriate.

The Firmwide Control Committee ("FCC") provides a forum for senior management to review and discuss firmwide operational risks, including existing and emerging issues and operational risk metrics, and to review operational risk management execution in the context of the Operational Risk Management Framework ("ORMF"). The ORMF provides the framework for the governance, risk identification and assessment, measurement, monitoring and reporting of operational risk. The FCC is co-chaired by the Chief Control Manager and the Firmwide Risk Executive for Operational Risk Management. The FCC relies on the prompt escalation of operational risk and control issues from businesses and functions as the primary owners of the operational risk. Operational risk and control issues may be escalated by business or function control committees to the FCC, which in turn, may escalate to the FRC, as appropriate.

The Firmwide Fiduciary Risk Governance Committee ("FFRGC") is a forum for risk matters related to the Firm's fiduciary activities. The FFRGC oversees the governance framework for fiduciary risk inherent in each of the Firm's LOBs. The governance framework supports the consistent identification and escalation of fiduciary risk or fiduciary related conflict of interest risk. 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 FFRGC is co-chaired by the Wealth Management CEO and the Asset & Wealth Management CRO. The FFRGC escalates significant fiduciary issues to the FRC, the DRPC and the Audit Committee, as appropriate.

The Firmwide Estimations Risk Committee ("FERC") reviews and oversees governance and execution activities related to quantitative and qualitative estimations, such as those used in risk management, budget forecasting and capital planning and analysis. The FERC is chaired by the Firmwide Risk Executive for Model Risk Governance and Review. The FERC serves as an escalation channel for relevant topics and issues raised by its members and the Line of Business Estimation Risk Committees. The FERC escalates significant issues to the FRC, as appropriate.

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 to identify opportunities and emerging areas of focus. The CRSC is co-chaired by the Conduct Risk Compliance Executive and the Human Resources Chief Administrative Officer. The CRSC may escalate systemic conduct risk issues to the FRC and as appropriate to the DRPC.

Line of Business and Regional Risk Committees review the ways in which the particular line of business 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. These committees may escalate matters to the FRC, as appropriate. LOB risk committees are co-chaired by the LOB CEO and the LOB CRO. Each LOB risk committee may create sub-committees with requirements for escalation. The regional committees are established similarly, as appropriate, for the region.

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 data that indicates 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. These committees escalate issues to the FCC, as appropriate.

The Firmwide Asset and Liability Committee ("ALCO"), chaired by the Firm's Treasurer and Chief Investment Officer, 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 the Firm's strategic end-to-end capital management and governance framework, including capital planning, capital strategy, and the implementation of regulatory capital requirements.

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. The VGF is chaired by the Firmwide head of the Valuation Control Group ("VCG") under the direction of the Firm's Controller, and includes sub-forums covering the Corporate & Investment Bank, Consumer & Community Banking, Commercial Banking, Asset & Wealth Management and Corporate, including Treasury and CIO.

In addition, 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 DRPC and the Audit Committee of the Firm's Board of Directors, respectively, and, with respect to compensation and other management-related matters, the Compensation & Management Development Committee of the Firm's Board of Directors.

Risk Identification

The Firm has a Risk Identification process designed to facilitate the first line of defense's 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 second line of defense reviews and challenges the first line's identification of risks, maintains the central repository and provides the consolidated Firmwide results to the FRC and DRPC.

Management’s discussion and analysis

STRATEGIC RISK MANAGEMENT

Strategic risk is the risk associated with the Firm’s current and future business plans and objectives. Strategic risk includes the risk to current or anticipated earnings, capital, liquidity, enterprise value, or the Firm’s reputation arising from adverse business decisions, poor implementation of business decisions, or lack of responsiveness to changes in the industry or external environment.

Overview

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, ongoing management of the Firm’s risk appetite and limit framework, and other relevant governance forums. The Board of Directors oversees management’s strategic decisions, and the DRPC oversees IRM and the Firm’s risk management framework.

The Firm’s strategic planning process, which includes the development and execution of strategic priorities and initiatives by the Operating Committee and the management teams of the lines of business and Corporate, is an important process for managing the Firm’s strategic risk. Guided by the Firm’s How We Do Business Principles (the “Principles”), the strategic priorities and initiatives are updated annually and include evaluating performance against prior year initiatives, assessment of the operating environment, refinement of existing strategies and development of new strategies.

These strategic priorities and initiatives are then incorporated in the Firm’s budget, and are reviewed by the Board of Directors.

In the process of developing the strategic initiatives, line of business and Corporate leadership identify the strategic risks associated with their strategic initiatives and those risks are incorporated into the Firmwide Risk Identification process and monitored and assessed as part of the Firmwide Risk Appetite framework. For further information on Risk Identification, refer to Enterprise-Wide Risk Management on page 79. For further information on the Risk Appetite framework, refer to Enterprise-Wide Risk Management on page 80.

The Firm’s balance sheet strategy, which focuses on risk-adjusted returns, strong capital and robust liquidity, is key to management of strategic risk. For further information on capital risk, refer to Capital Risk Management on pages 85-94. For further information on liquidity risk, refer to Liquidity Risk Management on pages 95–100

For further information on reputation risk, refer to Reputation Risk Management on page 101.

Governance and oversight

On at least an annual basis, the Firm’s Operating Committee defines the most significant strategic priorities and initiatives, including those of the Firm, the LOBs and Corporate, for the coming year and evaluates performance against the prior year. As part of the strategic planning process, IRM conducts a qualitative assessment of those significant initiatives to determine the impact on the risk profile of the Firm. The Firm’s priorities, initiatives and IRM’s assessment are provided to the Board for its review.

As part of its ongoing oversight and management of risk across the Firm, IRM is regularly engaged in significant discussions and decision-making across the Firm, including decisions to pursue new business opportunities or modify or exit existing businesses.

CAPITAL RISK MANAGEMENT

Capital risk is the risk the Firm has an insufficient level and 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 it to build and invest in market-leading businesses, even in a highly stressed environment. 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

Treasury & CIO assumed responsibility for capital management in March 2018.

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 meets these objectives through the establishment of 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's minimum capital levels are based on the most binding of three pillars: an internal assessment of the Firm's capital needs; an estimate of required capital under the CCAR and other stress testing requirements; and Basel III Fully Phased-In regulatory minimums. Where necessary, each pillar may include a management-established buffer. 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.

Contingency capital plan

The Firm's contingency capital plan, which is approved by the firmwide ALCO and the DRPC, establishes the capital management framework for the Firm and specifies the principles underlying the Firm's approach towards capital management in normal economic times 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 distributions, and sets out the capital contingency actions that must be taken or considered at various levels of capital depletion during a period of stress.

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 the CCAR and other stress testing processes to ensure that large BHCs have sufficient capital during periods of economic and financial stress, and have robust, forward-looking capital assessment and planning processes in place that address each BHC's unique risks to enable it to absorb losses under certain stress scenarios. Through CCAR, the Federal Reserve evaluates each BHC's capital adequacy and internal capital adequacy assessment processes ("ICAAP"), as well as its plans to make capital distributions, such as dividend payments or stock repurchases.

On June 28, 2018, the Federal Reserve informed the Firm that it did not object, on either a quantitative or qualitative basis, to the Firm's 2018 capital plan. For information on actions taken by the Firm's Board of Directors following the 2018 CCAR results, refer to Capital actions on pages 91-92.

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 Firm's Audit Committee is responsible for reviewing and approving the capital stress testing control framework.

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

Management's discussion and analysis

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.

Capital management oversight

With the reorganization of the Capital Management group into the Treasury and CIO organization, the Firm established a Capital Management oversight function within the CTC risk function. The CTC CRO, who reports to the Firm's CRO, is responsible for Firmwide Capital Management Oversight. Capital Management's Oversight responsibilities include:

- Establishing, calibrating and monitoring capital risk limits and indicators, including capital risk appetite tolerances;
- Performing independent assessment of the Firm's capital management activities; and
- Monitoring the Firm's capital position and balance sheet activities

In addition, the Basel Independent Review function ("BIR"), which is now 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 DRPC's oversight of management in executing that responsibility.

Governance

Committees responsible for overseeing the Firm's capital management include the Capital Governance Committee, the Treasurer Committee and the ALCO. Capital management oversight is governed through the CTC risk committee. In addition, the DRPC approves the Firm's capital management oversight policy and reviews and recommends to the Board of Directors, for formal approval, the Firm's capital risk tolerances. For additional discussion on the DRPC and the ALCO, refer to Enterprise-wide Risk Management on pages 79-140.

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 for the Firm's national banks, including JPMorgan Chase Bank, N.A. and Chase Bank USA, 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

Capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for large and internationally active U.S. bank holding companies ("BHC") and banks, including the Firm and its IDI subsidiaries. Basel III sets forth two comprehensive approaches for calculating RWA: a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). Certain of the requirements of Basel III were subject to phase-in periods that began on January 1, 2014 and continued through the end of 2018 ("transitional period"). While the required capital remained subject to the transitional rules during 2018, the Firm's capital ratios as of December 31, 2018 were equivalent whether calculated on a transitional or fully phased-in 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 methodologies, 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. For additional information on the SLR, refer to page 91.

Key Regulatory Developments

Banking supervisors globally continue to consider refinements and enhancements to the Basel III capital framework for financial institutions, and in December 2017, the Basel Committee issued Basel III: Finalizing post-crisis reforms ("Basel III Reforms"). The Basel Committee expects national regulatory authorities to implement the Basel III Reforms in the laws of their respective jurisdictions and to require banking organizations subject to such laws to meet most of the revised requirements by January 1, 2022, with certain elements being phased in through January 1, 2027.

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. The U.S. banking regulators will be proposing final requirements applicable to U.S. financial institutions.

Also in April 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 IDIs and to make conforming changes to the rules which are applicable to U.S. GSIBs relating to TLAC and external long-term debt that must satisfy certain eligibility criteria.

Risk-based Capital Regulatory Minimums

The following chart presents the Basel III minimum CET1 capital ratio during the transitional periods and on a fully phased-in basis under the Basel III rules currently in effect.

The capital adequacy of the Firm and its IDI subsidiaries, both during the transitional period and upon full phase-in, is evaluated against the Basel III approach (Standardized or Advanced) which, for each quarter, results in the lower ratio. The Firm's Basel III Standardized Fully Phased-In risk-based ratios are currently more binding than the Basel III Advanced Fully Phased-In 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 26. For further information on the Firm's Basel III measures, refer to the Firm's Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website (https://jpmorganchaseco.gcs-web.com/financial-information/basel-pillar-3-us-lcr-disclosures).

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 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 potential 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 GSIB surcharge and a countercyclical capital buffer.

Under the Federal Reserve's final 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 represents the Firm's GSIB surcharge.

	2018	2017
Fully Phased-In:		
Method 1	2.50 %	2.50 %
Method 2	3.50 %	3.50 %
Transitional[(a)]	2.625 %	1.75 %

(a) The GSIB surcharge is subject to transition provisions (in 25% increments) through the end of 2018.

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The Firm’s effective GSIB surcharge as calculated under Method 2 for 2019 is anticipated to be 3.5%.
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, 2018, 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 credit growth in the economy has become excessive and can be calibrated up to an additional 2.5% of RWA subject to a 12-month implementation period.
Failure to maintain regulatory capital equal to or in excess of the risk-based regulatory capital minimum plus the capital conservation buffer (inclusive of the GSIB surcharge) and any countercyclical buffer may result in limitations to the amount of capital that the Firm may distribute, such as through dividends and common equity repurchases.

Leverage-based Capital Regulatory Minimums
Supplementary leverage ratio
The SLR is defined as Tier 1 capital under Basel III divided by the Firm’s total leverage exposure. Total leverage exposure is calculated by taking the Firm’s total average on balance sheet assets, less amounts permitted to be deducted for Tier 1 capital, and adding certain off-balance sheet exposures, such as undrawn commitments and derivatives potential future exposure.
Failure to maintain an SLR ratio equal to or greater than the regulatory minimum may result in limitations on the amount of capital that the Firm may distribute.
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. For additional information, refer to Note 26.

The following tables present the Firm's Transitional and Fully Phased-In risk-based and leverage-based capital metrics under both the Basel III Standardized and Advanced Approaches. The Firm's Basel III ratios exceeded both the Transitional and Fully Phased-In regulatory minimums as of December 31, 2018 and 2017.

	Transitional/Fully Phased-In[c]		Transitional	Fully Phased-In
December 31, 2018 (in millions, except ratios)	Standardized	Advanced	Minimum capital ratios	Minimum capital ratios
Risk-based capital metrics:				
CET1 capital	**$ 183,474**	**$ 183,474**		
Tier 1 capital	**209,093**	**209,093**		
Total capital	**237,511**	**227,435**		
Risk-weighted assets	**1,528,916**	**1,421,205**		
CET1 capital ratio	**12.0** %	**12.9** %	9.0 %	10.5 %
Tier 1 capital ratio	**13.7**	**14.7**	10.5	12.0
Total capital ratio	**15.5**	**16.0**	12.5	14.0
Leverage-based capital metrics:				
Adjusted average assets[a]	**$ 2,589,887**	**$ 2,589,887**		
Tier 1 leverage ratio	**8.1** %	**8.1** %	4.0 %	4.0 %
Total leverage exposure	**NA**	**$ 3,269,988**		
SLR[b]	**NA**	**6.4** %	NA	5.0 % [b]

	Transitional			Fully Phased-In		
December 31, 2017 (in millions, except ratios)	Standardized	Advanced	Minimum capital ratios	Standardized	Advanced	Minimum capital ratios
Risk-based capital metrics:						
CET1 capital	$ 183,300	$ 183,300		$ 183,244	$ 183,244	
Tier 1 capital	208,644	208,644		208,564	208,564	
Total capital	238,395	227,933		237,960	227,498	
Risk-weighted assets	1,499,506	1,435,825		1,509,762	1,446,696	
CET1 capital ratio	12.2 %	12.8 %	7.50 %	12.1 %	12.7 %	10.5 %
Tier 1 capital ratio	13.9	14.5	9.00	13.8	14.4	12.0
Total capital ratio	15.9	15.9	11.00	15.8	15.7	14.0
Leverage based capital metrics:						
Adjusted average assets[a]	$ 2,514,270	$ 2,514,270		$ 2,514,822	$ 2,514,822	
Tier 1 leverage ratio	8.3 %	8.3 %	4.0 %	8.3 %	8.3 %	4.0 %
Total leverage exposure	NA	$ 3,204,463		NA	$ 3,205,015	
SLR	NA	6.5 %	NA	NA	6.5 %	5.0 % [b]

(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) Effective January 1, 2018, the SLR was fully phased-in under Basel III. The December 31, 2017 amounts were calculated under the Basel III Transitional rules.
(c) The Firm's capital ratios as of December 31, 2018 were equivalent whether calculated on a transitional or fully phased-in basis.

The Firm believes that it will operate with a Basel III CET1 capital ratio between 11% and 12% over the medium term.

For additional information on the Firm, JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A.'s capital, RWA and capital ratios under Basel III Standardized and Advanced Fully Phased-In rules and the SLR calculated under the Basel III Advanced Fully Phased-In rules, all of which are considered key regulatory capital measures, refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57-59.

Management's discussion and analysis

Capital components

The following table presents reconciliations of total stockholders' equity to Basel III Fully Phased-In CET1 capital, Tier 1 capital and Basel III Advanced and Standardized Fully Phased-In Total capital as of December 31, 2018 and 2017.

(in millions)	December 31, 2018	December 31, 2017
Total stockholders' equity	**$ 256,515**	**$ 255,693**
Less: Preferred stock	26,068	26,068
Common stockholders' equity	**230,447**	**229,625**
Less:		
Goodwill	47,471	47,507
Other intangible assets	748	855
Other CET1 capital adjustments	1,034	223
Add:		
Deferred tax liabilities[(a)]	2,280	2,204
Standardized/Advanced Fully Phased-In CET1 capital	**183,474**	**183,244**
Preferred stock	26,068	26,068
Less:		
Other Tier 1 adjustments	449	748
Standardized/Advanced Fully Phased-In Tier 1 capital	**209,093**	**208,564**
Long-term debt and other instruments qualifying as Tier 2 capital	13,772	14,827
Qualifying allowance for credit losses	14,500	14,672
Other	146	(103)
Standardized Fully Phased-In Tier 2 capital	**28,418**	**29,396**
Standardized Fully Phased-in Total capital	**237,511**	**237,960**
Adjustment in qualifying allowance for credit losses for Advanced Tier 2 capital	(10,076)	(10,462)
Advanced Fully Phased-In Tier 2 capital	**18,342**	**18,934**
Advanced Fully Phased-In Total capital	**$ 227,435**	**$ 227,498**

(a) Represents certain deferred tax liabilities related to tax-deductible goodwill and identifiable intangibles created in nontaxable transactions, which are netted against goodwill and other intangibles when calculating TCE.

Capital rollforward

The following table presents the changes in Basel III Fully Phased-In CET1 capital, Tier 1 capital and Tier 2 capital for the year ended December 31, 2018.

Year Ended December 31, (in millions)	**2018**
Standardized/Advanced CET1 capital at December 31, 2017	$ 183,244
Net income applicable to common equity	30,923
Dividends declared on common stock	(9,214)
Net purchase of treasury stock	(17,899)
Changes in additional paid-in capital	(1,417)
Changes related to AOCI	(1,203)
Adjustment related to DVA[(a)]	(1,165)
Changes related to other CET1 capital adjustments	205
Increase in Standardized/Advanced CET1 capital	230
Standardized/Advanced CET1 capital at December 31, 2018	**183,474**
Standardized/Advanced Tier 1 capital at December 31, 2017	208,564
Change in CET1 capital	230
Net issuance of noncumulative perpetual preferred stock	—

Other	299
Increase in Standardized/Advanced Tier 1 capital	529
Standardized/Advanced Tier 1 capital at December 31, 2018	**209,093**
Standardized Tier 2 capital at December 31, 2017	29,396
Change in long-term debt and other instruments qualifying as Tier 2	(1,055)
Change in qualifying allowance for credit losses	(172)
Other	249
Decrease in Standardized Tier 2 capital	(978)
Standardized Tier 2 capital at December 31, 2018	**28,418**
Standardized Total capital at December 31, 2018	**237,511**
Advanced Tier 2 capital at December 31, 2017	18,934
Change in long-term debt and other instruments qualifying as Tier 2	(1,055)
Change in qualifying allowance for credit losses	214
Other	249
Decrease in Advanced Tier 2 capital	(592)
Advanced Tier 2 capital at December 31, 2018	**18,342**
Advanced Total capital at December 31, 2018	**$ 227,435**

(a) Includes DVA related to structured notes recorded in AOCI.

RWA rollforward

The following table presents changes in the components of RWA under Basel III Standardized and Advanced Fully Phased-In for the year ended December 31, 2018. The amounts in the rollforward categories are estimates, based on the predominant driver of the change.

	Standardized			**Advanced**			
Year ended December 31, 2018 (in millions)	Credit risk RWA	Market risk RWA	**Total RWA**	Credit risk RWA	Market risk RWA	Operational risk RWA	**Total RWA**
December 31, 2017	$1,386,060	$123,702	**$1,509,762**	$922,905	$123,791	$400,000	**$1,446,696**
Model & data changes[(a)]	(10,431)	(13,191)	**(23,622)**	3,750	(13,191)	—	**(9,441)**
Portfolio runoff[(b)]	(8,381)	—	**(8,381)**	(10,161)	—	—	**(10,161)**
Movement in portfolio levels[(c)]	55,805	(4,648)	**51,157**	10,153	(4,624)	(11,418)	**(5,889)**
Changes in RWA	36,993	(17,839)	**19,154**	3,742	(17,815)	(11,418)	**(25,491)**
December 31, 2018	**$1,423,053**	**$105,863**	**$1,528,916**	**$926,647**	**$105,976**	**$388,582**	**$1,421,205**

(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).

(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 Fully Phased-In SLR as of December 31, 2018 and 2017.

(in millions, except ratio)	**December 31, 2018**	December 31, 2017
Tier 1 capital	**$209,093**	$208,564
Total average assets	2,636,505	$2,562,155
Less: Adjustments for deductions from Tier 1 capital	46,618	47,333
Total adjusted average assets[(a)]	2,589,887	2,514,822
Off-balance sheet exposures[(b)]	680,101	690,193
Total leverage exposure	**$3,269,988**	$3,205,015
SLR	**6.4 %**	6.5 %

(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.

For JPMorgan Chase Bank, N.A.'s and Chase Bank USA, N.A.'s SLR ratios, refer to Note 26.

Line of business equity

Each business segment is allocated capital by taking into consideration 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. On at least an annual basis, the assumptions and methodologies used in capital allocation are assessed and as a result, the capital allocated to lines of business may change. As of January 1, 2019, line of business capital allocations have increased due to a combination of changes in the relative weights toward Standardized RWA and stress, a higher capitalization rate, updated stress simulations, and general business growth.

The table below presents the Firm's assessed level of capital allocated to each line of business as of the dates indicated.

Line of business equity (Allocated capital)

		December 31,	
(in billions)	**January 1, 2019**	2018	2017
Consumer & Community Banking	**$ 52.0**	$51.0	$51.0

Corporate & Investment Bank	**80.0**	70.0	70.0
Commercial Banking	**22.0**	20.0	20.0
Asset & Wealth Management	**10.5**	9.0	9.0
Corporate	**65.9**	80.4	79.6
Total common stockholders' equity	**$ 230.4**	$ 230.4	$ 229.6

Capital actions

Preferred stock

Preferred stock dividends declared were $1.6 billion for the year ended December 31, 2018.

On January 24, 2019, the Firm issued $1.85 billion of 6.00% non-cumulative preferred stock, Series EE, and on January 30, 2019, the Firm announced that it will redeem all $925 million of its outstanding 6.70% non-cumulative preferred stock, Series T, on March 1, 2019. On September 21, 2018, the Firm issued $1.7 billion of 5.75% non-cumulative preferred stock, Series DD. On October 30, 2018, the Firm redeemed $1.7 billion of its fixed-to-floating rate non-cumulative perpetual preferred stock, Series I.

On October 20, 2017, the Firm issued $1.3 billion of fixed-to-floating rate non-cumulative preferred stock, Series CC, with an initial dividend rate of 4.625%. On December 1, 2017, the Firm redeemed all $1.3 billion of its outstanding 5.50% non-cumulative preferred stock, Series O.

For additional information on the Firm's preferred stock, refer to Note 20.

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Trust preferred securities

On September 10, 2018, the Firm's last remaining issuer of outstanding trust preferred securities ("issuer trust") was liquidated, resulting in $475 million of trust preferred securities and $15 million of trust common securities originally issued by the issuer trust being cancelled.

On December 18, 2017, the Delaware trusts that issued seven series of outstanding trust preferred securities were liquidated, and $1.6 billion of trust preferred and $56 million of trust common securities originally issued by those trusts were cancelled.

For additional information, refer to Note 19.

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 18, 2018, the Firm announced that its Board of Directors increased the quarterly common stock dividend from $0.56 per share to $0.80 per share, effective with the dividend paid on October 31, 2018. The Firm's dividends are subject to the Board of Directors' approval on a quarterly basis.

For information regarding dividend restrictions, refer to Note 20 and Note 25.

The following table shows the common dividend payout ratio based on net income applicable to common equity.

Year ended December 31,	**2018**	2017	2016
Common dividend payout ratio	**30 %**	33 %	30 %

Common equity

During the year ended December 31, 2018, warrant holders exercised their right to purchase 14.9 million shares of the Firm's common stock. The Firm issued from treasury stock 9.4 million shares of its common stock as a result of these exercises. There were no warrants outstanding at December 31, 2018, 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.

