FIVE-YEAR SUMMARY OF CONSOLIDATED FINANCIAL HIGHLIGHTS (unaudited)

As of or for the year ended December 31, (in millions, except per share, ratio, headcount data and where otherwise noted)	2019	2018	2017	2016	2015
Selected income statement data					
Total net revenue	$ 115,627	$ 109,029	$ 100,705	$ 96,569	$ 94,440
Total noninterest expense	65,497	63,394	59,515	56,672	59,911
Pre-provision profit	50,130	45,635	41,190	39,897	34,529
Provision for credit losses	5,585	4,871	5,290	5,361	3,827
Income before income tax expense	44,545	40,764	35,900	34,536	30,702
Income tax expense	8,114	8,290	11,459	9,803	6,260
Net income	$ 36,431	$ 32,474	$ 24,441 (f)	$ 24,733	$ 24,442
Earnings per share data					
Net income: Basic	$ 10.75	$ 9.04	$ 6.35	$ 6.24	$ 6.05
Diluted	10.72	9.00	6.31	6.19	6.00
Average shares: Basic	3,221.5	3,396.4	3,551.6	3,658.8	3,741.2
Diluted	3,230.4	3,414.0	3,576.8	3,690.0	3,773.6
Market and per common share data					
Market capitalization	$ 429,913	$ 319,780	$ 366,301	$ 307,295	$ 241,899
Common shares at period-end	3,084.0	3,275.8	3,425.3	3,561.2	3,663.5
Book value per share	75.98	70.35	67.04	64.06	60.46
Tangible book value per share ("TBVPS")[a]	60.98	56.33	53.56	51.44	48.13
Cash dividends declared per share	3.40	2.72	2.12	1.88	1.72
Selected ratios and metrics					
Return on common equity ("ROE")	15%	13%	10%	10%	11%
Return on tangible common equity ("ROTCE")[a]	19	17	12	13	13
Return on assets ("ROA")	1.33	1.24	0.96	1.00	0.99
Overhead ratio	57	58	59	59	63
Loans-to-deposits ratio	61	67	64	65	65
Liquidity coverage ratio ("LCR") (average)[b]	116	113	119	N/A	N/A
Common equity tier 1 ("CET1") capital ratio[c]	12.4	12.0	12.2	12.3	11.8
Tier 1 capital ratio[c]	14.1	13.7	13.9	14.0	13.5
Total capital ratio[c]	16.0	15.5	15.9	15.5	15.1
Tier 1 leverage ratio[c]	7.9	8.1	8.3	8.4	8.5
Supplementary leverage ratio ("SLR")[d]	6.3%	6.4%	6.5%	6.5%	6.5%
Selected balance sheet data (period-end)					
Trading assets	$ 411,103	$ 413,714	$ 381,844	$ 372,130	$ 343,839
Investment securities	398,239	261,828	249,958	289,059	290,827
Loans	959,769	984,554	930,697	894,765	837,299
Core Loans	916,144	931,856	863,683	806,152	732,093
Average core loans	906,606	885,221	829,558	769,385	670,757
Total assets	2,687,379	2,622,532	2,533,600	2,490,972	2,351,698
Deposits	1,562,431	1,470,666	1,443,982	1,375,179	1,279,715
Long-term debt	291,498	282,031	284,080	295,245	288,651
Common stockholders' equity	234,337	230,447	229,625	228,122	221,505
Total stockholders' equity	261,330	256,515	255,693	254,190	247,573
Headcount	256,981	256,105	252,539	243,355	234,598
Credit quality metrics					
Allowance for credit losses	$ 14,314	$ 14,500	$ 14,672	$ 14,854	$ 14,341
Allowance for loan losses to total retained loans	1.39%	1.39%	1.47%	1.55%	1.63%
Allowance for loan losses to retained loans excluding purchased credit-impaired loans[e]	1.31	1.23	1.27	1.34	1.37
Nonperforming assets	$ 4,497	$ 5,190	$ 6,426	$ 7,535	$ 7,034
Net charge-offs	5,629	4,856	5,387	4,692	4,086
Net charge-off rate	0.60%	0.52%	0.60% (g)	0.54%	0.52%

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

(b) For the years ended December 31, 2019, 2018 and 2017, the percentage represents the Firm's reported average LCR for the three months ended December 31, 2019, 2018 and 2017, which became effective April 1, 2017. Refer to Liquidity Risk Management on pages 93–98 for additional information on the Firm's LCR.

(c) The Basel III capital rules became fully phased-in effective January 1, 2019. Prior to this date, the required capital measures were subject to the transitional rules which, as of December 31, 2018, were the same on a fully phased-in and transitional basis. Refer to Capital Risk Management on pages 85–92 for additional information on these measures.

(d) The Basel III rule for the SLR became fully phased-in effective January 1, 2018. Prior to this date, the SLR was calculated under the transitional rules. Refer to Capital Risk Management on pages 85–92 for additional information on these measures.

(e) This ratio is a non-GAAP financial measure as it excludes the impact of residential real estate purchased credit-impaired ("PCI") loans. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59, and the Allowance for credit losses on pages 116–117 for further discussion of this measure.

(f) In December 2017, the Tax Cuts and Jobs Act ("TCJA") was signed into law. The Firm's results for the year ended December 31, 2017 included a $2.4 billion decrease to net income as a result of the enactment of the TCJA. Refer to Note 25 for additional information related to the impact of the TCJA.

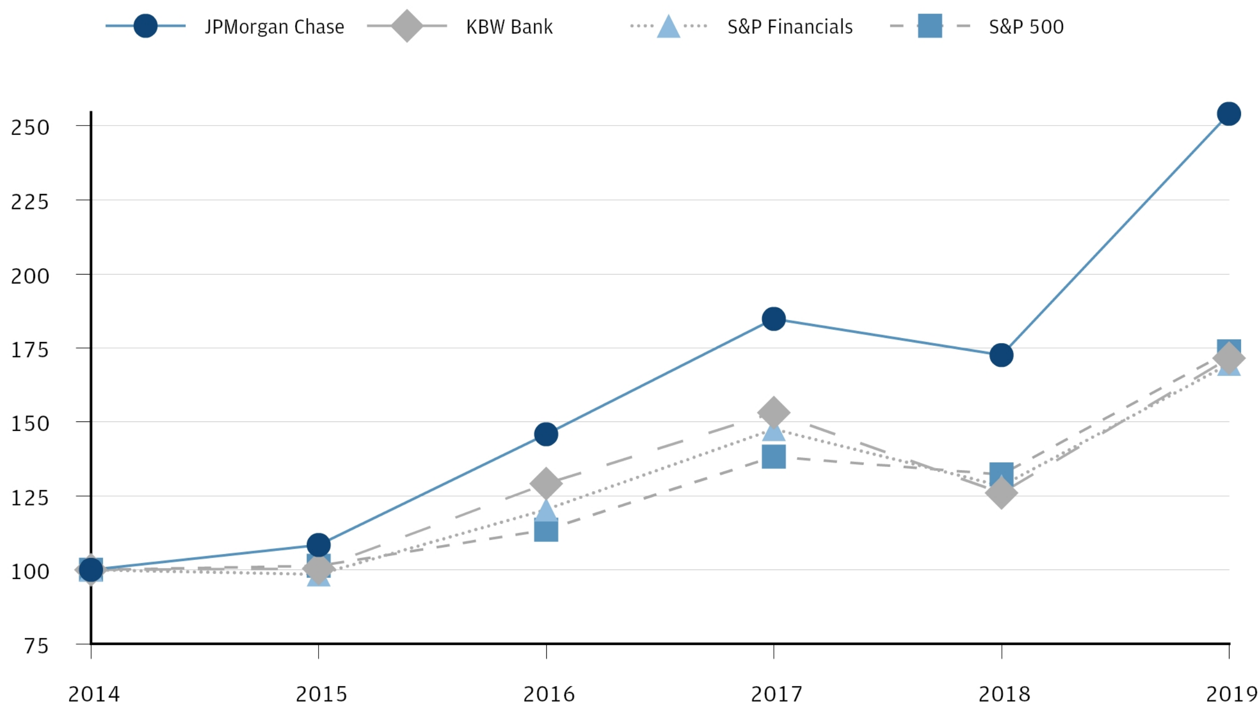
(g) Excluding net charge-offs of $467 million related to the student loan portfolio sale, the net charge-off rate for the year ended December 31, 2017 would have been 0.55%.

FIVE-YEAR STOCK PERFORMANCE

The following table and graph compare the five-year cumulative total return for JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm") common stock with the cumulative return of the S&P 500 Index, the KBW Bank Index and the S&P Financials Index. The S&P 500 Index is a commonly referenced equity benchmark in the United States of America ("U.S."), consisting of leading companies from different economic sectors. The KBW Bank Index seeks to reflect the performance of banks and thrifts that are publicly traded in the U.S. and is composed of leading national money center and regional banks and thrifts. The S&P Financials Index is an index of financial companies, all of which are components of the S&P 500. The Firm is a component of all three industry indices.

The following table and graph assume simultaneous investments of $100 on December 31, 2014, in JPMorgan Chase common stock and in each of the above indices. The comparison assumes that all dividends were reinvested.

December 31, (in dollars)	2014	2015	2016	2017	2018	**2019**
JPMorgan Chase	$ 100.00	$ 108.37	$ 145.82	$ 184.81	$ 172.52	**$ 254.07**
KBW Bank Index	100.00	100.48	129.13	153.14	126.02	**171.54**
S&P Financials Index	100.00	98.44	120.38	147.58	128.33	**169.52**
S&P 500 Index	100.00	101.37	113.49	138.26	132.19	**173.80**



The following is Management's discussion and analysis of the financial condition and results of operations ("MD&A") of JPMorgan Chase for the year ended December 31, 2019. The MD&A is included in both JPMorgan Chase's Annual Report for the year ended December 31, 2019 ("Annual Report") and its Annual Report on Form 10-K for the year ended December 31, 2019 ("2019 Form 10-K") filed with the Securities and Exchange Commission ("SEC"). Refer to the Glossary of terms and acronyms on pages 293–299 for definitions of terms and acronyms used throughout the Annual Report and the 2019 Form 10-K.

The MD&A contains statements that are forward-looking within the meaning of the Private Securities Litigation Reform Act of 1995. These statements are based on the current beliefs and expectations of JPMorgan Chase's management and are subject to significant risks and uncertainties. Refer to Forward-looking Statements on page 141) and Part 1, Item 1A: Risk factors in the 2019 Form 10-K on pages 6–28 for a discussion of certain of those risks and uncertainties and the factors that could cause JPMorgan Chase's actual results to differ materially because of those risks and uncertainties.

INTRODUCTION

JPMorgan Chase & Co. (NYSE: JPM), a financial holding company incorporated under Delaware law in 1968, is a leading global financial services firm and one of the largest banking institutions in the United States of America ("U.S."), with operations worldwide; JPMorgan Chase had $2.7 trillion in assets and $261.3 billion in stockholders' equity as of December 31, 2019. The Firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. Under the J.P. Morgan and Chase brands, the Firm serves millions of customers in the U.S. and globally many of the world's most prominent corporate, institutional and government clients.

JPMorgan Chase's principal bank subsidiary is JPMorgan Chase Bank, National Association ("JPMorgan Chase Bank, N.A."), a national banking association with U.S. branches in 38 states and Washington, D.C. as of December 31, 2019. JPMorgan Chase's principal nonbank subsidiary is J.P. Morgan Securities LLC ("J.P. Morgan Securities"), a U.S. broker-dealer. The bank and non-bank subsidiaries of JPMorgan Chase operate nationally as well as through overseas branches and subsidiaries, representative offices and subsidiary foreign banks. The Firm's principal operating subsidiary outside the U.S. is J.P. Morgan Securities plc, a U.K.-based subsidiary of JPMorgan Chase Bank, N.A.

For management reporting purposes, the Firm's activities are organized into four major reportable business segments, as well as a Corporate segment. The Firm's consumer business is the Consumer & Community Banking ("CCB") segment. The Firm's wholesale business segments are Corporate & Investment Bank ("CIB"), Commercial Banking ("CB"), and Asset & Wealth Management ("AWM"). Refer to Business Segment Results on pages 60–78, and Note 32 for a description of the Firm's business segments, and the products and services they provide to their respective client bases.

This executive overview of the MD&A highlights selected information and does not contain all of the information that is important to readers of this 2019 Form 10-K. For a complete description of the trends and uncertainties, as well as the risks and critical accounting estimates affecting the Firm and its various lines of business ("LOBs"), this 2019 Form 10-K should be read in its entirety.

Financial performance of JPMorgan Chase

Year ended December 31, (in millions, except per share data and ratios)	2019	2018	Change
Selected income statement data			
Total net revenue	**$115,627**	$109,029	6%
Total noninterest expense	**65,497**	63,394	3
Pre-provision profit	**50,130**	45,635	10
Provision for credit losses	**5,585**	4,871	15
Net income	**36,431**	32,474	12
Diluted earnings per share	**10.72**	9.00	19
Selected ratios and metrics			
Return on common equity	**15%**	13%	
Return on tangible common equity	**19**	17	
Book value per share	**$ 75.98**	$ 70.35	8
Tangible book value per share	**60.98**	56.33	8
Capital ratios[(a)]			
CET1	**12.4%**	**12.0%**	
Tier 1 capital	**14.1**	**13.7**	
Total capital	**16.0**	**15.5**	

(a) The Basel III capital rules became fully phased-in effective January 1, 2019. Prior to this date, the required capital measures were subject to the transitional rules which, as of December 31, 2018, were the same on a fully phased-in and transitional basis. Refer to Capital Risk Management on pages 85-92 for additional information on these measures.

Comparisons noted in the sections below are for the full year of 2019 versus the full year of 2018, unless otherwise specified.

Firmwide overview

JPMorgan Chase reported strong results for 2019, with record revenue, net income and EPS of $115.6 billion, $36.4 billion and $10.72 per share, respectively. The Firm reported ROE of 15% and ROTCE of 19%.

- Net income was $36.4 billion, up 12%.
- Total net revenue increased 6%. Net interest income was $57.2 billion, up 4%, driven by continued balance sheet growth and mix as well as higher average short-term rates, partially offset by higher deposit pay rates. Noninterest revenue was $58.4 billion, up 8%, driven by growth across CCB as well as higher Markets revenue in CIB. Noninterest revenue included approximately $500 million of gains on the sales of certain mortgage loans in Home Lending.
- Noninterest expense was $65.5 billion, up 3%, driven by continued investments across the businesses including employees, technology, real estate, and marketing, as well as higher volume- and revenue-related expenses, including depreciation expense on auto lease assets, partially offset by lower FDIC charges.
- Income tax expense included $1.1 billion of tax benefits related to the resolution of certain tax audits.
- The provision for credit losses was $5.6 billion, up $714 million, reflecting increases in both wholesale and consumer. The increase in the wholesale provision reflects additions to the allowance for credit losses in the current year on select client downgrades. The prior year reflected a benefit related to a single name in the Oil & Gas portfolio and higher recoveries. The increase in the consumer provision reflects higher net charge-offs and additions to the allowance for loan losses in Card, predominantly offset by a higher reduction in the allowance for loan losses in Home Lending. The prior year also benefited from larger recoveries in Home Lending on loan sales.
- The total allowance for credit losses was $14.3 billion at December 31, 2019, and the Firm had a loan loss coverage ratio of 1.39%, flat compared with the prior year; excluding the PCI portfolio, the equivalent ratio was 1.31% compared with 1.23% in the prior year. The Firm's nonperforming assets totaled $4.5 billion at December 31, 2019, a decrease from $5.2 billion in the prior year, primarily reflecting paydowns in the wholesale portfolio and improved credit performance in the consumer portfolio.
- Firmwide average total loans of $955 billion were up 1%, or up 3% excluding the impact of certain loan sales in Home Lending.

Selected capital-related metrics

- The Firm's CET1 capital was $188 billion, and the Standardized and Advanced CET1 ratios were 12.4% and 13.4%, respectively.
- The Firm's SLR was 6.3%.
- The Firm continued to grow tangible book value per share ("TBVPS"), ending 2019 at $60.98, up 8%.

ROTCE and TBVPS are non-GAAP financial measures. Refer to Explanation and Reconciliation of the Firm's Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59, and Capital Risk Management on pages 85–92 for a further discussion of each of these measures.

Business segment highlights

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

CCB ROE 31%	• Record revenue of $55.9 billion, up 7%; record net income of $16.6 billion, up 12% • Average loans down 3%; Home Lending loans down 9% impacted by loan sales; Card loans up 7% • Client investment assets up 27%; average deposits up 3% • Credit card sales volume up 10% and merchant processing volume up 11%
CIB ROE 14%	• Record revenue of $38.3 billion, up 5%; record net income of $11.9 billion, up 1% • Maintained #1 ranking for Global Investment Banking fees with 9.0% wallet share, up 40 basis points ("bps") • Investment Banking revenue of $7.2 billion, up 3% • Total Markets revenue of $20.9 billion, up 7%
CB ROE 17%	• Record Investment Banking revenue of $2.7 billion, up 10% • Average loans and deposits each up 1% • Strong credit quality with NCOs of 8 bps
AWM ROE 26%	• Record revenue of $14.3 billion, up 2% • Average loans up 8%; average deposits up 2% • Assets under management ("AUM") of $2.4 trillion, up 19%

Refer to the Business Segment Results on pages 60-61 for a detailed discussion of results by business segment.

Credit provided and capital raised

JPMorgan Chase continues to support consumers, businesses and communities around the globe. The Firm provided new and renewed credit and raised capital for wholesale and consumer clients during 2019, consisting of:

$2.3 trillion	Total credit provided and capital raised
$262 billion	Credit for consumers
$33 billion	Credit for U.S. small businesses
$860 billion	Credit for corporations
$1.0 trillion	Capital raised for corporate clients and non-U.S. government entities
$79 billion	Credit and capital raised for nonprofit and U.S. government entities[(a)]

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

Recent events

On February 25, 2020, JPMorgan Chase announced additional steps in its initiatives to address climate change and further promote sustainable development. This year, JPMorgan Chase commits to facilitate $200 billion to advance the objectives of the United Nations Sustainable Development Goals (SDGs), including $50 billion toward green initiatives. The new commitment is intended to address a broader set of challenges in the developing world and developed countries where social and economic development gaps persist. As part of this commitment, the Firm had previously announced the creation of the J.P. Morgan Development Finance Institution to expand its financing activities for developing countries.

On December 18, 2019, JPMorgan Chase announced that the China Securities Regulatory Commission has approved the application of J.P. Morgan Securities (China) Company Limited for a Securities and Futures Business Permit. This approval allows J.P. Morgan's majority-owned securities company in China to commence operations.

On December 11, 2019, JPMorgan Chase announced certain organizational changes to its U.S. Wealth Management business. The Firm's advisors across Chase Wealth Management and J.P. Morgan Securities will become one business unit – U.S. Wealth Management.

2020 outlook

These current expectations are forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. Such forward-looking statements are based on the current beliefs and expectations of JPMorgan Chase's management and are subject to significant risks and uncertainties. Refer to Forward-Looking Statements on page 141, *and the Risk Factors section on* pages 6–28 *of the Firm's 2019 Form 10-K, for a further discussion of certain of those risks and uncertainties and the other factors that could cause JPMorgan Chase's actual results to differ materially because of those risks and uncertainties. There is no assurance that actual results in 2019 will be in line with the outlook set forth below, and the Firm does not undertake to update any forward-looking statements.*

JPMorgan Chase's outlook for 2020 should be viewed against the backdrop of the global and U.S. economies, financial markets activity, the geopolitical environment, the competitive environment, client and customer activity levels, and regulatory and legislative developments in the U.S. and other countries where the Firm does business. Each of these factors will affect the performance of the Firm and its LOBs. The Firm will continue to make appropriate adjustments to its businesses and operations in response to ongoing developments in the business, economic, regulatory, and legal environments in which it operates.

Firmwide full-year 2020

- Management expects full-year 2020 net interest income, on a managed basis, to be approximately $57 billion, market dependent, reflecting the impact of lower interest rates offset by balance sheet growth and mix.
- The Firm continues to take a disciplined approach to managing expenses, while investing for growth and innovation. As a result, management expects Firmwide adjusted expense for the full-year 2020 to be approximately $67 billion.
- The Firm continues to experience charge-off rates at very low levels, reflecting favorable credit trends across the consumer and wholesale portfolios. Management expects full-year 2020 net charge-offs to be just over $6 billion, an increase from prior year, driven by Card on growth and mix.
- Management expects the full-year 2020 effective tax rate, on a reported basis, to be approximately 20%, and approximately 5 to 7 percentage points higher on a managed basis.

First-quarter 2020

- Management expects first-quarter 2020 net interest income, on a managed basis, to be approximately $14.2 billion, market dependent.
- Firmwide adjusted expense for the first-quarter 2020 is expected to be approximately $17 billion.
- The effective tax rate, on a reported basis, for the first quarter of 2020 is expected to be approximately 17% largely as a result of tax benefits related to the vesting of employee share-based awards.
- Markets revenue for the first-quarter of 2020 is expected to be higher when compared with the prior-year quarter by mid-teens percentage points, depending on market conditions.

Business Developments

Departure of the U.K. from the EU

The U.K.'s departure from the EU, which is commonly referred to as "Brexit," occurred on January 31, 2020.

Following this departure, the U.K. has entered a transition period that is scheduled to expire on December 31, 2020. The purpose of the transition period is to enable the U.K. and the EU to negotiate the terms of their future relationship. The transition period can be extended, but both sides need to agree to extend it by July 1, 2020. It is not clear whether the terms of the future relationship can be agreed before the end of 2020, and so significant uncertainty remains about the relationship between the U.K. and the EU after the end of the transition period.

The Firm has a long-standing presence in the U.K., which currently serves as the regional headquarters of the Firm's operations in over 30 countries across Europe, the Middle East, and Africa ("EMEA"). In the region, the Firm serves clients and customers across its business segments. The Firm has approximately 17,000 employees in the U.K., of which approximately two-thirds are in London, with operational and technology support centers in locations such as Bournemouth, Glasgow and Edinburgh.

In light of the ongoing uncertainty, the Firm continues to execute the relevant elements of its Firmwide Brexit Implementation program with the objective of being able to continue delivering the Firm's capabilities to its EU clients. The program covers strategic implementation across all impacted businesses and functions and includes an ongoing assessment of implementation risks including political, legal and regulatory risks and plans for addressing and mitigating those risks under any scenario, including where the U.K. and the EU fail to reach an agreement on their future relationship by the end of 2020 and the transition period is not extended.

The principal operational risks associated with Brexit continue to be the potential for disruption caused by insufficient preparations by individual market participants or in the overall market ecosystem, and risks related to potential disruptions of connectivity among market participants. There continues to be regulatory and legal uncertainty with respect to various matters including contract continuity, access by market participants to liquidity in certain products, such as products subject to potentially conflicting U.K. and EU regulatory requirements in relation to eligible trading venues, including certain cross-border derivative contracts and equities that are listed on both U.K. and EU exchanges, as well as ongoing access to central banks. It is uncertain as to whether any of these issues will be resolved in the negotiations, or whether any of the previous temporary solutions will be available at the end of the transition period to mitigate these risks.

The Firm is focused on the following key areas to ensure continuation of service to its EU clients: regulatory and legal entity readiness; client readiness; and business and operational readiness. Following are the significant updates.

Regulatory and legal entity readiness
The Firm's legal entities in Germany, Luxembourg and Ireland are now prepared and licensed to provide services to the Firm's EU clients, including a branch network covering locations such as Paris, Madrid and Milan.

Client readiness
The agreements covering a significant proportion of the Firm's EU client activity have been re-documented to other EU legal entities to help facilitate continuation of service. The Firm continues to actively engage with clients that have not completed re-documentation to ensure preparedness both in terms of documentation and any operational changes that may be required. The Firm may be negatively impacted by any operational disruption stemming from delays of or lapses in the readiness of other market participants or market infrastructures.

Business and operational readiness
The Firm relocated certain employees during 2019 and added specific employees to certain EU legal entities, where appropriate, to support the level of client activity that has been migrated. The Firm's longer term staffing plan will develop in accordance with the increasing level of activity in the EU entities and alongside the future legal and regulatory framework between the U.K. and EU. The Firm continues to closely monitor legislative developments, and its implementation plan allows for flexibility given the continued uncertainties.

IBOR transition

As a result of the expected discontinuation of certain unsecured benchmark interest rates, including the London Interbank Offered Rate ("LIBOR") and other Interbank Offered Rates ("IBORs") regulators and market participants in various jurisdictions have been working to identify alternative reference rates that are compliant with the International Organization of Securities Commission's standards for transaction-based benchmarks. In the U.S., the Alternative Reference Rates Committee (the "ARRC"), a group of market and official sector participants, identified the Secured Overnight Financing Rate ("SOFR") as its recommended alternative benchmark rate. Other alternative reference rates have been recommended in other jurisdictions. Industry sources estimate that IBORs are referenced in approximately $400 trillion of wholesale and consumer transactions globally spanning a broad range of financial products and contracts. The Firm has a significant number of IBOR-referenced contracts, including derivatives, bilateral and syndicated loans, securities, and debt and preferred stock issuances.

To manage the risks associated with the transition from IBORs, JPMorgan Chase established a Firmwide LIBOR Transition program in early 2018 that is overseen by the Firmwide CFO and the CEO of the CIB. When assessing risks associated with IBOR transition, the program monitors a variety of scenarios, including disorderly transition, measured/regulated transition considering volatility along the SOFR curve and clearinghouse plans to change their discount rates to alternative reference rates, and IBOR in continuity beyond December 2021.

The Firm continues to monitor and facilitate the transition by clients from IBOR-referencing products to products referencing alternative reference rates. The Firm's transition efforts to date include:

- ongoing implementation of new fallback provisions that provide for the determination of replacement rates for LIBOR-linked syndicated loans, securitizations, floating rate notes and bi-lateral business loans based on the recommendations of the ARRC, and introducing SOFR as a replacement benchmark rate for certain of these products;
- planning to adopt further fallback provisions recommended by the ARRC, including for residential ARMs, in conjunction with the adoption of these provisions by market participants; and
- completing its first bilateral SOFR loan in the U.S. and executing its first interest rate swap linked to the Euro short-term rate in Europe.

Market participants are continuing to work closely with the public sector as part of National Working Groups ("NWGs") towards the common goal of facilitating an orderly transition from IBORs. Current NWG efforts include the continued development of cash and derivative markets referencing alternative reference rates, as well as the development of industry consensus for fallback language that would determine the replacement rates to use in various IBOR-indexed contracts when a particular IBOR ceases to be produced. The Firm is monitoring and providing input in the development of the IBOR Fallbacks Protocol of the International Swaps and Derivatives Association ("ISDA"), which is expected to be published in 2020, and is encouraging its clients to actively participate in ISDA and industry consultations in order to ensure the broadest possible industry engagement in and understanding of IBOR transition. The Firm continues to monitor the development of alternative reference rates in other jurisdictions with NWGs.

The Financial Accounting Standards Board ("FASB") has confirmed that it will issue an accounting standards update in 2020 providing optional expedients and exceptions for applying generally accepted accounting principles to contracts and hedge relationships affected by benchmark reform. The International Accounting Standards Board ("IASB") has made amendments to IFRS hedge accounting requirements that provide relief to market participants on the accounting treatment of IBOR-linked products in the period leading up to the expected cessation of IBORs and is also considering further relief for the accounting impacts upon transition to an alternative reference rate.

The U.S. Treasury Department has issued proposed regulations that are intended to avoid adverse tax consequences in connection with the transition from IBORs. Under the proposed regulations, amendments to contracts meeting certain requirements will not be treated as taxable for U.S. federal income tax purposes.

The Firm continues to monitor the transition relief being considered by the FASB, IASB and U.S. Treasury Department regarding accounting and tax implications of reference rate reform. The Firm also continues to develop and implement plans to appropriately mitigate the risks associated with IBOR discontinuation as identified alternative reference rates develop and liquidity in these rates increases. The Firm will continue to engage with regulators and clients as the transition from IBORs progresses.

CONSOLIDATED RESULTS OF OPERATIONS

This section provides a comparative discussion of JPMorgan Chase's Consolidated Results of Operations on a reported basis for the two-year period ended December 31, 2019, unless otherwise specified. Refer to Consolidated Results of Operations on pages 48-51 of the Firm's Annual Report on Form 10-K for the year ended December 31, 2018 (the "2018 Form 10-K") for a discussion of the 2018 versus 2017 results. Factors that relate primarily to a single business segment are discussed in more detail within that business segment. Refer to pages 136–138 for a discussion of the Critical Accounting Estimates Used by the Firm that affect the Consolidated Results of Operations.

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

Revenue

Year ended December 31, (in millions)	2019	2018	2017
Investment banking fees	$ 7,501	$ 7,550	$ 7,412
Principal transactions	14,018	12,059	11,347
Lending- and deposit-related fees	6,369	6,052	5,933
Asset management, administration and commissions	17,165	17,118	16,287
Investment securities gains/(losses)	258	(395)	(66)
Mortgage fees and related income	2,036	1,254	1,616
Card income	5,304	4,989	4,433
Other income[(a)]	5,731	5,343	3,646
Noninterest revenue	58,382	53,970	50,608
Net interest income	57,245	55,059	50,097
Total net revenue	$ 115,627	$ 109,029	$ 100,705

(a) Included operating lease income of $5.5 billion, $4.5 billion and $3.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Investment banking fees were relatively flat, reflecting in CIB:

- higher debt underwriting fees driven by wallet share gains and increased activity in investment-grade and high-yield bonds,

offset by

- lower advisory fees driven by a decline in industry-wide fees despite wallet share gains.

Refer to CIB segment results on pages 66-70 and Note 6 for additional information.

Principal transactions revenue increased reflecting:

- higher revenue in CIB, which included a gain on the initial public offering ("IPO") of Tradeweb in the second quarter of 2019. Excluding this gain, the increase in CIB's revenue was driven by:
  - higher revenue in Fixed Income Markets, reflecting an overall strong performance, primarily in agency mortgage trading within Securitized Products; the increase in 2019 also reflected the impact of challenging market conditions in Credit in the fourth quarter of 2018; and
  - the favorable impact of tighter funding spreads on derivatives in Credit Adjustments & Other.

The net increase in CIB was partially offset by

- lower revenue in AWM related to hedges on certain investments. The impact of these hedges was more than offset by higher valuation gains on the related investments reflected in other income

Principal transactions revenue in Corporate was relatively flat, reflecting the combined impact of losses on cash deployment transactions in Treasury and CIO, which were more than offset by the related net interest income earned on those transactions, and lower net markdowns on certain legacy private equity investments.

Principal transactions revenue in CIB may in certain cases have offsets across other revenue lines, including net interest income. The Firm assesses its CIB Markets business performance on a total revenue basis.

Refer to CIB, AWM and Corporate segment results on pages 66-70, pages 74–76 and pages 77–78, respectively, and Note 6 for additional information.

Lending- and deposit-related fees increased primarily due to higher deposit-related fees in CCB, reflecting growth in customer accounts and transactions, and higher lending-related commitment fees in the wholesale businesses.

Refer to CCB, CIB and CB segment results on pages 62–65, pages 66-70 and pages 71–73, respectively, and Note 6 for additional information.

Asset management, administration and commissions revenue increased primarily due to higher asset management fees from growth in client investment assets in CCB.

Refer to CCB and AWM segment results on pages 62–65 and pages 74–76, respectively, and Note 6 for additional information.

Investment securities gains/(losses) in both periods reflect the impact of repositioning the investment securities portfolio. Refer to Corporate segment results on pages 77–78 and Note 10 for additional information.

Mortgage fees and related income increased driven by:

- higher net mortgage production revenue reflecting approximately $500 million of gains on sales of certain loans, as well as higher mortgage production volumes and margins,

partially offset by

- lower net mortgage servicing revenue driven by lower operating revenue reflecting faster prepayment speeds on lower rates and the impact of reclassifying certain loans to held-for-sale.

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

Card income increased as the prior year included an adjustment of approximately $330 million to the credit card rewards liability. Excluding this item, Card income was relatively flat. Refer to CCB segment results on pages 62–65 and Note 6 for further information.

Other income increased reflecting:

- higher operating lease income from growth in auto operating lease volume in CCB, and
- higher investment valuation gains in AWM, which were largely offset by the impact of the related hedges that were reflected in principal transactions revenue,

largely offset by

- lower other income in CIB largely related to increased amortization on a higher level of alternative energy investments. The increased amortization was more than offset by lower income tax expense from the associated tax credits.

The prior year included:

- $505 million of fair value gains related to the adoption in the first quarter of 2018 of the recognition and measurement accounting guidance for certain equity investments previously held at cost.

Refer to Note 6 for further information.

Net interest income increased driven by continued balance sheet growth and changes in mix, as well as higher average short-term rates, partially offset by higher rates paid on deposits.

The Firm’s average interest-earning assets were $2.3 trillion, up $133 billion, and the yield was 3.61%, up 14 bps. The net yield on these assets, on an FTE basis, was 2.46%, a decrease of 6 bps. The net yield excluding CIB Markets was 3.27%, up 2bps.

Net yield excluding CIB Markets is a non-GAAP financial measure. Refer to Explanation and Reconciliation of the Firm’s Use of Non-GAAP Financial Measures and Key Performance Measures on pages 57–59 for a further discussion of this measure.

Provision for credit losses

Year ended December 31, (in millions)	2019	2018	2017
Consumer, excluding credit card	**$ (383)**	$ (63)	$ 620
Credit card	**5,348**	4,818	4,973
Total consumer	4,965	4,755	5,593
Wholesale	**620**	116	(303)
Total provision for credit losses	**$ 5,585**	$ 4,871	$ 5,290

2019 compared with 2018

The **provision for credit losses** increased driven by both the wholesale and consumer portfolios.

The increase in the **wholesale** provision reflects additions to the allowance for credit losses in the current year on select client downgrades. The prior year reflected a benefit related to a single name in the Oil & Gas portfolio and higher recoveries.

The increase in the **total consumer** provision reflects:

- an increase in credit card due to
  - higher net charge-offs on loan growth, in line with expectations, and
  - a $500 million addition to the allowance for loan losses reflecting loan growth and higher loss rates, as newer vintages season and become a larger part of the portfolio, compared to a $300 million addition in the prior year

largely offset by

- a decrease in consumer, excluding credit card, in CCB due to
  - a $650 million reduction in the allowance for loan losses in the purchase credit-impaired ("PCI") residential real estate portfolio, reflecting continued improvement in home prices and delinquencies, and a $100 million reduction in the allowance for loan losses in the non credit-impaired residential real estate portfolio, compared to a $250 million reduction in the PCI residential real estate portfolio in the prior year, and
  - a $50 million reduction in the allowance for loan losses in the business banking portfolio

  partially offset by

  - lower net recoveries in the residential real estate portfolio as the prior year benefited from larger recoveries on loan sales.

Refer to the segment discussions of CCB on pages 62–65, CIB on pages 66-70, CB on pages 71–73, the Allowance for Credit Losses on pages 116–117 and Note 13 for further discussion of the credit portfolio and the allowance for credit losses.

Noninterest expense

Year ended December 31, (in millions)	2019	2018	2017
Compensation expense	**$ 34,155**	$ 33,117	$ 31,208
Noncompensation expense:			
Occupancy	**4,322**	3,952	3,723
Technology, communications and equipment	**9,821**	8,802	7,715
Professional and outside services	**8,533**	8,502	7,890
Marketing	**3,579**	3,290	2,900
Other[(a)(b)]	**5,087**	5,731	6,079
Total noncompensation expense	**31,342**	30,277	28,307
Total noninterest expense	**$ 65,497**	$ 63,394	$ 59,515

(a) Included Firmwide legal expense/(benefit) of $239 million, $72 million and $(35) million for the years ended December 31, 2019, 2018 and 2017, respectively.
(b) Included FDIC-related expense of $457 million, $1.2 billion and $1.5 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Compensation expense increased driven by investments across the businesses, including front office, as well as technology staff hires.

Noncompensation expense increased as a result of:

- higher investments across the businesses, including technology, real estate and marketing
- higher volume-related expense, including depreciation from growth in auto lease assets in CCB, and brokerage expense in certain businesses in CIB
- higher legal expense, and
- higher pension costs due to changes to actuarial assumptions and estimates,

largely offset by

- lower FDIC charges as a result of the elimination of the surcharge at the end of the third quarter of 2018
- the impact of efficiencies
- lower other regulatory-related assessments in CIB.

The prior year included a loss of $174 million on the liquidation of a legal entity in Corporate recorded in other expense. Refer to Note 24 for additional information on the liquidation of a legal entity.

Income tax expense

Year ended December 31, (in millions, except rate)	2019	2018	2017
Income before income tax expense	**$ 44,545**	$ 40,764	$ 35,900
Income tax expense	**8,114**	8,290	11,459
Effective tax rate	**18.2%**	20.3%	31.9%

2019 compared with 2018

The **effective tax rate** decreased due to the recognition of $1.1 billion of tax benefits related to the resolution of certain tax audits, and changes in the mix of income and expense subject to U.S. federal, and state and local taxes. The decrease was partially offset by lower tax benefits related to the vesting of employee share-based awards. In addition, the prior year included a $302 million net tax benefit resulting from changes in the estimates under the TCJA related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings. Refer to Note 25 for further information.

CONSOLIDATED BALANCE SHEETS AND CASH FLOWS ANALYSIS

Consolidated balance sheets analysis

The following is a discussion of the significant changes between December 31, 2019 and 2018.

Selected Consolidated balance sheets data

December 31, (in millions)	2019	2018	Change
Assets			
Cash and due from banks	$ 21,704	$ 22,324	(3)%
Deposits with banks	241,927	256,469	(6)
Federal funds sold and securities purchased under resale agreements	249,157	321,588	(23)
Securities borrowed	139,758	111,995	25
Trading assets	411,103	413,714	(1)
Investment securities	398,239	261,828	52
Loans	959,769	984,554	(3)
Allowance for loan losses	(13,123)	(13,445)	(2)
Loans, net of allowance for loan losses	946,646	971,109	(3)
Accrued interest and accounts receivable	72,861	73,200	–
Premises and equipment	25,813	14,934	73
Goodwill, MSRs and other intangible assets	53,341	54,349	(2)
Other assets	126,830	121,022	5
Total assets	$ 2,687,379	$ 2,622,532	2 %

Cash and due from banks and deposits with banks decreased primarily as a result of a shift in the deployment of cash to investment securities, and net maturities of short-term borrowings and long term debt in Treasury and CIO, partially offset by an increase in deposits. Deposits with banks reflect the Firm's placements of its excess cash with various central banks, including the Federal Reserve Banks.

Federal funds sold and securities purchased under resale agreements decreased as a result of client-driven market-making activities in Fixed Income Markets in CIB and a shift in the deployment of cash in Treasury and CIO. Refer to Liquidity Risk Management on pages 93–98 and Note 10 for additional information.

Securities borrowed increased in CIB related to client-driven market-making activities in Fixed Income Markets, and to cover customer short positions in prime brokerage. Refer to Liquidity Risk Management on pages 93–98 and Note 10 for additional information.

Trading assets was relatively flat, reflecting:

- a reduction in short-term instruments associated with cash deployment activities in Treasury and CIO,

offset by

- growth in client-driven activities in CIB Markets, primarily debt instruments, and
- in CCB, growth related to originations of mortgage warehouse loans, resulting from the favorable rate environment.

Refer to Notes 2 and 5 for additional information.

Investment securities increased primarily due to net purchases of U.S. Treasuries and U.S. GSE and government agency MBS in Treasury and CIO. The net purchases were primarily driven by cash deployment and interest rate risk management activities. Refer to Corporate segment results on pages 77–78, Investment Portfolio Risk Management on page 118 and Notes 2 and 10 for additional information on investment securities.

Loans decreased reflecting loan sales in Home Lending, and lower loans in CIB, primarily driven by a loan syndication and net paydowns, partially offset by growth in AWM and Card.

The allowance for loan losses decreased driven by:

- an $800 million reduction in the CCB allowance for loan losses, which included $650 million in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies; $100 million in the non credit-impaired residential real estate portfolio; and $50 million in the business banking portfolio; as well as
- a $151 million reduction for write-offs of PCI loans,

largely offset by

- a $500 million addition to the allowance for loan losses in the credit card portfolio reflecting loan growth and higher loss rates as newer vintages season and become a larger part of the portfolio, and
- a $115 million addition in the wholesale allowance for loan losses driven by select client downgrades.

Refer to Credit and Investment Risk Management on pages 100–118, and Notes 2, 3, 12 and 13 for further discussion of loans and the allowance for loan losses.

Premises and equipment increased primarily due to the adoption of the new lease accounting guidance effective January 1, 2019. Refer to Note 18 for additional information.

Goodwill, MSRs and other intangibles decreased reflecting lower MSRs as a result of the realization of expected cash flows and faster prepayment speeds on lower rates, partially offset by net additions to the MSRs. The decrease in MSRs was partially offset by an increase in goodwill related to the acquisition of InstaMed. Refer to Note 15 for additional information.

Other assets increased reflecting higher cash collateral placed with central counterparties in CIB, and higher auto operating lease assets from growth in the business in CCB.

Selected Consolidated balance sheets data

December 31, (in millions)	2019	2018	Change
Liabilities			
Deposits	$ 1,562,431	$ 1,470,666	6
Federal funds purchased and securities loaned or sold under repurchase agreements	183,675	182,320	1
Short-term borrowings	40,920	69,276	(41)
Trading liabilities	119,277	144,773	(18)
Accounts payable and other liabilities	210,407	196,710	7
Beneficial interests issued by consolidated variable interest entities (“VIEs”)	17,841	20,241	(12)
Long-term debt	291,498	282,031	3
Total liabilities	2,426,049	2,366,017	3
Stockholders’ equity	261,330	256,515	2
Total liabilities and stockholders’ equity	$ 2,687,379	$ 2,622,532	2%

Deposits increased reflecting:

- continued growth driven by new accounts in CCB
- growth in operating deposits in CIB driven by client activity, primarily in Treasury Services, and an increase in client-driven net issuances of structured notes in Markets, and
- higher deposits in CB and AWM from growth in interest-bearing deposits; for AWM, the growth was partially offset by migration, predominantly into the Firm’s investment-related products.

Refer to the Liquidity Risk Management discussion on pages 93–98; and Notes 2 and 17 for more information.

Federal funds purchased and securities loaned or sold under repurchase agreements was relatively flat,as the net increase from the Firm’s participation in the Federal Reserve’s open market operations was offset by client-driven activities, and lower secured financing of trading assets-debt instruments, all in CIB. Refer to the Liquidity Risk Management discussion on pages 93–98 and Note 11 for additional information.

Short-term borrowings decreased reflecting lower commercial paper issuances and short-term advances from Federal Home Loan Banks (“FHLB”) in Treasury and CIO, primarily driven by liquidity management. Refer to pages 93–98 for information on changes in Liquidity Risk Management.

Trading liabilities decreased due to client-driven market-making activities in CIB, which resulted in lower levels of short positions in both debt and equity instruments in Markets. Refer to Notes 2 and 5 for additional information.

Accounts payable and other liabilities increased reflecting:

- the impact of the adoption of the new lease accounting guidance effective January 1, 2019, and
- higher client payables related to client-driven activities in CIB.

Refer to Note 18 for additional information on Leases.

Beneficial interests issued by consolidated VIEs decreased due to:

- maturities of credit card securitizations,

largely offset by

- higher levels of Firm-administered multi-seller conduit commercial paper issued to third parties.

Refer to Off-Balance Sheet Arrangements on pages 55–56 and Note 14 and 28 for further information on Firm-sponsored VIEs and loan securitization trusts.

Long-term debt increased as a result of client-driven net issuances of structured notes in CIB’s Markets business, partially offset by net maturities of FHLB advances in Treasury and CIO.

Refer to Liquidity Risk Management on pages 93–98 and Note 20 for additional information on the Firm’s long-term debt activities.

Refer to page 149 for information on changes in stockholders’ equity, and Capital actions on pages 90–91.

Consolidated cash flows analysis

The following is a discussion of cash flow activities during the years ended December 31, 2019 and 2018. Refer to Consolidated cash flows analysis on page 54 of the Firm's 2018 Form 10-K for a discussion of the 2017 activities.

	Year ended December 31,		
(in millions)	**2019**	2018	2017
Net cash provided by/(used in)			
Operating activities	**$ 6,046**	$ 14,187	$ (10,827)
Investing activities	**(54,013)**	(197,993)	28,249
Financing activities	**32,987**	34,158	14,642
Effect of exchange rate changes on cash	**(182)**	(2,863)	8,086
Net increase/(decrease) in cash and due from banks and deposits with banks	**$ (15,162)**	$(152,511)	$ 40,150

Operating activities

JPMorgan Chase's operating assets and liabilities primarily support the Firm's lending and capital markets activities. These assets and liabilities can vary significantly in the normal course of business due to the amount and timing of cash flows, which are affected by client-driven and risk management activities and market conditions. The Firm believes that cash flows from operations, available cash and other liquidity sources, and its capacity to generate cash through secured and unsecured sources, are sufficient to meet its operating liquidity needs.

- In 2019, cash provided primarily reflected net income excluding noncash adjustments and net proceeds of sales, securitizations, and paydowns of loans held-for-sale, partially offset by higher securities borrowed, an increase in other assets and a decrease in trading liabilities.
- In 2018, cash provided primarily reflected net income excluding noncash adjustments, increased trading liabilities and accounts payable and other liabilities, partially offset by an increase in trading assets and net originations of loans held-for-sale.

Investing activities

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

- In 2019, cash used reflected net purchases of investment securities, partially offset by lower securities purchased under resale agreements, and net proceeds from sales and securitizations of loans held-for-investment.
- In 2018, cash used reflected an increase in securities purchased under resale agreements, higher net originations of loans and net purchases of investment securities.