Effective June 28, 2018, the Firm's Board of Directors authorized the repurchase of up to $20.7 billion of common equity between July 1, 2018 and June 30, 2019, as part of its annual capital plan. As of December 31, 2018, $10.4 billion of authorized repurchase capacity remained under the common equity repurchase program.

The following table sets forth the Firm's repurchases of common equity for the years ended December 31, 2018, 2017 and 2016. There were no repurchases of warrants during the years ended December 31, 2018, 2017 and 2016.

Year ended December 31, (in millions)	**2018**	2017	2016
Total number of shares of common stock repurchased	**181.5**	166.6	140.4
Aggregate purchase price of common stock repurchases	**$19,983**	$15,410	$9,082

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 Rule 10b5-1 plans must be made according to predefined schedules established when the Firm is not aware of material nonpublic information.

The authorization to repurchase common equity will be 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.

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

Other capital requirements

Total Loss-Absorbing Capacity ("TLAC")

On December 15, 2016, the Federal Reserve issued its final TLAC rule which requires the top-tier holding companies of eight U.S. GSIB holding companies, including the Firm, to maintain minimum levels of external TLAC and external long-term debt that satisfies certain eligibility criteria ("eligible LTD"), effective January 1, 2019.

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 final TLAC rule permanently grandfathered all long-term debt issued before December 31, 2016, to the extent these securities would be ineligible because they contained impermissible acceleration rights or were governed by non-U.S. law. As of December 31, 2018, the Firm exceeded the minimum requirements under the rule to which it became subject to on January 1, 2019.

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, 2018

(in billions, except ratio)	Eligible External TLAC	Eligible LTD
Total eligible TLAC & LTD	$ 380.5	$ 160.5
% of RWA	24.9 %	10.5 %
Minimum requirement	23.0	9.5
Surplus/(shortfall)	$ 28.9	$ 15.3
% of total leverage exposure	11.6 %	4.9 %
Minimum requirement[(a)]	9.5	4.5
Surplus/(shortfall)	$ 69.9	$ 13.4

For information on the financial consequences to holders of the Firm's debt and equity securities in a resolution scenario, refer to Part I, Item 1A: Risk Factors on pages 7-28 of the Firm's 2018 Form 10-K.

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 Rule 1.17 of the 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.

Under the market and credit risk standards of Appendix E of the Net Capital Rule, J.P. Morgan Securities is eligible to use the alternative method of computing net capital if, in addition to meeting its minimum net capital requirements, it maintains tentative net capital of at least $1.0 billion. J.P. Morgan Securities is required to notify the SEC in the event that tentative net capital is less than $5.0 billion. As of December 31, 2018, J.P. Morgan Securities maintained tentative net capital in excess of the minimum and notification requirements.

The following table presents J.P.Morgan Securities' net capital information:

December 31, 2018	Net capital	
(in millions)	Actual	Minimum
J.P. Morgan Securities	**$ 16,648**	**$ 3,069**

J.P. Morgan Securities plc

J.P. Morgan Securities plc is a wholly-owned subsidiary of JPMorgan Chase Bank, N.A. and is the Firm's principal operating subsidiary in the U.K. It has authority to engage in banking, investment banking and broker-dealer activities. J.P. Morgan Securities plc is jointly regulated by the PRA and the 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 following table presents J.P. Morgan Securities plc's capital information:

December 31, 2018	Total capital[(a)]	CET1 ratio		Total capital ratio	
(in millions, except ratios)	Estimated	Estimated	Minimum	Estimated	Minimum
J.P. Morgan Securities plc	**$ 53,086**	**17.4**	**4.5**	**22.5**	**8.0**

(a) Includes the tier 2 qualifying subordinated debt securities issued to meet the MREL requirements to which J.P. Morgan Securities plc became subject to on January 1, 2019. For additional information on MREL, refer to Supervision & Regulation on pages 1-6

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 assessment, measurement, monitoring, and control of liquidity risk across the Firm. Liquidity risk oversight is managed through a dedicated firmwide Liquidity Risk Oversight group. The CTC CRO, who reports to the Firm's CRO, is responsible for firmwide Liquidity Risk Oversight. Liquidity Risk Oversight's responsibilities include:

- Establishing and monitoring limits and indicators, including liquidity risk appetite tolerances;
- 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;
- Monitoring liquidity positions, balance sheet variances and funding activities;
- Conducting ad hoc analysis to identify potential emerging liquidity risks; and
- Performing independent review of liquidity risk management processes.

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, lines of business 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.

Risk governance

Committees responsible for liquidity governance include the firmwide ALCO as well as line of business and regional ALCOs, the Treasurer Committee, and the CTC Risk Committee. In addition, the DRPC reviews and recommends to the Board of Directors, for formal approval, the Firm's liquidity risk tolerances, liquidity strategy, and liquidity policy at least annually. For further discussion of ALCO and other risk-related committees, refer to Enterprise-wide Risk Management on pages 79–140.

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 ad hoc stress tests are performed, as needed, 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 the IHC provides funding support to the ongoing operations of the Parent Company and its subsidiaries, as necessary. The Firm maintains liquidity at the Parent Company and the IHC, in addition to liquidity held at the

Management's discussion and analysis

operating subsidiaries, at levels sufficient to comply with liquidity risk tolerances and minimum liquidity requirements, and to manage through periods of stress where access to normal funding sources is disrupted.

Contingency funding plan

The Firm's contingency funding plan ("CFP"), which is approved by the firmwide ALCO and the DRPC, 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 the Firm to 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 amounts of HQLA held by JPMorgan Chase Bank N.A. and Chase Bank USA, N.A that are in excess of each entity's standalone 100% minimum LCR requirement, and that are not transferable to non-bank affiliates, must be excluded from the Firm's reported HQLA. 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, 2018, September 30, 2018 and December 31, 2017 based on the Firm's current interpretation of the finalized LCR framework.

	Three months ended		
Average amount (in millions)	**December 31, 2018**	September 30, 2018	December 31, 2017
HQLA			
Eligible cash[(a)]	**$ 297,069**	$ 344,660	$ 370,126
Eligible securities[(b)(c)]	**232,201**	190,349	189,955
Total HQLA[(d)]	**$ 529,270**	$ 535,009	$ 560,081
Net cash outflows	**$ 467,704**	$ 466,803	$ 472,078
LCR	**113 %**	115 %	119 %
Net excess HQLA [(d)]	**$ 61,566**	$ 68,206	$ 88,003

(a) Represents cash on deposit at central banks, primarily Federal Reserve Banks.
(b) Predominantly U.S. Treasuries, U.S. Agency MBS, and sovereign bonds net of applicable haircuts under the LCR rules.
(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. and Chase Bank USA, N.A. that are not transferable to non-bank affiliates.

The Firm's average LCR decreased during the three months ended December 31, 2018, compared with the three month period ended September 30, 2018 due to a decrease in the average amount of reportable HQLA. Although HQLA increased in JPMorgan Chase Bank, N.A. during the period,

there was a decrease in the amount of HQLA in JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. that was determined to be transferable to non-bank affiliates. This decrease was based on a change in the Firm's interpretation of amounts available for transfer.

The Firm's average LCR decreased for the three months ended December 31, 2018, compared with the prior year period, due to a reduction in average HQLA primarily driven by (a) long-term debt maturities and CIB activities, and (b)

The Firm's average LCR may fluctuate from period to period, due to changes in its HQLA and estimated net cash outflows under the LCR as a result of ongoing business activity. The Firm's HQLA are expected to be available to meet its liquidity needs in a time of stress. For a further discussion of the Firm's LCR, refer to the Firm's US LCR Disclosure reports, which are available on the Firm's website at:
(https://jpmorganchaseco.gcs-web.com/financial-information/basel-pillar-3-us-lcr-disclosures).

Other liquidity sources

As of December 31, 2018, in addition to assets reported in the Firm's HQLA under the LCR rule, the Firm had approximately $226 billion of unencumbered marketable securities, such as equity securities and fixed income debt securities, available to raise liquidity, if required. This includes HQLA-eligible securities included as part of the excess liquidity at JPMorgan Chase Bank, N.A. that are not transferable to non-bank affiliates.

As of December 31, 2018, the Firm also had approximately $276 billion of available borrowing capacity at various FHLBs, discount windows at the Federal Reserve Banks and various other central banks as a result of collateral pledged by the Firm to such banks. This borrowing capacity excludes the benefit of securities reported in the Firm's HQLA or other unencumbered securities that are currently pledged at the Federal Reserve Bank discount windows. Although available, the Firm does not view the borrowing capacity at Federal Reserve Bank discount windows and the various 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 a stable deposit franchise as well as secured and unsecured funding in the capital markets. The Firm’s loan portfolio is funded with a portion of the Firm’s deposits, through securitizations and, with respect to a portion of the Firm’s real estate-related loans, with secured borrowings from the FHLBs. Deposits in excess of the amount utilized to fund loans are primarily 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. Securities borrowed or purchased under resale agreements and trading assets-debt and equity instruments are primarily funded by the Firm’s securities loaned or sold under agreements to repurchase, trading liabilities–debt and equity instruments, and a portion of the Firm’s long-term debt and stockholders’ equity. In addition to funding securities borrowed or purchased under resale agreements and trading assets-debt and equity instruments, proceeds from the Firm’s debt and equity issuances are used to fund certain loans and other financial and non-financial assets, or may be invested in the Firm’s investment securities portfolio. Refer to the discussion below for additional information relating to Deposits, Short-term funding, and Long-term funding and issuance.

Deposits

The table below summarizes, by line of business, the period-end and average deposit balances as of and for the years ended December 31, 2018 and 2017.

Deposits			Year ended December 31,	
As of or for the year ended December 31,			Average	
(in millions)	**2018**	2017	**2018**	2017
Consumer & Community Banking	**$678,854**	$659,885	**$670,388**	$640,219
Corporate & Investment Bank	**482,084**	455,883	**477,250**	447,697
Commercial Banking	**170,859**	181,512	**170,822**	176,884
Asset & Wealth Management	**138,546**	146,407	**137,272**	148,982
Corporate	**323**	295	**729**	3,604
Total Firm	**$1,470,666**	$1,443,982	**$1,456,461**	$1,417,386

A key strength of the Firm is its diversified deposit franchise, through each of its lines of business, which provides a stable source of funding and limits reliance on the wholesale funding markets. A significant portion of the Firm’s deposits are consumer 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, 2018 and 2017.

As of December 31, (in billions except ratios)	**2018**	2017
Deposits	**$1,470.7**	$1,444.0
Deposits as a % of total liabilities	**62 %**	63 %
Loans	**984.6**	930.7
Loans-to-deposits ratio	**67 %**	64 %

The Firm believes that average deposit balances are generally more representative of deposit trends than period-end deposit balances.

Average deposits increased for the year ended December 31, 2018 in CCB and CIB, partially offset by decreases in AWM, CB and Corporate.

- The increase in CCB reflects the continuation of growth from new accounts, and in CIB reflects growth in operating deposits in both Treasury Services and Securities Services driven by growth in client activity.
The decrease in AWM was driven by balance migration predominantly into the Firm's investment-related products.
- The decrease in CB was driven by a reduction in non-operating deposits. The decrease in Corporate was predominantly due to maturities of wholesale non-operating deposits, consistent with the Firm's efforts to reduce such deposits.

For further information on deposit and liability balance trends, 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.

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The following table summarizes short-term and long-term funding, excluding deposits, as of December 31, 2018 and 2017, and average balances for the years ended December 31, 2018 and 2017. For additional information, refer to the Consolidated Balance Sheets Analysis on pages 52–53 and Note 19.

Sources of funds (excluding deposits)

As of or for the year ended December 31,			Average	
(in millions)	**2018**	2017	**2018**	2017
Commercial paper	**$30,059**	$24,186	**$27,834**	$19,920
Other borrowed funds[a]	**8,789**	10,727	**11,369**	10,755
Total short-term unsecured funding[a]	**$38,848**	$34,913	**$39,203**	$30,675
Securities sold under agreements to repurchase[a][b]	**$171,975**	$147,713	**$177,629**	$173,450
Securities loaned[a][b]	**9,481**	9,211	**10,692**	12,798
Other borrowed funds[a][c]	**30,428**	16,889	**24,320**	15,857
Obligations of Firm-administered multi-seller conduits[d]	**4,843**	3,045	**3,396**	3,206
Total short-term secured funding[a]	**$216,727**	$176,858	**$216,037**	$205,311
Senior notes	**$162,733**	$155,852	**$153,162**	$154,352
Trust preferred securities	**—**	690	**471**	2,276
Subordinated debt	**16,743**	16,553	**16,178**	18,832
Structured notes[e]	**53,090**	45,727	**49,640**	42,918
Total long-term unsecured funding	**$232,566**	$218,822	**$219,451**	$218,378
Credit card securitization[d]	**$13,404**	$21,278	**$15,900**	$25,933
Other securitizations[d][f]	**—**	—	**—**	626
Federal Home Loan Bank ("FHLB") advances	**44,455**	60,617	**52,121**	69,916
Other long-term secured funding[g]	**5,010**	4,641	**4,842**	3,195
Total long-term secured funding	**$62,869**	$86,536	**$72,863**	$99,670
Preferred stock[h]	**$26,068**	$26,068	**$26,249**	$26,212
Common stockholders' equity[h]	**$230,447**	$229,625	**$229,222**	$230,350

(a) The prior period amounts have been revised to conform with the current period presentation.
(b) Primarily consists of short-term securities loaned or sold under agreements to repurchase.
(c) Includes FHLB advances with original maturities of less than one year of $11.4 billion as of December 31, 2018; there were no FHLB advances with original maturities of less than one year as of December 31, 2017.
(d) Included in beneficial interests issued by consolidated variable interest entities on the Firm's Consolidated balance sheets.
(e) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.
(f) Other securitizations includes securitizations of student loans. The Firm deconsolidated the student loan securitization entities in the second quarter of 2017 as it no longer had a controlling financial interest in these entities as a result of the sale of the student loan portfolio. The Firm's wholesale businesses also securitize loans for client-driven transactions, which are not considered to be a source of funding for the Firm and are not included in the table.
(g) Includes long-term structured notes which are secured.
(h) For additional information on preferred stock and common stockholders' equity refer to Capital Risk Management onpages 85-94, Consolidated statements of changes in stockholders' equity, Note20 and Note 21.

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 and agency MBS, and constitute a significant portion of the federal funds purchased and securities loaned or sold under repurchase agreements on the Consolidated balance sheets. The increase at December 31, 2018, compared to December 31, 2017, was primarily due to higher client-driven market-making activities and higher secured financing of trading assets-debt and equity instruments 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 increase in commercial paper was due to higher 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 maximum 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, 2018 and 2017. For additional information, refer to Note 19.

Long-term unsecured funding

Year ended December 31,	**2018**	2017	**2018**	2017
(Notional in millions)	Parent Company[b]		Subsidiaries[b]	
Issuance				
Senior notes issued in the U.S. market	**$22,000**	$21,250	**$9,562**	$62
Senior notes issued in non-U.S. markets	**1,502**	2,220	**—**	—
Total senior notes	**23,502**	23,470	**9,562**	62
Structured notes[a]	**2,444**	2,516	**25,410**	26,524
Total long-term unsecured funding – issuance	**$25,946**	$25,986	**$34,972**	$26,586
Maturities/redemptions				
Senior notes	**$19,141**	$20,971	**$4,466**	$1,366
Subordinated debt	**136**	3,401	**—**	3,500
Structured notes	**2,678**	5,440	**15,049**	17,141
Total long-term unsecured funding – maturities/redemptions	**$21,955**	$29,812	**$19,515**	$22,007

(a) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.
(b) The prior period amounts have been revised to conform with the current period presentation.

The Firm raises 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, 2018 and 2017.

Long-term secured funding

Year ended December 31,	Issuance		Maturities/Redemptions	
(in millions)	**2018**	2017	**2018**	2017
Credit card securitization	**$1,396**	$1,545	**$ 9,250**	$ 11,470
Other securitizations[a]	**—**	—	**—**	55
FHLB advances	**9,000**	—	**25,159**	18,900
Other long-term secured funding[b]	**377**	2,354	**289**	731
Total long-term secured funding	**$10,773**	$3,899	**$ 34,698**	$ 31,156

(a) Other securitizations includes securitizations of student loans. The Firm deconsolidated the student loan securitization entities in the second quarter of 2017 as it no longer had a controlling financial interest in these entities as a result of the sale of the student loan portfolio.
(b) 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. For further description of the client-driven loan securitizations, refer to Note 14.

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. Additionally, the Firm's funding requirements for VIEs and other third-

party commitments may be adversely affected by a decline in credit ratings. For additional information on the impact of a credit ratings downgrade on the funding requirements for VIEs, and on derivatives and collateral agreements, refer to SPEs on page 55, and liquidity risk and credit-related contingent features in Note 5.

The credit ratings of the Parent Company and the Firm's principal bank and non-bank subsidiaries as of December 31, 2018, were as follows.

	JPMorgan Chase & Co.			JPMorgan Chase Bank, N.A. Chase Bank USA, N.A.			J.P. Morgan Securities LLC J.P. Morgan Securities plc		
December 31, 2018	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

On October 25, 2018, Moody's upgraded the Parent Company's long-term issuer rating to A2 (previously A3) and short-term issuer rating to P-1 (previously P-2). The long-term issuer ratings were also upgraded for JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. to Aa2 (previously Aa3), and for J.P. Morgan Securities LLC and J.P. Morgan Securities plc to Aa3 (previously A1).

On June 21, 2018, Fitch upgraded the Parent Company's long-term issuer rating to AA- (previously A+) and short-term issuer rating to F1+ (previously F1). The long-term issuer ratings were also upgraded to AA for JPMorgan Chase Bank, N.A, Chase Bank USA, N.A., J.P. Morgan Securities LLC and J.P. Morgan Securities plc (all previously AA-).

Downgrades of the Firm's long-term ratings by one or two notches could result in an increase in its cost of funds, and access to certain funding markets could be reduced. 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.

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 potential that an action, inaction, transaction, investment or event will reduce trust in the Firm's integrity or competence by its 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. The Firmwide Risk Executive for Reputation Risk reports to the Firm's CRO.

The Firm's reputation risk management function includes the following activities:

- Establishing a firmwide Reputation Risk Governance policy and standards
- Managing the governance infrastructure and processes that support consistent identification, escalation, management and monitoring of reputation risk issues firmwide
- Providing oversight to LOB Reputation Risk Offices ("RRO") on certain situations that have the potential to damage the reputation of the LOB or the Firm

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. As reputation risk is inherently difficult to identify, manage, and quantify, an independent reputation risk management governance function is critical.

Governance and oversight

The Firm's Reputation Risk Governance policy establishes the principles for managing reputation risk for the Firm, and is approved annually by the Directors' Risk Policy Committee. 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

The Firm's reputation risk governance framework applies to each LOB and Corporate. Each LOB RRO advises their business on potential reputation risk issues and provides oversight of policy and standards created to guide the identification and assessment of reputation risk. LOB Reputation Risk Committees and forums review and assess reputation risk for their respective businesses. Each function also applies appropriate diligence to reputation risk arising from their day-to-day activities. Reputation risk issues deemed significant are escalated to the appropriate LOB Risk Committee and/or to the Firmwide Risk Committee.

Management's discussion and analysis

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 credit risk function reports to the Firm's CRO.

The Firm's credit risk management governance includes the following activities:

- Establishing a comprehensive 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 all 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 related market-based inputs, the Firm estimates credit losses for its exposures. Probable credit losses inherent in the consumer and wholesale held-for-investment loan portfolios are reflected in the allowance for loan losses, and probable credit losses inherent in lending-related commitments are reflected in the allowance for lending-related commitments. These losses are estimated using statistical analyses and other factors as described in Note 13. 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. For further information, refer to Critical Accounting Estimates used by the Firm on pages 141-143.

The methodologies used to estimate credit losses depend on the characteristics of the credit exposure, as described below.

Scored exposure

The scored portfolio is generally held in CCB and predominantly includes residential real estate loans, credit card loans, and certain auto and business banking loans. For the scored portfolio, 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, which consider loan-level factors such as delinquency status, credit scores, collateral values, and other risk factors. Credit loss analyses also consider, as appropriate, uncertainties and other factors, including those related to current macroeconomic and political conditions, the quality of underwriting standards, and other internal and external factors. The factors and analysis are updated on a quarterly basis or more frequently as market conditions dictate.

Risk-rated exposure

Risk-rated portfolios are generally held in CIB, CB and AWM, but also include certain business banking and auto dealer loans held in CCB that are risk-rated because they have characteristics similar to commercial loans. For the 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 default and takes into consideration collateral and structural support for each credit facility. The estimation process includes assigning risk ratings to each borrower and credit facility to differentiate risk within the portfolio. These risk ratings are reviewed regularly by Credit Risk Management and revised as needed to reflect the borrower’s current financial position, risk profile and related collateral. The calculations and assumptions are based on both internal and external historical experience and management judgment and are reviewed regularly.

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 line of businesses.

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 as deemed appropriate by management, typically on an annual basis. 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 — 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

Management's discussion and analysis

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.

For further discussion of consumer and wholesale loans, refer to Note 12.

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 geographic concentrations occurs monthly, and the appropriateness of the allowance for credit losses is reviewed by senior management at least on a quarterly basis. Through the risk reporting and governance structure, credit risk trends and limit exceptions are provided regularly to, and discussed with, risk committees, senior management and the Board of Directors as appropriate.

CREDIT PORTFOLIO

Credit risk is the risk associated with the default or change in credit profile of a client, counterparty or customer.

In the following tables, reported loans include loans retained (i.e., held-for-investment); loans held-for-sale; and certain loans accounted for at fair value. The following tables do not include loans which the Firm accounts for at fair value and classifies as trading assets. For further information regarding these loans, refer to Notes 2 and 3. For additional information on the Firm's loans, lending-related commitments and derivative receivables, including the Firm's accounting policies, refer to Notes 12, 27, and 5, respectively.

For further information regarding the credit risk inherent in the Firm's cash placed with banks, refer to Wholesale credit exposure – industry exposures on pages 113–115 ; for information regarding the credit risk inherent in the Firm's investment securities portfolio, refer to Note 10; and for information regarding credit risk inherent in the securities financing portfolio, refer to Note 11.

For a further discussion of the consumer credit environment and consumer loans, refer to Consumer Credit Portfolio on pages 106–111 and Note 12. For a further discussion of the wholesale credit environment and wholesale loans, refer to Wholesale Credit Portfolio on pages 112–119 and Note 12.

Total credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming[(d)(e)]	
	2018	2017	**2018**	2017
Loans retained	**$969,415**	$924,838	**$ 4,611**	$ 5,943
Loans held-for-sale	**11,988**	3,351	**—**	—
Loans at fair value	**3,151**	2,508	**220**	—
Total loans – reported	**984,554**	930,697	**4,831**	5,943
Derivative receivables	**54,213**	56,523	**60**	130
Receivables from customers and other[(a)]	**30,217**	26,272	**—**	—
Total credit-related assets	**1,068,984**	1,013,492	**4,891**	6,073
Assets acquired in loan satisfactions				
Real estate owned	**NA**	NA	**269**	311
Other	**NA**	NA	**30**	42
Total assets acquired in loan satisfactions	**NA**	NA	**299**	353
Lending-related commitments	**1,039,258**	991,482	**469**	731
Total credit portfolio	**$2,108,242**	$2,004,974	**$ 5,659**	$ 7,157
Credit derivatives used in credit portfolio management activities[(b)]	**$(12,682)**	$(17,609)	**$ —**	$ —
Liquid securities and other cash collateral held against derivatives[(c)]	**(15,322)**	(16,108)	**NA**	NA

Year ended December 31, (in millions, except ratios)	**2018**	2017
Net charge-offs[(f)]	**$4,856**	$5,387
Average retained loans		
Loans	**936,829**	898,979
Loans – reported, excluding residential real estate PCI loans	**909,386**	865,887
Net charge-off rates[(f)]		
Loans	**0.52 %**	0.60 %
Loans – excluding PCI	**0.53**	0.62

(a) Receivables from customers and other primarily represents held-for-investment margin loans to brokerage customers.