Financing activities

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

- In 2019, cash provided reflected higher deposits, partially offset by a decrease in short-term borrowings and net payments of long term borrowings.
- In 2018, cash provided reflected higher deposits, short-term borrowings, and securities loaned or sold under repurchase agreements, partially offset by net payments of long term borrowings.
- For both periods, cash was used for repurchases of common stock and cash dividends on common and preferred stock.

* * *

Refer to Consolidated Balance Sheets Analysis on pages 52–53, Capital Risk Management on pages 85–92, and Liquidity Risk Management on pages 93–98 for a further discussion of the activities affecting the Firm's cash flows.

OFF-BALANCE SHEET ARRANGEMENTS AND CONTRACTUAL CASH OBLIGATIONS

In the normal course of business, the Firm enters into various off-balance sheet arrangements and contractual obligations that may require future cash payments. Certain obligations are recognized on-balance sheet, while others are disclosed off-balance sheet under accounting principles generally accepted in the U.S. ("U.S. GAAP").

Special-purpose entities

The Firm has several types of off–balance sheet arrangements, including through nonconsolidated special-purpose entities ("SPEs"), which are a type of VIE, and through lending-related financial instruments (e.g., commitments and guarantees).

The Firm holds capital, as appropriate, against all SPE-related transactions and related exposures, such as derivative contracts and lending-related commitments and guarantees.

The Firm has no commitments to issue its own stock to support any SPE transaction, and its policies require that transactions with SPEs be conducted at arm's length and reflect market pricing. Consistent with this policy, no JPMorgan Chase employee is permitted to invest in SPEs with which the Firm is involved where such investment would violate the Firm's Code of Conduct.

The table below provides an index of where in this 2019 Form 10-K a discussion of the Firm's various off-balance sheet arrangements can be found. Refer to Note 1 for additional information about the Firm's consolidation policies.

Type of off-balance sheet arrangement	Location of disclosure	Page references
Special-purpose entities: variable interests and other obligations, including contingent obligations, arising from variable interests in nonconsolidated VIEs	Refer to Note 14	242–249
Off-balance sheet lending-related financial instruments, guarantees, and other commitments	Refer to Note 28	272–277

Contractual cash obligations

The accompanying table summarizes, by remaining maturity, JPMorgan Chase's significant contractual cash obligations at December 31, 2019. The contractual cash obligations included in the table below reflect the minimum contractual obligation under legally enforceable contracts with terms that are both fixed and determinable. Excluded from the table are certain liabilities with variable cash flows and/or no obligation to return a stated amount of principal at maturity.

The carrying amount of on-balance sheet obligations on the Consolidated balance sheets may differ from the minimum contractual amount of the obligations reported below. Refer to Note 28 for a discussion of mortgage repurchase liabilities and other obligations.

Contractual cash obligations

By remaining maturity at December 31, (in millions)	2019					2018
	2020	2021-2022	2023-2024	After 2024	**Total**	Total
On-balance sheet obligations						
Deposits[a]	**$ 1,546,142**	**$ 5,840**	**$ 3,550**	**$ 2,508**	**$ 1,558,040**	$ 1,468,031
Federal funds purchased and securities loaned or sold under repurchase agreements	**183,304**	**–**	**–**	**371**	**183,675**	182,320
Short-term borrowings[a]	**35,107**	**–**	**–**	**–**	**35,107**	62,393
Beneficial interests issued by consolidated VIEs	**13,628**	**3,950**	**–**	**296**	**17,874**	20,258
Long-term debt[a]	**35,031**	**58,847**	**50,680**	**105,857**	**250,415**	258,658
Operating leases[b]	**1,604**	**2,704**	**2,025**	**3,757**	**10,090**	10,992
Other[c]	**8,695**	**2,046**	**1,851**	**2,976**	**15,568**	11,794
Total on-balance sheet obligations	**1,823,511**	**73,387**	**58,106**	**115,765**	**2,070,769**	2,014,446
Off-balance sheet obligations						
Unsettled resale and securities borrowed agreements[d]	**117,203**	**748**	**–**	**–**	**117,951**	102,008
Contractual interest payments[e]	**7,844**	**10,517**	**7,876**	**28,444**	**54,681**	58,252
Equity investment commitments	**539**	**–**	**–**	**–**	**539**	271
Contractual purchases and capital expenditures	**1,920**	**766**	**210**	**33**	**2,929**	3,599
Obligations under co-brand programs	**351**	**710**	**382**	**105**	**1,548**	1,937
Total off-balance sheet obligations	**127,857**	**12,741**	**8,468**	**28,582**	**177,648**	166,067
Total contractual cash obligations	**$ 1,951,368**	**$ 86,128**	**$ 66,574**	**$ 144,347**	**$ 2,248,417**	$ 2,180,513

(a) Excludes structured notes on which the Firm is not obligated to return a stated amount of principal at the maturity of the notes, but is obligated to return an amount based on the performance of the structured notes.
(b) Includes noncancelable operating leases for premises and equipment used primarily for business purposes. Excludes the benefit of noncancelable sublease rentals of $846 million and $825 million at December 31, 2019 and 2018, respectively. Refer to Note 18 for further information on operating leases.
(c) Primarily includes dividends declared on preferred and common stock, deferred annuity contracts, pension and other postretirement employee benefit obligations, insurance liabilities and income taxes payable associated with the deemed repatriation under the TCJA.
(d) Refer to unsettled resale and securities borrowed agreements in Note 28 for further information.
(e) Includes accrued interest and future contractual interest obligations. Excludes interest related to structured notes for which the Firm's payment obligation is based on the performance of certain benchmarks.

EXPLANATION AND RECONCILIATION OF THE FIRM'S USE OF NON-GAAP FINANCIAL MEASURES AND KEY PERFORMANCE MEASURES

Non-GAAP financial measures

The Firm prepares its Consolidated Financial Statements in accordance with U.S. GAAP; these financial statements appear on pages 146–150. That presentation, which is referred to as "reported" basis, provides the reader with an understanding of the Firm's results that can be tracked consistently from year-to-year and enables a comparison of the Firm's performance with other companies' U.S. GAAP financial statements.

In addition to analyzing the Firm's results on a reported basis, management reviews Firmwide results, including the overhead ratio, on a "managed" basis; these Firmwide managed basis results are non-GAAP financial measures. The Firm also reviews the results of the LOBs on a managed basis. The Firm's definition of managed basis starts, in each case, with the reported U.S. GAAP results and includes certain reclassifications to present total net revenue for the Firm (and each of the reportable business segments) on an FTE basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in the managed results on a basis comparable to taxable investments and securities. These financial measures allow management to assess the comparability of revenue from year-to-year arising from both taxable and tax-exempt sources. The corresponding income tax impact related to tax-exempt items is recorded within income tax expense. These adjustments have no impact on net income as reported by the Firm as a whole or by the LOBs.

Management also uses certain non-GAAP financial measures at the Firm and business-segment level, because these other non-GAAP financial measures provide information to investors about the underlying operational performance and trends of the Firm or of the particular business segment, as the case may be, and, therefore, facilitate a comparison of the Firm or the business segment with the performance of its relevant competitors. Refer to Business Segment Results on pages 60–78 for additional information on these non-GAAP measures. Non-GAAP financial measures used by the Firm may not be comparable to similarly named non-GAAP financial measures used by other companies.

The following summary table provides a reconciliation from the Firm's reported U.S. GAAP results to managed basis.

Year ended December 31, (in millions, except ratios)	2019			2018			2017		
	Reported	Fully taxable-equivalent adjustments[(a)]	Managed basis	Reported	Fully taxable-equivalent adjustments[(a)]	Managed basis	Reported	Fully taxable-equivalent adjustments[(a)]	Managed basis
Other income	**$ 5,731**	**$ 2,534**	**$ 8,265**	$ 5,343	$ 1,877 [(b)]	$ 7,220	$ 3,646	$ 2,704	$ 6,350
Total noninterest revenue	**58,382**	**2,534**	**60,916**	53,970	1,877	55,847	50,608	2,704	53,312
Net interest income	**57,245**	**531**	**57,776**	55,059	628 [(b)]	55,687	50,097	1,313	51,410
Total net revenue	**115,627**	**3,065**	**118,692**	109,029	2,505	111,534	100,705	4,017	104,722
Pre-provision profit	**50,130**	**3,065**	**53,195**	45,635	2,505	48,140	41,190	4,017	45,207
Income before income tax expense	**44,545**	**3,065**	**47,610**	40,764	2,505	43,269	35,900	4,017	39,917
Income tax expense	**8,114**	**3,065**	**11,179**	8,290	2,505 [(b)]	10,795	11,459	4,017	15,476
Overhead ratio	**57%**	**NM**	**55%**	58%	NM	57%	59%	NM	57%

(a) Predominantly recognized in CIB, CB and Corporate.
(b) The decrease in fully taxable-equivalent adjustments for the year ended December 31, 2018, reflects the impact of the TCJA.

Net interest income and net yield excluding CIB's Markets businesses

In addition to reviewing net interest income and the net yield on a managed basis, management also reviews these metrics excluding CIB's Markets businesses, as shown below; these metrics, which exclude CIB's Markets businesses, are non-GAAP financial measures. Management reviews these metrics to assess the performance of the Firm's lending, investing (including asset-liability management) and deposit-raising activities. The resulting metrics that exclude CIB's Markets businesses are referred to as non-markets-related net interest income and net yield. CIB's Markets businesses are Fixed Income Markets and Equity Markets. Management believes that disclosure of non-markets-related net interest income and net yield provides investors and analysts with other measures by which to analyze the non-markets-related business trends of the Firm and provides a comparable measure to other financial institutions that are primarily focused on lending, investing and deposit-raising activities.

Year ended December 31, (in millions, except rates)	2019	2018	2017
Net interest income – reported	**$ 57,245**	$ 55,059	$ 50,097
Fully taxable-equivalent adjustments	**531**	628	1,313
Net interest income – managed basis[a]	**$ 57,776**	$ 55,687	$ 51,410
Less: CIB Markets net interest income[b]	**3,120**	3,087	4,630
Net interest income excluding CIB Markets[a]	**$ 54,656**	$ 52,600	$ 46,780
Average interest-earning assets[c]	**$2,345,491**	$2,212,908	$ 2,170,974
Less: Average CIB Markets interest-earning assets[b][c]	**672,629**	593,355	531,217
Average interest-earning assets excluding CIB Markets	**$1,672,862**	$1,619,553	$ 1,639,757
Net yield on average interest-earning assets – managed basis[c]	**2.46%**	2.52%	2.37%
Net yield on average CIB Markets interest-earning assets[b][c]	**0.46**	0.52	0.87
Net yield on average interest-earning assets excluding CIB Markets	**3.27%**	3.25%	2.85%

(a) Interest includes the effect of related hedges. Taxable-equivalent amounts are used where applicable.
(b) Refer to page 69 for further information on CIB's Markets businesses.
(c) In the second quarter of 2019, the Firm reclassified balances related to certain instruments from interest-earning to noninterest-earning assets, as the associated returns are recorded in principal transactions revenue and not in net interest income. These changes were applied retrospectively and, accordingly, prior period amounts were revised to conform with the current presentation.

Calculation of certain U.S. GAAP and non-GAAP financial measures

Certain U.S. GAAP and non-GAAP financial measures are calculated as follows:

Book value per share ("BVPS")
Common stockholders' equity at period-end / Common shares at period-end

Overhead ratio
Total noninterest expense / Total net revenue

Return on assets ("ROA")
Reported net income / Total average assets

Return on common equity ("ROE")
Net income* / Average common stockholders' equity

Return on tangible common equity ("ROTCE")
Net income* / Average tangible common equity

Tangible book value per share ("TBVPS")
Tangible common equity at period-end / Common shares at period-end

* Represents net income applicable to common equity

The Firm also reviews adjusted expense, which is noninterest expense excluding Firmwide legal expense and is therefore a non-GAAP financial measure. Additionally, certain credit metrics and ratios disclosed by the Firm exclude PCI loans, and are therefore non-GAAP measures. Management believes that these measures help investors understand the effect of these items on reported results and provide an alternate presentation of the Firm's performance. Refer to Credit and Investment Risk Management on pages 100–118 for additional information on credit metrics and ratios excluding PCI loans.

Tangible common equity, ROTCE and TBVPS

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

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

	Period-end		Average		
			Year ended December 31,		
(in millions, except per share and ratio data)	**Dec 31, 2019**	Dec 31, 2018	**2019**	2018	2017
Common stockholders' equity	**$ 234,337**	$ 230,447	**$ 232,907**	$ 229,222	$ 230,350
Less: Goodwill	**47,823**	47,471	**47,620**	47,491	47,317
Less: Other intangible assets	**819**	748	**789**	807	832
Add: Certain deferred tax liabilities[(a)]	**2,381**	2,280	**2,328**	2,231	3,116
Tangible common equity	**$ 188,076**	$ 184,508	**$ 186,826**	$ 183,155	$ 185,317
Return on tangible common equity	**NA**	NA	**19%**	17%	12%
Tangible book value per share	**$ 60.98**	$ 56.33	**NA**	NA	NA

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

Key performance measures

Core loans is considered a key performance measure. Core loans represents loans considered central to the Firm's ongoing businesses, and excludes loans classified as trading assets, runoff portfolios, discontinued portfolios and portfolios the Firm has an intent to exit. Core loans is a measure utilized by the Firm and its investors and analysts in assessing actual growth in the loan portfolio.

BUSINESS SEGMENT RESULTS

The Firm is managed on an LOB basis. There are four major reportable business segments – Consumer & Community Banking, Corporate & Investment Bank, Commercial Banking and Asset & Wealth Management. In addition, there is a Corporate segment.

The business segments are determined based on the products and services provided, or the type of customer served, and they reflect the manner in which financial information is currently evaluated by the Firm's Operating Committee. Segment results are presented on a managed basis. Refer to Explanation and Reconciliation of the Firm's use of Non-GAAP Financial Measures and Key Performance Measures, on pages 57–59 for a definition of managed basis.

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

(a) Effective in the first quarter of 2020, the Merchant Services business was realigned from CCB to CIB as part of the Firm's Wholesale Payments business. The revenue and expenses of the Merchant Services business will be reported across CCB, CIB and CB based primarily on client relationship.

Description of business segment reporting methodology

Results of the business segments are intended to present each segment as if it were a stand-alone business. The management reporting process that derives business segment results includes the allocation of certain income and expense items, described in more detail below. The Firm also assesses the level of capital required for each LOB on at least an annual basis. The Firm periodically assesses the assumptions, methodologies and reporting classifications used for segment reporting, and further refinements may be implemented in future periods.

Revenue sharing

When business segments join efforts to sell products and services to the Firm's clients, the participating business segments may agree to share revenue from those transactions. Revenue is generally recognized in the segment responsible for the related product or service on a gross basis, with an allocation to the other segment(s) involved in the transaction. The segment results reflect these revenue-sharing agreements.

Expense Allocation
Where business segments use services provided by corporate support units, or another business segment, the costs of those services are allocated to the respective business segments. The expense is generally allocated based on the actual cost and use of services provided. In contrast, certain costs and investments related to corporate support units, technology and operations not currently leveraged by any LOB, are not allocated to the business segments and are retained in Corporate. Expense retained in Corporate generally includes parent company costs that would not be incurred if the segments were stand-alone businesses; adjustments to align corporate support units; and other items not aligned with a particular business segment.

Funds transfer pricing
Funds transfer pricing is the process by which the Firm allocates interest income and expense to each business segment and transfers the primary interest rate risk and liquidity risk exposures to Treasury and CIO within Corporate. The funds transfer pricing process considers the interest rate risk, liquidity risk and regulatory requirements on a product-by-product basis within each business segment. This process is overseen by senior management and reviewed by the Firm's Treasurer Committee.

Debt expense and preferred stock dividend allocation
As part of the funds transfer pricing process, almost all of the cost of the credit spread component of outstanding unsecured long-term debt and preferred stock dividends is allocated to the reportable business segments, while the balance of the cost is retained in Corporate. The methodology to allocate the cost of unsecured long-term debt and preferred stock dividends to the business segments is aligned with the Firm's process to allocate capital. The allocated cost of unsecured long-term debt is included in a business segment's net interest income, and net income is reduced by preferred stock dividends to arrive at a business segment's net income applicable to common equity.

Business segment capital allocation
The amount of capital assigned to each business is referred to as equity. Periodically, the assumptions and methodologies used to allocate capital are assessed and as a result, the capital allocated to the LOBs may change. Refer to Line of business equity on page 90 for additional information on business segment capital allocation.

Segment Results – Managed Basis

The following tables summarize the Firm's results by segment for the periods indicated.

Year ended December 31,	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking		
(in millions, except ratios)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Total net revenue	**$ 55,883**	$ 52,079	$ 46,485	**$ 38,298**	$ 36,448	$ 34,657	**$ 8,984**	$ 9,059	$ 8,605
Total noninterest expense	**28,896**	27,835	26,062	**21,519**	20,918	19,407	**3,500**	3,386	3,327
Pre-provision profit/(loss)	**26,987**	24,244	20,423	**16,779**	15,530	15,250	**5,484**	5,673	5,278
Provision for credit losses	**4,952**	4,753	5,572	**277**	(60)	(45)	**296**	129	(276)
Net income/(loss)	**16,641**	14,852	9,395	**11,922**	11,773	10,813	**3,924**	4,237	3,539
Return on equity ("ROE")	**31%**	28%	17%	**14%**	16%	14%	**17%**	20%	17%

Year ended December 31,	Asset & Wealth Management			Corporate			Total		
(in millions, except ratios)	**2019**	2018	2017	**2019**	2018	2017	**2019**	2018	2017
Total net revenue	**$ 14,316**	$ 14,076	$ 13,835	**$ 1,211**	$ (128)	$ 1,140	**$118,692**	$111,534	$104,722
Total noninterest expense	**10,515**	10,353	10,218	**1,067**	902	501	**65,497**	63,394	59,515
Pre-provision profit/(loss)	**3,801**	3,723	3,617	**144**	(1,030)	639	**53,195**	48,140	45,207
Provision for credit losses	**61**	53	39	**(1)**	(4)	–	**5,585**	4,871	5,290
Net income/(loss)	**2,833**	2,853	2,337	**1,111**	(1,241)	(1,643)	**36,431**	32,474	24,441
Return on equity ("ROE")	**26%**	31%	25%	**NM**	NM	NM	**15%**	13%	10%

Note: Net income in 2019 and 2018 for each of the business segments reflects the favorable impact of the reduction in the U.S. federal statutory income tax rate as a result of the TCJA.

The following sections provide a comparative discussion of the Firms results by segment as of or for the years ended December 31, 2019 and 2018.

CONSUMER & COMMUNITY BANKING

Consumer & Community Banking offers services to consumers and businesses through bank branches, ATMs, digital (including mobile and online) and telephone banking. CCB is organized into Consumer & Business Banking (including Consumer Banking/Chase Wealth Management and Business Banking), Home Lending (including Home Lending Production, Home Lending Servicing and Real Estate Portfolios) and Card, Merchant Services & Auto. Consumer & Business Banking offers deposit and investment products and services to consumers, and lending, deposit, and cash management and payment solutions to small businesses. Home Lending includes mortgage origination and servicing activities, as well as portfolios consisting of residential mortgages and home equity loans. Card, Merchant Services & Auto issues credit cards to consumers and small businesses, offers payment processing services to merchants, and originates and services auto loans and leases.

Selected income statement data

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Revenue			
Lending- and deposit-related fees	**$ 3,859**	$ 3,624	$ 3,431
Asset management, administration and commissions	**2,499**	2,402	2,212
Mortgage fees and related income	**2,035**	1,252	1,613
Card income	**4,847**	4,554	4,024
All other income	**5,402**	4,428	3,430
Noninterest revenue	**18,642**	16,260	14,710
Net interest income	**37,241**	35,819	31,775
Total net revenue	**55,883**	52,079	46,485
Provision for credit losses	**4,952**	4,753	5,572
Noninterest expense			
Compensation expense	**10,700**	10,534	10,133
Noncompensation expense[(a)]	**18,196**	17,301	15,929
Total noninterest expense	**28,896**	27,835	26,062
Income before income tax expense	**22,035**	19,491	14,851
Income tax expense	**5,394**	4,639	5,456
Net income	**$ 16,641**	$ 14,852	$ 9,395
Revenue by line of business			
Consumer & Business Banking	**$ 26,495**	$ 24,805	$ 21,104
Home Lending	**5,179**	5,484	5,955
Card, Merchant Services & Auto	**24,209**	21,790	19,426
Mortgage fees and related income details:			
Net production revenue	**1,618**	268	636
Net mortgage servicing revenue[(b)]	**417**	984	977
Mortgage fees and related income	**$ 2,035**	$ 1,252	$ 1,613
Financial ratios			
Return on equity	**31%**	28%	17%
Overhead ratio	**52**	53	56

Note: In the discussion and the tables which follow, CCB presents certain financial measures which exclude the impact of PCI loans; these are non-GAAP financial measures.

(a) Included depreciation expense on leased assets of $4.1 billion, $3.4 billion and $2.7 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

(b) Included MSR risk management results of $(165) million, $(111) million and $(242) million for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net income was $16.6 billion, an increase of 12%.

Net revenue was $55.9 billion, an increase of 7%. Net production revenue included approximately $500 million of gains on the sales of certain mortgage loans that were predominantly offset by charges in net interest income for the unwind of the related internal funding from Treasury and CIO associated with these loans. The charges reflect the net present value of that funding and is recognized as interest income in Treasury and CIO. Refer to Corporate on pages 77–78 and Funds Transfer Pricing ("FTP") on page 61 of this Form 10-K for further information.

Net interest income was $37.2 billion, up 4%, and included charges from the loan sales mentioned above. Excluding these charges, net interest income increased, driven by:

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

partially offset by

- lower loan balances due to loan sales, as well as loan spread compression in Home Lending.

Noninterest revenue was $18.6 billion, up 15%, and included gains from the loan sales mentioned above as well as the impact of the prior-year adjustment of approximately $330 million to the credit card rewards liability. Excluding these notable items, noninterest revenue increased 9%, driven by:

- higher auto lease volume, and
- higher net mortgage production revenue reflecting higher production volumes and margins,

partially offset by

- lower net mortgage servicing revenue driven by lower operating revenue reflecting faster prepayment speeds on lower rates and the impact of reclassifying certain loans to held-for-sale.

Refer to Note 15 for further information regarding changes in value of the MSR asset and related hedges, and mortgage fees and related income.

Noninterest expense was $28.9 billion, up 4%, driven by:

- investments in the business including technology and marketing and higher depreciation on auto lease assets,

partially offset by

- expense efficiencies and lower FDIC charges.

The provision for credit losses was $5.0 billion, an increase of 4%, reflecting:

- an increase in credit card due to
  - higher net charge-offs on loan growth, in line with expectations, and
  - a $500 million addition to the allowance for loan losses reflecting loan growth and higher loss rates, as newer vintages season and become a larger part of the portfolio, compared to a $300 million addition in the prior year

largely offset by

- a decrease in consumer, excluding credit card due to
  - a $650 million reduction in the allowance for loan losses in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies, and a $100 million reduction in the allowance for loan losses in the non credit-impaired residential real estate portfolio, compared to a $250 million reduction in the PCI residential real estate portfolio in the prior year, and
  - a $50 million reduction in the allowance for loan losses in the business banking portfolio

  partially offset by

  - lower net recoveries in the residential real estate portfolio as the prior year benefited from larger recoveries on loan sales.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Total assets	**$ 539,090**	$ 557,441	$ 552,601
Loans:			
Consumer & Business Banking	**27,199**	26,612	25,789
Home equity	**30,163**	36,013	42,751
Residential mortgage	**169,636**	203,859	197,339
Home Lending	**199,799**	239,872	240,090
Card	**168,924**	156,632	149,511
Auto	**61,522**	63,573	66,242
Total loans	**457,444**	486,689	481,632
Core loans	**414,107**	434,466	415,167
Deposits	**718,416**	678,854	659,885
Equity	**52,000**	51,000	51,000
Selected balance sheet data (average)			
Total assets	**$ 542,191**	$ 547,368	$ 532,756
Loans:			
Consumer & Business Banking	**26,608**	26,197	24,875
Home equity	**32,975**	39,133	46,398
Residential mortgage	**186,557**	202,624	190,242
Home Lending	**219,532**	241,757	236,640
Card	**156,325**	145,652	140,024
Auto	**61,862**	64,675	65,395
Student	**—**	—	2,880
Total loans	**464,327**	478,281	469,814
Core loans	**416,694**	419,066	393,598
Deposits	**693,550**	670,388	640,219
Equity	**52,000**	51,000	51,000
Headcount	**127,137**	129,518	133,721

Selected metrics

As of or for the year ended December 31, (in millions, except ratio data)	2019	2018	2017
Credit data and quality statistics			
Nonaccrual loans[a][b]	**$ 3,018**	$ 3,339	$ 4,084
Net charge-offs/(recoveries)[c]			
Consumer & Business Banking	**296**	236	257
Home equity	**(48)**	(7)	63
Residential mortgage	**(50)**	(287)	(16)
Home Lending	**(98)**	(294)	47
Card	**4,848**	4,518	4,123
Auto	**206**	243	331
Student	**—**	—	498 [g]
Total net charge-offs/(recoveries)	**$ 5,252**	$ 4,703	$ 5,256 [g]
Net charge-off/(recovery) rate[c]			
Consumer & Business Banking	**1.11%**	0.90 %	1.03%
Home equity[d]	**(0.19)**	(0.02)	0.18
Residential mortgage[d]	**(0.03)**	(0.16)	(0.01)
Home Lending[d]	**(0.05)**	(0.14)	0.02
Card	**3.10**	3.10	2.95
Auto	**0.33**	0.38	0.51
Student	**—**	—	NM
Total net charge-offs/(recovery) rate[d]	**1.20**	1.04	1.21 [g]
30+ day delinquency rate			
Home Lending[e][f]	**0.76%**	0.77%	1.19%
Card	**1.87**	1.83	1.80
Auto	**0.94**	0.93	0.89
90+ day delinquency rate - Card	**0.95**	0.92	0.92
Allowance for loan losses			
Consumer & Business Banking	**$ 746**	$ 796	$ 796
Home Lending, excluding PCI loans	**903**	1,003	1,003
Home Lending – PCI loans[c]	**987**	1,788	2,225
Card	**5,683**	5,184	4,884
Auto	**465**	464	464
Total allowance for loan losses[c]	**$ 8,784**	$ 9,235	$ 9,372

(a) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(b) At December 31, 2019, 2018 and 2017, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million, $2.6 billion and $4.3 billion, respectively. These amounts have been excluded based upon the government guarantee.
(c) Net charge-offs/(recoveries) and the net charge-off/(recovery) rates for the years ended December 31, 2019, 2018 and 2017, excluded $151 million, $187 million and $86 million, respectively, of write-offs in the PCI portfolio. These write-offs decreased the allowance for loan losses for PCI loans. Refer to Summary of changes in the allowance for credit losses on page 117 for further information on PCI write-offs.
(d) Excludes the impact of PCI loans. For the years ended December 31, 2019, 2018 and 2017, the net charge-off/(recovery) rates including the impact of PCI loans were as follows: (1) home equity of (0.15)%, (0.02)% and 0.14%, respectively; (2) residential mortgage of (0.03)%, (0.14)% and (0.01)%, respectively; (3)

Home Lending of (0.05)%, (0.12)% and 0.02%, respectively; and (4) total CCB of 1.14%, 0.98% and 1.12%, respectively.

(e) At December 31, 2019, 2018 and 2017, excluded mortgage loans insured by U.S. government agencies of $1.7 billion, $4.1 billion and $6.2 billion, respectively, that are 30 or more days past due. These amounts have been excluded based upon the government guarantee.

(f) Excludes PCI loans. The 30+ day delinquency rate for PCI loans was 8.44%, 9.16% and 10.13% at December 31, 2019, 2018 and 2017, respectively.

(g) Excluding net charge-offs of $467 million related to the student loan portfolio transfer, the total net charge-off rates for the full year 2017 would have been 1.10%.

Selected metrics

As of or for the year ended December 31, (in billions, except ratios and where otherwise noted)	2019	2018	2017
Business Metrics			
CCB households (in millions)	**62.6**	61.7	61.1
Number of branches	**4,976**	5,036	5,130
Active digital customers (in thousands)[(a)]	**52,421**	49,254	46,694
Active mobile customers (in thousands)[(b)]	**37,297**	33,260	30,056
Debit and credit card sales volume	**$ 1,114.4**	$ 1,016.9	$ 916.9
Consumer & Business Banking			
Average deposits	**$ 678.9**	$ 656.5	$ 625.6
Deposit margin	**2.49%**	2.38%	1.98%
Business banking origination volume	**$ 6.6**	$ 6.7	$ 7.3
Client investment assets	**358.0**	282.5	273.3
Home Lending			
Mortgage origination volume by channel			
Retail	**$ 51.0**	$ 38.3	$ 40.3
Correspondent	**54.2**	41.1	57.3
Total mortgage origination volume[(c)]	**$ 105.2**	$ 79.4	$ 97.6
Total loans serviced (period-end)	**$ 761.4**	$ 789.8	$ 816.1
Third-party mortgage loans serviced (period-end)	**520.8**	519.6	553.5
MSR carrying value (period-end)	**4.7**	6.1	6.0
Ratio of MSR carrying value (period-end) to third-party mortgage loans serviced (period-end)	**0.90%**	1.17%	1.08%
MSR revenue multiple[(d)]	**2.65x**	3.34x	3.09x
Card, excluding Commercial Card			
Credit card sales volume	**$ 762.8**	$ 692.4	$ 622.2
New accounts opened (in millions)	**7.8**	7.8	8.4
Card Services			
Net revenue rate	**11.52%**	11.27%	10.57%
Merchant Services			
Merchant processing volume	**$ 1,511.5**	$ 1,366.1	$ 1,191.7
Auto			
Loan and lease origination volume	**$ 34.0**	$ 31.8	$ 33.3
Average Auto operating lease assets	**21.6**	18.8	15.2

(a) Users of all web and/or mobile platforms who have logged in within the past 90 days.

(b) Users of all mobile platforms who have logged in within the past 90 days.

(c) Firmwide mortgage origination volume was $115.9 billion, $86.9 billion and $107.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

(d) Represents the ratio of MSR carrying value (period-end) to third-party mortgage loans serviced (period-end) divided by the ratio of loan servicing-related revenue to third-party mortgage loans serviced (average).

CORPORATE & INVESTMENT BANK

The Corporate & Investment Bank, which consists of Banking and Markets & Securities Services, offers a broad suite of investment banking, market-making, prime brokerage, and treasury and securities products and services to a global client base of corporations, investors, financial institutions, government and municipal entities. Banking offers a full range of investment banking products and services in all major capital markets, including advising on corporate strategy and structure, capital-raising in equity and debt markets, as well as loan origination and syndication. Banking also includes Treasury Services, which provides transaction services, consisting of cash management and liquidity solutions. Markets & Securities Services is a global market-maker in cash securities and derivative instruments, and also offers sophisticated risk management solutions, prime brokerage, and research. Markets & Securities Services also includes Securities Services, a leading global custodian which provides custody, fund accounting and administration, and securities lending products principally for asset managers, insurance companies and public and private investment funds.

Selected income statement data

Year ended December 31, (in millions)	2019	2018	2017
Revenue			
Investment banking fees	**$ 7,575**	$ 7,473	$ 7,356
Principal transactions	**14,396**	12,271	10,873
Lending- and deposit-related fees	**1,518**	1,497	1,531
Asset management, administration and commissions	**4,545**	4,488	4,207
All other income	**1,108**	1,239	572
Noninterest revenue	**29,142**	26,968	24,539
Net interest income	**9,156**	9,480	10,118
Total net revenue[(a)]	**38,298**	36,448	34,657
Provision for credit losses	**277**	(60)	(45)
Noninterest expense			
Compensation expense	**10,618**	10,215	9,531
Noncompensation expense	**10,901**	10,703	9,876
Total noninterest expense	**21,519**	20,918	19,407
Income before income tax expense	**16,502**	15,590	15,295
Income tax expense	**4,580**	3,817	4,482
Net income	**$ 11,922**	$ 11,773	$ 10,813

(a) Includes tax-equivalent adjustments, predominantly due to income tax credits related to alternative energy investments; income tax credits and amortization of the cost of investments in affordable housing projects; and tax-exempt income from municipal bonds of $2.3 billion, $1.7 billion and $2.4 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

Selected income statement data

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Financial ratios			
Return on equity	**14%**	16%	14%
Overhead ratio	**56**	57	56
Compensation expense as percentage of total net revenue	**28**	28	28
Revenue by business			
Investment Banking	**$ 7,215**	$ 6,987	$ 6,852
Treasury Services	**4,565**	4,697	4,172
Lending	**1,331**	1,298	1,429
Total Banking	**13,111**	12,982	12,453
Fixed Income Markets	**14,418**	12,706	12,812
Equity Markets	**6,494**	6,888	5,703
Securities Services	**4,154**	4,245	3,917
Credit Adjustments & Other[(a)]	**121**	(373)	(228)
Total Markets & Securities Services	**25,187**	23,466	22,204
Total net revenue	**$38,298**	$36,448	$34,657

(a) Includes credit valuation adjustments ("CVA") managed centrally within CIB and funding valuation adjustments ("FVA") on derivatives, which are primarily reported in principal transactions revenue. Results are presented net of associated hedging activities and net of CVA and FVA amounts allocated to Fixed Income Markets and Equity Markets. Refer to Notes 2, 3 and 24 for additional information.

2019 compared with 2018

Net income was $11.9 billion, up 1%.

Net revenue was $38.3 billion, up 5%.

Banking revenue was $13.1 billion, up 1%.

- Investment Banking revenue was $7.2 billion, up 3%, with higher debt underwriting fees, largely offset by lower advisory and equity underwriting fees. The Firm maintained its #1 ranking for Global Investment Banking fees with overall share gains, according to Dealogic.
  - Debt underwriting fees were $3.5 billion, up 8%, reflecting wallet share gains and increased activity in investment-grade and high-yield bonds.
  - Advisory fees were $2.4 billion, down 5%, and Equity underwriting fees were $1.7 billion, down 1%, driven by a decline in industry-wide fees despite wallet share gains.
- Treasury Services revenue was $4.6 billion, down 3%, driven by deposit margin compression predominantly offset by higher balances and fee growth.
- Lending revenue was $1.3 billion, up 3%, with higher net interest income largely offset by losses on hedges of accrual loans.

Markets & Securities Services revenue was $25.2 billion, up 7%. Markets revenue was $20.9 billion, up 7% which included a gain on the IPO of Tradeweb in the second quarter of 2019. Prior year results included approximately $500 million of fair value gains recorded in the first quarter of 2018 related to the adoption of the recognition and measurement accounting guidance for certain equity investments previously held at cost.

- Fixed Income Markets revenue was $14.4 billion, up 13%, reflecting an overall strong performance, notably in Securitized Products. The increase in 2019 also reflected the impact of challenging market conditions in Credit and Rates in the fourth quarter of 2018.
- Equity Markets revenue was $6.5 billion, down 6%, compared to a strong prior year, driven by lower client activity in derivatives partially offset by higher client activity in Cash Equities.
- Securities Services revenue was $4.2 billion, down 2%, driven by deposit margin compression and the impact of a business exit largely offset by organic growth.
- Credit Adjustments & Other was a gain of $121 million reflecting tighter funding spreads on derivatives, compared with a loss of $373 million in the prior year.

The provision for credit losses was $277 million, compared with a $60 million net benefit in the prior year. This increase reflects additions to the allowance for credit losses in the current year on select client downgrades, and a benefit related to a single name in the Oil & Gas portfolio and higher recoveries, both in the prior year.

Noninterest expense was $21.5 billion, up 3%, predominantly driven by higher volume-related expenses and investments, including front office and technology staff hires, as well as higher legal expense, partially offset by lower FDIC charges.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Assets	**$ 908,153**	$ 903,051	$ 826,384
Loans:			
Loans retained[(a)]	**121,733**	129,389	108,765
Loans held-for-sale and loans at fair value	**10,112**	13,050	4,321
Total loans	**131,845**	142,439	113,086
Core loans	**131,672**	142,122	112,754
Equity	**80,000**	70,000	70,000
Selected balance sheet data (average)			
Assets	**$ 985,544**	$ 922,758	$ 857,060
Trading assets-debt and equity instruments	**404,363**	349,169	342,124
Trading assets-derivative receivables	**48,196**	60,552	56,466
Loans:			
Loans retained[(a)]	**122,371**	114,417	108,368
Loans held-for-sale and loans at fair value	**8,609**	6,412	4,995
Total loans	**130,980**	120,829	113,363
Core loans	**130,810**	120,560	113,006
Equity	**80,000**	70,000	70,000
Headcount	**55,991**	54,480	51,181

(a) Loans retained includes credit portfolio loans, loans held by consolidated Firm-administered multi-seller conduits, trade finance loans, other held-for-investment loans and overdrafts.

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	2019	2018	2017
Credit data and quality statistics			
Net charge-offs/ (recoveries)	**$ 183**	$ 93	$ 71
Nonperforming assets:			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	**308**	443	812
Nonaccrual loans held-for-sale and loans at fair value	**95**	220	–
Total nonaccrual loans	**403**	663	812
Derivative receivables	**30**	60	130
Assets acquired in loan satisfactions	**70**	57	85
Total nonperforming assets	**503**	780	1,027
Allowance for credit losses:			
Allowance for loan losses	**1,202**	1,199	1,379
Allowance for lending-related commitments	**848**	754	727
Total allowance for credit losses	**2,050**	1,953	2,106
Net charge-off/(recovery) rate[(b)]	**0.15%**	0.08%	0.07%
Allowance for loan losses to period-end loans retained	**0.99**	0.93	1.27
Allowance for loan losses to period-end loans retained, excluding trade finance and conduits[(c)]	**1.31**	1.24	1.92
Allowance for loan losses to nonaccrual loans retained[(a)]	**390**	271	170
Nonaccrual loans to total period-end loans	**0.31**	0.47	0.72

(a) Allowance for loan losses of $110 million, $174 million and $316 million were held against these nonaccrual loans at December 31, 2019, 2018 and 2017, respectively.
(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.
(c) Management uses allowance for loan losses to period-end loans retained, excluding trade finance and conduits, a non-GAAP financial measure, to provide a more meaningful assessment of CIB's allowance coverage ratio.

Investment banking fees

	Year ended December 31,		
(in millions)	2019	2018	2017
Advisory	**$ 2,377**	$ 2,509	$ 2,150
Equity underwriting	**1,666**	1,684	1,468
Debt underwriting[(a)]	**3,532**	3,280	3,738
Total investment banking fees	**$ 7,575**	$ 7,473	$ 7,356

(a) Represents long-term debt and loan syndications.

League table results – wallet share

Year ended December 31,	2019			2018			2017		
		Rank	Share		Rank	Share		Rank	Share
Based on fees[a]									
M&A[b]									
Global	#	**2**	**9.2%**	#	2	8.7%	#	2	8.4%
U.S.		**2**	**9.4**		2	8.9		2	9.0
Equity and equity-related[c]									
Global		**1**	**9.4**		1	9.0		2	7.1
U.S.		**1**	**13.4**		1	12.3		1	11.5
Long-term debt[d]									
Global		**1**	**7.8**		1	7.2		1	7.8
U.S.		**1**	**12.0**		1	11.2		2	11.1
Loan syndications									
Global		**1**	**10.1**		1	9.7		1	9.3
U.S.		**1**	**12.8**		1	12.3		1	10.9
Global investment banking fees[e]	#	**1**	**9.0%**	#	1	8.6%	#	1	8.1%

(a) Source: Dealogic as of January 2, 2020. Reflects the ranking of revenue wallet and market share.
(b) Global M&A excludes any withdrawn transactions. U.S. M&A revenue wallet represents wallet from client parents based in the U.S.
(c) Global equity and equity-related ranking includes rights offerings and Chinese A-Shares.
(d) Long-term debt rankings include investment-grade, high-yield, supranationals, sovereigns, agencies, covered bonds, asset-backed securities ("ABS") and mortgage-backed securities ("MBS"); and exclude money market, short-term debt, and U.S. municipal securities.
(e) Global investment banking fees exclude money market, short-term debt and shelf deals.

Markets revenue

The following table summarizes select income statement data for the Markets businesses. Markets includes both Fixed Income Markets and Equity Markets. Markets revenue comprises principal transactions, fees, commissions and other income, as well as net interest income. The Firm assesses its Markets business performance on a total revenue basis, as offsets may occur across revenue line items. For example, securities that generate net interest income may be risk-managed by derivatives that are recorded in principal transactions revenue. Refer to Notes 6 and 7 for a description of the composition of these income statement line items.

Principal transactions reflects revenue on financial instruments and commodities transactions that arise from client-driven market-making activity. Principal transactions revenue includes amounts recognized upon executing new transactions with market participants, as well as "inventory-related revenue", which is revenue recognized from gains and losses on derivatives and other instruments that the Firm has been holding in anticipation of, or in response to, client demand, and changes in the fair value of instruments used by the Firm to actively manage the risk exposure arising from such inventory. Principal transactions revenue recognized upon executing new transactions with market participants is driven by many factors including the level of client activity, the bid-offer spread (which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa), market liquidity and volatility. These factors are interrelated and sensitive to the same factors that drive inventory-related revenue, which include general market conditions, such as interest rates, foreign exchange rates, credit spreads, and equity and commodity prices, as well as other macroeconomic conditions.

For the periods presented below, the predominant source of principal transactions revenue was the amount recognized upon executing new transactions.

Year ended December 31, (in millions, except where otherwise noted)	2019			2018			2017		
	Fixed Income Markets	Equity Markets	Total Markets	Fixed Income Markets	Equity Markets	Total Markets	Fixed Income Markets	Equity Markets	Total Markets
Principal transactions	**$ 8,786**	**$ 5,739**	**$ 14,525**	$ 7,560	$ 5,566	$ 13,126	$ 7,393	$ 3,855	$ 11,248
Lending- and deposit-related fees	**198**	**7**	**205**	197	6	203	191	6	197
Asset management, administration and commissions	**407**	**1,775**	**2,182**	410	1,794	2,204	390	1,635	2,025
All other income	**872**	**8**	**880**	952	22	974	436	(21)	415
Noninterest revenue	**10,263**	**7,529**	**17,792**	9,119	7,388	16,507	8,410	5,475	13,885
Net interest income[a]	**4,155**	**(1,035)**	**3,120**	3,587	(500)	3,087	4,402	228	4,630
Total net revenue	**$ 14,418**	**$ 6,494**	**$ 20,912**	$ 12,706	$ 6,888	$ 19,594	$ 12,812	$ 5,703	$ 18,515
Loss days[b]			1			5			4

(a) The decline in Markets net interest income in 2018 was driven by higher funding costs.
(b) Loss days represent the number of days for which Markets posted losses. The loss days determined under this measure differ from the disclosure of daily market risk-related gains and losses for the Firm in the value-at-risk ("VaR") back-testing discussion on pages 121–123.

Selected metrics

As of or for the year ended December 31, (in millions, except where otherwise noted)	2019	2018	2017
Assets under custody ("AUC") by asset class (period-end) (in billions):			
Fixed Income	$ 13,498	$ 12,440	$ 13,043
Equity	10,100	8,078	7,863
Other[(a)]	3,233	2,699	2,563
Total AUC	$ 26,831	$ 23,217	$ 23,469
Client deposits and other third party liabilities (average)[(b)]	$ 464,770	$ 434,422	$ 408,911

(a) Consists of mutual funds, unit investment trusts, currencies, annuities, insurance contracts, options and other contracts.
(b) Client deposits and other third-party liabilities pertain to the Treasury Services and Securities Services businesses.

International metrics

As of or for the year ended December 31, (in millions, except where otherwise noted)	2019	2018[(c)]	2017[(c)]
Total net revenue[(a)]			
Europe/Middle East/Africa	$ 11,718	$ 12,260	$ 11,590
Asia-Pacific	5,330	5,077	4,313
Latin America/Caribbean	1,549	1,473	1,232
Total international net revenue	18,597	18,810	17,135
North America	19,701	17,638	17,522
Total net revenue	$ 38,298	$ 36,448	$ 34,657
Loans retained (period-end)[(a)]			
Europe/Middle East/Africa	$ 23,056	$ 24,842	$ 23,689
Asia-Pacific	15,144	17,192	15,385
Latin America/Caribbean	6,189	6,515	5,895
Total international loans	44,389	48,549	44,969
North America	77,344	80,840	63,796
Total loans retained	$ 121,733	$ 129,389	$ 108,765
Client deposits and other third-party liabilities (average)[(b)]			
Europe/Middle East/Africa	$ 174,477	$ 162,846	$ 154,654
Asia-Pacific	90,364	82,867	76,673
Latin America/Caribbean	29,027	26,668	25,490
Total international	$ 293,868	$ 272,381	$ 256,817
North America	170,902	162,041	152,094
Total client deposits and other third-party liabilities	$ 464,770	$ 434,422	$ 408,911
AUC (period-end)[(b)] **(in billions)**			
North America	$ 16,855	$ 14,359	$ 13,971
All other regions	9,976	8,858	9,498
Total AUC	$ 26,831	$ 23,217	$ 23,469

(a) Total net revenue and loans retained (excluding loans held-for-sale and loans at fair value) are based on the location of the trading desk, booking location, or domicile of the client, as applicable.
(b) Client deposits and other third-party liabilities pertaining to the Treasury Services and Securities Services businesses, and AUC, are based on the domicile of the client.
(c) The prior period amounts have been revised to conform with the current period presentation.

Commercial Banking provides comprehensive financial solutions, including lending, treasury services, investment banking and asset management products across three primary client segments: Middle Market Banking, Corporate Client Banking and Commercial Real Estate Banking. Other includes amounts not aligned with a primary client segment.

Middle Market Banking covers small business and midsized corporations, local governments and nonprofit clients.

Corporate Client Banking covers large corporations.