(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. For additional information, refer to Credit derivatives on page 119 and Note 5.

(c) Includes collateral related to derivative instruments where an appropriate legal opinion has not been either sought or obtained.

(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, 2018 and 2017, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $2.6 billion and $4.3 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $75 million and $95 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").

(f) For the year ended December 31, 2017, excluding net charge-offs of $467 million related to the student loan portfolio transfer, the net charge-off rate for loans would have been 0.55% and for loans - excluding PCI would have been 0.57%.

Management's discussion and analysis

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. The total amount of residential real estate loans delinquent 30+ days, excluding government guaranteed and purchased credit-impaired loans, decreased from December 31, 2017 due to improved credit performance and the impact of loans that were delinquent in 2017 due to hurricanes. The Credit Card 30+ day delinquency rate and the net charge-off rate increased from the prior year, in line with expectations. For further information on consumer loans, refer to Note 12. For further information on lending-related commitments, refer to Note 27.

The following table presents consumer credit-related information with respect to the credit portfolio held by CCB, prime mortgage and home equity loans held by AWM, and prime mortgage loans held by Corpora For further information about the Firm's nonaccrual and charge-off accounting policies, refer to Note 12.

Consumer credit portfolio

As of or for the year ended December 31, (in millions, except ratios)	Credit exposure		Nonaccrual loans[i][j]		Net charge-offs/(recoveries)[d][k]		Net charge-off/(recovery) rate[d][k][l]	
	2018	2017	**2018**	2017	**2018**	2017	**2018**	2017
Consumer, excluding credit card								
Loans, excluding PCI loans and loans held-for-sale								
Residential mortgage	**$231,078**	$216,496	**$1,765**	$2,175	**$ (291)**	$ (10)	**(0.13)%**	— %
Home equity	**28,340**	33,450	**1,323**	1,610	**(5)**	69	**(0.02)**	0.19
Auto[a][b]	**63,573**	66,242	**128**	141	**243**	331	**0.38**	0.51
Consumer & Business Banking[b][c]	**26,612**	25,789	**245**	283	**236**	257	**0.90**	1.03
Student[d]	**—**	—	**—**	—	**—**	498	**—**	NM
Total loans, excluding PCI loans and loans held-for-sale	**349,603**	341,977	**3,461**	4,209	**183**	1,145	**0.05**	0.34
Loans – PCI								
Home equity	**8,963**	10,799	**NA**	NA	**NA**	NA	**NA**	NA
Prime mortgage	**4,690**	6,479	**NA**	NA	**NA**	NA	**NA**	NA
Subprime mortgage	**1,945**	2,609	**NA**	NA	**NA**	NA	**NA**	NA
Option ARMs[e]	**8,436**	10,689	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – PCI	**24,034**	30,576	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – retained	**373,637**	372,553	**3,461**	4,209	**183**	1,145	**0.05**	0.31
Loans held-for-sale	**95**	128	**—**	—	**—**	—	**—**	—
Total consumer, excluding credit card loans	**373,732**	372,681	**3,461**	4,209	**183**	1,145	**0.05**	0.31
Lending-related commitments[f]	**46,066**	48,553						
Receivables from customers[g]	**154**	133						
Total consumer exposure, excluding credit card	**419,952**	421,367						
Credit Card								
Loans retained[h]	**156,616**	149,387	**—**	—	**4,518**	4,123	**3.10**	2.95
Loans held-for-sale	**16**	124	**—**	—	**—**	—	**—**	—
Total credit card loans	**156,632**	149,511	**—**	—	**4,518**	4,123	**3.10**	2.95
Lending-related commitments[f]	**605,379**	572,831						
Total credit card exposure	**762,011**	722,342						
Total consumer credit portfolio	**$1,181,963**	$1,143,709	**$3,461**	$4,209	**$ 4,701**	$ 5,268	**0.90 %**	1.04 %
Memo: Total consumer credit portfolio, excluding PCI	**$1,157,929**	$1,113,133	**$3,461**	$4,209	**$ 4,701**	$ 5,268	**0.95 %**	1.11 %

(a) At December 31, 2018 and 2017, excluded operating lease assets of $20.5 billion and $17.1 billion, respectively. These operating lease assets are included in other assets on the Firm's Consolidated balance sheets. The risk of loss on these assets relates to the residual value of the leased vehicles, which is managed through projection of the lease residual value at lease origination, periodic review of residual values, and through arrangements with certain auto manufacturers that mitigates this risk.

(b) Includes certain business banking and auto dealer risk-rated loans that apply the wholesale methodology 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) For the year ended December 31, 2017, excluding net charge-offs of $467 million related to the student loan portfolio sale, the net charge-off rate for Total consumer, excluding credit card and PCI loans and loans held-for-sale would have been 0.20%; Total consumer - retained excluding credit card loans would have been 0.18%; Total consumer credit portfolio would have been 0.95%; and Total consumer credit portfolio, excluding PCI loans would have been 1.01%.

(e) At December 31, 2018 and 2017, approximately 69% and 68%, respectively, of the PCI option adjustable rate mortgages ("ARMs") portfolio has been modified into fixed-rate, fully amortizing loans.

(f) 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. For further information, refer to Note 27.

(g)

Receivables from customers represent held-for-investment margin loans to brokerage customers that are collateralized through assets maintained in the clients' brokerage accounts. These receivables are reported within accrued interest and accounts receivable on the Firm's Consolidated balance sheets.

(h) Includes billed interest and fees net of an allowance for uncollectible interest and fees.

(i) At December 31, 2018 and 2017, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $2.6 billion and $4.3 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.

(j) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.

(k) Net charge-offs/(recoveries) and net charge-off/(recovery) rates excluded write-offs in the PCI portfolio of $187 million and $86 million for the years ended December 31, 2018 and 2017, respectively. These write-offs decreased the allowance for loan losses for PCI loans. Refer to Allowance for Credit Losses on pages 120–122 for further information.

(l) Average consumer loans held-for-sale were $387 million and $1.5 billion for the years ended December 31, 2018 and 2017, respectively. These amounts were excluded when calculating net charge-off/(recovery) rates.

Management's discussion and analysis

Consumer, excluding credit card

Portfolio analysis

Consumer loan balances increased from December 31, 2017 predominantly due to originations of high-quality prime mortgage loans that have been retained on the balance sheet, largely offset by paydowns and the charge-off or liquidation of delinquent loans.

PCI loans are excluded from the following discussions of individual loan products and are addressed separately below. For further information about the Firm's consumer portfolio, including information about delinquencies, loan modifications and other credit quality indicators, refer to
Note 12.

Residential mortgage: The residential mortgage portfolio, including loans held-for-sale, predominantly consists of high-quality prime mortgage loans with approximately 1% consisting of subprime mortgage loans, which continue to run off. The residential mortgage portfolio increased from December 31, 2017 driven by the retention of originated high-quality prime mortgage loans, which exceeded paydowns and mortgage loan sales. Residential mortgage 30+ day delinquencies decreased from December 31, 2017. Nonaccrual loans decreased from December 31, 2017 due to lower delinquencies. Net recoveries for the year ended December 31, 2018 improved when compared with the prior year, reflecting loan sales and continued improvement in home prices and delinquencies.

At December 31, 2018 and 2017, the Firm's residential mortgage portfolio included $21.6 billion and $20.2 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. Performance of this portfolio for the year ended December 31, 2018 was in line with the performance of the broader residential mortgage portfolio for the same period. The Firm continues to monitor the risks associated with these loans.

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, 2018**	December 31, 2017
Current	**$ 2,884**	$ 2,401
30-89 days past due	**1,528**	1,958
90 or more days past due	**2,600**	4,264
Total government guaranteed loans	**$ 7,012**	$ 8,623

Home equity: The home equity portfolio declined from December 31, 2017 primarily reflecting loan paydowns. The amount of 30+ day delinquencies decreased from December 31, 2017. Nonaccrual loans decreased from December 31, 2017 due to lower delinquencies. There was a net recovery for the year ended December 31, 2018 compared to a net charge-off for the prior year, as a result of continued improvement in home prices and lower delinquencies.

At December 31, 2018, 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 $26 billion at December 31, 2018. This amount included $12 billion of HELOCs that have recast from interest-only to fully amortizing payments or have been modified and $4 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.

The Firm monitors risks associated with junior lien loans where the borrower has a senior lien loan that is either delinquent or has been modified. These loans are considered "high-risk seconds" and are classified as nonaccrual as they are considered to pose a higher risk of default than other junior lien loans. At December 31, 2018, the Firm estimated that the carrying value of its home equity portfolio contained approximately $550 million of current junior lien loans that were considered high-risk seconds, compared with approximately $725 million at December 31, 2017.

Auto: The auto loan portfolio, which predominantly consists of prime-quality loans, declined when compared with December 31, 2017, as paydowns and the charge-off or liquidation of delinquent loans were predominantly offset by new originations. Nonaccrual loans decreased from December 31, 2017. Net charge-offs for the year ended December 31, 2018 declined when compared with the prior year primarily as a result of an incremental adjustment recorded in 2017 in accordance with regulatory guidance regarding the timing of loss recognition for certain loans in bankruptcy and loans where assets were acquired in loan satisfactions.

Consumer & Business banking: Consumer & Business Banking loans increased when compared with December 31, 2017 due to loan originations, predominantly offset by paydowns and charge-offs of delinquent loans. Nonaccrual loans and net charge-offs decreased when compared with the prior year.

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, 2017 due to portfolio run off and loan sales. As of December 31, 2018, approximately 10% of the option ARM PCI loans were delinquent and approximately 69% of the portfolio had been modified into fixed-rate, fully amortizing loans. The borrowers for substantially all of the remaining option ARM loans are making amortizing payments, although such payments are not necessarily fully amortizing. This latter group of loans is subject to the risk of payment shock due to future payment recast. Default rates generally increase on option ARM loans when payment recast results in a payment increase. The expected increase in default rates is considered in the Firm's quarterly impairment assessment.

The following table provides a summary of lifetime principal loss estimates included in either the nonaccretable difference or the allowance for loan losses.

Summary of PCI loans lifetime principal loss estimates

	Lifetime loss estimates(a)		Life-to-date liquidation losses(b)	
December 31, (in billions)	**2018**	2017	**2018**	2017
Home equity	**$14.1**	$14.2	**$13.0**	$12.9
Prime mortgage	**4.1**	4.0	**3.9**	3.8
Subprime mortgage	**3.3**	3.3	**3.2**	3.1
Option ARMs	**10.3**	10.0	**9.9**	9.7
Total	**$31.8**	$31.5	**$30.0**	$29.5

(a) Includes the original nonaccretable difference established in purchase accounting of $30.5 billion for principal losses plus additional principal losses recognized subsequent to acquisition through the provision and allowance for loan losses. The remaining nonaccretable difference for principal losses was $512 million and $842 million at December 31, 2018 and 2017, respectively.

(b) Represents both realization of loss upon loan resolution and any principal forgiven upon modification.

For further information on the Firm's PCI loans, including write-offs, refer to Note 12.

Geographic composition of residential real estate loans

At December 31, 2018, $160.3 billion, or 63% 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 $152.8 billion, or 63%, at December 31, 2017. For additional information on the geographic composition of the Firm's residential real estate loans, refer to Note 12.

Current estimated loan-to-values of residential real estate loans

Average current estimated loan-to-value ("LTV") ratios have declined consistent with improvements in home prices, customer pay downs, and charge-offs or liquidations of higher LTV loans. For further information on current estimated LTVs of residential real estate loans, refer to Note 12.

Loan modification activities for residential real estate loans

The performance of modified loans generally differs by product type due to differences in both the credit quality and the types of modifications provided. Performance metrics for modifications to the residential real estate portfolio, excluding PCI loans, that have been seasoned more than six months show weighted-average redefault rates of 22% for residential mortgages and 20% for home equity. Performance metrics for modifications to the PCI residential real estate portfolio that have been seasoned more than six months show weighted average redefault rates of 19% for home equity, 18% for prime mortgages, 16% for option ARMs and 32% for subprime mortgages. The cumulative redefault rates reflect the performance of modifications completed from October 1, 2009 through December 31, 2018.

Management's discussion and analysis

Certain modified loans have interest rate reset provisions ("step-rate modifications") where the interest rates on these loans generally began to increase commencing in 2014 by 1% per year, and will continue to do so until the rate reaches a specified cap. The cap on these loans is typically at a prevailing market interest rate for a fixed-rate mortgage loan as of the modification date. At December 31, 2018, the carrying value of non-PCI loans and the unpaid principal balance of PCI loans modified in step-rate modifications, which have not yet met their specified caps, were $2 billion and $3 billion, respectively. The Firm continues to monitor this risk exposure and the impact of these potential interest rate increases is considered in the Firm's allowance for loan losses.
The following table presents information as of December 31, 2018 and 2017, relating to modified retained residential real estate loans for which concessions have been granted to borrowers experiencing financial difficulty. For further information on modifications for the years ended December 31, 2018 and 2017, refer to Note 12.

Modified residential real estate loans

December 31, (in millions)	**2018** Retained loans	Nonaccrual retained loans(d)	2017 Retained loans	Nonaccrual retained loans(d)
Modified residential real estate loans, excluding PCI loans(a)(b)				
Residential mortgage	**$4,565**	**$ 1,459**	$5,620	$ 1,743
Home equity	**2,012**	**955**	2,118	1,032
Total modified residential real estate loans, excluding PCI loans	**$6,577**	**$ 2,414**	$7,738	$ 2,775
Modified PCI loans(c)				
Home equity	**$2,086**	**NA**	$2,277	NA
Prime mortgage	**3,179**	**NA**	4,490	NA
Subprime mortgage	**2,041**	**NA**	2,678	NA
Option ARMs	**6,410**	**NA**	8,276	NA
Total modified PCI loans	**$13,716**	**NA**	$17,721	NA

(a) Amounts represent the carrying value of modified residential real estate loans.

(b) At December 31, 2018 and 2017, $4.1 billion and $3.8 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. For additional information about sales of loans in securitization transactions with Ginnie Mae, refer to Note 14.

(c) Amounts represent the unpaid principal balance of modified PCI loans.

(d) As of December 31, 2018 and 2017, nonaccrual loans included $2.0 billion and $2.2 billion, respectively, of troubled debt restructurings ("TDRs") for which the borrowers were less than 90 days past due. For additional information about loans modified in a TDR that are on nonaccrual status, refer to Note 12.

Nonperforming assets

The following table presents information as of December 31, 2018 and 2017, about consumer, excluding credit card, nonperforming assets.

Nonperforming assets(a)

December 31, (in millions)	**2018**	2017
Nonaccrual loans(b)		
Residential real estate	**$3,088**	$3,785
Other consumer	**373**	424
Total nonaccrual loans	**3,461**	4,209
Assets acquired in loan satisfactions		
Real estate owned	**210**	225
Other	**30**	40
Total assets acquired in loan satisfactions	**240**	265
Total nonperforming assets	**$3,701**	$4,474

(a) At December 31, 2018 and 2017, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $2.6 billion and $4.3 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $75 million and $95 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.

December 31, 2018

greater than 150 days past due, respectively. In the aggregate, the unpaid principal balance of residential real estate loans greater than 150 days past due was charged down by approximately 32% and 40% to the estimated net realizable value of the collateral at December 31, 2018 and 2017, respectively.

Nonaccrual loans: The following table presents changes in the consumer, excluding credit card, nonaccrual loans for the years ended December 31, 2018 and 2017.

Nonaccrual loan activity

Year ended December 31, (in millions)	2018	2017
Beginning balance	**$4,209**	$4,820
Additions	**2,799**	3,525
Reductions:		
Principal payments and other[(a)]	**1,407**	1,577
Charge-offs	**468**	699
Returned to performing status	**1,399**	1,509
Foreclosures and other liquidations	**273**	351
Total reductions	**3,547**	4,136
Net changes	**(748)**	(611)
Ending balance	**$3,461**	$4,209

(a) Other reductions includes loan sales.

Active and suspended foreclosure: For information on loans that were in the process of active or suspended foreclosure, refer to Note 12.

Credit card

Total credit card loans increased from December 31, 2017 due to new account growth and higher sales volume. The December 31, 2018 30+ day delinquency rate increased to 1.83% from 1.80% at December 31, 2017, but the December 31, 2018 90+ day delinquency rate of 0.92% was flat compared to December 31, 2017. Net charge-offs increased for the year ended December 31, 2018 when compared with the prior year, primarily due to the seasoning of more recent vintages with higher loss rates, as anticipated given underwriting standards at the time of origination. 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.

Geographic and FICO composition of credit card loans

At December 31, 2018, $71.2 billion, or 45% of the total retained credit card loan portfolio, were concentrated in California, Texas, New York, Florida and Illinois, compared with $67.2 billion, or 45%, at December 31, 2017. For additional information on the geographic and FICO composition of the Firm's credit card loans, refer to Note 12.

Modifications of credit card loans

At December 31, 2018 and 2017, the Firm had $1.3 billion and $1.2 billion, respectively, of credit card loans outstanding that have been modified in TDRs. For additional information about loan modification programs to borrowers, refer to Note 12.

Management's discussion and analysis

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 quality of the wholesale portfolio was stable for the year ended December 31, 2018, characterized by low levels of criticized exposure, nonaccrual loans and charge-offs. Refer to the industry discussion on pages 113–115 for further information. Retained loans increased across all wholesale lines of business, primarily driven by commercial and industrial and financial institution clients in CIB, and Wealth Management clients globally in AWM. 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, and excludes all exposure managed by CCB.

Wholesale credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming[c]	
	2018	2017	**2018**	2017
Loans retained	**$ 439,162**	$ 402,898	**$ 1,150**	$ 1,734
Loans held-for-sale	**11,877**	3,099	**—**	—
Loans at fair value	**3,151**	2,508	**220**	—
Loans – reported	**454,190**	408,505	**1,370**	1,734
Derivative receivables	**54,213**	56,523	**60**	130
Receivables from customers and other[a]	**30,063**	26,139	**—**	—
Total wholesale credit-related assets	**538,466**	491,167	**1,430**	1,864
Lending-related commitments	**387,813**	370,098	**469**	731
Total wholesale credit exposure	**$ 926,279**	$ 861,265	**$ 1,899**	$ 2,595
Credit derivatives used in credit portfolio management activities[b]	**$ (12,682)**	$ (17,609)	**$ —**	$ —
Liquid securities and other cash collateral held against derivatives	**(15,322)**	(16,108)	**NA**	NA

(a) Receivables from customers and other include $30.1 billion and $26.0 billion of held-for-investment margin loans at December 31, 2018 and 2017, respectively, to prime brokerage customers 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. For additional information, refer to Credit derivatives on page 119, and Note 5.

(c) Excludes assets acquired in loan satisfactions.

The following tables present the maturity and ratings profiles of the wholesale credit portfolio as of December 31, 2018 and 2017. The ratings scale is based on the Firm's internal risk ratings, which generally correspond to the ratings assigned by S&P and Moody's. For additional information on wholesale loan portfolio risk ratings, refer to Note 12.

Wholesale credit exposure – maturity and ratings profile

	Maturity profile[d]				Ratings profile			
					Investment-grade	Noninvestment-grade		
December 31, 2018 (in millions, except ratios)	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	**Total**	AAA/Aaa to BBB-/Baa3	BB+/Ba1 & below	**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 %**

	Maturity profile[d]				Ratings profile			
					Investment-grade	Noninvestment-grade		
December 31, 2017 (in millions, except ratios)	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	Total	AAA/Aaa to BBB-/Baa3	BB+/Ba1 & below	Total	Total % of IG
Loans retained	$ 121,643	$ 177,033	$ 104,222	$ 402,898	$ 311,681	$ 91,217	$ 402,898	77 %
Derivative receivables				56,523			56,523	
Less: Liquid securities and other cash collateral held against derivatives				(16,108)			(16,108)	
Total derivative receivables, net of all collateral	9,882	10,463	20,070	40,415	32,373	8,042	40,415	80
Lending-related commitments	80,273	275,317	14,508	370,098	274,127	95,971	370,098	74
Subtotal	211,798	462,813	138,800	813,411	618,181	195,230	813,411	76
Loans held-for-sale and loans at fair value[a]				5,607			5,607	
Receivables from customers and other				26,139			26,139	
Total exposure – net of liquid securities and other cash collateral held against derivatives				$ 845,157			$ 845,157	
Credit derivatives used in credit portfolio management activities[b][c]	$ (1,807)	$ (11,011)	$ (4,791)	$ (17,609)	$ (14,984)	$ (2,625)	$ (17,609)	85 %

(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, 2018, 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 $12.1 billion at December 31, 2018, compared with $15.6 billion at December 31, 2017. The decrease was driven by Oil & Gas, including credit quality improvements in the portfolio, and a loan sale in the first quarter of 2018.

Management’s discussion and analysis

Below are summaries of the Firm’s exposures as of December 31, 2018 and 2017. The industry of risk category is generally based on the client or counterparty’s primary business activity. For additional information on industry concentrations, refer to Note 4.