Commercial Real Estate Banking covers investors, developers, and owners of multifamily, office, retail, industrial and affordable housing properties.

Selected income statement data

Year ended December 31, (in millions)	2019	2018	2017
Revenue			
Lending- and deposit-related fees	**$ 913**	$ 870	$ 919
All other income[a]	**1,517**	1,473	1,603
Noninterest revenue	**2,430**	2,343	2,522
Net interest income	**6,554**	6,716	6,083
Total net revenue[b]	**8,984**	9,059	8,605
Provision for credit losses	**296**	129	(276)
Noninterest expense			
Compensation expense	**1,785**	1,694	1,534
Noncompensation expense	**1,715**	1,692	1,793
Total noninterest expense	**3,500**	3,386	3,327
Income before income tax expense	**5,188**	5,544	5,554
Income tax expense	**1,264**	1,307	2,015
Net income	**$ 3,924**	$ 4,237	$ 3,539

(a) Effective in the first quarter of 2019, includes revenue from investment banking products, commercial card transactions and asset management fees. The prior period amounts have been revised to conform with the current period presentation.
(b) Total net revenue included tax-equivalent adjustments from income tax credits related to equity investments in designated community development entities and in entities established for rehabilitation of historic properties, as well as tax-exempt income related to municipal financing activities of $460 million, $444 million and $699 million for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net income was $3.9 billion, a decrease of 7%.

Net revenue was $9.0 billion, a decrease of 1%. Net interest income was $6.6 billion, a decrease of 2%, predominantly driven by lower deposit margins. Noninterest revenue was $2.4 billion, an increase of 4%, driven by higher investment banking revenue, predominantly due to increased equity underwriting and M&A activity, and growth in lending and deposit related fees.

Noninterest expense was $3.5 billion, an increase of 3%, driven by continued investments in the business, largely offset by lower FDIC charges.

The provision for credit losses was $296 million, up from $129 million in the prior year. The increase in the provision reflects additions to the allowance for credit losses on select client downgrades in the current year and higher recoveries in the prior year.

CB product revenue consists of the following:

Lending includes a variety of financing alternatives, which are primarily provided on a secured basis; collateral includes receivables, inventory, equipment, real estate or other assets. Products include term loans, revolving lines of credit, bridge financing, asset-based structures, leases, and standby letters of credit.

Treasury services includes revenue from a broad range of products and services that enable CB clients to manage payments and receipts, as well as invest and manage funds.

Investment banking includes revenue from a range of products providing CB clients with sophisticated capital-raising alternatives, as well as balance sheet and risk management tools through advisory, equity underwriting, and loan syndications. Revenue from Fixed Income and Equity Markets products used by CB clients is also included.

Other product revenue primarily includes tax-equivalent adjustments generated from Community Development Banking activities and certain income derived from principal transactions.

Selected income statement data (continued)

Year ended December 31, (in millions, except ratios)	2019	2018	2017
Revenue by product			
Lending	**$ 4,057**	$ 4,049	$ 4,094
Treasury services	**3,920**	4,074	3,444
Investment banking[(a)]	**919**	852	805
Other	**88**	84	262
Total Commercial Banking net revenue	**$ 8,984**	$ 9,059	$ 8,605
Investment banking revenue, gross[(b)]	**$ 2,744**	$ 2,491	$ 2,385
Revenue by client segment			
Middle Market Banking	**$ 3,702**	$ 3,708	$ 3,341
Corporate Client Banking	**2,994**	2,984	2,727
Commercial Real Estate Banking[(c)]	**2,169**	2,249	2,416
Other[(c)]	**119**	118	121
Total Commercial Banking net revenue	**$ 8,984**	$ 9,059	$ 8,605
Financial ratios			
Return on equity	**17%**	20%	17%
Overhead ratio	**39**	37	39

(a) Includes CB's share of revenue from investment banking products sold to CB clients through the CIB.
(b) Refer to page 60 for a discussion of revenue sharing.
(c) Effective in the first quarter of 2019, client segment data includes Commercial Real Estate Banking which comprises the former Commercial Term Lending and Real Estate Banking client segments, and Community Development Banking (previously part of Other). The prior period amounts have been revised to conform with the current period presentation.

Selected metrics

As of or for the year ended December 31, (in millions, except headcount)	2019	2018	2017
Selected balance sheet data (period-end)			
Total assets	$ 220,514	$ 220,229	$ 221,228
Loans:			
Loans retained	207,287	204,219	202,400
Loans held-for-sale and loans at fair value	1,009	1,978	1,286
Total loans	$ 208,296	$ 206,197	$ 203,686
Core loans	208,181	206,039	203,469
Equity	22,000	20,000	20,000
Period-end loans by client segment			
Middle Market Banking	$ 54,188	$ 56,656	$ 56,965
Corporate Client Banking	51,165	48,343	46,963
Commercial Real Estate Banking[(a)]	101,951	100,088	98,297
Other[(a)]	992	1,110	1,461
Total Commercial Banking loans	$ 208,296	$ 206,197	$ 203,686
Selected balance sheet data (average)			
Total assets	$ 218,896	$ 218,259	$ 217,047
Loans:			
Loans retained	206,837	204,243	197,203
Loans held-for-sale and loans at fair value	1,082	1,258	909
Total loans	$ 207,919	$ 205,501	$ 198,112
Core loans	207,787	205,320	197,846
Client deposits and other third-party liabilities	172,734	170,901	177,018
Equity	22,000	20,000	20,000
Average loans by client segment			
Middle Market Banking	$ 55,690	$ 57,092	$ 55,474
Corporate Client Banking	50,360	47,780	46,037
Commercial Real Estate Banking[(a)]	100,884	99,243	95,038
Other[(a)]	985	1,386	1,563
Total Commercial Banking loans	$ 207,919	$ 205,501	$ 198,112
Headcount	11,629	11,042	10,061

(a) Effective in the first quarter of 2019, client segment data includes Commercial Real Estate Banking which comprises the former Commercial Term Lending and Real Estate Banking client segments, and Community Development Banking (previously part of Other). The prior period amounts have been revised to conform with the current period presentation.

Selected metrics

As of or for the year ended December 31, (in millions, except ratios)	2019	2018	2017
Credit data and quality statistics			
Net charge-offs/(recoveries)	$ 160	$ 53	$ 39
Nonperforming assets			
Nonaccrual loans:			
Nonaccrual loans retained[(a)]	498	511	617
Nonaccrual loans held-for-sale and loans at fair value	–	–	–
Total nonaccrual loans	498	511	617
Assets acquired in loan satisfactions	25	2	3
Total nonperforming assets	523	513	620
Allowance for credit losses:			
Allowance for loan losses	2,780	2,682	2,558
Allowance for lending-related commitments	293	254	300
Total allowance for credit losses	3,073	2,936	2,858
Net charge-off/(recovery) rate[(b)]	0.08%	0.03%	0.02%
Allowance for loan losses to period-end loans retained	1.34	1.31	1.26
Allowance for loan losses to nonaccrual loans retained[(a)]	558	525	415
Nonaccrual loans to period-end total loans	0.24	0.25	0.30

(a) Allowance for loan losses of $114 million, $92 million and $92 million was held against nonaccrual loans retained at December 31, 2019, 2018 and 2017, respectively.

(b) Loans held-for-sale and loans at fair value were excluded when calculating the net charge-off/(recovery) rate.

ASSET & WEALTH MANAGEMENT

Asset & Wealth Management, with client assets of $3.2 trillion, is a global leader in investment and wealth management. AWM clients include institutions, high-net-worth individuals and retail investors in major markets throughout the world. AWM offers investment management across most major asset classes including equities, fixed income, alternatives and money market funds. AWM also offers multi-asset investment management, providing solutions for a broad range of clients' investment needs. For Wealth Management clients, AWM also provides retirement products and services, brokerage and banking services including trusts and estates, loans, mortgages and deposits. The majority of AWM's client assets are in actively managed portfolios.

Selected income statement data

Year ended December 31, (in millions, except ratios and headcount)	2019	2018	2017
Revenue			
Asset management, administration and commissions	**$10,212**	$10,171	$ 9,856
All other income	**604**	368	600
Noninterest revenue	**10,816**	10,539	10,456
Net interest income	**3,500**	3,537	3,379
Total net revenue	**14,316**	14,076	13,835
Provision for credit losses	**61**	53	39
Noninterest expense			
Compensation expense	**5,705**	5,495	5,317
Noncompensation expense	**4,810**	4,858	4,901
Total noninterest expense	**10,515**	10,353	10,218
Income before income tax expense	**3,740**	3,670	3,578
Income tax expense	**907**	817	1,241
Net income	**$ 2,833**	$ 2,853	$ 2,337
Revenue by line of business			
Asset Management	**$ 7,254**	$ 7,163	$ 7,257
Wealth Management	**7,062**	6,913	6,578
Total net revenue	**$14,316**	$14,076	$13,835
Financial ratios			
Return on common equity	**26%**	31%	25%
Overhead ratio	**73**	74	74
Pre-tax margin ratio:			
Asset Management	**26**	26	22
Wealth Management	**26**	26	30
Asset & Wealth Management	**26**	26	26
Headcount	**24,191**	23,920	22,975
Number of Wealth Management client advisors	**2,890**	2,865	2,605

2019 compared with 2018

Net income was $2.8 billion, a decrease of 1%.

Net revenue was $14.3 billion, an increase of 2%. Net interest income was $3.5 billion, down 1%, driven by deposit margin compression, predominantly offset by loan and deposit growth. Noninterest revenue was $10.8 billion, up 3%, driven by higher net investment valuation gains and growth in fees on higher average market levels, partially offset by a shift in the mix toward lower fee products.

Revenue from Asset Management was $7.3 billion, up 1%, driven by higher investment valuation gains. The impact on fees from higher average market levels was more than offset by a shift in the mix toward lower fee products.

Revenue from Wealth Management was $7.1 billion, up 2%, driven by loan and deposit growth, growth in fees on the cumulative impact of net inflows and higher average market levels and brokerage activity, largely offset by deposit margin compression.

The provision for credit losses was $61 million, up from $53 million in the prior year, reflecting higher net-charge offs, as well as net additions to the allowance for loan losses, predominantly due to loan growth.

Noninterest expense was $10.5 billion, an increase of 2%, predominantly driven by investments in the business as well as volume- and revenue-related expenses.

AWM's lines of business consist of the following:

Asset Management provides comprehensive global investment services, including asset management, pension analytics, asset-liability management and active risk-budgeting strategies.

Wealth Management offers investment advice and wealth management, including investment management, capital markets and risk management, tax and estate planning, banking, lending and specialty-wealth advisory services.

AWM's client segments consist of the following:

Private Banking clients include high- and ultra-high-net-worth individuals, families, money managers, business owners and small corporations worldwide.

Institutional clients include both corporate and public institutions, endowments, foundations, nonprofit organizations and governments worldwide.

Retail clients include financial intermediaries and individual investors.

Asset Management has two high-level measures of its overall fund performance.

- **Percentage of mutual fund assets under management in funds rated 4- or 5-star:** Mutual fund rating services rank funds based on their risk-adjusted performance over various periods. A 5-star rating is the best rating and represents the top 10% of industry-wide ranked funds. A 4-star rating represents the next 22.5% of industry-wide ranked funds. A 3-star rating represents the next 35% of industry-wide ranked funds. A 2-star rating represents the next 22.5% of industry-wide ranked funds. A 1-star rating is the worst rating and represents the bottom 10% of industry-wide ranked funds. The "overall Morningstar rating" is derived from a weighted average of the performance associated with a fund's three-, five- and ten-year (if applicable) Morningstar Rating metrics. For U.S. domiciled funds, separate star ratings are given at the individual share class level. The Nomura "star rating" is based on three-year risk-adjusted performance only. Funds with fewer than three years of history are not rated and hence excluded from this analysis. All ratings, the assigned peer categories and the asset values used to derive this analysis are sourced from these fund rating providers mentioned in footnote (a). The data providers re-denominate the asset values into U.S. dollars. This % of AUM is based on star ratings at the share class level for U.S. domiciled funds, and at a "primary share class" level to represent the star rating of all other funds except for Japan where Nomura provides ratings at the fund level. The "primary share class", as defined by Morningstar, denotes the share class recommended as being the best proxy for the portfolio and in most cases will be the most retail version (based upon annual management charge, minimum investment, currency and other factors). The performance data could have been different if all funds/accounts would have been included. Past performance is not indicative of future results.
- **Percentage of mutual fund assets under management in funds ranked in the 1st or 2nd quartile (one, three and five years)**: All quartile rankings, the assigned peer categories and the asset values used to derive this analysis are sourced from the fund ranking providers mentioned in footnote (b). Quartile rankings are done on the net-of-fee absolute return of each fund. The data providers re-denominate the asset values into U.S. dollars. This % of AUM is based on fund performance and associated peer rankings at the share class level for U.S. domiciled funds and at the "primary share class" level or fund level for all other funds. The "primary share class", as defined by Morningstar, denotes the share class recommended as being the best proxy for the portfolio and in most cases will be the most retail version (based upon annual management charge, minimum investment, currency and other factors). Where peer group rankings given for a fund are in more than one "primary share class" territory both rankings are included to reflect local market competitiveness. The performance data could have been different if all funds/accounts would have been included. Past performance is not indicative of future results.

Selected metrics

As of or for the year ended December 31, (in millions, except ranking data and ratios)	2019	2018	2017
% of JPM mutual fund assets rated as 4- or 5-star[(a)]	**61%**	58%	60%
% of JPM mutual fund assets ranked in 1st or 2nd quartile:[(b)]			
1 year	**59**	68	64
3 years	**77**	73	75
5 years	**75**	85	83
Selected balance sheet data (period-end)[(c)]			
Total assets	**$ 182,004**	$ 170,024	$ 151,909
Loans	**160,535**	147,632	130,640
Core loans	**160,535**	147,632	130,640
Deposits	**147,804**	138,546	146,407
Equity	**10,500**	9,000	9,000
Selected balance sheet data (average)[(c)]			
Total assets	**$ 170,764**	$ 160,269	$ 144,206
Loans	**149,655**	138,622	123,464
Core loans	**149,655**	138,622	123,464
Deposits	**140,118**	137,272	148,982
Equity	**10,500**	9,000	9,000
Credit data and quality statistics[(c)]			
Net charge-offs	**$ 31**	$ 10	$ 14
Nonaccrual loans	**116**	263	375
Allowance for credit losses:			
Allowance for loan losses	**354**	326	290
Allowance for lending-related commitments	**19**	16	10
Total allowance for credit losses	**373**	342	300
Net charge-off rate	**0.02%**	0.01%	0.01%
Allowance for loan losses to period-end loans	**0.22**	0.22	0.22
Allowance for loan losses to nonaccrual loans	**305**	124	77
Nonaccrual loans to period-end loans	**0.07**	0.18	0.29

(a) Represents the Nomura "star rating" for Japan domiciled funds and Morningstar for all other domiciled funds. Includes only Asset Management retail open-ended mutual funds that have a rating. Excludes money market funds, Undiscovered Managers Fund, and Brazil domiciled funds.
(b) Quartile ranking sourced from Lipper, Morningstar, Nomura and Fund Doctor based on country of domicile. Includes only Asset Management retail open-ended mutual funds that are ranked by the aforementioned sources. Excludes money market funds, Undiscovered Managers Fund, and Brazil domiciled funds.
(c) Loans, deposits and related credit data and quality statistics relate to the Wealth Management business.

Client assets

2019 compared with 2018

Client assets were $3.2 trillion, an increase of 18%. Assets under management were $2.4 trillion, an increase of 19% driven by the impact of higher market levels and net inflows into both long-term and liquidity products.

Client assets

December 31, (in billions)	2019	2018	2017
Assets by asset class			
Liquidity	**$ 542**	$ 480	$ 459
Fixed income	**602**	464	474
Equity	**474**	384	428
Multi-asset and alternatives	**746**	659	673
Total assets under management	**2,364**	1,987	2,034
Custody/brokerage/ administration/deposits	**862**	746	755
Total client assets	**$ 3,226**	$ 2,733	$ 2,789
Memo:			
Alternatives client assets[a]	**$ 185**	$ 171	$ 166
Assets by client segment			
Private Banking	**$ 672**	$ 552	$ 526
Institutional	**1,074**	926	968
Retail	**618**	509	540
Total assets under management	**$ 2,364**	$ 1,987	$ 2,034
Private Banking	**$ 1,504**	$ 1,274	$ 1,256
Institutional	**1,099**	946	990
Retail	**623**	513	543
Total client assets	**$ 3,226**	$ 2,733	$ 2,789

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

Client assets (continued)

Year ended December 31, (in billions)	2019	2018	2017
Assets under management rollforward			
Beginning balance	**$ 1,987**	$ 2,034	$ 1,771
Net asset flows:			
Liquidity	**60**	31	9
Fixed income	**106**	(1)	36
Equity	**(10)**	2	(11)
Multi-asset and alternatives	**4**	24	43
Market/performance/other impacts	**217**	(103)	186
Ending balance, December 31	**$ 2,364**	$ 1,987	$ 2,034
Client assets rollforward			
Beginning balance	**$ 2,733**	$ 2,789	$ 2,453
Net asset flows	**178**	88	93
Market/performance/other impacts	**315**	(144)	243
Ending balance, December 31	**$ 3,226**	$ 2,733	$ 2,789

International metrics

Year ended December 31, (in billions, except where otherwise noted)	2019	2018	2017
Total net revenue (in millions)[a]			
Europe/Middle East/Africa[b]	**$ 2,869**	$ 2,850	$ 2,837
Asia-Pacific[b]	**1,509**	1,538	1,405
Latin America/Caribbean[b]	**724**	755	702
Total international net revenue	**5,102**	5,143	4,944
North America	**9,214**	8,933	8,891
Total net revenue	**$ 14,316**	$ 14,076	$ 13,835
Assets under management			
Europe/Middle East/Africa[b]	**$ 428**	$ 366	$ 393
Asia-Pacific[b]	**192**	163	161
Latin America/Caribbean[b]	**62**	51	51
Total international assets under management	**682**	580	605
North America	**1,682**	1,407	1,429
Total assets under management	**$ 2,364**	$ 1,987	$ 2,034
Client assets			
Europe/Middle East/Africa[b]	**$ 520**	$ 440	$ 466
Asia-Pacific[b]	**272**	226	230
Latin America/Caribbean[b]	**147**	125	124
Total international client assets	**939**	791	820
North America	**2,287**	1,942	1,969
Total client assets	**$ 3,226**	$ 2,733	$ 2,789

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

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

The Corporate segment consists of Treasury and Chief Investment Office and Other Corporate, which includes corporate staff functions and expense that is centrally managed. Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks. The major Other Corporate functions include Real Estate, Technology, Legal, Corporate Finance, Human Resources, Internal Audit, Risk Management, Compliance, Control Management, Corporate Responsibility and various Other Corporate groups.

Selected income statement and balance sheet data

Year ended December 31, (in millions, except headcount)	2019	2018	2017
Revenue			
Principal transactions	**$ (461)**	$ (426)	$ 284
Investment securities gains/(losses)	**258**	(395)	(66)
All other income[a]	**89**	558	867
Noninterest revenue	**(114)**	(263)	1,085
Net interest income	**1,325**	135	55
Total net revenue[b]	**1,211**	(128)	1,140
Provision for credit losses	**(1)**	(4)	–
Noninterest expense[c]	**1,067**	902	501
Income/(loss) before income tax expense/(benefit)	**145**	(1,026)	639
Income tax expense/(benefit)	**(966)**	215	2,282
Net income/(loss)	**$ 1,111**	$ (1,241)	$ (1,643)
Total net revenue			
Treasury and CIO	**2,032**	510	566
Other Corporate	**(821)**	(638)	574
Total net revenue	**$ 1,211**	$ (128)	$ 1,140
Net income/(loss)			
Treasury and CIO	**1,394**	(69)	60
Other Corporate	**(283)**	(1,172)	(1,703)
Total net income/(loss)	**$ 1,111**	$ (1,241)	$ (1,643)
Total assets (period-end)	**$ 837,618**	$ 771,787	$ 781,478
Loans (period-end)	**1,649**	1,597	1,653
Core loans[d]	**1,649**	1,597	1,653
Headcount	**38,033**	37,145	34,601

(a) Included revenue related to a legal settlement of $645 million for the year ended December 31, 2017.

(b) Included tax-equivalent adjustments, driven by tax-exempt income from municipal bonds, of $314 million, $382 million and $905 million for the years ended December 31, 2019, 2018 and 2017, respectively. The decrease in taxable-equivalent adjustments for the year ended December 31, 2018, reflects the impact of the TCJA.

(c) Included a net legal benefit of $(214) million, $(241) million and $(593) million for the years ended December 31, 2019, 2018 and 2017, respectively.

(d) Average core loans were $1.7 billion, $1.7 billion and $1.6 billion for the years ended December 31, 2019, 2018 and 2017, respectively.

2019 compared with 2018

Net Income was $1.1 billion compared with a net loss of $1.2 billion in the prior year.

Net revenue was $1.2 billion, compared with a net loss of $128 million in the prior year driven by higher net interest income and noninterest revenue. The increase in net interest income was driven by balance sheet growth and changes in mix, and also includes income related to the unwind of the internal funding provided to CCB upon the sale of certain mortgage loans. The income reflects the net present value of that funding and is recognized as a charge to net interest income in CCB. Refer to CCB on pages 62–65 and FTP on page 61 of this Form 10-K for further information.

Noninterest revenue increased reflecting:

- investment securities gains, compared with losses in the prior year, due to the repositioning of the investment securities portfolio, and
- lower net markdowns on certain legacy private equity investments,

partially offset by

- market-driven impacts on certain Corporate investments, and
- higher losses on cash deployment transactions which were more than offset by the related net interest income earned on those transactions.

Noninterest expense of $1.1 billion was up $165 million reflecting higher investments in technology and real estate, and higher pension costs due to changes to actuarial assumptions and estimates.

The prior year included a pre-tax loss of $174 million on the liquidation of a legal entity.

The current period included $1.1 billion of tax benefits related to the resolution of certain tax audits. The prior year expense reflected a net benefit of $302 million resulting from changes in estimates under the TCJA related to the remeasurement of certain deferred taxes and the deemed repatriation tax on non-U.S. earnings, which was more than offset by changes to certain tax reserves and other tax adjustments.

Treasury and CIO overview

Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks. The risks managed by Treasury and CIO arise from the activities undertaken by the Firm's four major reportable business segments to serve their respective client bases, which generate both on- and off-balance sheet assets and liabilities.

Treasury and CIO seek to achieve the Firm's asset-liability management objectives generally by investing in high-quality securities that are managed for the longer-term as part of the Firm's investment securities portfolio. Treasury and CIO also use derivatives to meet the Firm's asset-liability management objectives. Refer to Note 5 for further information on derivatives. In addition, Treasury and CIO manage the Firm's cash position primarily through deposits at central banks and investments in short-term instruments. Refer to Liquidity Risk Management on pages 93–98 for further information on liquidity and funding risk. Refer to Market Risk Management on pages 119–126 for information on interest rate, foreign exchange and other risks.