Wholesale credit exposure – industries[(a)]

			Noninvestment-grade			Selected metrics			
As of or for the year ended December 31, 2018 (in millions)	Credit exposure[(f)]	Investment-grade	Noncriticized	Criticized performing	Criticized nonperforming	30 days or more past due and accruing loans	Net charge-offs/ (recoveries)	Credit derivative hedges[(g)]	Liquid securities and other cash collateral held against derivative receivables
Real Estate	$ 143,316	$ 117,988	$ 24,174	$ 1,019	$ 135	$ 70	$ (20)	$ (2)	$ (1)
Individuals and Individual Entities[(b)]	97,077	86,581	10,164	174	158	703	12	—	(915)
Consumer & Retail	94,815	60,678	31,901	2,033	203	43	55	(248)	(14)
Technology, Media & Telecommunications	72,646	46,334	24,081	2,170	61	8	12	(1,011)	(12)
Industrials	58,528	38,487	18,594	1,311	136	171	20	(207)	(29)
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)
Asset Managers	42,807	36,722	6,067	4	14	10	—	—	(5,829)
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)
Central Govt	18,456	18,251	124	81	—	4	—	(7,994)	(2,130)
Automotive	17,339	9,637	7,310	392	—	1	—	(125)	—
Chemicals & Plastics	16,035	11,490	4,427	118	—	4	—	—	—
Transportation	15,660	10,508	4,699	393	60	21	6	(31)	(112)
Metals & Mining	15,359	8,188	6,767	385	19	1	—	(174)	(22)
Insurance	12,639	9,777	2,830	—	32	—	—	(36)	(2,080)
Financial Markets Infrastructure	7,484	6,746	738	—	—	—	—	—	(26)
Securities Firms	4,558	3,099	1,459	—	—	—	—	(158)	(823)
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								

As of or for the year ended December 31, 2017 (in millions)	Credit exposure[f]	Investment-grade	Noninvestment-grade Noncriticized	Noninvestment-grade Criticized performing	Noninvestment-grade Criticized nonperforming	Selected metrics 30 days or more past due and accruing loans	Selected metrics Net charge-offs/ (recoveries)	Selected metrics Credit derivative hedges[g]	Selected metrics Liquid securities and other cash collateral held against derivative receivables
Real Estate	$ 139,409	$ 115,401	$ 23,012	$ 859	$ 137	$ 254	$ (4)	$ —	$ (2)
Individuals and Individual Entities[b]	87,371	77,029	10,024	80	238	899	10	—	(762)
Consumer & Retail	87,679	55,737	29,619	1,791	532	30	34	(275)	(9)
Technology, Media & Telecommunications	59,274	36,510	20,453	2,258	53	14	(12)	(910)	(19)
Industrials	55,272	37,198	16,770	1,159	145	150	(1)	(196)	(21)
Banks & Finance Cos	49,037	34,654	13,767	612	4	1	6	(1,216)	(3,174)
Healthcare	55,997	42,643	12,731	585	38	82	(1)	—	(207)
Asset Managers	32,531	28,029	4,484	4	14	27	—	—	(5,290)
Oil & Gas	41,317	21,430	14,854	4,046	987	22	71	(747)	(1)
Utilities	29,317	24,486	4,383	227	221	—	11	(160)	(56)
State & Municipal Govt[c]	28,633	27,977	656	—	—	12	5	(130)	(524)
Central Govt	19,182	18,741	376	65	—	4	—	(10,095)	(2,520)
Automotive	14,820	9,321	5,278	221	—	10	1	(284)	—
Chemicals & Plastics	15,945	11,107	4,764	74	—	4	—	—	—
Transportation	15,797	9,870	5,302	527	98	9	14	(32)	(131)
Metals & Mining	14,171	6,989	6,822	321	39	3	(13)	(316)	(1)
Insurance	14,089	11,028	2,981	—	80	1	—	(157)	(2,195)
Financial Markets Infrastructure	5,036	4,775	261	—	—	—	—	—	(23)
Securities Firms	4,113	2,559	1,553	1	—	—	—	(274)	(335)
All other[d]	60,529	57,081	3,259	180	9	2	(2)	(2,817)	(838)
Subtotal	$ 829,519	$ 632,565	$ 181,349	$ 13,010	$ 2,595	$ 1,524	$ 119	$ (17,609)	$ (16,108)
Loans held-for-sale and loans at fair value	5,607								
Receivables from customers and other	26,139								
Total[e]	$ 861,265								

(a) T

(e) Excludes cash placed with banks of $268.1 billion and $421.0 billion, at December 31, 2018 and 2017, 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.

Management's discussion and analysis

Real Estate

Presented below is additional information on the Real Estate industry to which the Firm has significant exposure. Real Estate exposure increased $3.9 billion to $143.3 billion during the year ended December 31, 2018, while the investment-grade percentage of the portfolio remained relatively flat at 82%. For further information on Real Estate loans, refer to Note 12.

	December 31, 2018				
(in millions, except ratios)	**Loans and Lending-related Commitments**	**Derivative Receivables**	**Credit exposure**	**% Investment-grade**	**% Drawn(c)**
Multifamily(a)	**$ 85,683**	**$ 33**	**$ 85,716**	**89 %**	**92 %**
Other	**57,469**	**131**	**57,600**	**72**	**63**
Total Real Estate Exposure(b)	**143,152**	**164**	**143,316**	**82**	**81**

	December 31, 2017				
(in millions, except ratios)	Loans and Lending-related Commitments	Derivative Receivables	Credit exposure	% Investment-grade	% Drawn(c)
Multifamily(a)	$ 84,635	$ 34	$ 84,669	89 %	92 %
Other	54,620	120	54,740	74	66
Total Real Estate Exposure(b)	139,255	154	139,409	83	82

(a) Multifamily exposure is largely in California.
(b) Real Estate exposure is predominantly secured; unsecured exposure is predominantly investment-grade.
(c) Represents drawn exposure as a percentage of credit exposure.

Loans

In the normal course of its wholesale business, the Firm provides loans to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals. For a further discussion on loans, including information on credit quality indicators and sales of loans, refer to Note 12.

The following table presents the change in the nonaccrual loan portfolio for the years ended December 31, 2018 and 2017.

Wholesale nonaccrual loan activity

Year ended December 31, (in millions)	**2018**	2017
Beginning balance	**$ 1,734**	$ 2,063
Additions	**1,188**	1,482
Reductions:		
Paydowns and other	**692**	1,137
Gross charge-offs	**299**	200
Returned to performing status	**234**	189
Sales	**327**	285
Total reductions	**1,552**	1,811
Net changes	**(364)**	(329)
Ending balance	**$ 1,370**	$ 1,734

The following table presents net charge-offs/recoveries, which are defined as gross charge-offs less recoveries, for the years ended December 31, 2018 and 2017. 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)	**2018**	2017

Loans – reported		
Average loans retained	**$416,828**	$392,263
Gross charge-offs	**313**	212
Gross recoveries	**(158)**	(93)
Net charge-offs	**155**	119
Net charge-off rate	**0.04%**	0.03%

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 the Firm fulfill 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. In the Firm's view, the total contractual amount of these wholesale lending-related commitments is not representative of the Firm's expected future credit exposure or funding requirements. For further information on wholesale lending-related commitments, refer to Note 27.

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 provision of clearing services if clients do not adhere to their obligations under the clearing agreement. For further discussion of clearing services, refer to Note 27.

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. For a further discussion of derivative contracts, counterparties and settlement types, refer to Note 5.
The following table summarizes the net derivative receivables for the periods presented.

Derivative receivables

December 31, (in millions)	**2018**	2017
Total, net of cash collateral	**$54,213**	$56,523
Liquid securities and other cash collateral held against derivative receivables[(a)]	**(15,322)**	(16,108)
Total, net of all collateral	**$38,891**	$40,415

(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 $54.2 billion and $56.5 billion at December 31, 2018 and 2017, 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 $15.3 billion and $16.1 billion at December 31, 2018 and 2017, respectively, that may be used as security when the fair value of the client's exposure is in the Firm's favor.
In addition to the collateral described in the preceding paragraph, 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. For additional information on the Firm's use of collateral agreements, refer to Note 5.

While useful as a current view of credit exposure, the net fair value of the derivative receivables does not capture the potential future variability of that credit exposure. To capture the potential future variability of credit exposure, the Firm calculates, on a client-by-client basis, three measures of potential derivatives-related credit loss: Peak, Derivative Risk Equivalent ("DRE"), and Average exposure ("AVG"). These measures all incorporate netting and collateral benefits, where applicable.

Peak represents a conservative measure of potential exposure to a counterparty calculated in a manner that is broadly equivalent to a 97.5% confidence level over the life of the transaction. Peak is the primary measure used by the Firm for setting of 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

Management's discussion and analysis

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 the CVA, as further described below.
The fair value of the Firm's derivative receivables incorporates CVA to reflect the credit quality of counterparties. CVA is based on the Firm's AVG to a counterparty and the counterparty's credit spread in the credit derivatives market. The Firm believes that active risk management is essential to controlling the dynamic credit risk in the derivatives portfolio. In addition, the Firm's risk management process takes into consideration the potential impact of wrong-way risk, which is broadly defined as the potential for increased correlation between the Firm's exposure to a counterparty (AVG) and the counterparty's credit quality. Many factors may influence the nature and magnitude of these correlations over time. To the extent that these correlations are identified, the Firm may adjust the CVA associated with that counterparty's AVG. The Firm risk manages exposure to changes in CVA by entering into

credit derivative contracts, as well as interest rate, foreign exchange, equity and commodity derivative contracts.
The accompanying 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, 2018
(in billions)

The following table summarizes the ratings profile of the Firm's derivative receivables, including credit derivatives, net of all collateral, at the dates indicated. The ratings scale is based on the Firm's internal ratings, which generally correspond to the ratings as assigned by S&P and Moody's.

Ratings profile of derivative receivables

Rating equivalent	**2018**		2017	
December 31, (in millions, except ratios)	Exposure net of all collateral	% of exposure net of all collateral	Exposure net of all collateral	% of exposure net of all collateral
AAA/Aaa to AA-/Aa3	**$ 11,831**	**31 %**	$ 11,529	29 %
A+/A1 to A-/A3	**7,428**	**19**	6,919	17
BBB+/Baa1 to BBB-/Baa3	**12,536**	**32**	13,925	34
BB+/Ba1 to B-/B3	**6,373**	**16**	7,397	18
CCC+/Caa1 and below	**723**	**2**	645	2
Total	**$ 38,891**	**100 %**	$ 40,415	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, 2018, and December 31, 2017.

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. For a detailed description of credit derivatives, refer to Credit derivatives in Note 5.

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. For further information on derivatives used in credit portfolio management activities, refer to Credit derivatives in Note 5.

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; for further information on these credit derivatives as well as credit derivatives used in the Firm's capacity as a market-maker in credit derivatives, refer to Credit derivatives in Note 5.

Credit derivatives used in credit portfolio management activities

	Notional amount of protection purchased and sold [(a)]	
December 31, (in millions)	**2018**	2017
Credit derivatives used to manage:		
Loans and lending-related commitments	**$1,272**	$1,867
Derivative receivables	**11,410**	15,742
Credit derivatives used in credit portfolio management activities	**$12,682**	$17,609

(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.

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.

For further information on the components of the allowance for credit losses and related management judgments, refer to Critical Accounting Estimates Used by the Firm on pages 141-143 and Note 13.

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, 2018, 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, 2017 driven by:

- a reduction in the consumer allowance due to a $250 million reduction in the CCB allowance for loan losses in the residential real estate PCI portfolio, reflecting continued improvement in home prices and lower delinquencies, as well as a $187 million reduction in the allowance for write-offs of PCI loans partially due to loan sales. These reductions were largely offset by a $300 million addition to the allowance in the credit card portfolio, due to loan growth and higher loss rates, as anticipated.

For additional information on the consumer and wholesale credit portfolios, refer to Consumer Credit Portfolio on pages 106–111, Wholesale Credit Portfolio on pages 112–119 and Note 12.

Summary of changes in the allowance for credit losses

Year ended December 31, (in millions, except ratios)	2018 Consumer, excluding credit card	2018 Credit card	2018 Wholesale	2018 Total	2017 Consumer, excluding credit card	2017 Credit card	2017 Wholesale	2017 Total
Allowance for loan losses								
Beginning balance at January 1,	**$4,579**	**$4,884**	**$4,141**	**$13,604**	$5,198	$4,034	$4,544	$13,776
Gross charge-offs	**1,025**	**5,011**	**313**	**6,349**	1,779	4,521	212	6,512
Gross recoveries	**(842)**	**(493)**	**(158)**	**(1,493)**	(634)	(398)	(93)	(1,125)
Net charge-offs[a]	**183**	**4,518**	**155**	**4,856**	1,145	4,123	119	5,387
Write-offs of PCI loans[b]	**187**	**—**	**—**	**187**	86	—	—	86
Provision for loan losses	**(63)**	**4,818**	**130**	**4,885**	613	4,973	(286)	5,300
Other	**—**	**—**	**(1)**	**(1)**	(1)	—	2	1
Ending balance at December 31,	**$4,146**	**$5,184**	**$4,115**	**$13,445**	$4,579	$4,884	$4,141	$13,604
Impairment methodology								
Asset-specific[c]	**$196**	**$440**	**$297**	**$933**	$246	$383	$461	$1,090
Formula-based	**2,162**	**4,744**	**3,818**	**10,724**	2,108	4,501	3,680	10,289
PCI	**1,788**	**—**	**—**	**1,788**	2,225	—	—	2,225
Total allowance for loan losses	**$4,146**	**$5,184**	**$4,115**	**$13,445**	$4,579	$4,884	$4,141	$13,604
Allowance for lending-related commitments								
Beginning balance at January 1,	**$33**	**$—**	**$1,035**	**$1,068**	$26	$—	$1,052	$1,078
Provision for lending-related commitments	**—**	**—**	**(14)**	**(14)**	7	—	(17)	(10)
Other	**—**	**—**	**1**	**1**	—	—	—	—
Ending balance at December 31,	**$33**	**$—**	**$1,022**	**$1,055**	$33	$—	$1,035	$1,068
Impairment methodology								
Asset-specific	**$—**	**$—**	**$99**	**$99**	$—	$—	$187	$187
Formula-based	**33**	**—**	**923**	**956**	33	—	848	881
Total allowance for lending-related commitments[d]	**$33**	**$—**	**$1,022**	**$1,055**	$33	$—	$1,035	$1,068
Total allowance for credit losses	**$4,179**	**$5,184**	**$5,137**	**$14,500**	$4,612	$4,884	$5,176	$14,672
Memo:								
Retained loans, end of period	**$373,637**	**$156,616**	**$439,162**	**$969,415**	$372,553	$149,387	$402,898	$924,838
Retained loans, average	**374,395**	**145,606**	**416,828**	**936,829**	366,798	139,918	392,263	898,979
PCI loans, end of period	**24,034**	**—**	**3**	**24,037**	30,576	—	3	30,579
Credit ratios								
Allowance for loan losses to retained loans	**1.11%**	**3.31%**	**0.94%**	**1.39%**	1.23%	3.27%	1.03%	1.47%
Allowance for loan losses to retained nonaccrual loans[e]	**120**	**NM**	**358**	**292**	109	NM	239	229
Allowance for loan losses to retained nonaccrual loans excluding credit card	**120**	**NM**	**358**	**179**	109	NM	239	147
Net charge-off rates[a]	**0.05**	**3.10**	**0.04**	**0.52**	0.31	2.95	0.03	0.60
Credit ratios, excluding residential real estate PCI loans								
Allowance for loan losses to retained loans	**0.67**	**3.31**	**0.94**	**1.23**	0.69	3.27	1.03	1.27
Allowance for loan losses to retained nonaccrual loans[e]	**68**	**NM**	**358**	**253**	56	NM	239	191
Allowance for loan losses to retained nonaccrual loans excluding credit card	**68**	**NM**	**358**	**140**	56	NM	239	109
Net charge-off rates[a]	**0.05%**	**3.10%**	**0.04%**	**0.53%**	0.34%	2.95%	0.03%	0.62%

Note: In the table above, the financial measures which exclude the impact of PCI loans are non-GAAP financial measures.

(a) For the year ended December 31, 2017, excluding net charge-offs of $467 million related to the student loan portfolio transfer, the net charge-off rate for Consumer, excluding credit card would have been 0.18%; total Firm would have been 0.55%; Consumer, excluding credit card and PCI loans would have been 0.20%; and total Firm, excluding PCI would have been 0.57%.

(b) 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.

(c) 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.
(d) The allowance for lending-related commitments is reported in accounts payable and other liabilities on the Consolidated balance sheets.
(e) The Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status as permitted by regulatory guidance.

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Provision for credit losses

The following table presents the components of the Firm's provision for credit losses:

Year ended December 31, (in millions)	Provision for loan losses			Provision for lending-related commitments			Total provision for credit losses		
	2018	2017	2016	**2018**	2017	2016	**2018**	2017	2016
Consumer, excluding credit card	**$(63)**	$613	$467	**$—**	$7	$—	**$(63)**	$620	$467
Credit card	**4,818**	4,973	4,042	**—**	—	—	**4,818**	4,973	4,042
Total consumer	**4,755**	5,586	4,509	**—**	7	—	**4,755**	5,593	4,509
Wholesale	**130**	(286)	571	**(14)**	(17)	281	**116**	(303)	852
Total	**$4,885**	$5,300	$5,080	**$(14)**	$(10)	$281	**$4,871**	$5,290	$5,361

Provision for credit losses

The for the year ended December 31, 2018 as a result of a decline in the consumer provision, partially offset by an increase in the wholesale provision **provision for credit losses** for the year ended December 31, 2018 as a result of a decline in the consumer provision, partially offset by an increase in the wholesale provision   for the year ended December 31, 2018 as a result of a decline in the consumer provision, partially offset by an increase in the wholesale provision decreased for the year ended December 31, 2018 as a result of a decline in the consumer provision, partially offset by an increase in the wholesale provision

- the decrease in the **consumer, excluding credit card** portfolio in CCB was due to
  - lower net charge-offs in the residential real estate portfolio, largely driven by recoveries from loan sales, and
  - lower net charge-offs in the auto portfolio

partially offset by

- a $250 million reduction in the allowance for loan losses in the residential real estate portfolio — PCI, reflecting continued improvement in home prices and lower delinquencies; the reduction was $75 million lower than the prior year for the residential real estate portfolio — non credit-impaired

- the prior year also included a net $218 million write-down recorded in connection with the sale of the student loan portfolio, and
- the decrease in the **credit card** portfolio was due to
  - a $300 million addition to the allowance for loan losses, reflecting loan growth and higher loss rates, as anticipated; the addition was $550 million lower than the prior year,

largely offset by

- higher net charge-offs due to seasoning of more recent vintages, as anticipated, and

- in **wholesale**, the current period expense of $116 million reflected additions to the allowance for loan losses from select client downgrades,

largely offset by

- other net portfolio activity, including a reduction in the allowance for loan losses related to a single name in the Oil & Gas portfolio in the first quarter of 2018, compared to a net benefit of $303 million in the prior year. The prior year benefit reflected a reduction in the allowance for loan losses on credit quality improvements in the Oil & Gas, Natural Gas Pipelines, and Metals and Mining portfolios.

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 held predominantly by Treasury and CIO in connection with the Firm's balance sheet or asset-liability management objectives or from principal investments managed in various LOBs and Corporate in predominantly privately-held financial instruments. 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 minimized given that Treasury and CIO substantially invest in high-quality securities. At December 31, 2018, the investment securities portfolio was $260.1 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 ratings that correspond to ratings as defined by S&P and Moody's). For further information on the investment securities portfolio, refer to Corporate segment results on pages 77–78 and Note 10. For further information on the market risk inherent in the portfolio, refer to Market Risk Management on pages 124–131. For further information on related liquidity risk, refer to Liquidity Risk on pages 95–100.

Governance and oversight

Investment securities risks are governed by the Firm's Risk Appetite framework, and discussed at the CIO, Treasury and Corporate (CTC) Risk Committee with regular updates to the DRPC.

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 cover 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 various LOBs and Corporate and are reflected within their respective financial results. Effective January 1, 2018, the Firm adopted new accounting guidance related to the recognition and measurement of financial assets, which requires fair value adjustments upon observable price changes to certain equity investments previously held at cost in the principal investment portfolios. For additional information, refer to Notes 1 and 2.

As of December 31, 2018 and 2017, the aggregate carrying values of the principal investment portfolios were $22.2 billion and $19.5 billion, respectively, which included tax-oriented investments (e.g., affordable housing and alternative energy investments) of $16.6 billion and $14.0 billion, respectively, and private equity, various debt and equity instruments, and real assets of $5.6 billion and $5.5 billion, respectively.

Governance and oversight

The Firm's approach to managing principal risk is consistent with the Firm's general risk governance structure. A Firmwide risk policy framework exists for all principal investing activities. All investments are approved by investment committees that include executives who are independent from the investing businesses.

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.

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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. The Market Risk Management function reports to the Firm's CRO.

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:

- Establishment of a market risk policy framework
- Independent measurement, monitoring and control of line of business, Corporate, and firmwide market risk
- Definition, approval and monitoring of limits
- Performance of 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 the Firm 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, the Firm takes into consideration factors such as market volatility, product liquidity, accommodation of client business, and management experience. The Firm maintains different levels of limits. Firm level limits include VaR and stress limits. Similarly, line of business 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 lines of business and Corporate, as well as at the portfolio and/or legal entity level.

Market Risk Management sets limits and regularly reviews and updates them as appropriate, with any changes approved by line of business or Corporate management and Market Risk Management. Senior management, including the Firm's CEO and CRO, are 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 lines of business 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 senior management of the Firm and of the line of business or Corporate to determine the appropriate 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 line of business-level limits that have been breached are escalated to senior management, the LOB Risk Committee, and/or the Firmwide Risk Committee.

The following table summarizes, by line of business and Corporate, the predominant business activities that give rise to market risks, and certain measures used to capture those risks.

Predominant business activities that give rise to market risk by line of business and Corporate

LOBs and Corporate	Predominant business activities[(a)]	Related market risks	Positions included in Risk Management VaR	Positions included in earnings-at-risk	Positions included in other sensitivity-based measures
CCB	• Services mortgage loans • Originates loans and takes deposits	• Non-linear risk primarily from prepayment options embedded in mortgages and changes in the probability of newly originated mortgage commitments actually closing • Basis risk from differences in the relative movements of the rate indices underlying mortgage exposure and other interest rates	• Mortgage pipeline loans, classified as derivatives • Warehouse loans, classified as trading assets – debt instruments • MSRs • Hedges of pipeline loans, warehouse loans and MSRs, classified as derivatives • Interest-only securities, classified as trading assets debt instruments, and related hedges, classified as derivatives	• Retained loan portfolio • Deposits	
CIB	• Makes markets and services clients across fixed income, foreign exchange, equities and commodities • Originates loans and takes deposits	• Risk of loss from adverse movements in market prices across interest rate, credit, currency, commodity and equity risk factors	• Trading assets/liabilities – debt and marketable equity instruments, and derivatives, including hedges of the retained loan portfolio • Certain securities purchased, loaned or sold under resale agreements and securities borrowed • Fair value option elected liabilities • Derivative CVA and associated hedges • Marketable equity investments	• Retained loan portfolio • Deposits	• Privately held equity and other investments measured at fair value • Derivatives FVA and fair value option elected liabilities DVA
CB	• Originates loans and takes deposits	• Interest rate risk and prepayment risk		• Retained loan portfolio • Deposits	
AWM	• Provides initial capital investments in products such as mutual funds and capital invested alongside third-party investors • Originates loans and takes deposits	• Risk from changes in market factors (e.g., rates and credit spreads)	• Debt securities held in advance of distribution to clients, classified as trading assets - debt instruments[(b)]	• Retained loan portfolio • Deposits	• Initial seed capital investments and related hedges, classified as derivatives • Capital invested alongside third-party investors, typically in privately distributed collective vehicles managed by AWM (i.e., co-investments)
Corporate	• Manages the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks	• Structural interest rate risk from the Firm's traditional banking activities • Structural non-USD foreign exchange risks	• Derivative positions measured at fair value through noninterest revenue in earnings • Marketable equity investments	• Deposits with banks • Investment securities portfolio and related interest rate hedges •	• 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

Long-term debt and related interest rate hedges

(a) In addition to the predominant business activities, each of the LOBs 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 above. For additional discussion on principal investments refer to Investment Portfolio Risk Management on page 123.
(b) The AWM contribution to Firmwide average VaR was not material for the year ended December 31, 2018 and 2017.

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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 lines of business and Corporate, and 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. For further information on the Firm's valuation process, refer to Valuation process in Note 2. Because 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. For information regarding model reviews and approvals, refer to Estimations and Model Risk Management on page 140.

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.

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), refer to JPMorgan Chase's Basel

III Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website at: (http://investor.shareholder.com/jpmorganchase/basel.cfm).
The table below shows the results of the Firm's Risk Management VaR measure using a 95% confidence level.