The investment securities portfolio primarily consists of U.S. GSE and government agency and nonagency mortgage-backed securities, U.S. and non-U.S. government securities, obligations of U.S. states and municipalities, other ABS and corporate debt securities. At December 31, 2019, the investment securities portfolio was $396.4 billion, and the average credit rating of the securities comprising the portfolio was AA+ (based upon external ratings where available and, where not available, based primarily upon internal risk ratings. Refer to Note 10 for further information on the investment securities portfolio and internal risk ratings.

Selected income statement and balance sheet data

As of or for the year ended December 31, (in millions)	2019	2018	2017
Investment securities gains/ (losses)	$ 258	$ (395)	$ (78)
Available-for-sale ("AFS") investment securities (average)	283,205	203,449	219,345
Held-to-maturity ("HTM") investment securities (average)	34,939	31,747	47,927
Investment securities portfolio (average)	318,144	235,196	267,272
AFS investment securities (period-end)	348,876	228,681	200,247
HTM investment securities (period-end)	47,540	31,434	47,733
Investment securities portfolio (period-end)	396,416	260,115	247,980

Risk is an inherent part of JPMorgan Chase's business activities. When the Firm extends a consumer or wholesale loan, advises customers and clients on their investment decisions, makes markets in securities, or offers other products or services, the Firm takes on some degree of risk. The Firm's overall objective is to manage its businesses, and the associated risks, in a manner that balances serving the interests of its clients, customers and investors and protects the safety and soundness of the Firm.

The Firm believes that effective risk management requires, among other things:

- Acceptance of responsibility, including identification and escalation of risk issues, by all individuals within the Firm;
- Ownership of risk identification, assessment, data and management within each of the LOBs and Corporate; and
- Firmwide structures for risk governance.

The Firm strives for continual improvement in its efforts to enhance controls, ongoing employee training and development, talent retention, and other measures. The Firm follows a disciplined and balanced compensation framework with strong internal governance and independent oversight by the Board of Directors (the "Board"). The impact of risk and control issues is carefully considered in the Firm's performance evaluation and incentive compensation processes.

Risk governance and oversight framework

The Firm's risk management governance and oversight framework involves understanding drivers of risks, types of risks, and impacts of risks.

Drivers of Risks are factors that cause a risk to exist. Drivers of risks include the economic environment, regulatory and government policy, competitor and market evolution, business decisions, process and judgment error, deliberate wrongdoing, dysfunctional markets, and natural disasters.

Types of Risks are categories by which risks manifest themselves. Risks are generally categorized in the following four risk types:

- Strategic risk is the risk to earnings, capital, liquidity or reputation associated with poorly designed or failed business plans or inadequate response to changes in the operating environment.
- Credit and investment risk is the risk associated with the default or change in credit profile of a client, counterparty or customer; or loss of principal or a reduction in expected returns on investments, including consumer credit risk, wholesale credit risk, and investment portfolio risk.
- Market risk is the risk associated with the effect of changes in market factors, such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.
- Operational risk is the risk associated with an adverse outcome resulting from inadequate or failed internal processes or systems; human factors; or external events impacting the Firm's processes or systems; it includes compliance, conduct, legal, and estimations and model risk.

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

The Firm's risk governance and oversight framework is managed on a Firmwide basis. The Firm has an Independent Risk Management ("IRM") function, which consists of the Risk Management and Compliance organizations. The Chief Executive Officer ("CEO") appoints, subject to approval by the Risk Committee of the Board ("Board Risk Committee"), the Firm's Chief Risk Officer ("CRO") to lead the IRM organization and manage the risk governance structure of the Firm. The framework is subject to approval by the Board Risk Committee in the form of the primary risk management policies. The Firm's CRO oversees and delegates authorities to LOB CROs, Firmwide Risk Executives ("FREs"), and the Firm's Chief Compliance Officer ("CCO"), who each establish Risk Management and Compliance organizations, set the Firm's risk governance policies and standards, and define and oversee the implementation of the Firm's risk governance. The LOB CROs are responsible for risks that arise in their LOBs, while FREs oversee risk areas that span across the individual LOB, functions and regions.

Three lines of defense

The Firm relies upon each of its LOBs and Corporate areas giving rise to risk to operate within the parameters identified by the IRM function, and within its own management-identified risk and control standards. Each LOB and Treasury & CIO, including their aligned Operations, Technology and Control Management are the Firm's "first line of defense" and own the identification of risks, as well as the design and execution of controls to manage those risks. The first line of defense is responsible for adherence

to applicable laws, rules and regulations and for the implementation of the risk management structure (which may include policy, standards, limits, thresholds and controls) established by IRM.

The IRM function is independent of the businesses and is the Firm's "second line of defense." The IRM function sets and oversees the risk management structure for Firmwide risk governance, and independently assesses and challenges the first line of defense risk management practices. IRM is also responsible for its own adherence to applicable laws, rules and regulations and for the implementation of policies and standards established by IRM with respect to its own processes.

The Internal Audit function operates independently from other parts of the Firm and performs independent testing and evaluation of processes and controls across the Firm as the "third line of defense." The Internal Audit Function is headed by the General Auditor, who reports to the Audit Committee and administratively to the CEO.

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

Risk identification and ownership

Each LOB and Corporate area owns the ongoing identification of risks, as well as the design and execution of controls, inclusive of IRM-specified controls, to manage those risks. To support this activity, the Firm has a risk identification process designed to facilitate their responsibility to identify material risks inherent to the Firm, catalog them in a central repository and review the most material risks on a regular basis. The IRM function reviews and challenges the LOB and Corporate's identification of risks, maintains the central repository and provides the consolidated Firmwide results to the Firmwide Risk Committee ("FRC") and Board Risk Committee.

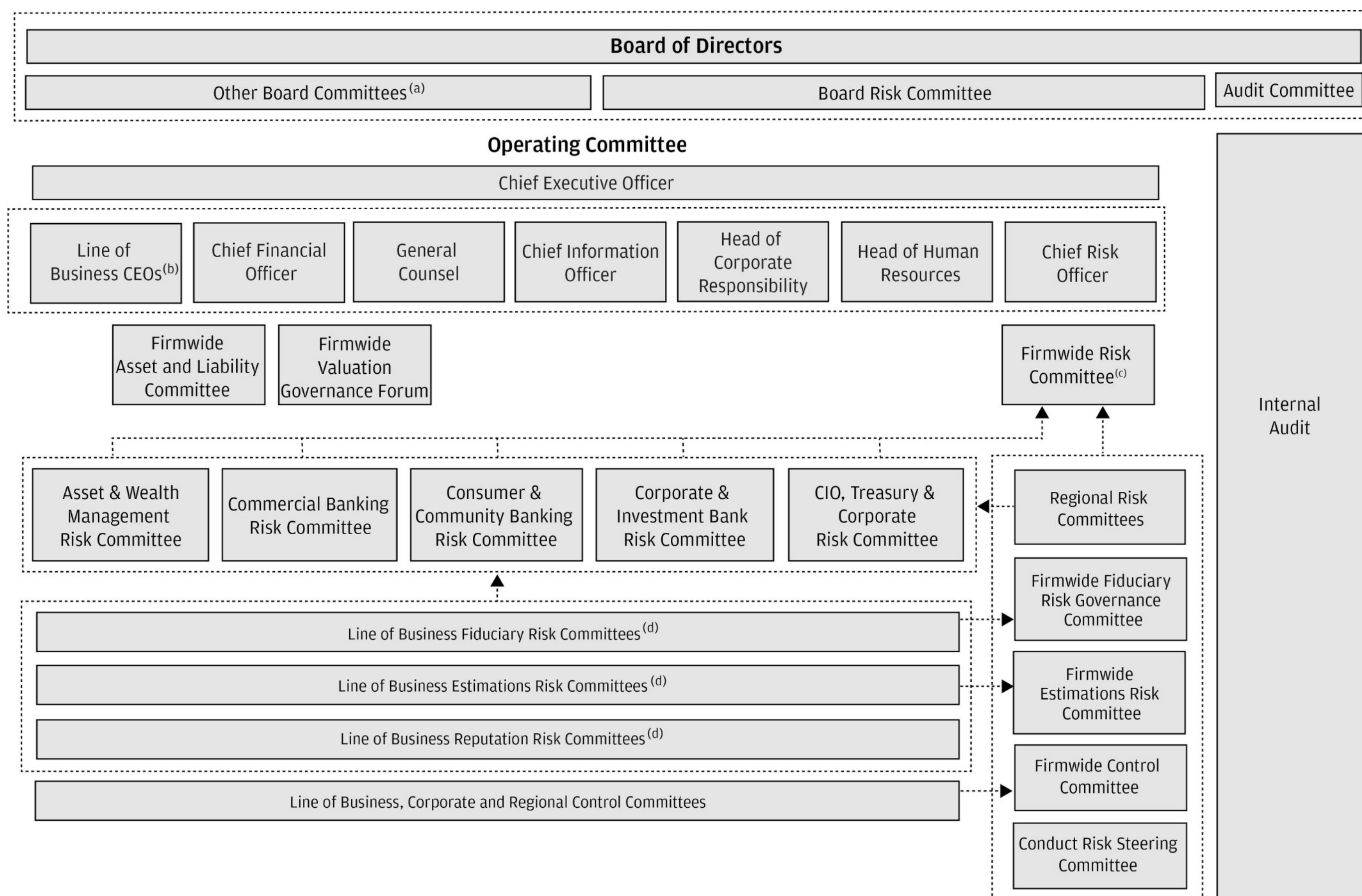
Risk appetite

The Firm's overall appetite for risk is governed by a "Risk Appetite" framework. The framework and the Firm's risk appetite are set and approved by the Firm's CEO, Chief Financial Officer ("CFO") and CRO. Quantitative parameters and qualitative factors are used to monitor and measure the Firm's capacity to take risk consistent with its stated risk appetite. Qualitative factors have been established to assess select operational risks that impact the Firm's reputation. Risk Appetite results are reported to the Board Risk Committee.

Risk governance and oversight structure

The independent status of the IRM function is supported by a governance structure that provides for escalation of risk issues to senior management, the FRC, and the Board of Directors, as appropriate.

The chart below illustrates the Board of Directors' and key senior management-level committees in the Firm's risk governance structure. In addition, there are other committees, forums and paths of escalation that support the oversight of risk which are not shown in the chart below or described in this Form 10-K.



(a) Other Board Committees include the Compensation & Management Development Committee, Corporate Governance & Nominating Committee and Public Responsibility Committee
(b) The LOB CEOs for Corporate & Investment Bank and Consumer & Community Banking are also the firm's Co-Presidents and Co-Chief Operating Officers; the CEO for Consumer Lending reports to the CEO for Consumer & Community Banking and is also a member of the Operating Committee
(c) The Firmwide Risk Committee escalates significant issues directly to the Board Risk Committee as appropriate
(d) As applicable

The Firm's Operating Committee, which consists of the Firm's CEO, CRO, CFO and other senior executives, is accountable to and may refer matters to the Firm's Board of Directors. The Operating Committee is responsible for escalating to the Board the information necessary to facilitate the Board's exercise of its duties.

Board oversight

The Firm's Board of Directors provides oversight of risk. The Board Risk Committee is the principal committee that oversees risk matters. The Audit Committee oversees the control environment, and the Compensation & Management Development Committee oversees compensation and other management-related matters. Each committee of the Board oversees reputational risks and conduct risks within its scope of responsibility.

The JPMorgan Chase Bank, N.A. Board of Directors is responsible for the oversight of management of the bank. The JPMorgan Chase Bank, N.A. Board accomplishes this function acting directly and through the principal standing committees of the Firm's Board of Directors. Risk and control oversight on behalf of JPMorgan Chase Bank N.A. is primarily the responsibility of the Risk Committee and the Audit Committee, respectively, and, with respect to compensation and other management-related matters, the Compensation & Management Development Committee.

The Board Risk Committee assists the Board in its oversight of management's responsibility to implement a global risk management framework reasonably designed to identify, assess and manage the Firm's risks. The Board Risk Committee's responsibilities include approval of applicable primary risk policies and review of certain associated frameworks, analysis and reporting established by management. Breaches in risk appetite and parameters, issues that may have a material adverse impact on the Firm, including capital and liquidity issues, and other significant risk-related matters are escalated to the Board Risk Committee, as appropriate.

The Audit Committee assists the Board in its oversight of management's responsibility to ensure that there is an effective system of controls reasonably designed to safeguard the Firm's assets and income, ensure the integrity of the Firm's financial statements, and maintain compliance with the Firm's ethical standards, policies, plans and procedures, and with laws and regulations. It also assists the Board in its oversight of the Firm's independent registered public accounting firm's qualifications, independence and performance, and of the performance of the Firm's Internal Audit function.

The Compensation & Management Development Committee ("CMDC") assists the Board in its oversight of the Firm's compensation principles and practices. The CMDC reviews and approves the Firm's compensation and benefits programs. In addition, the Committee reviews Operating Committee members' performance against their goals, and approves their compensation awards. The CMDC also reviews the development of and succession for key executives, and provides oversight of the Firm's culture, including reviewing updates from management regarding significant conduct issues and any related employee actions, including compensation actions.

The Public Responsibility Committee assists the Board in its oversight of the Firm's positions and practices on public responsibility matters such as community investment, fair lending, sustainability, consumer practices and other public policy issues that reflect the Firm's values and character and could impact the Firm's reputation among all of its stakeholders. The Committee also provides guidance on these matters to management and the Board, as appropriate.

The Corporate Governance & Nominating Committee exercises general oversight with respect to the governance of the Board. The Committee evaluates and recommends to the Board corporate governance practices applicable to the Firm. It also appraises the framework for assessing the Board's performance and self-evaluation.

Management oversight

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

The Firmwide Risk Committee ("FRC") is the Firm's highest management-level risk committee. It provides oversight of the risks inherent in the Firm's businesses and serves as an escalation point for risk topics and issues raised by underlying committees and/or FRC members.

The Firmwide Control Committee ("FCC") is an escalation committee for senior management to review and discuss the Firmwide operational risk environment including identified issues, operational risk metrics and significant events that have been escalated.

The Firmwide Fiduciary Risk Governance Committee ("FFRGC") provides oversight of the governance framework for fiduciary risk or fiduciary-related conflict of interest risk inherent in each of the Firm's LOBs. The FFRGC approves risk or compliance policy exceptions and reviews periodic reports from the LOBs and control functions including fiduciary metrics and control trends.

The Firmwide Estimations Risk Committee ("FERC") provides oversight of the governance framework for quantitative and qualitative estimations and models as specified in the Estimations and Model Risk Management Policy. The FERC also has responsibility to set the prioritization of estimations and model risk activities and drive consistency through review of LOB activities and escalated issues.

The Conduct Risk Steering Committee ("CRSC") is responsible for reviewing, calibrating and consolidating Firmwide Conduct Risk Appetite and setting overall direction for the Firm's Conduct Risk Program.

Line of Business and Regional Risk Committees are responsible for providing oversight of the governance, limits, and controls that are in place through the scope of their activities. These committees review the ways in which the particular LOB or the business operating in a particular region could be exposed to adverse outcomes with a focus on identifying, accepting, escalating and/or requiring remediation of matters brought to these committees.

Line of Business and Corporate Control Committees oversee the control environment of their respective business or function. As part of that mandate, they are responsible for reviewing indicators of elevated or emerging risks and other data that may impact the quality and stability of the processes in a business or function, addressing key operational risk issues, focusing on processes with control concerns and overseeing control remediation.

Line of Business Reputation Risk Committees review and assess transactions, activities and clients that have the potential for material reputation risk to the Firm.

The Firmwide Asset and Liability Committee ("ALCO") is responsible for overseeing the Firm's asset and liability management ("ALM") activities and the management of liquidity risk, balance sheet, interest rate risk, and capital risk. The ALCO is supported by the Treasurer Committee and the Capital Governance Committee. The Treasurer Committee is responsible for monitoring the Firm's overall balance sheet, liquidity risk and interest rate risk. The Capital Governance Committee is responsible for overseeing and providing guidance concerning the effectiveness of the Firm's capital framework, capital policies and regulatory capital implementation.

The Firmwide Valuation Governance Forum ("VGF") is composed of senior finance and risk executives and is responsible for overseeing the management of fair value risks arising from valuation activities conducted across the Firm.

Risk governance and oversight functions

The Firm manages its risk through risk governance and oversight functions. The scope of a particular function may include one or more drivers, types and/or impacts of risk. For example, Country Risk Management oversees country risk which may be a driver of risk or an aggregation of exposures that could give rise to multiple risk types such as credit or market risk.

The following sections discuss the risk governance and oversight functions in place to manage the risks inherent in the Firms business activities.

Risk governance and oversight functions	Page
Strategic risk	84
Capital risk	85-92
Liquidity risk	93-98
Reputation risk	99
Consumer credit risk	103-107
Wholesale credit risk	108-115
Investment portfolio risk	118
Market risk	119-126
Country risk	127-128
Operational risk	129-135
Compliance risk	132
Conduct risk	133
Legal risk	134
Estimations and Model risk	135

STRATEGIC RISK MANAGEMENT

Strategic risk is the risk to earnings, capital, liquidity or reputation associated with poorly designed or failed business plans or inadequate response to changes in the operating environment.

Management and oversight

The Operating Committee and the senior leadership of each LOB and Corporate are responsible for managing the Firm's most significant strategic risks. Strategic risks are overseen by IRM through participation in business reviews, LOB and Corporate senior management committees and other relevant governance forums and ongoing discussions. The Board of Directors oversees management's strategic decisions, and the Board Risk Committee oversees IRM and the Firm's risk management framework.

In the process of developing business plans and strategic initiatives, LOB and Corporate leadership identify the associated risks that are incorporated into the Firmwide Risk Identification process and monitored and assessed as part of the Firmwide Risk Appetite framework.

In addition, IRM conducts a qualitative assessment of the LOB and Corporate strategic initiatives to assess their impact on the risk profile of the Firm.

The Firm's strategic planning process, which includes the development and execution of strategic initiatives, is one component of managing the Firm's strategic risk. Guided by the Firm's How We Do Business Principles (the "Principles"), the Operating Committee and management teams in each LOB and Corporate review and update the strategic plan periodically. The process includes evaluating the high-level strategic framework and performance against prior-year initiatives, assessing the operating environment, refining existing strategies and developing new strategies.

These strategic initiatives, along with IRM's assessment, are incorporated in the Firm's budget and provided to the Board for review.

The Firm's balance sheet strategy, which focuses on risk-adjusted returns, strong capital and robust liquidity, is also a component in the management of strategic risk. Refer to Capital Risk Management on pages 85–92 for further information on capital risk. Refer to Liquidity Risk Management on pages 93–98 for further information on liquidity risk. In addition, for further information on reputation risk, refer to Reputation Risk Management on page 99.

Capital risk is the risk the Firm has an insufficient level or composition of capital to support the Firm's business activities and associated risks during normal economic environments and under stressed conditions.

A strong capital position is essential to the Firm's business strategy and competitive position. Maintaining a strong balance sheet to manage through economic volatility is considered a strategic imperative of the Firm's Board of Directors, CEO and Operating Committee. The Firm's fortress balance sheet philosophy focuses on risk-adjusted returns, strong capital and robust liquidity. The Firm's capital risk management strategy focuses on maintaining long-term stability to enable the Firm to build and invest in market-leading businesses, including in highly stressed environments. Senior management considers the implications on the Firm's capital prior to making any significant decisions that could impact future business activities. In addition to considering the Firm's earnings outlook, senior management evaluates all sources and uses of capital with a view to ensuring the Firm's capital strength.

Capital management oversight

The Firm has a Capital Management Oversight function whose primary objective is to provide independent assessment, measuring, monitoring and control of capital risk across the Firm.

Capital Management Oversight's responsibilities include:

- Defining, monitoring and reporting capital risk metrics;
- Establishing, calibrating and monitoring capital risk limits and indicators, including capital risk appetite;
- Developing a process to classify, monitor and report limit breaches; and
- Performing an independent assessment of the Firm's capital management activities, including changes made to the contingency capital plan described below.

In addition, the Basel Independent Review function ("BIR"), which is a part of the IRM function, conducts independent assessments of the Firm's regulatory capital framework. These assessments are intended to ensure compliance with the applicable regulatory capital rules in support of senior management's responsibility for managing capital and for the Board Risk Committee's oversight of management in executing that responsibility.

Capital management

Treasury & CIO is responsible for capital management.

The primary objectives of effective capital management are to:

- Maintain sufficient capital in order to continue to build and invest in the Firm's businesses through the cycle and in stressed environments;
- Retain flexibility to take advantage of future investment opportunities;
- Promote the Firm's ability to serve as a source of strength to its subsidiaries;
- Ensure the Firm operates above the minimum regulatory capital ratios as well as maintain "well-capitalized" status for the Firm and its insured depository institution ("IDI") subsidiaries at all times under applicable regulatory capital requirements;
- Meet capital distribution objectives; and
- Maintain sufficient capital resources to operate throughout a resolution period in accordance with the Firm's preferred resolution strategy.

The Firm addresses these objectives through establishing internal minimum capital requirements and a strong capital management governance framework, both in business as usual conditions and in the event of stress.

Capital risk management is intended to be flexible in order to react to a range of potential events. In its management of capital, the Firm takes into consideration economic risk and all applicable regulatory capital requirements to determine the level of capital needed.

The Firm considers regulatory capital requirements as well as an internal assessment of capital adequacy, in normal economic cycles and in stress events, when setting its minimum capital levels. The capital governance framework requires regular monitoring of the Firm's capital positions, stress testing and defining escalation protocols, both at the Firm and material legal entity levels.

Governance

Committees responsible for overseeing the Firm's capital management include the Capital Governance Committee, the Treasurer Committee and the Firmwide ALCO. Capital management oversight is governed through the CIO, Treasury and Corporate ("CTC") risk committee. In addition, the Board Risk Committee periodically reviews the Firm's capital risk tolerance. Refer to Firmwide Risk Management on pages 79–83 for additional discussion on the Board Risk Committee and the ALCO.

Capital planning and stress testing

Comprehensive Capital Analysis and Review

The Federal Reserve requires large bank holding companies, including the Firm, to submit on an annual basis a capital plan that has been reviewed and approved by the Board of Directors. The Federal Reserve uses Comprehensive Capital Analysis and Review ("CCAR") and other stress testing processes to ensure that large bank holding companies ("BHC") have sufficient capital during periods of economic and financial stress, and have robust, forward-looking capital assessment and planning processes in place that address each BHC's unique risks to enable it to absorb losses under certain stress scenarios. Through CCAR, the Federal Reserve evaluates each BHC's capital adequacy and internal capital adequacy assessment processes ("ICAAP"), as well as its plans to make capital distributions, such as dividend payments or stock repurchases.

On June 27, 2019, the Federal Reserve informed the Firm that it did not object to the Firm's 2019 capital plan. Refer to Capital actions on pages 90-91 for information on actions taken by the Firm's Board of Directors following the 2019 CCAR results.