Total VaR

As of or for the year ended December 31,	**2018**			2017		
(in millions)	Avg.	Min	Max	Avg.	Min	Max
CIB trading VaR by risk type						
Fixed income	**$33**	**$25**	**$46**	$28	$20	$40
Foreign exchange	**6**	**3**	**15**	10	4	20
Equities	**17**	**13**	**26**	12	8	19
Commodities and other	**8**	**4**	**13**	7	4	10
Diversification benefit to CIB trading VaR	**(26)** (a)	**NM** (b)	**NM** (b)	(30) (a)	NM (b)	NM (b)
CIB trading VaR	**38**	**26** (b)	**58** (b)	27	14 (b)	38 (b)
Credit portfolio VaR	**3**	**3**	**4**	7	3	12
Diversification benefit to CIB VaR	**(2)** (a)	**NM** (b)	**NM** (b)	(6) (a)	NM (b)	NM (b)
CIB VaR	**39**	**26** (b)	**59** (b)	28	17 (b)	39 (b)
CCB VaR	**1**	**—**	**3**	2	1	4
Corporate VaR	**12**	**9**	**14**	4	1	16
Diversification benefit to other VaR	**(1)** (a)	**NM** (b)	**NM** (b)	(1) (a)	NM (b)	NM (b)
Other VaR	**12**	**9** (b)	**14** (b)	5	2 (b)	16 (b)
Diversification benefit to CIB and other VaR	**(10)** (a)	**NM** (b)	**NM** (b)	(4) (a)	NM (b)	NM (b)
Total VaR	**$41**	**$28** (b)	**$62** (b)	$29	$17 (b)	$42 (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 lines of business, 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 $12 million for the year-ended December 31, 2018 as compared with the prior year. The increase was primarily due to changes in the risk profile for Fixed Income and Equities risk types, the inclusion of certain CIB marketable equity investments and a Corporate private equity position that became publicly traded in the fourth quarter of 2017, as well as increased volatility in the one-year historical look-back period.
In addition, average Credit Portfolio VaR has declined by $4 million, reflecting the sale of select positions in the prior year.
VaR can vary significantly over time as positions change, market volatility fluctuates, and diversification benefits change.

VaR back-testing

The Firm evaluates the effectiveness of its VaR methodology by 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 fees, commissions, certain valuation adjustments, net interest income, and gains and losses arising from intraday trading.

Management's discussion and analysis

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, 2018. 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'

Daily Market Risk-Related Gains and Losses
vs. Risk Management VaR (1-day, 95% Confidence level)
Year ended December 31, 2018

Market Risk-Related Gains and Losses

Risk Management VaR
First Quarter Second Quarter Third Quarter Fourth Quarter
2018 2018 2018 2018

Management's discussion and analysis

December 31, (in billions)	**2018**	2017
Parallel shift:		
+100 bps shift in rates	**$0.9**	$1.7
-100 bps shift in rates	**(2.1)**	(3.6)
Steeper yield curve:		
+100 bps shift in long-term rates	**0.5**	0.7
-100 bps shift in short-term rates	**(1.2)**	(2.2)
Flatter yield curve:		
+100 bps shift in short-term rates	**0.4**	1.0
-100 bps shift in long-term rates	**(0.9)**	(1.4)

December 31, (in billions)	**2018**	2017
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

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 lines of business, primarily manage these risks on behalf of the Firm. Treasury and CIO may hedge certain of these risks using derivatives within risk limits governed by the CTC Risk Committee.

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 OCI due to changes in relevant market variables. For additional information on the positions captured in other sensitivity-based measures, refer to the table Predominant business activities that give rise to market risk on page 125.

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, 2018 and 2017, as the movement in market parameters across maturities may vary and are not intended to imply management's expectation of future deterioration in these sensitivities.

Year ended December 31,

Gain/(loss) (in millions)

Activity	**Description**	**Sensitivity measure**	**2018**	**2017**
Investment activities[(a)]				
Investment management activities	Consists of seed capital and related hedges; and fund co-investments	10% decline in market value	$(102)	$(110)
Other investments	Consists of privately held equity and other investments held at fair value	10% decline in market value	(218)	(338)
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	(13)	(10)
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	17	(13)
Derivatives – funding spread risk	Impact of changes in the spread related to derivatives FVA	1 basis point parallel increase in spread	(4)	(6)
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	30	22
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	1	(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.

Management's discussion and analysis

COUNTRY RISK
MANAGEMENT

Top 20 country exposures (excluding the U.S.)[a]

December 31, (in billions)	2018				2017[f]
	Lending and deposits[b]	Trading and investing[c][d]	Other[e]	Total exposure	Total exposure
Germany	**$ 53.7**	**$ 8.1**	**$ 0.3**	**$ 62.1**	$ 57.4
United Kingdom	**28.0**	**10.1**	**2.6**	**40.7**	44.9
Japan	**25.4**	**3.3**	**0.4**	**29.1**	30.8
China	**9.5**	**7.1**	**2.7**	**19.3**	16.3
France	**10.8**	**6.5**	**0.6**	**17.9**	19.4
Canada	**10.8**	**3.4**	**0.1**	**14.3**	14.9
Australia	**7.2**	**5.4**	**0.4**	**13.0**	11.4
Switzerland	**9.1**	**0.6**	**3.1**	**12.8**	13.9
India	**6.1**	**4.0**	**1.7**	**11.8**	12.3
Luxembourg	**10.5**	**0.5**	**—**	**11.0**	9.5
South Korea	**4.2**	**3.2**	**0.2**	**7.6**	6.8
Brazil	**4.4**	**2.9**	**—**	**7.3**	4.6
Singapore	**3.9**	**1.4**	**1.5**	**6.8**	6.3
Italy	**2.4**	**3.8**	**0.2**	**6.4**	6.7
Netherlands	**5.0**	**0.4**	**0.4**	**5.8**	8.0
Mexico	**3.7**	**1.8**	**—**	**5.5**	5.2
Hong Kong	**2.4**	**1.1**	**1.9**	**5.4**	4.2
Saudi Arabia	**4.7**	**0.6**	**—**	**5.3**	4.5
Spain	**3.8**	**1.3**	**—**	**5.1**	6.8
Malaysia	**1.8**	**1.1**	**1.4**	**4.3**	3.0

Management's discussion and analysis

OPERATIONAL RISK MANAGEMENT

Operational risk is the risk associated with inadequate or failed internal processes, people and systems, or from external events and includes compliance risk, conduct risk, legal risk, 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. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Firm. The goal is to keep 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

To monitor and control operational risk, the Firm has an Operational Risk Management Framework ("ORMF") which is designed to enable the Firm to maintain a sound and well-controlled operational environment. The ORMF has four main components: Governance, Operational Risk Identification and Assessment, Operational Risk Measurement, and Operational Risk Monitoring and Reporting.

Governance

The lines of business and Corporate are responsible for applying the ORMF in order to manage the operational risk that arises from their activities. The Control Management organization, which consists of control managers within each line of business and Corporate, is responsible for the day-to-day execution of the ORMF.

Line of business 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. These committees escalate operational risk issues to the FCC, as appropriate. For additional information on the FCC, refer to Enterprise-wide Risk Management on pages 79–140.

The Firmwide Risk Executive for Operational Risk Management ("ORM"), a direct report to the CRO, is responsible for defining the ORMF and establishing minimum standards for its execution. Operational Risk Officers report to both the line of business CROs and to the Firmwide Risk Executive for ORM, and are independent of the respective businesses or corporate functions they oversee.

The Firm's Operational Risk Management Policy is approved by the DRPC. This policy establishes the Operational Risk Management Framework for the Firm.

Operational Risk identification and assessment

The Firm utilizes a structured risk and control self-assessment process which is executed by the lines of business and Corporate in accordance with the minimum standards established by ORM, to identify, assess, mitigate and manage its operational risk. As part of this process, lines of business and Corporate identify key operational risks inherent in their activities, address gaps or deficiencies identified, and define actions to reduce residual risk. Action plans are developed for identified control issues and lines of business and Corporate are held accountable for tracking and resolving issues in a timely manner. Operational Risk Officers independently challenge the execution of the self-assessment and evaluate the appropriateness of the residual risk results.

In addition to the self-assessment process, the Firm tracks and monitors events that have led to or could lead to actual operational risk losses, including litigation-related events. Responsible lines of business and Corporate analyze their losses to evaluate the effectiveness of their control environment to assess where controls have failed, and to determine where targeted remediation efforts may be required. ORM 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

In addition to the level of actual operational risk losses, 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.
For information related to operational risk RWA, CCAR or ICAAP, refer to Capital Risk Management section, pages 85-94.

Operational Risk Monitoring and reporting

ORM has established standards for consistent operational risk monitoring and reporting. Operational risk reports are produced on a firmwide basis as well as by line of business and Corporate. Reporting includes the evaluation of key risk 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. For more information on Compliance risk, Conduct risk, Legal risk and Estimations and Model risk, refer to pages 137, 138, 139 and 140, respectively. 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 the Firm's 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) could also be 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 can also be 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 are due to client failure to maintain the security of their own systems and processes, clients will generally be 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 to prevent, detect, and respond to cyberattacks. The Global Chief Information Officer, Chief Technology Control Officer, and Chief Information Security Officer ("CISO") update the Audit Committee of the Board of Directors at least annually 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 detailed 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. 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 in this regard including Compliance and the Legal Department.

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 lines of business, the Cybersecurity and Technology Control organization identifies information security risk issues and champions 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 Control organization comprises Governance and Control, Assessments, Assurance and Training, Cybersecurity Operations, business aligned control officers, Identity and Access Management, and resiliency functions that execute the Information Security Program.

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 line of business and Corporate.

Management's discussion and analysis

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 including technology management, Firmwide management and the Operating Committee. The forums are used to escalate information security risks or other matters as appropriate to the FCC.

IRM provides oversight of the activities which identify, assess, manage and mitigate cybersecurity risk. As integral participants in cybersecurity governance forums, the IRM organization actively monitors and oversees the Cybersecurity and Technology Control functions.

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 an annual basis, and it is supplemented by firmwide testing initiatives, including quarterly phishing tests. Finally, the Firm's Global Privacy Program requires all employees to take annual 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, flooding, transit strikes, terrorist threats or infectious disease. The safety of the Firm's employees and customers is of the highest priority. The Firm's global 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 corporate 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 Firm's global 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. Over the past year, the risk of payment fraud remained at a heightened level across the industry. The complexities of these incidents and the strategies used by perpetrators continue to evolve. A Payments Control Program including the LOBs and Corporate develop methods for managing the risk, implementing controls and providing employee and client education and awareness training. 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. The Firm's consumer and wholesale businesses collaborate closely to deploy risk mitigation controls across their businesses.

Third-party outsourcing risk

To identify and manage the operational risk inherent in its outsourcing activities, the Firm has a Third-Party Oversight ("TPO") framework to assist the lines of business and Corporate in selecting, documenting, onboarding, monitoring and managing their supplier relationships. The objective of the TPO framework is to hold third parties to the same high level of operational performance as is expected of the Firm's internal operations. The Corporate Third-Party Oversight group is responsible for Firmwide TPO 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 utilizes a wholly-owned captive insurer, Park Assurance Company, as needed to comply with local laws and regulations (e.g., workers compensation), as well as to serve other needs (e.g., property loss and public liability). Insurance may also be required by third parties with whom the Firm does business. The insurance purchased is reviewed and approved by senior management.

COMPLIANCE RISK MANAGEMENT

Compliance risk, a subcategory of operational risk, is the risk of failure to comply with legal or regulatory obligations or codes of conduct and standards of self-regulatory organizations applicable to the business activities of the Firm.

Overview

Each line of business and Corporate hold primary ownership of and accountability for managing compliance risk. The Firm's Compliance Organization ("Compliance"), which is independent of the lines of business, works closely with senior management to provide 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 line of business and the jurisdiction, and include those 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, among others. 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.

Compliance implements various practices designed to identify and mitigate compliance risk by establishing policies and standards, testing, monitoring, training and providing guidance.

Governance and oversight

Compliance is led by the Firms' CCO who reports to the Firm's CRO.

The Firm maintains oversight and coordination of its Compliance Risk Management practices through the Firm's CCO, lines of business CCOs and regional CCOs to implement the Compliance program globally across the lines of business and regions. The Firm's CCO is a member of the FCC and the FRC. The Firm's CCO also provides regular updates to the Audit Committee and DRPC. In addition, certain Special Purpose Committees of the Board have been established to oversee the Firm's compliance with regulatory Consent Orders.

The Firm has a Code of Conduct (the "Code"). Each employee is given annual training on the Code and is required annually to affirm his or her compliance with the Code. All new hires must complete Code training shortly after their start date with the Firm. The Code 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, customers, suppliers, contract workers, business partners, or agents. The Code prohibits retaliation against anyone who raises an issue or concern in good faith. Specified compliance officers are specially trained and designated as "code specialists" who act as a resource to employees on questions related to the Code. Employees can report any known or suspected 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 24/7 globally, with translation services. It is maintained by an outside service provider. Annually, the Audit Committee receives a report on the Code of Conduct program, including an update on the employee completion rate for Code of Conduct training and affirmation.

Management’s discussion and analysis

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 line of business 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 law everywhere the Firm operates. For further discussion of the Code, refer to Compliance Risk Management on page 137.

Governance and oversight

The Conduct Risk Program is governed by a Board-level approved Conduct Risk Governance Policy. The Conduct Risk Governance Policy establishes the framework for ownership, assessment, managing and escalating conduct risk in the Firm.

The 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.

The CRSC may escalate systemic conduct risk issues to the FRC and as appropriate to the DRPC. The misconduct (actual or potential) of individuals involved in material risk and control issues are escalated to the HR Control Forum. Certain committees of the Board oversee conduct risk issues within the scope of their responsibilities.

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 function completes an assessment of conduct risk quarterly, 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 Enterprise-wide Risk Management.

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 General Counsel's leadership team includes a General Counsel for each line of business, the heads of the Litigation and Corporate & Regulatory practices, as well as the Firm's Corporate Secretary. Each region (e.g., Latin America, Asia Pacific) has a General Counsel who is responsible for managing legal risk across all lines of business and functions in the region.

The Firm's General Counsel and other members of Legal report on significant legal matters at each meeting of the Firm's Board of Directors, at least quarterly to the Audit Committee, and periodically to the DRPC.

Legal serves on and advises various committees (including new business initiative and reputation risk committees) and advises the Firm's businesses to protect the Firm's reputation beyond any particular legal requirements.

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 model risk management policies and certain analytical and judgment-based estimations, such as those used in risk management, budget forecasting and capital planning and analysis. MRGR reports to the Firm's CRO.

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. The factors considered in reviewing a model include whether the model accurately reflects the characteristics of the product and its significant risks, the selection and reliability of model inputs, consistency with models for similar products, the appropriateness of any model-related adjustments, and sensitivity to input parameters and assumptions that cannot be observed from the market. 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, the head of the Model Risk function may grant exceptions 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.

For a summary of model-based valuations and other valuation techniques, refer to Critical Accounting Estimates Used by the Firm on pages 141-143 and Note 2.

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

JPMorgan Chase'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 loan assets 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. For further information on these components, areas of judgment and methodologies used in establishing the Firm's allowance for credit losses, refer to Allowance for credit losses on pages 120–122 and Note 13.

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, 2018, 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 current levels could imply:
  - an increase to modeled credit loss estimates of approximately $425 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 current levels could imply an increase to modeled annual credit loss estimates of approximately $875 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 $175 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

Management's discussion and analysis

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. For further information, refer to Note 2.

December 31, 2018 (in billions, except ratios)	Total assets at fair value	Total level 3 assets
Trading debt and equity instruments	$359.5	$4.2
Derivative receivables[(a)]	54.2	5.8
Trading assets	413.7	10.0
AFS securities	230.4	—
Loans	3.2	0.1
MSRs	6.1	6.1
Other	27.2	1.0
Total assets measured at fair value on a recurring basis	680.6	17.2
Total assets measured at fair value on a nonrecurring basis	1.4	1.1
Total assets measured at fair value	$682.0	$18.3
Total Firm assets	$2,622.5	
Level 3 assets as a percentage of total Firm assets[(a)]		0.7 %
Level 3 assets as a percentage of total Firm assets at fair value[(a)]		2.7 %

(a) For purposes of the table above, the derivative receivables total reflects the impact of netting adjustments; however, the $5.8 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. For further discussion of the valuation of level 3 instruments, including unobservable inputs used, refer to Note 2.

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. For a further discussion of valuation adjustments applied by the Firm, refer to Note 2.

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. For a detailed discussion of the Firm's valuation process and hierarchy, and its determination of fair value for individual financial instruments, refer to Note 2.

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, 2018, the Firm reviewed current economic conditions, business performance, estimated market cost of equity, 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, 2018. The fair values of these reporting units exceeded their carrying values by approximately 20% 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.

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.

For additional information on goodwill, refer to Note 15.

Credit card rewards liability

JPMorgan Chase offers credit cards with various rewards programs which allow cardholders to earn rewards points based on their account activity and the terms and conditions of the rewards program. Generally, there are no limits on the points that an eligible cardholder can earn, nor do they expire, and these 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 $5.8 billion and $4.9 billion at December 31, 2018 and 2017, 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 NOLs. 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, 2018, management has determined it is more likely than not that the Firm will realize its deferred tax assets, net of the existing valuation allowance.

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.

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.
The income tax expense for the current year includes a change in estimate recorded under SEC Staff Accounting Bulletin No. 118 (SAB 118) resulting from the enactment of the TCJA. The accounting under SAB 118 is complete. For additional information on income taxes, refer to Note 24.

Litigation reserves

For a description of the significant estimates and judgments associated with establishing litigation reserves, refer to Note 29.

Management's discussion and analysis

ACCOUNTING AND REPORTING DEVELOPMENTS

Financial Accounting Standards Board ("FASB") Standards Adopted during 2018

Standard	Summary of guidance	Effects on financial statements
Revenue recognition – revenue from contracts with customers *Issued May 2014*	• Requires that revenue from contracts with customers be recognized upon transfer of control of a good or service in the amount of consideration expected to be received. • Changes the accounting for certain contract costs, including whether they may be offset against revenue in the Consolidated statements of income, and requires additional disclosures about revenue and contract costs.	• Adopted January 1, 2018. • For further information, refer to Note 1.
Recognition and measurement of financial assets and financial liabilities *Issued January 2016*	• Requires that certain equity instruments be measured at fair value, with changes in fair value recognized in earnings. • Provides a measurement alternative for equity securities without readily determinable fair values to be measured at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer. Any such price changes are reflected in earnings beginning in the period of adoption.	• Adopted January 1, 2018. • For further information, refer to Note 1.
Classification of certain cash receipts and cash payments in the statement of cash flows *Issued August 2016*	• Provides targeted amendments to the classification of certain cash flows, including the treatment of settlement payments for zero coupon debt instruments and distributions received from equity method investments.	• Adopted January 1, 2018. • The adoption of the guidance had no material impact as the Firm was either in compliance with the amendments or the amounts to which it was applied were immaterial.
Treatment of restricted cash on the statement of cash flows *Issued November 2016*	• Requires restricted cash to be combined with unrestricted cash when reconciling the beginning and ending cash balances on the Consolidated statements of cash flows. • Requires additional disclosures to supplement the Consolidated statements of cash flows.	• Adopted January 1, 2018 • For further information, refer to Note 1.

FASB Standards Adopted during 2018 (continued)

Standard	Summary of guidance	Effects on financial statements
Definition of a business *Issued January 2017*	• Narrows the definition of a business and clarifies that, to be considered a business, substantially all of the fair value of the gross assets acquired (or disposed of) may not be concentrated in a single identifiable asset or a group of similar assets. • In addition, a business must now include, at a minimum, an input and a substantive process that together significantly contribute to the ability to create outputs.	• Adopted January 1, 2018. • The adoption of the guidance had no impact because it is applied prospectively. Subsequent to adoption, fewer transactions will be treated as acquisitions or dispositions of a business.
Presentation of net periodic pension cost and net periodic postretirement benefit cost *Issued March 2017*	• Requires the service cost component of net periodic pension and postretirement benefit cost to be reported separately in the Consolidated statements of income from the other cost components.	• Adopted January 1, 2018. • For further information, refer to Note 1.
Premium amortization on purchased callable debt securities *Issued March 2017*	• Requires amortization of premiums to the earliest call date on certain debt securities.	• Adopted January 1, 2018. • For further information, refer to Note 1.
Hedge accounting *Issued August 2017*	• Aligns the accounting with the economics of the risk management activities. • Expands the ability for certain hedges of interest rate risk to qualify for hedge accounting. • Allows recognition of ineffectiveness in cash flow hedges and net investment hedges in OCI. • Permits an election at adoption to transfer certain investment securities classified as held-to-maturity to available-for-sale. • Simplifies hedge documentation requirements.	• Adopted January 1, 2018. • For further information, refer to Note 1.
Reclassification of certain tax effects from AOCI *Issued February 2018*	• Permits reclassification of the income tax effects of the TCJA on items within AOCI to retained earnings so that the tax effects of items within AOCI reflect the appropriate tax rate.	• Adopted January 1, 2018. • For further information, refer to Note 1.

Management's discussion and analysis

FASB Standards Issued but not adopted as of December 31, 2018

Standard	Summary of guidance	Effects on financial statements
Leases *Issued February 2016*	• Requires lessees to recognize all leases longer than twelve months on the Consolidated balance sheets as a lease liability with a corresponding right-of-use asset. • Requires lessees and lessors to classify most leases using principles similar to existing lease accounting, but eliminates the "bright line" classification tests. • Expands qualitative and quantitative leasing disclosures.	• Adopted January 1, 2019. • The Firm elected the practical expedient to adopt and implement the new lease guidance as of January 1, 2019 through a cumulative-effect adjustment without revising prior comparative periods. Upon adoption, the Firm recognized lease right-of-use ("ROU") assets and lease liabilities on the Consolidated balance sheet of $8.1 billion and $8.2 billion, respectively. The impact to the Firm's CET1 capital ratio was a reduction of approximately 6 bps. The adoption of the new lease guidance did not have a material impact on the Firm's Consolidated statement of income. • The Firm elected the available practical expedients 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.
Financial instruments – credit losses *Issued June 2016*	• Replaces existing incurred loss impairment guidance and establishes a single allowance framework for financial assets carried at amortized cost, which will reflect management's estimate of credit losses over the full remaining expected life of the financial assets and will consider expected future changes in macroeconomic conditions. • Eliminates existing guidance for PCI loans, and requires recognition of the nonaccretable difference as an increase to the allowance for expected credit losses on financial assets purchased with more than insignificant credit deterioration since origination, which will be offset by an increase in the recorded investment of the related loans. • 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.	• Required effective date: January 1, 2020.[a] • The Firm has established a Firmwide, cross-discipline governance structure, which provides implementation oversight. The Firm continues to test and refine its current expected credit loss models that satisfy the requirements of the new standard. This review and testing, as well as efforts to meet expanded disclosure requirements, will extend through the remainder of 2019. • The Firm expects that the allowance related to the Firm's loans and commitments will increase as it will cover credit losses over the full remaining expected life of the portfolios. The Firm currently intends to estimate losses over a two-year forecast period using the weighted-average of a range of macroeconomic scenarios (established on a Firmwide basis), and then revert to longer term historical loss experience to estimate losses over more extended periods. • The Firm currently expects the increase in the allowance to be in the range of $4-6 billion, primarily driven by Card. This estimate is subject to further refinement based on continuing reviews and approvals of models, methodologies and judgments. The ultimate impact will depend upon the nature and characteristics of the Firm's portfolio at the adoption date, the macroeconomic conditions and forecasts at that date, and other management judgments. • The Firm plans to adopt the new guidance on January 1, 2020.
Goodwill *Issued January 2017*	• Requires an impairment loss to be recognized when the estimated fair value of a reporting unit falls below its carrying value. • Eliminates the second condition in the current guidance that requires an impairment loss to be recognized only if the estimated implied fair value of the goodwill is below its carrying value.	• Required effective date: January 1, 2020.[a] • Based on current impairment test results, the Firm does not expect a material effect on the Consolidated Financial Statements. However, the impact of the new accounting guidance will depend on the performance of the reporting units and the market conditions at the time of adoption. • After adoption, the guidance may result in more frequent goodwill impairment losses due to the removal of the second condition. • The Firm plans to adopt the new guidance on January 1, 2020.