Internal Capital Adequacy Assessment Process
Annually, the Firm prepares the ICAAP, which informs the Board of Directors of the ongoing assessment of the Firm's processes for managing the sources and uses of capital as well as compliance with supervisory expectations for capital planning and capital adequacy. The Firm's ICAAP integrates stress testing protocols with capital planning.

The CCAR and other stress testing processes assess the potential impact of alternative economic and business scenarios on the Firm's earnings and capital. Economic scenarios, and the parameters underlying those scenarios, are defined centrally and applied uniformly across the businesses. These scenarios are articulated in terms of macroeconomic factors, which are key drivers of business results; global market shocks, which generate short-term but severe trading losses; and idiosyncratic operational risk events. The scenarios are intended to capture and stress key vulnerabilities and idiosyncratic risks facing the Firm. However, when defining a broad range of scenarios, actual events can always be worse. Accordingly, management considers additional stresses outside these scenarios, as necessary. These results are reviewed by management and the Board of Directors.

Contingency capital plan

The Firm's contingency capital plan establishes the capital management framework for the Firm and specifies the principles underlying the Firm's approach towards capital management in normal economic conditions and during stress. The contingency capital plan defines how the Firm calibrates its targeted capital levels and meets minimum capital requirements, monitors the ongoing appropriateness of planned capital distributions, and sets out the capital contingency actions that are expected to be taken or considered at various levels of capital depletion during a period of stress.

Regulatory capital

The Federal Reserve establishes capital requirements, including well-capitalized standards, for the consolidated financial holding company. The Office of the Comptroller of the Currency ("OCC") establishes similar minimum capital requirements for the Firm's IDI subsidiaries, including JPMorgan Chase Bank, N.A. The U.S. capital requirements generally follow the Capital Accord of the Basel Committee, as amended from time to time.

Basel III Overview
The capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for large and internationally active U.S. BHCs and banks, including the Firm and its IDI subsidiaries, including JPMorgan Chase Bank, N.A. The minimum amount of regulatory capital that must be held by BHCs and banks is determined by calculating risk-weighted assets ("RWA"), which are on-balance sheet assets and off-balance sheet exposures, weighted according to risk. Two comprehensive approaches are prescribed for calculating RWA: a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). Effective January 1, 2019, the capital adequacy of the Firm is evaluated against the fully phased-in measures under Basel III and represents the lower of the Standardized or Advanced approaches. During 2018, the required capital measures were subject to the transitional rules and as of December 31, 2018 the results were the same on a fully phased-in and on a transitional basis.

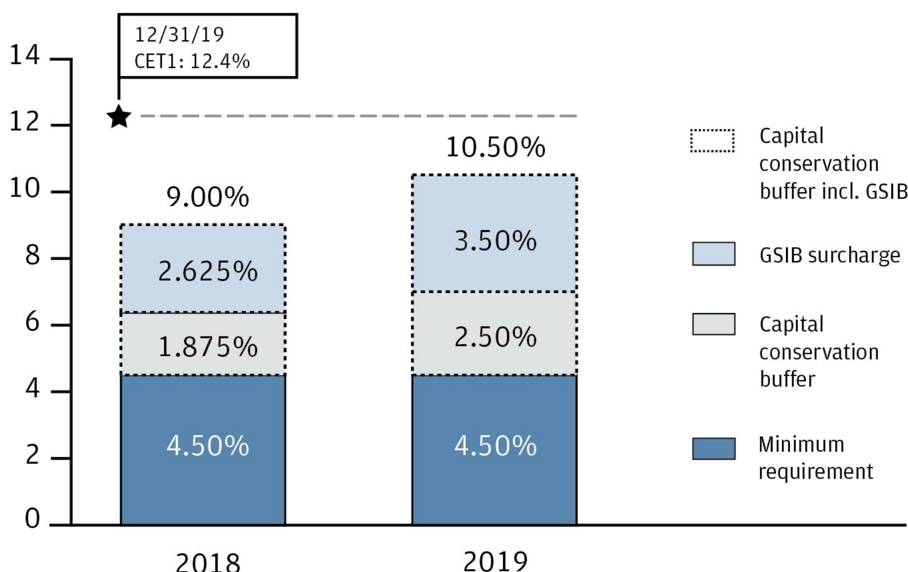
Basel III establishes capital requirements for calculating credit risk RWA and market risk RWA, and in the case of Basel III Advanced, operational risk RWA. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced. In addition to the RWA calculated under these approaches, the Firm may supplement such amounts to incorporate management judgment and feedback from its regulators.

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

Key Regulatory Developments
Effective January 1, 2020, the Firm adopted the Financial Instruments – Credit Losses ("CECL") guidance under U.S. GAAP. As provided by the U.S. banking agencies, the Firm elected to phase-in the impact to retained earnings of $2.7 billion to regulatory capital, at 25 percent per year in each of 2020 to 2023 ("CECL transitional period"). Based on the Firm's capital as of December 31, 2019, the estimated impact to the Standardized CET1 capital ratio will be a reduction of approximately 4 bps for each transitional year. Refer to Accounting and Reporting Developments on pages 139-140 and Note 1 for further information.

Risk-based Capital Regulatory Minimums

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



The Firm's Basel III Standardized-risk-based ratios are currently more binding than the Basel III Advanced-risk-based ratios, and the Firm expects that this will remain the case for the foreseeable future.

Additional information regarding the Firm's capital ratios, as well as the U.S. federal regulatory capital standards to which the Firm is subject, is presented in Note 27. Refer to the Firm's Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website, for further information on the Firm's Basel III measures.

All banking institutions are currently required to have a minimum CET1 capital ratio of 4.5% of risk-weighted assets. Certain banking organizations, including the Firm, are also required to hold additional amounts of capital to serve as a "capital conservation buffer". The capital conservation buffer is intended to be used to absorb losses in times of financial or economic stress. The capital conservation buffer was subject to a phase-in period that began January 1, 2016 and continued through the end of 2018.

As an expansion of the capital conservation buffer, the Firm is also required to hold additional levels of capital in the form of a global systemically important bank ("GSIB") surcharge and a countercyclical capital buffer.

Under the Federal Reserve's GSIB rule, the Firm is required to calculate its GSIB surcharge on an annual basis under two separately prescribed methods, and is subject to the higher of the two. The first ("Method 1"), reflects the GSIB surcharge as prescribed by the Basel Committee's assessment methodology, and is calculated across five criteria: size, cross-jurisdictional activity, interconnectedness, complexity and substitutability. The second ("Method 2"), modifies the Method 1 requirements to include a measure of short-term wholesale funding in place of substitutability, and introduces a GSIB score "multiplication factor". The following table presents the Firm's GSIB surcharge.

	2019	2018
Fully Phased-In:		
Method 1	2.50%	2.50%
Method 2	3.50%	3.50%
Transitional[a]	N/A	2.625%

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

The Firm's effective regulatory minimum GSIB surcharge calculated under Method 2 remains unchanged at 3.5% for 2020.

The Federal Reserve's framework for setting the countercyclical capital buffer takes into account the macro financial environment in which large, internationally active banks function. As of December 31, 2019, the U.S. countercyclical capital buffer remained at 0%. The Federal Reserve will continue to review the buffer at least annually. The buffer can be increased if the Federal Reserve, FDIC and OCC determine that systemic risks are meaningfully above normal and can be calibrated up to an additional 2.5% of RWA subject to a 12-month implementation period.

Failure to maintain regulatory capital equal to or in excess of the risk-based regulatory capital minimum plus the capital conservation buffer (inclusive of the GSIB surcharge) and any countercyclical buffer may result in limitations to the amount of capital that the Firm may distribute, such as through dividends and common equity repurchases.

Leverage-based Capital Regulatory Minimums

Supplementary leverage ratio

The SLR is defined as Tier 1 capital under Basel III divided by the Firm's total leverage exposure. Total leverage exposure is calculated by taking the Firm's total average on-balance sheet assets, less amounts permitted to be

deducted for Tier 1 capital, and adding certain off-balance sheet exposures, such as undrawn commitments and derivatives potential future exposure.

Failure to maintain an SLR ratio equal to or greater than the regulatory minimum may result in limitations on the amount of capital that the Firm may distribute such as through dividends and common equity repurchases.

Other regulatory capital

In addition to meeting the capital ratio requirements of Basel III, the Firm and its IDI subsidiaries also must maintain minimum capital and leverage ratios in order to be "well-capitalized" under the regulations issued by the Federal Reserve and the Prompt Corrective Action ("PCA") requirements of the FDIC Improvement Act ("FDICIA"), respectively. Refer to Note 27 for additional information.

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

	December 31, 2019			December 31, 2018		
(in millions)	Standardized	Advanced	Minimum capital ratios	Standardized[b]	Advanced[b]	Minimum capital ratios
Risk-based capital metrics:						
CET1 capital	**$ 187,753**	**$ 187,753**		$ 183,474	$ 183,474	
Tier 1 capital	**214,432**	**214,432**		209,093	209,093	
Total capital	**242,589**	**232,112**		237,511	227,435	
Risk-weighted assets	**1,515,869**	**1,397,878**		1,528,916	1,421,205	
CET1 capital ratio	**12.4%**	**13.4%**	**10.5%**	12.0%	12.9%	9.0%
Tier 1 capital ratio	**14.1**	**15.3**	**12.0**	13.7	14.7	10.5
Total capital ratio	**16.0**	**16.6**	**14.0**	15.5	16.0	12.5
Leverage-based capital metrics:						
Adjusted average assets[a]	**$ 2,730,239**	**$ 2,730,239**		$ 2,589,887	$ 2,589,887	
Tier 1 leverage ratio	**7.9%**	**7.9%**	**4.0%**	8.1%	8.1%	4.0%
Total leverage exposure	**NA**	**$ 3,423,431**		NA	$ 3,269,988	
SLR	**NA**	**6.3%**	**5.0%** [c]	NA	6.4%	5.0% [c]

(a) Adjusted average assets, for purposes of calculating the Tier 1 leverage ratio, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) The Firm's capital ratios as of December 31, 2018 were equivalent whether calculated on a transitional or fully phased-in basis.
(c) Represents minimum SLR requirement of 3.0%, as well as supplementary leverage buffer of 2.0%.

The Firm believes that it will operate with a Basel III CET1 capital ratio between 11.5% and 12% over the medium term.

Capital components

The following table presents reconciliations of total stockholders' equity to Basel III CET1 capital, Tier 1 capital and Total capital as of December 31, 2019 and 2018.

(in millions)	December 31, 2019	December 31, 2018
Total stockholders' equity	**$ 261,330**	$ 256,515
Less: Preferred stock	26,993	26,068
Common stockholders' equity	**234,337**	230,447
Less:		
Goodwill	47,823	47,471
Other intangible assets	819	748
Other CET1 capital adjustments	323	1,034
Add:		
Certain deferred tax liabilities[(a)]	2,381	2,280
Standardized/Advanced CET1 capital	**187,753**	183,474
Preferred stock	26,993	26,068
Less: Other Tier 1 adjustments	314	449
Standardized/Advanced Tier 1 capital	**214,432**	209,093
Long-term debt and other instruments qualifying as Tier 2 capital	13,733	13,772
Qualifying allowance for credit losses	14,314	14,500
Other	110	146
Standardized Tier 2 capital	**28,157**	28,418
Standardized Total capital	**242,589**	237,511
Adjustment in qualifying allowance for credit losses for Advanced Tier 2 capital	(10,477)	(10,076)
Advanced Tier 2 capital	**17,680**	18,342
Advanced Total capital	**$ 232,112**	$ 227,435

(a) Represents deferred tax liabilities related to tax-deductible goodwill and to identifiable intangibles created in nontaxable transactions, which are netted against goodwill and other intangibles when calculating CET1 capital.

Capital rollforward

The following table presents the changes in Basel III CET1 capital, Tier 1 capital and Tier 2 capital for the year ended December 31, 2019.

Year Ended December 31, (in millions)	**2019**
Standardized/Advanced CET1 capital at December 31, 2018	$ 183,474
Net income applicable to common equity	34,844
Dividends declared on common stock	(10,897)
Net purchase of treasury stock	(22,555)
Changes in additional paid-in capital	(640)
Changes related to AOCI	2,904
Adjustment related to DVA[(a)]	1,103
Changes related to other CET1 capital adjustments	(480)
Change in Standardized/Advanced CET1 capital	4,279
Standardized/Advanced CET1 capital at December 31, 2019	**187,753**
Standardized/Advanced Tier 1 capital at December 31, 2018	209,093
Change in CET1 capital	4,279
Net issuance of noncumulative perpetual preferred stock	925
Other	135
Change in Standardized/Advanced Tier 1 capital	5,339
Standardized/Advanced Tier 1 capital at December 31, 2019	**214,432**
Standardized Tier 2 capital at December 31, 2018	28,418
Change in long-term debt and other instruments qualifying as Tier 2	(39)
Change in qualifying allowance for credit losses	(186)
Other	(36)
Change in Standardized Tier 2 capital	(261)
Standardized Tier 2 capital at December 31, 2019	**28,157**
Standardized Total capital at December 31, 2019	**242,589**
Advanced Tier 2 capital at December 31, 2018	18,342
Change in long-term debt and other instruments qualifying as Tier 2	(39)
Change in qualifying allowance for credit losses	(587)
Other	(36)
Change in Advanced Tier 2 capital	(662)
Advanced Tier 2 capital at December 31, 2019	**17,680**
Advanced Total capital at December 31, 2019	**$ 232,112**

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

RWA rollforward

The following table presents changes in the components of RWA under Basel III Standardized and Advanced approaches for the year ended December 31, 2019. The amounts in the rollforward categories are estimates, based on the predominant driver of the change.

Year ended December 31, 2019 (in millions)	Standardized			Advanced			
	Credit risk RWA	Market risk RWA	**Total RWA**	Credit risk RWA	Market risk RWA	Operational risk RWA	**Total RWA**
December 31, 2018	$ 1,423,053	$ 105,863	**$ 1,528,916**	$ 926,647	$ 105,976	$ 388,582	**$ 1,421,205**
Model & data changes[a]	(6,406)	(24,433)	**(30,839)**	(34,584)	(24,433)	–	**(59,017)**
Portfolio runoff[b]	(5,800)	–	**(5,800)**	(5,500)	–	–	**(5,500)**
Movement in portfolio levels[c]	29,373	(5,781)	**23,592**	46,385	(5,891)	696	**41,190**
Changes in RWA	17,167	(30,214)	**(13,047)**	6,301	(30,324)	696	**(23,327)**
December 31, 2019	**$ 1,440,220**	**$ 75,649**	**$ 1,515,869**	**$ 932,948**	**$ 75,652**	**$ 389,278**	**$ 1,397,878**

(a) Model & data changes refer to material movements in levels of RWA as a result of revised methodologies and/or treatment per regulatory guidance (exclusive of rule changes); and an update to the wholesale credit risk Advanced Approach parameters.
(b) Portfolio runoff for credit risk RWA primarily reflects reduced risk from position rolloffs in legacy portfolios in Home Lending.
(c) Movement in portfolio levels (inclusive of rule changes) refers to: changes in book size, composition, credit quality, and market movements for credit risk RWA; changes in position and market movements for market risk RWA; and updates to cumulative losses for operational risk RWA.

Supplementary leverage ratio

The following table presents the components of the Firm's SLR as of December 31, 2019 and 2018.

(in millions, except ratio)	**December 31, 2019**	December 31, 2018
Tier 1 capital	**$ 214,432**	$ 209,093
Total average assets	2,777,270	$ 2,636,505
Less: Adjustments for deductions from Tier 1 capital	47,031	46,618
Total adjusted average assets[a]	2,730,239	2,589,887
Off-balance sheet exposures[b]	693,192	680,101
Total leverage exposure	**$ 3,423,431**	$ 3,269,988
SLR	**6.3%**	6.4%

(a) Adjusted average assets, for purposes of calculating the SLR, includes total quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill and other intangible assets.
(b) Off-balance sheet exposures are calculated as the average of the three month-end spot balances during the reporting quarter.

Refer to Note 27 for JPMorgan Chase Bank, N.A.'s SLR ratios.

Line of business equity

Each business segment is allocated capital by taking into consideration a variety of factors including capital levels of similarly rated peers and applicable regulatory capital requirements. ROE is measured and internal targets for expected returns are established as key measures of a business segment's performance.

The Firm's allocation methodology incorporates Basel III Standardized RWA, Basel III Advanced RWA, leverage, the GSIB surcharge, and a simulation of capital in a severe stress environment. Periodically, the assumptions and methodologies used to allocate capital are assessed and as a result, the capital allocated to the LOBs may change. The Firm will assess impacts from any regulatory changes to the capital framework as changes are finalized.

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

Line of business equity (Allocated capital)

(in billions)	**January 1, 2020**	December 31, 2019	December 31, 2018
Consumer & Community Banking	**$ 52.0**	$ 52.0	$ 51.0
Corporate & Investment Bank	**80.0**	80.0	70.0
Commercial Banking	**22.0**	22.0	20.0
Asset & Wealth Management	**10.5**	10.5	9.0
Corporate[a]	**67.1**	69.8	80.4
Total common stockholders' equity	**$ 231.6**	$ 234.3	$ 230.4

(a) Includes the $2.7 billion (after-tax) impact to retained earnings upon the adoption of CECL on January 1, 2020.

Capital actions

Preferred stock

Preferred stock dividends declared were $1.6 billion for the year ended December 31, 2019.

During the year ended December 31, 2019 and through the date of filing of the 2019 Form 10-K, the Firm issued and redeemed several series of non-cumulative preferred stock. Refer to Note 21 for additional information on the Firm's preferred stock, including issuances and redemptions.

Common stock dividends

The Firm's common stock dividends are planned as part of the Capital Management governance framework in line with the Firm's capital management objectives.

On September 17, 2019, the Firm announced that its Board of Directors had declared a quarterly common stock dividend of $0.90 per share, an increase from $0.80 per share, effective with the dividend paid on October 31, 2019. The Firm's dividends are subject to the Board of Directors' approval on a quarterly basis.

Refer to Note 21 and Note 26 for information regarding dividend restrictions.

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

Year ended December 31,	2019	2018	2017
Common dividend payout ratio	**31%**	30%	33%

Common equity
The Firm's Board of Directors has authorized the repurchase of up to $29.4 billion of gross common equity between July 1, 2019 and June 30, 2020 as part of the Firm's annual capital plan. As of December 31, 2019, $15.6 billion of authorized repurchase capacity remained under this common equity repurchase program.

The following table sets forth the Firm's repurchases of common equity for the years ended December 31, 2019, 2018 and 2017.

Year ended December 31, (in millions)	2019	2018	2017
Total number of shares of common stock repurchased	**213.0**	181.5	166.6
Aggregate purchase price of common stock repurchases	**$ 24,121**	$ 19,983	$ 15,410

The Firm from time to time enters into written trading plans under Rule 10b5-1 of the Securities Exchange Act of 1934 to facilitate repurchases in accordance with the common equity repurchase program. A Rule 10b5-1 repurchase plan allows the Firm to repurchase its equity during periods when it may otherwise not be repurchasing common equity – for example, during internal trading blackout periods.

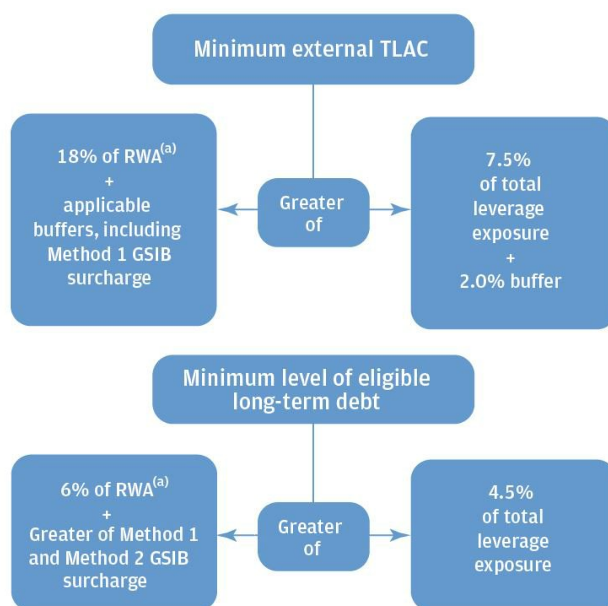
The authorization to repurchase common equity is utilized at management's discretion, and the timing of purchases and the exact amount of common equity that may be repurchased is subject to various factors, including market conditions; legal and regulatory considerations affecting the amount and timing of repurchase activity; the Firm's capital position (taking into account goodwill and intangibles); internal capital generation; and alternative investment opportunities. The repurchase program does not include specific price targets or timetables; may be executed through open market purchases or privately negotiated transactions, or utilizing Rule 10b5-1 plans; and may be suspended by management at any time.

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

Other capital requirements

Total Loss-Absorbing Capacity ("TLAC")
Effective January 1, 2019, the Federal Reserve's TLAC rule requires the U.S. GSIB top-tier holding companies, including JPMorgan Chase & Co., to maintain minimum levels of external TLAC and eligible long-term debt ("eligible LTD").

The minimum external TLAC and the minimum level of eligible long-term debt requirements are shown below:



(a) RWA is the greater of Standardized and Advanced.

Failure to maintain TLAC equal to or in excess of the regulatory minimum plus applicable buffers may result in limitations to the amount of capital that the Firm may distribute, such as through dividends and common equity repurchases.

The following table presents the eligible external TLAC and LTD amounts, as well as a representation of the amounts as a percentage of the Firm's total RWA and total leverage exposure.

December 31, 2019 (in billions, except ratio)	Eligible external TLAC	Eligible LTD
Total eligible TLAC & LTD	$ 386.4	$ 161.8
% of RWA	25.5%	10.7%
Minimum requirement	23.0	9.5
Surplus/(shortfall)	$ 37.7	$ 17.8
% of total leverage exposure	11.3%	4.7%
Minimum requirement	9.5	4.5
Surplus/(shortfall)	$ 61.2	$ 7.8

Refer to Part I, Item 1A: Risk Factors on pages 6–28 of the 2019 Form 10-K for information on the financial consequences to holders of the Firm's debt and equity securities in a resolution scenario.

Broker-dealer regulatory capital

J.P. Morgan Securities
JPMorgan Chase's principal U.S. broker-dealer subsidiary is J.P. Morgan Securities. J.P. Morgan Securities is subject to Rule 15c3-1 under the Securities Exchange Act of 1934 (the "Net Capital Rule"). J.P. Morgan Securities is also registered as a futures commission merchant and subject to the Rules of the Commodity Futures Trading Commission ("CFTC").

J.P. Morgan Securities has elected to compute its minimum net capital requirements in accordance with the "Alternative Net Capital Requirements" of the Net Capital Rule.

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

December 31, 2019 (in millions)	Actual	Minimum
Net Capital	$ 21,050	$ 3,751

In addition to its alternative minimum net capital requirements, J.P. Morgan Securities is required to hold "tentative net capital" in excess of $1.0 billion and is also required to notify the SEC in the event that its tentative net capital is less than $5.0 billion. Tentative net capital is net capital before deducting market and credit risk charges as defined by the Net Capital Rule. As of December 31, 2019, J.P. Morgan Securities maintained tentative net capital in excess of the minimum and notification requirements.