(a) Early adoption is permitted.

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 2018 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 deal effectively with an economic slowdown or other economic or market disruption;
- 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 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 or conflicts 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 Firm’s 2018 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 forward-looking statements. The reader should, however, consult any further disclosures of a forward-looking nature the Firm may make in any subsequent Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, 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.
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 generally accepted accounting principles, 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, 2018. 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, 2018, 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, 2018.
The effectiveness of the Firm's internal control over financial reporting as of December 31, 2018, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

James Dimon
Chairman and Chief Executive Officer

Marianne Lake
Executive Vice President and Chief Financial Officer

February 26, 2019

Report of Independent Registered Public Accounting Firm

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, 2018 and 2017, 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, 2018, 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, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 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, 2018, 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.

February 26, 2019

We have served as the Firm's auditor since 1965.

PricewaterhouseCoopers LLP 300 Madison Avenue New York, NY 10017

Consolidated statements of income

Year ended December 31, (in millions, except per share data)	**2018**	2017	2016
Revenue			
Investment banking fees	**$7,550**	$7,412	$6,572
Principal transactions	**12,059**	11,347	11,566
Lending- and deposit-related fees	**6,052**	5,933	5,774
Asset management, administration and commissions	**17,118**	16,287	15,364
Investment securities gains/(losses)	**(395)**	(66)	141
Mortgage fees and related income	**1,254**	1,616	2,491
Card income	**4,989**	4,433	4,779
Other income	**5,343**	3,646	3,799
Noninterest revenue	**53,970**	50,608	50,486
Interest income	**77,442**	64,372	55,901
Interest expense	**22,383**	14,275	9,818
Net interest income	**55,059**	50,097	46,083
Total net revenue	**109,029**	100,705	96,569
Provision for credit losses	**4,871**	5,290	5,361
Noninterest expense			
Compensation expense	**33,117**	31,208	30,203
Occupancy expense	**3,952**	3,723	3,638
Technology, communications and equipment expense	**8,802**	7,715	6,853
Professional and outside services	**8,502**	7,890	7,526
Marketing	**3,290**	2,900	2,897
Other expense	**5,731**	6,079	5,555
Total noninterest expense	**63,394**	59,515	56,672
Income before income tax expense	**40,764**	35,900	34,536
Income tax expense	**8,290**	11,459	9,803
Net income	**$32,474**	$24,441	$24,733
Net income applicable to common stockholders	**$30,709**	$22,567	$22,834
Net income per common share data			
Basic earnings per share	**$9.04**	$6.35	$6.24
Diluted earnings per share	**9.00**	6.31	6.19
Weighted-average basic shares	**3,396.4**	3,551.6	3,658.8
Weighted-average diluted shares	**3,414.0**	3,576.8	3,690.0

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of comprehensive income

Year ended December 31, (in millions)	**2018**	2017	2016
Net income	**$32,474**	$24,441	$24,733
Other comprehensive income/(loss), after–tax			
Unrealized gains/(losses) on investment securities	**(1,858)**	640	(1,105)
Translation adjustments, net of hedges	**20**	(306)	(2)
Fair value hedges	**(107)**	NA	NA
Cash flow hedges	**(201)**	176	(56)
Defined benefit pension and OPEB plans	**(373)**	738	(28)
DVA on fair value option elected liabilities	**1,043**	(192)	(330)
Total other comprehensive income/(loss), after–tax	**(1,476)**	1,056	(1,521)
Comprehensive income	**$30,998**	$25,497	$23,212

Effective January 1, 2018, the Firm adopted several new accounting standards. For additional information, refer to Note 1.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated balance sheets

December 31, (in millions, except share data)	**2018**	2017
Assets		
Cash and due from banks	**$ 22,324**	$ 25,898
Deposits with banks	**256,469**	405,406
Federal funds sold and securities purchased under resale agreements (included **13,235** and $14,732 at fair value)	**321,588**	198,422
Securities borrowed (included **$5,105** and $3,049 at fair value)	**111,995**	105,112
Trading assets (included assets pledged of **$89,073** and $109,887)	**413,714**	381,844
Investment securities (included **$230,394** and $202,225 at fair value and assets pledged of **$11,432** and $17,969)	**261,828**	249,958
Loans (included **$3,151** and $2,508 at fair value)	**984,554**	930,697
Allowance for loan losses	**(13,445)**	(13,604)
Loans, net of allowance for loan losses	**971,109**	917,093
Accrued interest and accounts receivable	**73,200**	67,729
Premises and equipment	**14,934**	14,159
Goodwill, MSRs and other intangible assets	**54,349**	54,392
Other assets (included **$9,630** and $16,128 at fair value and assets pledged of **$3,457** and $7,980)	**121,022**	113,587
Total assets[(a)]	**$ 2,622,532**	$ 2,533,600
Liabilities		
Deposits (included **$23,217** and $21,321 at fair value)	**$ 1,470,666**	$ 1,443,982
Federal funds purchased and securities loaned or sold under repurchase agreements (included **$935** and $697 at fair value)	**182,320**	158,916
Short-term borrowings (included **$7,130** and $9,191 at fair value)	**69,276**	51,802
Trading liabilities	**144,773**	123,663
Accounts payable and other liabilities (included **$3,269** and $9,208 at fair value)	**196,710**	189,383
Beneficial interests issued by consolidated VIEs (included **$28** and $45 at fair value)	**20,241**	26,081
Long-term debt (included **$54,886** and $47,519 at fair value)	**282,031**	284,080
Total liabilities[(a)]	**2,366,017**	2,277,907
Commitments and contingencies (refer to Notes 27, 28 and 29)		
Stockholders' equity		
Preferred stock ($1 par value; authorized 200,000,000 shares: issued **2,606,750** shares)	**26,068**	26,068
Common stock ($1 par value; authorized 9,000,000,000 shares; issued **4,104,933,895** shares)	**4,105**	4,105
Additional paid-in capital	**89,162**	90,579
Retained earnings	**199,202**	177,676
Accumulated other comprehensive loss	**(1,507)**	(119)
Shares held in restricted stock units ("RSU") trust, at cost (**472,953** shares)	**(21)**	(21)
Treasury stock, at cost (**829,167,674** and 679,635,064 shares)	**(60,494)**	(42,595)
Total stockholders' equity	**256,515**	255,693
Total liabilities and stockholders' equity	**$ 2,622,532**	$ 2,533,600

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

(a) The following table presents information on assets and liabilities related to VIEs that are consolidated by the Firm at December 31, 2018 and 2017. 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. For a further discussion, refer to Note 14.

December 31, (in millions)	**2018**	2017
Assets		
Trading assets	**$ 1,966**	$ 1,449
Loans	**59,456**	68,995
All other assets	**1,013**	2,674
Total assets	**$ 62,435**	$ 73,118
Liabilities		

Beneficial interests issued by consolidated VIEs	**$ 20,241**	$ 26,081
All other liabilities	**312**	349
Total liabilities	**$ 20,553**	$ 26,430

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)	**2018**	2017	2016
Preferred stock			
Balance at January 1	**$ 26,068**	$ 26,068	$ 26,068
Issuance	**1,696**	1,258	—
Redemption	**(1,696)**	(1,258)	—
Balance at December 31	**26,068**	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	**90,579**	91,627	92,500
Shares issued and commitments to issue common stock for employee share-based compensation awards, and related tax effects	**(738)**	(734)	(334)
Other	**(679)**	(314)	(539)
Balance at December 31	**89,162**	90,579	91,627
Retained earnings			
Balance at January 1	**177,676**	162,440	146,420
Cumulative effect of change in accounting principles	**(183)**	—	(154)
Net income	**32,474**	24,441	24,733
Dividends declared:			
Preferred stock	**(1,551)**	(1,663)	(1,647)
Common stock (**$2.72**, $2.12 and $1.88 per share for 2018, 2017 and 2016, respectively)	**(9,214)**	(7,542)	(6,912)
Balance at December 31	**199,202**	177,676	162,440
Accumulated other comprehensive income			
Balance at January 1	**(119)**	(1,175)	192
Cumulative effect of change in accounting principles	**88**	—	154
Other comprehensive income/(loss), after-tax	**(1,476)**	1,056	(1,521)
Balance at December 31	**(1,507)**	(119)	(1,175)
Shares held in RSU Trust, at cost			
Balance at January 1 and December 31	**(21)**	(21)	(21)
Treasury stock, at cost			
Balance at January 1	**(42,595)**	(28,854)	(21,691)
Repurchase	**(19,983)**	(15,410)	(9,082)
Reissuance	**2,084**	1,669	1,919
Balance at December 31	**(60,494)**	(42,595)	(28,854)
Total stockholders' equity	**$ 256,515**	$ 255,693	$ 254,190

Effective January 1, 2018, the Firm adopted several new accounting standards. For additional information, refer to Note 1.

The Notes to Consolidated Financial Statements are an integral part of these statements.

Consolidated statements of cash flows

Year ended December 31, (in millions)	**2018**	2017	2016
Operating activities			
Net income	**$32,474**	$24,441	$24,733
Adjustments to reconcile net income to net cash provided by/(used in) operating activities:			
Provision for credit losses	**4,871**	5,290	5,361
Depreciation and amortization	**7,791**	6,179	5,478
Deferred tax expense	**1,721**	2,312	4,651
Other	**2,717**	2,136	1,799
Originations and purchases of loans held-for-sale	**(102,141)**	(94,628)	(61,107)
Proceeds from sales, securitizations and paydowns of loans held-for-sale	**93,453**	93,270	60,196
Net change in:			
Trading assets	**(38,371)**	5,673	(20,007)
Securities borrowed	**(6,861)**	(8,653)	2,313
Accrued interest and accounts receivable	**(5,849)**	(15,868)	(5,815)
Other assets	**(8,833)**	3,982	(4,176)
Trading liabilities	**18,290**	(26,256)	5,198
Accounts payable and other liabilities	**14,630**	(16,508)	5,087
Other operating adjustments	**295**	7,803	(1,827)
Net cash provided by/(used in) operating activities	**14,187**	(10,827)	21,884
Investing activities			
Net change in:			
Federal funds sold and securities purchased under resale agreements	**(123,201)**	31,448	(17,468)
Held-to-maturity securities:			
Proceeds from paydowns and maturities	**2,945**	4,563	6,218
Purchases	**(9,368)**	(2,349)	(143)
Available-for-sale securities:			
Proceeds from paydowns and maturities	**37,401**	56,117	65,950
Proceeds from sales	**46,067**	90,201	48,592
Purchases	**(95,091)**	(105,309)	(123,959)
Proceeds from sales and securitizations of loans held-for-investment	**29,826**	15,791	15,429
Other changes in loans, net	**(81,586)**	(61,650)	(80,996)
All other investing activities, net	**(4,986)**	(563)	(2,825)
Net cash provided by/(used in) investing activities	**(197,993)**	28,249	(89,202)
Financing activities			
Net change in:			
Deposits	**26,728**	57,022	97,336
Federal funds purchased and securities loaned or sold under repurchase agreements	**23,415**	(6,739)	13,007
Short-term borrowings	**18,476**	16,540	(2,461)
Beneficial interests issued by consolidated VIEs	**1,712**	(1,377)	(5,707)
Proceeds from long-term borrowings	**71,662**	56,271	83,070
Payments of long-term borrowings	**(76,313)**	(83,079)	(68,949)
Proceeds from issuance of preferred stock	**1,696**	1,258	—
Redemption of preferred stock	**(1,696)**	(1,258)	—
Treasury stock repurchased	**(19,983)**	(15,410)	(9,082)
Dividends paid	**(10,109)**	(8,993)	(8,476)
All other financing activities, net	**(1,430)**	407	(467)
Net cash provided by financing activities	**34,158**	14,642	98,271

Effect of exchange rate changes on cash and due from banks and deposits with banks	**(2,863)**	8,086	(1,482)
Net increase/(decrease) in cash and due from banks and deposits with banks	**(152,511)**	40,150	29,471
Cash and due from banks and deposits with banks at the beginning of the period	**431,304**	391,154	361,683
Cash and due from banks and deposits with banks at the end of the period	**$278,793**	$431,304	$391,154
Cash interest paid	**$21,152**	$14,153	$9,508
Cash income taxes paid, net	**3,542**	4,325	2,405

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

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. For a discussion of the Firm's business segments, refer to Note 31.

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 certain 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 t h e general partner or managing member and has a potentially significant interest.

The Firm's investment companies and asset management funds have investments in both publicly-held and privately-held entities, including investments in buyouts, growth equity and venture opportunities. These investments are accounted for under investment company guidelines and, accordingly, irrespective of the percentage of equity ownership interests held, are carried on the Consolidated balance sheets at fair value, and are recorded in other assets, with income or loss included in noninterest revenue. If consolidated, the Firm retains such specialized investment company guidelines.

Variable interest entities

VIEs are entities that, by design, either (1) lack sufficient equity to permit the entity to finance its activities without additional subordinated financial support from other parties, or (2) have equity investors that do not have the ability to make significant decisions relating to the entity's operations through voting rights, or do not have the obligation to absorb the expected losses, or do not have the right to receive the residual returns of the entity.

The most common type of VIE is an SPE. SPEs are commonly used in securitization transactions in order to isolate certain assets and distribute the cash flows from those assets to investors. The basic SPE structure involves a company selling assets to the SPE; the SPE funds the purchase of those assets by issuing securities to investors. The legal documents that govern the transaction specify how the cash earned on the assets must be allocated to the SPE's investors and other parties that have rights to those cash flows. SPEs are generally structured to insulate investors from claims on the SPE's assets by creditors of other entities, including the creditors of the seller of the assets.

The primary beneficiary of a VIE (i.e., the party that has a controlling financial interest) is required to consolidate the assets and liabilities of the VIE. The primary beneficiary is the party that has both (1) the power to direct the activities of the VIE that most significantly impact the VIE's economic performance; and (2) through its interests in the VIE, the obligation to absorb losses or the right to receive benefits from the VIE that could potentially be significant to the VIE.

To assess whether the Firm has the power to direct the activities of a VIE that most significantly impact the VIE's economic performance, the Firm considers all the facts and circumstances, including its role in establishing the VIE and its ongoing rights and responsibilities. This assessment

Notes to consolidated financial statements

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.

Revenue recognition

Interest income

The Firm records interest income on loans, debt securities, and other debt instruments, generally on a level-yield basis, based on the underlying contractual rate. For further discussion of interest income, refer to Note 7.

Revenue from contracts with customers

JPMorgan Chase records noninterest revenue from certain contracts with customers under ASC 606, *Revenue from Contracts with customers,* in investment banking fees, deposit-related fees, asset management administration and commissions, and components of card income. Under this guidance, revenue is recognized when the Firm's performance obligations are satisfied. For further discussion of the Firm's revenue from contracts with customers, refer to Note 6.

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. For further discussion of fair value measurement, refer to Notes 2 and 3. For further discussion of principal transactions revenue, refer to Note 6.

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 OCI within stockholders' equity. 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.
For further discussion of the Firm's derivative instruments, refer to Note 5. For further discussion of the Firm's securities financing agreements, refer to Note 11.

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 standards adopted January 1, 2018

Revenue recognition – revenue from contracts with customers

The adoption of this guidance requires gross presentation of certain costs that were previously offset against revenue. Adoption of the guidance did not result in any material changes in the timing of the Firm's revenue recognition. This guidance was adopted retrospectively and, accordingly, prior period amounts were revised, which resulted in an increase in both noninterest revenue and noninterest expense. The Firm did not apply any practical expedients. For additional information, refer to the table on page 158 of this Note, and Note 6.

Recognition and measurement of financial assets and financial liabilities

The adoption of this guidance requires that certain equity instruments be measured at fair value, with changes in fair value recognized in earnings. The guidance also provides an alternative to measure 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 (the "measurement alternative"). The Firm elected the measurement alternative for its qualifying equity securities and the adoption of the guidance resulted in fair value gains of $505 million which were recognized in other income in the first quarter of 2018. For additional information, refer to Notes 2 and 10.

Premium amortization on purchased callable debt securities

The adoption of this guidance requires that premiums be amortized to the earliest call date on certain debt securities. The adoption of this guidance resulted in a cumulative-effect adjustment to retained earnings and

AOCI. For additional information, refer to the table below, and Notes 10 and 23.

Hedge accounting

The adoption of this guidance better aligns hedge accounting with the economics of the Firm's risk management activities. As permitted by the guidance, the Firm also elected to transfer certain investment securities from HTM to AFS. The adoption of this guidance resulted in a cumulative-effect adjustment to retained earnings and AOCI as a result of the investment securities transfer and the revised guidance for excluded components. For additional information, refer to the table below, and Notes 5, 10 and 23.

Treatment of restricted cash on the statement of cash flows

The adoption of this guidance requires restricted cash to be combined with unrestricted cash when reconciling the beginning and ending cash balances on the Consolidated statements of cash flows. To align the Consolidated balance sheets with the Consolidated statements of cash flows, the Firm reclassified restricted cash into cash and due from banks or deposits with banks. In addition, for the Firm's Consolidated statements of cash flows, cash is defined as those amounts included in cash and due from banks and deposits with banks. This guidance was applied retrospectively and, accordingly, prior period amounts have been revised. For additional information, refer to the table below, and Note 25.

Presentation of net periodic pension cost and net periodic postretirement benefit cost

The adoption of this guidance requires the service cost component of net periodic pension cost and net periodic postretirement benefit cost to be reported separately in the Consolidated statements of income from the other cost components. This change was adopted retrospectively and, accordingly, prior period amounts were revised, which resulted in an increase in compensation expense and a reduction in other expense. For additional information, refer to the table below, and Note 8.

Reclassification of certain tax effects from AOCI

The adoption of this guidance permitted the Firm to reclassify from AOCI to retained earnings stranded tax effects due to the revaluation of deferred tax assets and liabilities as a result of changes in applicable tax rates under the TCJA. The adoption of this guidance resulted in a cumulative-effect adjustment to retained earnings and AOCI. For additional information, refer to the table below, and Note 23.

Notes to consolidated financial statements

The following tables present the prior period impact to the Consolidated statements of income and the Consolidated balance sheets from the retrospective adoption of the new accounting standards in the first quarter of 2018:

Selected Consolidated statements of income data

Year ended December 31, 2017 (in millions)	Reported	Revisions[(a)]	Revised
Revenue			
Investment banking fees	$ 7,248	$ 164	$ 7,412
Asset management, administration and commissions	15,377	910	16,287
Other income	3,639	7	3,646
Total net revenue	99,624	1,081	100,705
Noninterest expense			
Compensation expense	31,009	199	31,208
Technology, communication and equipment expense	7,706	9	7,715
Professional and outside services	6,840	1,050	7,890
Other expense	6,256	(177)	6,079
Total noninterest expense	$ 58,434	$ 1,081	$ 59,515

Year ended December 31, 2016 (in millions)	Reported	Revisions[(a)]	Revised
Revenue			
Investment banking fees	$ 6,448	$ 124	$ 6,572
Asset management, administration and commissions	14,591	773	15,364
Other income	3,795	4	3,799
Total net revenue	95,668	901	96,569
Noninterest expense			
Compensation expense	29,979	224	30,203
Technology, communication and equipment expense	6,846	7	6,853
Professional and outside services	6,655	871	7,526
Other expense	5,756	(201)	5,555
Total noninterest expense	$ 55,771	$ 901	$ 56,672

(a) Revisions relate to revenue recognition and pension cost guidance.

Selected Consolidated balance sheets data

December 31, 2017 (in millions)	Reported	Revisions[(a)]	Revised
Assets			
Cash and due from banks	$ 25,827	$ 71	$ 25,898
Deposits with banks	404,294	1,112	405,406
Other assets	114,770	(1,183)	113,587
Total assets	$ 2,533,600	$ —	$ 2,533,600

(a) Revisions relate to the reclassification of restricted cash.

The following table presents the adjustment to retained earnings and AOCI as a result of the adoption of new accounting standards in the first quarter of 2018:

Increase/(decrease) (in millions)	Retained earnings	AOCI
Premium amortization on purchased callable debt securities	**$ (505)**	**$ 261**
Hedge accounting	**34**	**115**
Reclassification of certain tax effects from AOCI	**288**	**(288)**
Total	**$ (183)**	**$ 88**

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.

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 (e.g., held-for-sale loans), 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, equity or debt prices, 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.

Notes to consolidated financial statements

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 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 applied and determined 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.
- Unobservable parameter valuation adjustments 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. Unobservable

parameter valuation adjustments are applied 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. For more information on such adjustments refer to Credit and funding adjustments on page 175 of this Note.

<u>*Valuation model review and approval*</u>

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 data 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 to 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, the head of the Model Risk function may grant exceptions 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 transparency of inputs to the valuation of an asset or liability as of the measurement date. The three levels are defined as follows.

- Level 1 – inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.
- Level 2 – inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.
- Level 3 – one or more inputs to the valuation methodology are unobservable and significant to the fair value measurement.

A financial instrument's categorization within the valuation hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The following table describes the valuation methodologies generally used by the Firm to measure its significant products/instruments at fair value, including the general classification of such instruments pursuant to the valuation hierarchy.

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Securities financing agreements	Valuations are based on discounted cash flows, which consider: • Derivative features: for further information refer to the discussion of derivatives below. • Market rates for the respective maturity • Collateral characteristics	Predominantly level 2
Loans and lending-related commitments — wholesale		
Loans carried at fair value (e.g., trading loans and non-trading loans) and associated lending-related commitments	Where observable market data is available, valuations are based on: • Observed market prices (circumstances are infrequent) • Relevant broker quotes • Observed market prices for similar instruments Where observable market data is unavailable or limited, valuations are based on discounted cash flows, which consider the following: • Credit spreads derived from the cost of CDS; or benchmark credit curves developed by the Firm, by industry and credit rating • Prepayment speed • Collateral characteristics	Level 2 or 3
Loans — consumer		
Trading loans — conforming residential mortgage loans expected to be sold (CCB, CIB)	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.	Predominantly level 2
Investment and trading securities	Quoted market prices are used where available.	Level 1
	In the absence of quoted market prices, securities are valued based on: • Observable market prices for similar securities • Relevant broker quotes • Discounted cash flows In addition, the following inputs to discounted cash flows are used for the following products: Mortgage- and asset-backed securities specific inputs: • Collateral characteristics • Deal-specific payment and loss allocations • Current market assumptions related to yield, prepayment speed, conditional default rates and loss severity Collateralized loan obligations (“CLOs”) specific inputs: • Collateral characteristics • Deal-specific payment and loss allocations • Expected prepayment speed, conditional default rates, loss severity • Credit spreads • Credit rating data	Level 2 or 3
Physical commodities	Valued using observable market prices or data.	Level 1 and 2

Notes to consolidated financial statements

Product/instrument	Valuation methodology	Classifications in the valuation hierarchy
Derivatives	Exchange-traded derivatives that are actively traded and valued using the exchange price.	Level 1
	Derivatives that are valued using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs as well as considering the contractual terms. The key valuation inputs used will depend on the type of derivative and the nature of the underlying instruments and may include equity prices, commodity prices, interest rate yield curves, foreign exchange rates, volatilities, correlations, CDS spreads and recovery rates. Additionally, the credit quality of the counterparty and of the Firm as well as market funding levels may also be considered. In addition, specific inputs used for derivatives that are valued based on models with significant unobservable inputs are as follows: Structured credit derivatives specific inputs include: • CDS spreads and recovery rates • Credit correlation between the underlying debt instruments Equity option specific inputs include: • Equity volatilities • Equity correlation • Equity-FX correlation • Equity-IR correlation Interest rate and FX exotic options specific inputs include: • Interest rate spread volatility • Interest rate correlation • Foreign exchange correlation • Interest rate-FX correlation Commodity derivatives specific inputs include: • Commodity volatility • Forward commodity price Additionally, adjustments are made to reflect counterparty credit quality (CVA) and the impact of funding (FVA). Refer to page 175 of this Note.	Level 2 or 3
Mortgage servicing rights	Refer to Mortgage servicing rights in Note 15.	Level 3
Private equity direct investments	Fair value is estimated using all available information; the range of potential inputs include: • Transaction prices • Trading multiples of comparable public companies • Operating performance of the underlying portfolio company • Adjustments as required, since comparable public companies are not identical to the company being valued, and for company-specific issues and lack of liquidity. • Additional available inputs relevant to the investment. Net asset value	Level 2 or 3

Fund investments (e.g., mutual/collective investment funds, private equity funds, hedge funds, and real estate funds)	• NAV is supported by the ability to redeem and purchase at the NAV level.	Level 1
	• 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 2 or 3[(a)]
Beneficial interests issued by consolidated VIEs	Valued using observable market information, where available. In the absence of observable market information, valuations are based on the fair value of the underlying assets held by the VIE.	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.

Product/instrument	Valuation methodology	Classification in the valuation hierarchy
Structured notes (included in deposits, short-term borrowings and long-term debt)	• Valuations are based on discounted cash flow analyses that consider the embedded derivative and the terms and payment structure of the note. • The embedded derivative features are considered using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs, depending on the embedded derivative. The specific inputs used vary according to the nature of the embedded derivative features, as described in the discussion above regarding derivatives valuation. Adjustments are then made to this base valuation to reflect the Firm's own credit risk (DVA). Refer to page 175 of this Note.	Level 2 or 3

Notes to consolidated financial statements

The following table presents the assets and liabilities reported at fair value as of December 31, 2018 and 2017, by major product category and fair value hierarchy.

Assets and liabilities measured at fair value on a recurring basis

	Fair value hierarchy				
December 31, 2018 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments	Total fair value
Federal funds sold and securities purchased under resale agreements	**$ —**	**$ 13,235**	**$ —**	**$ —**	**$ 13,235**
Securities borrowed	**—**	**5,105**	**—**	**—**	**5,105**
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. 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 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(e)	**1,453**	**518,969**	**5,817**	**(472,026)**	**54,213**
Total trading assets(f)	**157,109**	**718,597**	**9,985**	**(472,026)**	**413,665**
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. 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(f)(g)	7,810	195	927	—	8,932
Total assets measured at fair value on a recurring basis	$ 236,291	$ 899,182	$ 17,165	$ (472,026)	$ 680,612
Deposits	$ —	$ 19,048	$ 4,169	$ —	$ 23,217
Federal funds purchased and securities loaned or sold under repurchase agreements	—	935	—	—	935
Short-term borrowings	—	5,607	1,523	—	7,130
Trading liabilities:					
Debt and equity instruments(d)	80,199	22,755	50	—	103,004
Derivative payables:					
Interest rate	1,526	239,576	1,680	(234,998)	7,784
Credit	—	19,309	967	(18,609)	1,667
Foreign exchange	695	163,549	973	(152,432)	12,785
Equity	—	46,462	4,733	(41,034)	10,161
Commodity	—	21,158	1,260	(13,046)	9,372
Total derivative payables(e)	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

	Fair value hierarchy				
December 31, 2017 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments	Total fair value
Federal funds sold and securities purchased under resale agreements	$ —	$ 14,732	$ —	$ —	$ 14,732
Securities borrowed	—	3,049	—	—	3,049
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. government agencies(a)	—	41,515	307	—	41,822
Residential – nonagency	—	1,835	60	—	1,895
Commercial – nonagency	—	1,645	11	—	1,656
Total mortgage-backed securities	—	44,995	378	—	45,373
U.S. Treasury and government agencies(a)	30,758	6,475	1	—	37,234
Obligations of U.S. states and municipalities	—	9,067	744	—	9,811
Certificates of deposit, bankers' acceptances and commercial paper	—	226	—	—	226
Non-U.S. government debt securities	28,887	28,831	78	—	57,796
Corporate debt securities	—	24,146	312	—	24,458
Loans(b)	—	35,242	2,719	—	37,961
Asset-backed securities	—	3,284	153	—	3,437
Total debt instruments	59,645	152,266	4,385	—	216,296
Equity securities	87,346	197	295	—	87,838
Physical commodities(c)	4,924	1,322	—	—	6,246
Other	—	14,197	690	—	14,887
Total debt and equity instruments(d)	151,915	167,982	5,370	—	325,267
Derivative receivables:					
Interest rate	181	314,107	1,704	(291,319)	24,673
Credit	—	21,995	1,209	(22,335)	869
Foreign exchange	841	158,834	557	(144,081)	16,151
Equity	—	37,722	2,318	(32,158)	7,882
Commodity	—	19,875	210	(13,137)	6,948
Total derivative receivables(e)	1,022	552,533	5,998	(503,030)	56,523
Total trading assets(f)	152,937	720,515	11,368	(503,030)	381,790
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. government agencies(a)	—	70,280	—	—	70,280
Residential – nonagency	—	11,366	1	—	11,367
Commercial – nonagency	—	5,025	—	—	5,025
Total mortgage-backed securities	—	86,671	1	—	86,672
U.S. Treasury and government agencies	22,745	—	—	—	22,745
Obligations of U.S. states and municipalities	—	32,338	—	—	32,338
Certificates of deposit	—	59	—	—	59
Non-U.S. government debt securities	18,140	9,154	—	—	27,294
Corporate debt securities	—	2,757	—	—	2,757
Asset-backed securities:					
Collateralized loan obligations	—	20,720	276	—	20,996
Other	—	8,817	—	—	8,817
Equity securities(g)	547	—	—	—	547
Total available-for-sale securities	41,432	160,516	277	—	202,225
Loans	—	2,232	276	—	2,508

Mortgage servicing rights	—	—	6,030	—	6,030
Other assets(f)(g)	13,795	343	1,265	—	15,403
Total assets measured at fair value on a recurring basis	$ 208,164	$ 901,387	$ 19,216	$ (503,030)	$ 625,737
Deposits	$ —	$ 17,179	$ 4,142	$ —	$ 21,321
Federal funds purchased and securities loaned or sold under repurchase agreements	—	697	—	—	697
Short-term borrowings	—	7,526	1,665	—	9,191
Trading liabilities:					
Debt and equity instruments(d)	64,664	21,183	39	—	85,886
Derivative payables:					
Interest rate	170	282,825	1,440	(277,306)	7,129
Credit	—	22,009	1,244	(21,954)	1,299
Foreign exchange	794	154,075	953	(143,349)	12,473
Equity	—	39,668	5,727	(36,203)	9,192
Commodity	—	21,017	884	(14,217)	7,684
Total derivative payables(e)	964	519,594	10,248	(493,029)	37,777
Total trading liabilities	65,628	540,777	10,287	(493,029)	123,663
Accounts payable and other liabilities	9,074	121	13	—	9,208
Beneficial interests issued by consolidated VIEs	—	6	39	—	45
Long-term debt	—	31,394	16,125	—	47,519
Total liabilities measured at fair value on a recurring basis	$ 74,702	$ 597,700	$ 32,271	$ (493,029)	$ 211,644

(a) At December 31, 2018 and 2017, included total U.S. government-sponsored enterprise obligations of $92.3 billion and $78.0 billion, respectively, which were predominantly mortgage-related.

(b) At December 31, 2018 and 2017, included within trading loans were $13.2 billion and $11.4 billion, respectively, of residential first-lien mortgages, and $2.3 billion and $4.2 billion, respectively, of commercial first-lien mortgages. Residential mortgage loans include conforming mortgage loans originated with the intent to sell to U.S. government agencies of $7.6 billion and $5.7 billion, respectively, and reverse mortgages of zero and $836 million, respectively.

Notes to consolidated financial statements

(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. For a further discussion of the Firm’s hedge accounting relationships, refer to Note 5. 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) 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. For purposes of the tables above, the Firm does not reduce derivative receivables and derivative payables balances for this netting adjustment, either within or across the levels of the fair value hierarchy, as such netting is not relevant to a presentation based on the transparency of inputs to the valuation of an asset or liability. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral.

(f) 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, 2018 and 2017, the fair values of these investments, which include certain hedge funds, private equity funds, real estate and other funds, were $747 million and $779 million, respectively. Included in these balances at December 31, 2018 and 2017, were trading assets of $49 million and $54 million, respectively, and other assets of $698 million and $725 million, respectively.

(g) Effective January 1, 2018, the Firm adopted the recognition and measurement guidance. Equity securities that were previously reported as AFS securities were reclassified to other assets upon adoption.

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). For further information on the Firm's valuation process and a detailed discussion of the determination of fair value for individual financial instruments, refer to pages 159–163 of this Note.

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 all relevant empirical data in deriving valuation inputs including transaction details, yield curves, interest rates, prepayment speed, default rates, volatilities, correlations, 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, 2018, interest rate correlation inputs used in estimating fair value were concentrated towards the upper end of 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 the interest rate-foreign exchange ("IR-FX") correlation inputs were distributed across the range. In addition, the interest rate spread volatility inputs used in estimating fair value were distributed across the range; equity volatilities and commodity volatilities were concentrated in the middle of the range; and forward commodity prices used in estimating the fair value of commodity 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 and conditional default rates were concentrated towards the lower end of the range; loss severity and price inputs were concentrated towards the upper end of the range.

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Level 3 inputs[(a)]

December 31, 2018

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)]	$ 858	Discounted cash flows	Yield	0 % –19%	6%
			Prepayment speed	0 % –24%	9%
			Conditional default rate	0 % –9%	1%
			Loss severity	0 % –100%	6%
Commercial mortgage-backed securities and loans[(c)]	419	Market comparables	Price	$0 –$103	$90
Obligations of U.S. states and municipalities	689	Market comparables	Price	$62 –$100	$96
Corporate debt securities	334	Market comparables	Price	$0 –$107	$57
Loans[(d)]	234	Discounted cash flows	Yield	8%	8%
	942	Market comparables	Price	$2 –$101	$78
Asset-backed securities	127	Market comparables	Price	$1 –$102	$67
Net interest rate derivatives	(180)	Option pricing	Interest rate spread volatility	16 bps –38bps	
			Interest rate correlation	(45)% –97%	
			IR-FX correlation	45 % –60%	
	142	Discounted cash flows	Prepayment speed	4 % –30%	
Net credit derivatives	(163)	Discounted cash flows	Credit correlation	25 % –55%	
			Credit spread	10 bps –1,487bps	
			Recovery rate	20 % –70%	
			Conditional default rate	3 % –72%	
			Loss severity	100%	
	56	Market comparables	Price	$1 –$115	
Net foreign exchange derivatives	(122)	Option pricing	IR-FX correlation	(45)% –60%	
	(175)	Discounted cash flows	Prepayment speed	8 % –9%	
Net equity derivatives	(2,225)	Option pricing	Equity volatility	14 % –57%	
			Equity correlation	20 % –98%	
			Equity-FX correlation	(75)% –61%	
			Equity-IR correlation	20 % –60%	
Net commodity derivatives	(1,129)	Option pricing	Forward commodity price	$39 –$56 per barrel	
			Commodity volatility	5 % –68%	
			Commodity correlation	(51)% –95%	
MSRs	6,130	Discounted cash flows	Refer to Note 15		
Other assets	306	Discounted cash flows	Credit spread	55bps	55bps
			Yield	8% –10%	8%
	922	Market comparables	Price	$20 $108	$40
			EBITDA multiple	2.9x –8.3x	7.5x
Long-term debt, short-term borrowings, and deposits[(e)]	25,110	Option pricing	Interest rate spread volatility	16 bps –38bps	
			Interest rate correlation	(45)% –97%	
			IR-FX correlation	(45)% –60%	
			Equity correlation	20 % –98%	
			Equity-FX correlation	(75)% –61%	
			Equity-IR correlation	20 % –60%	
Other level 3 assets and liabilities, net[(f)]	326				

(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) Includes U.S. government agency securities of $541 million, nonagency securities of $65 million and trading loans of $252 million.

(c) Includes U.S. government agency securities of $8 million, nonagency securities of $11 million, trading loans of $278 million and non-trading loans of $122 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.

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.

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Correlation – Correlation is a measure of the relationship between the movements of two variables (e.g., how the change in one variable influences the change in the other). 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.

EBITDA multiple – EBITDA multiples refer to the input (often derived from the value of a comparable company) that is multiplied by the historic and/or expected earnings before interest, taxes, depreciation and amortization (“EBITDA”) of a company in order to estimate the company’s value. An increase in the EBITDA multiple, in isolation, net of adjustments, would result in an increase 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, 2018, 2017 and 2016. When a determination is made to classify a financial instrument within level 3, the determination is based on the significance of the unobservable inputs to the overall fair value measurement. However, level 3 financial instruments typically include, in addition to the unobservable or level 3 components, observable components (that is, components that are actively quoted and can be validated to external sources); accordingly, the gains and losses in the table below include changes in fair value due in part to observable factors that are part of the valuation methodology. Also, the Firm risk-manages the observable components of level 3 financial instruments using securities and derivative positions that are classified within level 1 or 2 of the fair value hierarchy; as these level 1 and level 2 risk management instruments are not included below, the gains or losses in the following tables do not reflect the effect of the Firm’s risk management activities related to such level 3 instruments.

Year ended December 31, 2018 (in millions)	Fair value measurements using significant unobservable inputs								
	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	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2018
Assets:(a)									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. 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 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** (d)	**—**	**—**	**(277)**	**—**	**—**	**1**	**—**
Loans	**276**	**(7)** (c)	**123**	**—**	**(196)**	**—**	**(74)**	**122**	**(7)** (c)
Mortgage servicing rights	**6,030**	**230** (e)	**1,246**	**(636)**	**(740)**	**—**	**—**	**6,130**	**230** (e)
Other assets	**1,265**	**(328)** (c)	**61**	**(37)**	**(37)**	4	**(1)**	**927**	**(340)** (c)

Year ended December 31, 2018 (in millions)	Fair value measurements using significant unobservable inputs									
	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)(i)	**$ —**	**$ —**	**$ 1,437**	**$ (736)**	**$ 2**	**$ (540)**	**$ 4,169**	**$ (204)** (c)(i)

Federal funds purchased and securities loaned or sold under repurchase agreements	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**	**—**
Short-term borrowings	**1,665**	**(329)** [(c)(i)]	**—**	**—**	**3,455**	**(3,388)**	**272**	**(152)**	**1,523**	**(131)** [(c)(i)]
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)(i)]	**—**	**—**	**11,919**	**(7,769)**	**1,143**	**(831)**	**19,418**	**(1,385)** [(c)(i)]

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Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs								
	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	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2017
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. 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 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 [d]	—	(50)	(352)	—	—	277	14 [d]
Loans	570	35 [c]	—	(26)	(303)	—	—	276	3 [c]
Mortgage servicing rights	6,096	(232) [e]	1,103	(140)	(797)	—	—	6,030	(232) [e]
Other assets	2,223	244 [c]	66	(177)	(870)	—	(221)	1,265	74 [c]

Year ended December 31, 2017 (in millions)	Fair value measurements using significant unobservable inputs									
	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][i]	$ —	$—	$ 3,027	$ (291)	$ 11	$(874)	$4,142	$ 198 [c][i]

Federal funds purchased and securities loaned or sold under repurchase agreements	—	—	—	—	—	—	—	—	—	—
Short-term borrowings	1,134	42 (c)(i)	—	—	3,289	(2,748)	150	(202)	1,665	7 (c)(i)
Trading liabilities – debt and equity instruments	43	(3) (c)	(46)	48	—	3	3	(9)	39	—
Accounts payable and other liabilities	13	(2)	(1)	—	—	3	—	—	13	(2)
Beneficial interests issued by consolidated VIEs	48	2 (c)	(122)	39	—	(6)	78	—	39	—
Long-term debt	12,850	1,067 (c)(i)	—	—	12,458	(10,985)	1,660	(925)	16,125	552 (c)(i)

Year ended December 31, 2016 (in millions)	Fair value measurements using significant unobservable inputs								
	Fair value at January 1, 2016	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, 2016	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2016
Assets:[a]									
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. government agencies	$715	$ (20)	$ 135	$(295)	$ (115)	$ 111	$(139)	$392	$ (36)
Residential – nonagency	194	4	252	(319)	(20)	67	(95)	83	5
Commercial – nonagency	115	(11)	69	(29)	(3)	173	(297)	17	3
Total mortgage-backed securities	1,024	(27)	456	(643)	(138)	351	(531)	492	(28)
Obligations of U.S. states and municipalities	651	19	149	(132)	(38)	—	—	649	—
Non-U.S. government debt securities	74	(4)	91	(97)	(7)	19	(30)	46	(7)
Corporate debt securities	736	2	445	(359)	(189)	148	(207)	576	(22)
Loans	6,604	(343)	2,228	(2,598)	(1,311)	1,044	(787)	4,837	(169)
Asset-backed securities	1,832	39	655	(712)	(968)	288	(832)	302	19
Total debt instruments	10,921	(314)	4,024	(4,541)	(2,651)	1,850	(2,387)	6,902	(207)
Equity securities	265	—	90	(108)	(40)	29	(5)	231	7
Physical commodities	—	—	—	—	—	—	—	—	—
Other	744	79	649	(287)	(360)	26	(90)	761	28
Total trading assets – debt and equity instruments	11,930	(235) [c]	4,763	(4,936)	(3,051)	1,905	(2,482)	7,894	(172) [c]
Net derivative receivables:[b]									
Interest rate	876	756	193	(57)	(713)	(14)	222	1,263	(144)
Credit	549	(742)	10	(2)	211	36	36	98	(622)
Foreign exchange	(725)	67	64	(124)	(649)	(48)	31	(1,384)	(350)
Equity	(1,514)	(145)	277	(852)	213	94	(325)	(2,252)	(86)
Commodity	(935)	194	1	10	645	8	(8)	(85)	(36)
Total net derivative receivables	(1,749)	130 [c]	545	(1,025)	(293)	76	(44)	(2,360)	(1,238) [c]
Available-for-sale securities:									
Mortgage-backed securities	1	—	—	—	—	—	—	1	—
Asset-backed securities	823	1	—	—	(119)	—	(42)	663	1
Total available-for-sale securities	824	1 [d]	—	—	(119)	—	(42)	664	1 [d]
Loans	1,518	(49) [c]	259	(7)	(838)	—	(313)	570	—
Mortgage servicing rights	6,608	(163) [e]	679	(109)	(919)	—	—	6,096	(163) [e]
Other assets	2,401	130 [c]	487	(496)	(299)	—	—	2,223	48 [c]

Year ended December 31, 2016 (in millions)	Fair value measurements using significant unobservable inputs									
	Fair value at January 1, 2016	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, 2016	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2016
Liabilities:[a]										
Deposits	$2,950	$ (56) [c]	$ —	$—	$ 1,375	$ (1,283)	$ —	$(869)	$2,117	$ 23 [c]

Federal funds purchased and securities loaned or sold under repurchase agreements	—	—	—	—	—	(2)	6	(4)	—	—
Short-term borrowings	639	(230) (c)	—	—	1,876	(1,210)	114	(55)	1,134	(70) (c)
Trading liabilities – debt and equity instruments	63	(12) (c)	(15)	23	—	(22)	13	(7)	43	(18) (c)
Accounts payable and other liabilities	19	—	—	—	—	(6)	—	—	13	—
Beneficial interests issued by consolidated VIEs	549	(31) (c)	—	—	143	(613)	—	—	48	6 (c)
Long-term debt	11,447	147 (c)	—	—	8,140	(5,810)	315	(1,389)	12,850	639 (c)

Notes to consolidated financial statements

(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 3%, 3% and 4% at December 31, 2018, 2017 and 2016 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 15%, 15% and 12% at December 31, 2018, 2017 and 2016, 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) 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. Realized gains/(losses) and foreign exchange hedge accounting adjustments recorded in income on AFS securities were $1 million, zero and zero for the years ended December 31, 2018, 2017 and 2016, respectively. Unrealized gains/(losses) recorded on AFS securities in OCI were zero, $15 million and $1 million for the years ended December 31, 2018, 2017 and 2016, respectively.

(e) Changes in fair value for MSRs are reported in mortgage fees and related income.

(f) Loan originations are included in purchases.

(g) Includes financial assets and liabilities that have matured, been partially or fully repaid, impacts of modifications, deconsolidations 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 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, 2018 and 2017, respectively. Unrealized (gains)/losses are reported in OCI, and they were $(277) million and $(48) million for the years ended December 31, 2018 and 2017, respectively.

Level 3 analysis

Consolidated balance sheets changes

Level 3 assets (including assets measured at fair value on a nonrecurring basis) were 0.7% of total Firm assets at December 31, 2018. The following describes significant changes to level 3 assets since December 31, 2017, for those items measured at fair value on a recurring basis. For further information on changes impacting items measured at fair value on a nonrecurring basis, refer to Assets and liabilities measured at fair value on a nonrecurring basis on page 176.

For the year ended December 31, 2018

Level 3 assets were $17.2 billion at December 31, 2018, reflecting a decrease of $2.1 billion from December 31, 2017, largely due to:

- $1.2 billion decrease in trading assets — debt and equity instruments predominantly driven by a decrease of $1.0 billion in trading loans primarily due to settlements and net sales.

Transfers between levels for instruments carried at fair value on a recurring basis

During the year ended December 31, 2018, 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, 2018, 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, 2017, 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.

During the year ended December 31, 2017, 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, 2016, transfers from level 3 into level 2 included the following:

- $1.4 billion of long-term debt driven by an increase in observability and a reduction in the significance of unobservable inputs for certain structured notes.

During the year ended December 31, 2016, transfers from level 2 into level 3 included the following:

- $1.1 billion of gross equity derivative receivables and $1.0 billion of gross equity derivative payables as a result of an decrease in observability and an increase in the significance of unobservable inputs.
- $1.0 billion of trading loans driven by a decrease in observability.

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, 2018, 2017 and 2016. For further information on these instruments, refer to Changes in level 3 recurring fair value measurements rollforward tables on pages 170-174.

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.

2016

- There were no individually significant movements for the year ended December 31, 2016.

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)	**2018**	2017	2016
Credit and funding adjustments:			
Derivatives CVA	**$ 193**	$ 802	$ (84)
Derivatives FVA	**(74)**	(295)	7

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 174 in this Note and Note 23 for further information.

Notes to consolidated financial statements

Assets and liabilities measured at fair value on a nonrecurring basis

The following tables present the assets held as of December 31, 2018 and 2017, respectively, for which a nonrecurring fair value adjustment was recorded during the years ended December 31, 2018 and 2017, respectively, by major product category and fair value hierarchy.

December 31, 2018 (in millions)	Fair value hierarchy Level 1	Level 2	Level 3		Total fair value
Loans	**$ —**	**$ 273**	**$ 264**	(b)	**$ 537**
Other assets[a]	**—**	**8**	**815**		**823**
Total assets measured at fair value on a nonrecurring basis	**$ —**	**$ 281**	**$ 1,079**		**$ 1,360**

December 31, 2017 (in millions)	Fair value hierarchy Level 1	Level 2	Level 3	Total fair value
Loans	$ —	$ 238	$ 596	$ 834
Other assets	—	283	183	466
Total assets measured at fair value on a nonrecurring basis	$ —	$ 521	$ 779	$ 1,300

(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) as a result of the adoption of the recognition and measurement guidance. Of the $815 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2018, $667 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) Of the $264 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2018, $225 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 from13% to 54% with a weighted average of 25%.

There were no material liabilities measured at fair value on a nonrecurring basis at December 31, 2018 and 2017.

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, 2018, 2017 and 2016, related to financial instruments held at those dates.

December 31, (in millions)	**2018**		2017	2016
Loans	**$ (68)**		$ (159)	$ (209)
Other assets	**132**	(a)	(148)	37
Accounts payable and other liabilities	**—**		(1)	—
Total nonrecurring fair value gains/(losses)	**$ 64**		$ (308)	$ (172)

(a) Included $149 million for the year ended 2018 of net gains as a result of the measurement alternative.

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), refer to Note 12.

Equity securities without readily determinable fair values

As a result of the adoption of the recognition and measurement guidance and the election of the measurement alternative in the first quarter of 2018, 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, 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.

(in millions)	As of or for the Year ended December 31, 2018
Other assets	
Carrying value	$ 1,510
Upward carrying value changes	309
Downward carrying value changes/impairment	(160)

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 1.6298 at December 31, 2018, 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. Financial instruments within the scope of these disclosure requirements are included in the following table. However, certain financial instruments and all nonfinancial instruments are excluded from the scope of these disclosure requirements. Accordingly, the fair value disclosures provided in the following table include only a partial estimate of the fair value of JPMorgan Chase's assets and liabilities. For example, the Firm has developed long-term relationships with its customers through its deposit base and credit card accounts, commonly referred to as core deposit intangibles and credit card 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 Note.

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, 2018 and 2017, of financial assets and liabilities, excluding financial instruments that are carried at fair value on a recurring basis, and their classification within the fair value hierarchy.

	December 31, 2018					December 31, 2017				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	**Carrying value**	**Level 1**	**Level 2**	**Level 3**	**Total estimated fair value**	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value
Financial assets										
Cash and due from banks	**$ 22.3**	**$ 22.3**	**$ —**	**$ —**	**$ 22.3**	$ 25.9	$ 25.9	$ —	$ —	$ 25.9
Deposits with banks	**256.5**	**256.5**	**—**	**—**	**256.5**	405.4	401.8	3.6	—	405.4
Accrued interest and accounts receivable	**72.0**	**—**	**71.9**	**0.1**	**72.0**	67.0	—	67.0	—	67.0
Federal funds sold and securities purchased under resale agreements	**308.4**	**—**	**308.4**	**—**	**308.4**	183.7	—	183.7	—	183.7
Securities borrowed	**106.9**	**—**	**106.9**	**—**	**106.9**	102.1	—	102.1	—	102.1
Investment securities, held-to-maturity	**31.4**	**—**	**31.5**	**—**	**31.5**	47.7	—	48.7	—	48.7
Loans, net of allowance for loan losses[(a)]	**968.0**	**—**	**241.5**	**728.5**	**970.0**	914.6	—	213.2	707.1	920.3
Other[(b)]	**60.5**	**—**	**59.6**	**1.0**	**60.6**	53.9	—	52.1	9.2	61.3
Financial liabilities										
Deposits	**$ 1,447.4**	**$ —**	**$ 1,447.5**	**$ —**	**$ 1,447.5**	$ 1,422.7	$ —	$ 1,422.7	$ —	$ 1,422.7
Federal funds purchased and securities loaned or sold under repurchase agreements	**181.4**	**—**	**181.4**	**—**	**181.4**	158.2	—	158.2	—	158.2
Short-term borrowings	**62.1**	**—**	**62.1**	**—**	**62.1**	42.6	—	42.4	0.2	42.6
Accounts payable and other liabilities	**160.6**	**0.2**	**157.0**	**3.0**	**160.2**	152.0	—	148.9	2.9	151.8
Beneficial interests issued by consolidated VIEs	**20.2**	**—**	**20.2**	**—**	**20.2**	26.0	—	26.0	—	26.0
Long-term debt and junior subordinated deferrable interest debentures	**227.1**	**—**	**224.6**	**3.3**	**227.9**	236.6	—	240.3	3.2	243.5

Effective January 1, 2018, the Firm adopted several new accounting standards. Certain of the new accounting standards were applied retrospectively and, accordingly, prior period amounts were revised. For additional information, refer to Note 1.

(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 loss 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.

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

The majority of the Firm's lending-related commitments are not carried at fair value on a recurring basis on the Consolidated balance sheets. The carrying value of the wholesale allowance for lending-related commitments and the estimated fair value of these wholesale lending-related commitments were as follows for the periods indicated.

	December 31, 2018					December 31, 2017				
		Estimated fair value hierarchy					Estimated fair value hierarchy			
(in billions)	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value[(a)]	Level 1	Level 2	Level 3	Total estimated fair value
Wholesale lending-related commitments	**$ 1.0**	**$ —**	**$ —**	**$ 2.1**	**$ 2.1**	$ 1.1	$ —	$ —	$ 1.6	$ 1.6

(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.

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. For a further discussion of the valuation of lending-related commitments, refer to page 161 of this Note.

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 elected were previously 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 CIB's 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, 2018, 2017 and 2016, 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.

	2018			2017			2016		
December 31, (in millions)	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]
Federal funds sold and securities purchased under resale agreements	**$ (35)**	**$ —**	**$ (35)**	$ (97)	$ —	$ (97)	$ (76)	$ —	$ (76)
Securities borrowed	**22**	**—**	**22**	50	—	50	1	—	1
Trading assets:									
Debt and equity instruments, excluding loans	**(1,680)**	**1** [c]	**(1,679)**	1,943	2 [c]	1,945	120	(1) [c]	119
Loans reported as trading assets:									
Changes in instrument-specific credit risk	**414**	**1** [c]	**415**	330	14 [c]	344	461	43 [c]	504
Other changes in fair value	**160**	**185** [c]	**345**	217	747 [c]	964	79	684 [c]	763
Loans:									
Changes in instrument-specific credit risk	**(1)**	**—**	**(1)**	(1)	—	(1)	13	—	13
Other changes in fair value	**(1)**	**—**	**(1)**	(12)	3 [c]	(9)	(7)	—	(7)
Other assets	**5**	**(45)** [d]	**(40)**	11	(55) [d]	(44)	20	62 [d]	82
Deposits[a]	**181**	**—**	**181**	(533)	—	(533)	(134)	—	(134)
Federal funds purchased and securities loaned or sold under repurchase agreements	**11**	**—**	**11**	11	—	11	19	—	19
Short-term borrowings[a]	**862**	**—**	**862**	(747)	—	(747)	(236)	—	(236)
Trading liabilities	**1**	**—**	**1**	(1)	—	(1)	6	—	6
Beneficial interests issued by consolidated VIEs	**—**	**—**	**—**	—	—	—	23	—	23
Long-term debt[a][b]	**2,695**	**—**	**2,695**	(2,022)	—	(2,022)	(773)	—	(773)

(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, 2018, 2017 and 2016.

(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. For further information regarding interest income and interest expense, refer to Note 7.

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, 2018 and 2017, for loans, long-term debt and long-term beneficial interests for which the fair value option has been elected.

December 31, (in millions)	2018 Contractual principal outstanding	2018 Fair value	2018 Fair value over/(under) contractual principal outstanding	2017 Contractual principal outstanding	2017 Fair value	2017 Fair value over/(under) contractual principal outstanding
Loans[a]						
Nonaccrual loans						
Loans reported as trading assets	**$ 4,240**	**$ 1,350**	**$ (2,890)**	$ 4,219	$ 1,371	$ (2,848)
Loans	**39**	**—**	**(39)**	39	—	(39)
Subtotal	**4,279**	**1,350**	**(2,929)**	4,258	1,371	(2,887)
All other performing loans						
Loans reported as trading assets	**42,215**	**40,403**	**(1,812)**	38,157	36,590	(1,567)
Loans	**3,186**	**3,151**	**(35)**	2,539	2,508	(31)
Total loans	**$ 49,680**	**$ 44,904**	**$ (4,776)**	$ 44,954	$ 40,469	$ (4,485)
Long-term debt						
Principal-protected debt	**$ 32,674**[c]	**$ 28,718**	**$ (3,956)**	$ 26,297[c]	$ 23,848	$ (2,449)
Nonprincipal-protected debt[b]	**NA**	**26,168**	**NA**	NA	23,671	NA
Total long-term debt	**NA**	**$ 54,886**	**NA**	NA	$ 47,519	NA
Long-term beneficial interests						
Nonprincipal-protected debt[b]	**NA**	**$ 28**	**NA**	NA	$ 45	NA
Total long-term beneficial interests	**NA**	**$ 28**	**NA**	NA	$ 45	NA

(a) There were no performing loans that were ninety days or more past due as of December 31, 2018 and 2017.

(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, 2018 and 2017, the contractual amount of lending-related commitments for which the fair value option was elected was $6.9 billion and $7.4 billion, respectively, with a corresponding fair value of $(82) million and $(76) million, respectively. For further information regarding off-balance sheet lending-related financial instruments, refer to Note 27.

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)	Dec 31, 2018 Long-term debt	Dec 31, 2018 Short-term borrowings	Dec 31, 2018 Deposits	Dec 31, 2018 Total	Dec 31, 2017 Long-term debt	Dec 31, 2017 Short-term borrowings	Dec 31, 2017 Deposits	Dec 31, 2017 Total
Risk exposure								
Interest rate	**$ 24,137**	**$ 62**	**$ 12,372**	**$ 36,571**	$ 22,056	$ 69	$ 8,058	$ 30,183
Credit	**4,009**	**995**	**—**	**5,004**	4,329	1,312	—	5,641
Foreign exchange	**3,169**	**157**	**38**	**3,364**	2,841	147	38	3,026
Equity	**21,382**	**5,422**	**7,368**	**34,172**	17,581	7,106	6,548	31,235
Commodity	**372**	**34**	**1,207**	**1,613**	230	15	4,468	4,713
Total structured notes	**$ 53,069**	**$ 6,670**	**$ 20,985**	**$ 80,724**	$ 47,037	$ 8,649	$ 19,112	$ 74,798

Notes to consolidated financial statements

	2018				2017			
	Credit	On-balance sheet		Off-balance	Credit	On-balance sheet		Off-balance
December 31, (in millions)	exposure[g]	Loans	Derivatives	sheet[h]	exposure[g]	Loans	Derivatives	sheet[h]
Consumer, excluding credit card	**$ 419,798**	**$ 373,732**	**$ —**	**$ 46,066**	$ 421,234	$ 372,681	$ —	$ 48,553
Receivables from customers[a]	**154**	**—**	**—**	**—**	133	—	—	—
Total Consumer, excluding credit card	**419,952**	**373,732**	**—**	**46,066**	421,367	372,681	—	48,553
Credit card	**762,011**	**156,632**	**—**	**605,379**	722,342	149,511	—	572,831
Total consumer-related	**1,181,963**	**530,364**	**—**	**651,445**	1,143,709	522,192	—	621,384
Wholesale-related[b]								
Real Estate	**143,316**	**115,737**	**164**	**27,415**	139,409	113,648	153	25,608
Individuals and Individual Entities[c]	**97,077**	**86,586**	**1,017**	**9,474**	87,371	77,768	1,252	8,351
Consumer & Retail	**94,815**	**36,921**	**1,093**	**56,801**	87,679	31,044	1,114	55,521
Technology, Media & Telecommunications	**72,646**	**16,980**	**2,667**	**52,999**	59,274	13,665	2,265	43,344
Industrials	**58,528**	**19,126**	**958**	**38,444**	55,272	18,161	1,163	35,948
Banks & Finance Cos	**49,920**	**28,825**	**5,903**	**15,192**	49,037	25,879	6,816	16,342
Healthcare	**48,142**	**16,347**	**1,874**	**29,921**	55,997	16,273	2,191	37,533
Asset Managers	**42,807**	**16,806**	**9,033**	**16,968**	32,531	11,480	7,998	13,053
Oil & Gas	**42,600**	**13,008**	**559**	**29,033**	41,317	12,621	1,727	26,969
Utilities	**28,172**	**5,591**	**1,740**	**20,841**	29,317	6,187	2,084	21,046
State & Municipal Govt[d]	**27,351**	**10,319**	**2,000**	**15,032**	28,633	12,134	2,888	13,611
Central Govt	**18,456**	**3,867**	**12,869**	**1,720**	19,182	3,375	13,937	1,870
Automotive	**17,339**	**5,170**	**399**	**11,770**	14,820	4,903	342	9,575
Chemicals & Plastics	**16,035**	**4,902**	**181**	**10,952**	15,945	5,654	208	10,083
Transportation	**15,660**	**6,391**	**1,102**	**8,167**	15,797	6,733	977	8,087
Metals & Mining	**15,359**	**5,370**	**488**	**9,501**	14,171	4,728	702	8,741
Insurance	**12,639**	**1,356**	**2,569**	**8,714**	14,089	1,411	2,804	9,874
Financial Markets Infrastructure	**7,484**	**18**	**5,941**	**1,525**	5,036	351	3,499	1,186
Securities Firms	**4,558**	**645**	**2,029**	**1,884**	4,113	952	1,692	1,469
All other[e]	**68,284**	**45,197**	**1,627**	**21,460**	60,529	35,931	2,711	21,887
Subtotal	**881,188**	**439,162**	**54,213**	**387,813**	829,519	402,898	56,523	370,098
Loans held-for-sale and loans at fair value	**15,028**	**15,028**	**—**	**—**	5,607	5,607	—	—
Receivables from customers and other[a]	**30,063**	**—**	**—**	**—**	26,139	—	—	—
Total wholesale-related	**926,279**	**454,190**	**54,213**	**387,813**	861,265	408,505	56,523	370,098
Total exposure[f][g]	**$ 2,108,242**	**$ 984,554**	**$ 54,213**	**$ 1,039,258**	$ 2,004,974	$ 930,697	$ 56,523	$ 991,482

Notes to consolidated financial statements

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 contracts 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 increases or decreases 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 forward contracts 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 contracts 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. For a further discussion of credit derivatives, refer to the discussion in the Credit derivatives section on pages 195-197 of this Note.

For more information about risk management derivatives, refer to the risk management derivatives gains and losses table on page 195 of this Note, and the hedge accounting gains and losses tables on pages 192-195 of this Note.

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. For further information on the Firm's clearing services, refer to Note 27.

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. For further discussion of the offsetting of assets and liabilities, refer to Note 1. 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 188-195 of this Note provide additional information on the amount of, and reporting for, derivative assets, liabilities, gains and losses. For further discussion of derivatives embedded in structured notes, refer to Notes 2 and 3.

Derivatives designated as hedges

The Firm adopted new hedge accounting guidance in the first quarter of 2018, which required prospective amendments to the disclosures, as reflected in this Note. For additional information on the impact upon adoption of the new guidance, refer to Notes 1 and 23.

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 interest income, interest expense, noninterest revenue 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	192
• Interest rate	Hedge floating-rate assets and liabilities	Cash flow hedge	Corporate	194
• Foreign exchange	Hedge foreign currency-denominated assets and liabilities	Fair value hedge	Corporate	192
• Foreign exchange	Hedge foreign currency-denominated forecasted revenue and expense	Cash flow hedge	Corporate	194
• Foreign exchange	Hedge the value of the Firm's investments in non-U.S. dollar functional currency entities	Net investment hedge	Corporate	195
• Commodity	Hedge commodity inventory	Fair value hedge	CIB	192
Manage specifically identified risk exposures not designated in qualifying hedge accounting relationships:				
• Interest rate	Manage the risk of the mortgage pipeline, warehouse loans and MSRs	Specified risk management	CCB	195
• Credit	Manage the credit risk of wholesale lending exposures	Specified risk management	CIB	195
• Interest rate and foreign exchange	Manage the risk of certain other specified assets and liabilities	Specified risk management	Corporate	195
Market-making derivatives and other activities:				
• Various	Market-making and related risk management	Market-making and other	CIB	195
• Various	Other derivatives	Market-making and other	CIB, Corporate	195

Notional amount of derivative contracts

The following table summarizes the notional amount of derivative contracts outstanding as of December 31, 2018 and 2017.

	Notional amounts[b]	
December 31, (in billions)	**2018**	2017
Interest rate contracts		
Swaps	**$21,763**	$21,043
Futures and forwards	**3,562**	4,904
Written options	**3,997**	3,576
Purchased options	**4,322**	3,987
Total interest rate contracts	**33,644**	33,510
Credit derivatives[a]	**1,501**	1,522
Foreign exchange contracts		
Cross-currency swaps	**3,548**	3,953
Spot, futures and forwards	**5,871**	5,923
Written options	**835**	786
Purchased options	**830**	776
Total foreign exchange contracts	**11,084**	11,438
Equity contracts		
Swaps	**346**	367
Futures and forwards	**101**	90
Written options	**528**	531
Purchased options	**490**	453
Total equity contracts	**1,465**	1,441
Commodity contracts		
Swaps	**134**	133 [c]
Spot, futures and forwards	**156**	168
Written options	**135**	98
Purchased options	**120**	93
Total commodity contracts	**545**	492 [c]
Total derivative notional amounts	**$48,239**	$48,403 [c]

(a) For more information on volumes and types of credit derivative contracts, refer to the Credit derivatives discussion on pages 195-197.
(b) Represents the sum of gross long and gross short third-party notional derivative contracts.
(c) The prior period amounts have been revised to conform with the current period presentation.

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 used simply as a reference 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, 2018 and 2017, 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, 2018 (in millions)	Gross derivative receivables: Not designated as hedges	Gross derivative receivables: Designated as hedges	Gross derivative receivables: Total derivative receivables	Net derivative receivables[b]	Gross derivative payables: Not designated as hedges	Gross derivative payables: Designated as hedges	Gross derivative payables: Total derivative payables	Net derivative payables[b]
Trading assets and liabilities								
Interest rate	**$ 267,871**	**$ 833**	**$ 268,704**	**$ 23,214**	**$ 242,782**	**$ —**	**$ 242,782**	**$ 7,784**
Credit	**20,095**	**—**	**20,095**	**612**	**20,276**	**—**	**20,276**	**1,667**
Foreign exchange	**167,057**	**628**	**167,685**	**13,450**	**164,392**	**825**	**165,217**	**12,785**
Equity	**49,285**	**—**	**49,285**	**9,946**	**51,195**	**—**	**51,195**	**10,161**
Commodity	**20,223**	**247**	**20,470**	**6,991**	**22,297**	**121**	**22,418**	**9,372**
Total fair value of trading assets and liabilities	**$ 524,531**	**$ 1,708**	**$ 526,239**	**$ 54,213**	**$ 500,942**	**$ 946**	**$ 501,888**	**$ 41,769**

December 31, 2017 (in millions)	Gross derivative receivables: Not designated as hedges	Gross derivative receivables: Designated as hedges	Gross derivative receivables: Total derivative receivables	Net derivative receivables[b]	Gross derivative payables: Not designated as hedges	Gross derivative payables: Designated as hedges	Gross derivative payables: Total derivative payables	Net derivative payables[b]
Trading assets and liabilities								
Interest rate	$ 314,962 [c]	$ 1,030 [c]	$ 315,992	$ 24,673	$ 284,433 [c]	$ 3 [c]	$ 284,436	$ 7,129
Credit	23,205	—	23,205	869	23,252	—	23,252	1,299
Foreign exchange	159,740	491	160,231	16,151	154,601	1,221	155,822	12,473
Equity	40,040	—	40,040	7,882	45,395	—	45,395	9,192
Commodity	20,066	19	20,085	6,948	21,498	403	21,901	7,684
Total fair value of trading assets and liabilities	$ 558,013 [c]	$ 1,540 [c]	$ 559,553	$ 56,523	$ 529,179 [c]	$ 1,627 [c]	$ 530,806	$ 37,777

(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.

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

Derivatives netting

The following tables present, as of December 31, 2018 and 2017, 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)	**2018** Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables	2017 Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables
U.S. GAAP nettable derivative receivables						
Interest rate contracts:						
OTC	**$ 258,227**	**$ (239,498)**	**$ 18,729**	$ 305,569	$ (284,917)	$ 20,652
OTC–cleared	**6,404**	**(5,856)**	**548**	6,531	(6,318)	213
Exchange-traded[a]	**322**	**(136)**	**186**	185	(84)	101
Total interest rate contracts	**264,953**	**(245,490)**	**19,463**	312,285	(291,319)	20,966
Credit contracts:						
OTC	**12,648**	**(12,261)**	**387**	15,390	(15,165)	225
OTC–cleared	**7,267**	**(7,222)**	**45**	7,225	(7,170)	55
Total credit contracts	**19,915**	**(19,483)**	**432**	22,615	(22,335)	280
Foreign exchange contracts:						
OTC	**163,862**	**(153,988)**	**9,874**	155,289	(142,420)	12,869
OTC–cleared	**235**	**(226)**	**9**	1,696	(1,654)	42
Exchange-traded[a]	**32**	**(21)**	**11**	141	(7)	134
Total foreign exchange	**164,129**	**(154,235)**	**9,894**	157,126	(144,081)	13,045

contracts						
Equity contracts:						
OTC	**26,178**	**(23,879)**	**2,299**	22,024	(19,917)	2,107
Exchange-traded[a]	**18,876**	**(15,460)**	**3,416**	14,188	(12,241)	1,947
Total equity contracts	**45,054**	**(39,339)**	**5,715**	36,212	(32,158)	4,054
Commodity contracts:						
OTC	**7,448**	**(5,261)**	**2,187**	7,204 [e]	(4,436)	2,768 [e]
Exchange-traded[a]	**8,815**	**(8,218)**	**597**	8,854	(8,701)	153
Total commodity contracts	**16,263**	**(13,479)**	**2,784**	16,058 [e]	(13,137)	2,921 [e]
Derivative receivables with appropriate legal opinion	**510,314**	**(472,026)**	**38,288** [d]	544,296 [e]	(503,030)	41,266 [d][e]
Derivative receivables where an appropriate legal opinion has not been either sought or obtained	**15,925**		**15,925**	15,257 [e]		15,257 [e]
Total derivative receivables recognized on the Consolidated balance sheets	**$ 526,239**		**$ 54,213**	$ 559,553		$ 56,523
Collateral not nettable on the Consolidated balance sheets[b][c]			**(13,046)**			(13,363)
Net amounts			**$ 41,167**			$ 43,160

Notes to consolidated financial statements

December 31, (in millions)	2018 Gross derivative payables	2018 Amounts netted on the Consolidated balance sheets	2018 Net derivative payables	2017 Gross derivative payables	2017 Amounts netted on the Consolidated balance sheets	2017 Net derivative payables
U.S. GAAP nettable derivative payables						
Interest rate contracts:						
OTC	**$ 233,404**	**$ (228,369)**	**$ 5,035**	$ 276,960	$ (271,294)	$ 5,666
OTC–cleared	**7,163**	**(6,494)**	**669**	6,004	(5,928)	76
Exchange-traded[(a)]	**210**	**(135)**	**75**	127	(84)	43