J.P. Morgan Securities plc
J.P. Morgan Securities plc is a wholly-owned subsidiary of JPMorgan Chase Bank, N.A. and has authority to engage in banking, investment banking and broker-dealer activities. J.P. Morgan Securities plc is jointly regulated by the U.K. Prudential Regulation Authority ("PRA") and the Financial Conduct Authority ("FCA"). J.P. Morgan Securities plc is subject to the European Union Capital Requirements Regulation and the PRA capital rules, each of which implemented Basel III and thereby subject J.P. Morgan Securities plc to its requirements.

The Bank of England requires, on a transitional basis, that U.K. banks, including U.K. regulated subsidiaries of overseas groups, maintain a minimum requirement for own funds and eligible liabilities ("MREL"). As of December 31, 2019, J.P. Morgan Securities plc was compliant with the requirements of the MREL rule.

The following table presents J.P. Morgan Securities plc's capital metrics:

December 31, 2019 (in millions, except ratios)	Estimated	Minimum ratios
Total capital	$ 52,983	
CET1 ratio	16.5%	4.5%
Total capital ratio	21.3%	8.0%

Liquidity risk is the risk that the Firm will be unable to meet its contractual and contingent financial obligations as they arise or that it does not have the appropriate amount, composition and tenor of funding and liquidity to support its assets and liabilities.

Liquidity risk oversight

The Firm has a liquidity risk oversight function whose primary objective is to provide independent assessment, measurement, monitoring, and control of liquidity risk across the Firm. Liquidity Risk Oversight's responsibilities include:

- Defining, monitoring and reporting liquidity risk metrics;
- Establishing and monitoring limits and indicators, including Liquidity Risk Appetite;
- Developing a process to classify, monitor and report limit breaches;
- Performing an independent review of liquidity risk management processes;
- Monitoring and reporting internal firmwide and legal entity liquidity stress tests as well as regulatory defined liquidity stress tests;
- Approving or escalating for review new or updated liquidity stress assumptions; and
- Monitoring liquidity positions, balance sheet variances and funding activities;

Liquidity management

Treasury and CIO is responsible for liquidity management. The primary objectives of effective liquidity management are to:

- Ensure that the Firm's core businesses and material legal entities are able to operate in support of client needs and meet contractual and contingent financial obligations through normal economic cycles as well as during stress events, and
- Manage an optimal funding mix and availability of liquidity sources.

As part of the Firm's overall liquidity management strategy, the Firm manages liquidity and funding using a centralized, global approach in order to:

- Optimize liquidity sources and uses;
- Monitor exposures;
- Identify constraints on the transfer of liquidity between the Firm's legal entities; and
- Maintain the appropriate amount of surplus liquidity at a firmwide and legal entity level, where relevant.

In the context of the Firm's liquidity management, Treasury and CIO is responsible for:

- Analyzing and understanding the liquidity characteristics of the assets and liabilities of the Firm, LOBs and legal entities, taking into account legal, regulatory, and operational restrictions;
- Developing internal liquidity stress testing assumptions;
- Defining and monitoring firmwide and legal entity-specific liquidity strategies, policies, reporting and contingency funding plans;
- Managing liquidity within the Firm's approved liquidity risk appetite tolerances and limits;
- Managing compliance with regulatory requirements related to funding and liquidity risk; and
- Setting transfer pricing in accordance with underlying liquidity characteristics of balance sheet assets and liabilities as well as certain off-balance sheet items.

Governance

Committees responsible for liquidity governance include the firmwide ALCO as well as LOB and regional ALCOs, the Treasurer Committee, and the CTC Risk Committee. In addition, the Board Risk Committee reviews and recommends to the Board of Directors, for formal approval, the Firm's liquidity risk tolerances, liquidity strategy, and liquidity policy. Refer to Firmwide Risk Management on pages 79–83 for further discussion of ALCO and other risk-related committees.

Internal stress testing

Liquidity stress tests are intended to ensure that the Firm has sufficient liquidity under a variety of adverse scenarios, including scenarios analyzed as part of the Firm's resolution and recovery planning. Stress scenarios are produced for JPMorgan Chase & Co. ("Parent Company") and the Firm's material legal entities on a regular basis, and other stress tests are performed in response to specific market events or concerns. Liquidity stress tests assume all of the Firm's contractual financial obligations are met and take into consideration:

- Varying levels of access to unsecured and secured funding markets,
- Estimated non-contractual and contingent cash outflows, and
- Potential impediments to the availability and transferability of liquidity between jurisdictions and material legal entities such as regulatory, legal or other restrictions.

Liquidity outflow assumptions are modeled across a range of time horizons and currency dimensions and contemplate both market and idiosyncratic stresses.

Results of stress tests are considered in the formulation of the Firm's funding plan and assessment of its liquidity position. The Parent Company acts as a source of funding for the Firm through equity and long-term debt issuances, and its intermediate holding company, JPMorgan Chase Holdings LLC (the "IHC") provides funding support to the ongoing operations of the Parent Company and its subsidiaries. The Firm maintains liquidity at the Parent Company, IHC, and operating subsidiaries at levels sufficient to comply with liquidity risk tolerances and minimum

liquidity requirements, and to manage through periods of stress when access to normal funding sources may be disrupted.

Contingency funding plan

The Firm's contingency funding plan ("CFP"), which is approved by the firmwide ALCO and the Board Risk Committee, is a compilation of procedures and action plans for managing liquidity through stress events. The CFP incorporates the limits and indicators set by the Liquidity Risk Oversight group. These limits and indicators are reviewed regularly to identify emerging risks or vulnerabilities in the Firm's liquidity position. The CFP identifies the alternative contingent funding and liquidity resources available to the Firm and its legal entities in a period of stress.

Liquidity Coverage Ratio

The LCR rule requires that the Firm maintain an amount of unencumbered High Quality Liquid Assets ("HQLA") that is sufficient to meet its estimated total net cash outflows over a prospective 30 calendar-day period of significant stress. HQLA is the amount of liquid assets that qualify for inclusion in the LCR. HQLA primarily consist of unencumbered cash and certain high-quality liquid securities as defined in the LCR rule.

Under the LCR rule, the amount of HQLA held by JPMorgan Chase Bank, N.A. that is in excess of its stand-alone 100% minimum LCR requirement, and that is not transferable to non-bank affiliates, must be excluded from the Firm's reported HQLA.

Estimated net cash outflows are based on standardized stress outflow and inflow rates prescribed in the LCR rule, which are applied to the balances of the Firm's assets, sources of funds, and obligations. The LCR is required to be a minimum of 100%.

The following table summarizes the Firm's average LCR for the three months ended December 31, 2019, September 30, 2019 and December 31, 2018 based on the Firm's interpretation of the finalized LCR framework.

	Three months ended		
Average amount (in millions)	**December 31, 2019**	September 30, 2019	December 31, 2018
HQLA			
Eligible cash[(a)]	**$ 203,296**	$ 199,757	$ 297,069
Eligible securities[(b)(c)]	**341,990**	337,704	232,201
Total HQLA[(d)]	**$ 545,286**	$ 537,461	$ 529,270
Net cash outflows	**$ 469,402**	$ 468,452	$ 467,704
LCR	**116%**	115%	113%
Net excess HQLA [(d)]	**$ 75,884**	$ 69,009	$ 61,566

(a) Represents cash on deposit at central banks, primarily the Federal Reserve Banks.
(b) Predominantly U.S. Treasuries, U.S. GSE and government agency MBS, and sovereign bonds net of applicable haircuts under the LCR rule.
(c) HQLA eligible securities may be reported in securities borrowed or purchased under resale agreements, trading assets, or investment securities on the Firm's Consolidated balance sheets.
(d) Excludes average excess HQLA at JPMorgan Chase Bank, N.A. that are not transferable to non-bank affiliates.

The Firm's average LCR increased during the three months ended December 31, 2019, compared with both the three-month periods ended September 30, 2019 and December 31, 2018, due to an increase in HQLA from unsecured long-term debt issuances. Additionally, liquidity in JPMorgan Chase Bank, N.A. increased during the fourth quarter and from the prior year period primarily due to growth in stable deposits. This increase in excess liquidity is excluded from the Firm's reported LCR under the LCR rule.

The Firm's average LCR fluctuates from period to period, due to changes in its HQLA and estimated net cash outflows as a result of ongoing business activity. Refer to the Firm's U.S. LCR Disclosure reports, which are available on the Firm's website for a further discussion of the Firm's LCR.

Other liquidity sources

In addition to the assets reported in the Firm's HQLA above, the Firm had unencumbered marketable securities, such as equity securities and fixed income debt securities, that the Firm believes would be available to raise liquidity of approximately $315 billion and $226 billion as of December 31, 2019 and 2018, respectively. This includes securities included as part of the excess liquidity at JPMorgan Chase Bank, N.A. that are not transferable to non-bank affiliates, as described above. The amount of such securities increased from the prior year.

The Firm also had available borrowing capacity at FHLBs and the discount window at the Federal Reserve Bank as a result of collateral pledged by the Firm to such banks of approximately $322 billion and $276 billion as of December 31, 2019 and 2018, respectively. This borrowing capacity excludes the benefit of cash and securities reported in the Firm's HQLA or other unencumbered securities that are currently pledged at the Federal Reserve Bank discount window and other central banks. Available borrowing capacity increased from the prior year primarily as a result of an increase in collateral available to be pledged as a result of the merger of Chase Bank USA, N.A. with and into JPMorgan Chase Bank, N.A., and an increase in available collateral as a result of maturities of borrowings from FHLBs. Although available, the Firm does not view this borrowing capacity at the Federal Reserve Bank discount window and the other central banks as a primary source of liquidity.

Funding

Sources of funds

Management believes that the Firm's unsecured and secured funding capacity is sufficient to meet its on- and off-balance sheet obligations.

The Firm funds its global balance sheet through diverse sources of funding including stable deposits, secured and unsecured funding in the capital markets and stockholders' equity. Deposits are the primary funding source for JPMorgan Chase Bank, N.A. Additionally, JPMorgan Chase Bank, N.A. may also access funding through short- or long-term secured borrowings, through the issuance of unsecured long-term debt, or from borrowings from the Parent company or the IHC. The Firm's non-bank subsidiaries are primarily funded from long-term unsecured borrowings and short-term secured borrowings, primarily securities loaned or sold under repurchase agreements. Excess funding is invested by Treasury and CIO in the Firm's investment securities portfolio or deployed in cash or other short-term liquid investments based on their interest rate and liquidity risk characteristics.

Deposits

The table below summarizes, by LOB, the period-end and average deposit balances as of and for the years ended December 31, 2019 and 2018.

As of or for the year ended December 31,			Average	
(in millions)	**2019**	2018	**2019**	2018
Consumer & Community Banking	**$ 718,416**	$ 678,854	**$ 693,550**	$ 670,388
Corporate & Investment Bank	**511,843**	482,084	**515,913**	477,250
Commercial Banking	**184,115**	170,859	**172,666**	170,822
Asset & Wealth Management	**147,804**	138,546	**140,118**	137,272
Corporate	**253**	323	**820**	729
Total Firm	**$ 1,562,431**	$ 1,470,666	**$ 1,523,067**	$ 1,456,461

Deposits provide a stable source of funding and reduce the Firm's reliance on the wholesale funding markets. A significant portion of the Firm's deposits are consumer deposits and wholesale operating deposits, which are both considered to be stable sources of liquidity. Wholesale operating deposits are considered to be stable sources of liquidity because they are generated from customers that maintain operating service relationships with the Firm.

The table below shows the loan and deposit balances, the loans-to-deposits ratios, and deposits as a percentage of total liabilities, as of December 31, 2019 and 2018.

As of December 31, (in billions except ratios)	**2019**	2018
Deposits	**$ 1,562.4**	$ 1,470.7
Deposits as a % of total liabilities	**64%**	62%
Loans	**959.8**	984.6
Loans-to-deposits ratio	**61%**	67%

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

Average deposits across the Firm increased for the year ended December 31, 2019.

The increase in CIB reflects growth in operating deposits driven by client activity, primarily in Treasury Services, and an increase in client-driven net issuances of structured notes in Markets. The increase in CCB was driven by continued growth in new accounts. The increases in AWM and CB were primarily driven by growth in interest-bearing deposits; for AWM, the growth was partially offset by migration, predominantly into the Firm's investment-related products.

Refer to the discussion of the Firm's Business Segment Results and the Consolidated Balance Sheets Analysis on pages 60–78 and pages 52–53, respectively, for further information on deposit and liability balance trends.

The following table summarizes short-term and long-term funding, excluding deposits, as of December 31, 2019 and 2018, and average balances for the years ended December 31, 2019 and 2018. Refer to the Consolidated Balance Sheets Analysis on pages 52–53 and Note 20 for additional information.

Sources of funds (excluding deposits)

As of or for the year ended December 31, (in millions)	2019	2018	Average 2019	Average 2018
Commercial paper	**$ 14,754**	$ 30,059	**$ 22,977**	$ 27,834
Other borrowed funds	**7,544**	8,789	**10,369**	11,369
Total short-term unsecured funding	**$ 22,298**	$ 38,848	**$ 33,346**	$ 39,203
Securities sold under agreements to repurchase[(a)]	**$ 175,709**	$ 171,975	**$ 217,807**	$ 177,629
Securities loaned[(a)]	**5,983**	9,481	**8,816**	10,692
Other borrowed funds[(b)]	**18,622**	30,428	**26,050**	24,320
Obligations of Firm-administered multi-seller conduits[(c)]	**9,223**	4,843	**10,929**	3,396
Total short-term secured funding	**$ 209,537**	$ 216,727	**$ 263,602**	$ 216,037
Senior notes	**$ 166,185**	$ 162,733	**$ 168,546**	$ 153,162
Trust preferred securities	**—**	—	**—**	471
Subordinated debt	**17,591**	16,743	**17,387**	16,178
Structured notes[(d)]	**74,724**	53,090	**65,487**	49,640
Total long-term unsecured funding	**$ 258,500**	$ 232,566	**$ 251,420**	$ 219,451
Credit card securitization[(c)]	**$ 6,461**	$ 13,404	**$ 9,707**	$ 15,900
FHLB advances	**28,635**	44,455	**34,143**	52,121
Other long-term secured funding[(e)]	**4,363**	5,010	**4,643**	4,842
Total long-term secured funding	**$ 39,459**	$ 62,869	**$ 48,493**	$ 72,863
Preferred stock[(f)]	**$ 26,993**	$ 26,068	**$ 27,511**	$ 26,249
Common stockholders' equity[(f)]	**$ 234,337**	$ 230,447	**$ 232,907**	$ 229,222

(a) Primarily consists of short-term securities loaned or sold under agreements to repurchase.
(b) There were no FHLB advances with original maturities of less than one year as of December 31, 2019. As of December 31, 2018, includes FHLB advances with original maturities of less than one year of $11.4 billion.
(c) Included in beneficial interests issued by consolidated variable interest entities on the Firm's Consolidated balance sheets.
(d) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.
(e) Includes long-term structured notes which are secured.
(f) Refer to Capital Risk Management on pages 85–92, Consolidated statements of changes in stockholders' equity on page 149, and Note 21 and Note 22 for additional information on preferred stock and common stockholders' equity.

Short-term funding

The Firm's sources of short-term secured funding primarily consist of securities loaned or sold under agreements to repurchase. These instruments are secured predominantly by high-quality securities collateral, including government-issued debt, U.S. GSE and government agency MBS. Securities loaned or sold under agreements to repurchase were relatively flat at December 31, 2019, compared with December 31, 2018, as the net increase from the Firm's participation in the Federal Reserve's open market operations was offset by client-driven activities, and lower secured financing of trading assets-debt instruments, all in CIB.

The balances associated with securities loaned or sold under agreements to repurchase fluctuate over time due to customers' investment and financing activities, the Firm's demand for financing, the ongoing management of the mix of the Firm's liabilities, including its secured and unsecured financing (for both the investment securities and market-making portfolios), and other market and portfolio factors.

The Firm's sources of short-term unsecured funding primarily consist of issuance of wholesale commercial paper. The decrease in commercial paper at December 31, 2019, from December 31, 2018, was due to lower net issuance primarily for short-term liquidity management.

Long-term funding and issuance

Long-term funding provides additional sources of stable funding and liquidity for the Firm. The Firm's long-term funding plan is driven primarily by expected client activity, liquidity considerations, and regulatory requirements, including TLAC. Long-term funding objectives include maintaining diversification, maximizing market access and optimizing funding costs. The Firm evaluates various funding markets, tenors and currencies in creating its optimal long-term funding plan.

The significant majority of the Firm's long-term unsecured funding is issued by the Parent Company to provide flexibility in support of both bank and non-bank subsidiary funding needs. The Parent Company advances substantially all net funding proceeds to its subsidiary, the IHC. The IHC does not issue debt to external counterparties. The following table summarizes long-term unsecured issuance and maturities or redemptions for the years ended December 31, 2019 and 2018. Refer to Note 20 for additional information on long-term debt.

Long-term unsecured funding

Year ended December 31,	2019	2018	2019	2018
(Notional in millions)	Parent Company		Subsidiaries	
Issuance				
Senior notes issued in the U.S. market	**$ 14,000**	$ 22,000	**$ 1,750**	$ 9,562
Senior notes issued in non-U.S. markets	**5,867**	1,502	**–**	–
Total senior notes	**19,867**	23,502	**1,750**	9,562
Structured notes[a]	**5,844**	2,444	**33,563**	25,410
Total long-term unsecured funding – issuance	**$ 25,711**	$ 25,946	**$ 35,313**	$ 34,972
Maturities/redemptions				
Senior notes	**$ 18,098**	$ 19,141	**$ 5,367**	$ 4,466
Subordinated debt	**183**	136	**–**	–
Structured notes	**2,944**	2,678	**19,271**	15,049
Total long-term unsecured funding – maturities/redemptions	**$ 21,225**	$ 21,955	**$ 24,638**	$ 19,515

(a) Includes certain TLAC-eligible long-term unsecured debt issued by the Parent Company.

The Firm can also raise secured long-term funding through securitization of consumer credit card loans and advances from the FHLBs. The following table summarizes the securitization issuance and FHLB advances and their respective maturities or redemptions for the years ended December 31, 2019 and 2018.

Long-term secured funding

Year ended December 31,	Issuance		Maturities/Redemptions	
(in millions)	2019	2018	2019	2018
Credit card securitization	**$ –**	$ 1,396	**$ 6,975**	$ 9,250
FHLB advances	**–**	9,000	**15,817**	25,159
Other long-term secured funding[a]	**204**	377	**927**	289
Total long-term secured funding	**$ 204**	$ 10,773	**$ 23,719**	$ 34,698

(a) Includes long-term structured notes which are secured.

The Firm's wholesale businesses also securitize loans for client-driven transactions; those client-driven loan securitizations are not considered to be a source of funding for the Firm and are not included in the table above. Refer to Note 14 for further description of the client-driven loan securitizations.

Credit ratings

The cost and availability of financing are influenced by credit ratings. Reductions in these ratings could have an adverse effect on the Firm's access to liquidity sources, increase the cost of funds, trigger additional collateral or funding requirements and decrease the number of investors and counterparties willing to lend to the Firm. The nature and magnitude of the impact of ratings downgrades depends on numerous contractual and behavioral factors, which the Firm believes are incorporated in its liquidity risk and stress testing metrics. The Firm believes that it maintains sufficient liquidity to withstand a potential decrease in funding capacity due to ratings downgrades.

Additionally, the Firm's funding requirements for VIEs and other third- party commitments may be adversely affected by a decline in credit ratings.

The credit ratings of the Parent Company and the Firm's principal bank and non-bank subsidiaries as of December 31, 2019, were as follows.

	JPMorgan Chase & Co.			JPMorgan Chase Bank, N.A.[a]			J.P. Morgan Securities LLC J.P. Morgan Securities plc		
December 31, 2019	Long-term issuer	Short-term issuer	Outlook	Long-term issuer	Short-term issuer	Outlook	Long-term issuer	Short-term issuer	Outlook
Moody's Investors Service	A2	P-1	Stable	Aa2	P-1	Stable	Aa3	P-1	Stable
Standard & Poor's	A-	A-2	Stable	A+	A-1	Stable	A+	A-1	Stable
Fitch Ratings	AA-	F1+	Stable	AA	F1+	Stable	AA	F1+	Stable

(a) On May 18, 2019, Chase Bank USA, N.A. merged with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. The credit rating for JPMorgan Chase Bank, N.A. reflects the credit rating of the merged entity.

JPMorgan Chase's unsecured debt does not contain requirements that would call for an acceleration of payments, maturities or changes in the structure of the existing debt, provide any limitations on future borrowings or require additional collateral, based on unfavorable changes in the Firm's credit ratings, financial ratios, earnings, or stock price.

Critical factors in maintaining high credit ratings include a stable and diverse earnings stream, strong capital and liquidity ratios, strong credit quality and risk management controls, and diverse funding sources. Rating agencies continue to evaluate economic and geopolitical trends, regulatory developments, future profitability, risk management practices, and litigation matters, as well as their broader ratings methodologies. Changes in any of these factors could lead to changes in the Firm's credit ratings.

Reputation risk is the risk that an action or inaction may negatively impact the Firm's integrity and reduce confidence in the Firm's competence held by various constituents, including clients, counterparties, customers, investors, regulators, employees, communities or the broader public.

Organization and management

Reputation Risk Management is an independent risk management function that establishes the governance framework for managing reputation risk across the Firm. As reputation risk is inherently difficult to identify, manage, and quantify, an independent reputation risk management governance function is critical.

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

- Establishing a Firmwide Reputation Risk Governance policy and standards consistent with the reputation risk framework
- Managing the governance infrastructure and processes that support consistent identification, escalation, management and monitoring of reputation risk issues Firmwide
- Providing guidance to LOB Reputation Risk Offices ("RRO"), as appropriate

The types of events that give rise to reputation risk are broad and could be introduced in various ways, including by the Firm's employees and the clients, customers and counterparties with which the Firm does business. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Firm.

Governance and oversight

The Firm's Reputation Risk Governance policy establishes the principles for managing reputation risk for the Firm. It is the responsibility of employees in each LOB and Corporate to consider the reputation of the Firm when deciding whether to offer a new product, engage in a transaction or client relationship, enter a new jurisdiction, initiate a business process or other matters. Increasingly, sustainability, social responsibility and environmental impacts are important considerations in assessing the Firm's reputation risk, and are considered as part of reputation risk governance.

Reputation risk issues deemed material are escalated as appropriate.

CREDIT AND INVESTMENT RISK MANAGEMENT

Credit and investment risk is the risk associated with the default or change in credit profile of a client, counterparty or customer; or loss of principal or a reduction in expected returns on investments, including consumer credit risk, wholesale credit risk, and investment portfolio risk.

Credit risk management

Credit risk is the risk associated with the default or change in credit profile of a client, counterparty or customer. The Firm provides credit to a variety of customers, ranging from large corporate and institutional clients to individual consumers and small businesses. In its consumer businesses, the Firm is exposed to credit risk primarily through its home lending, credit card, auto, and business banking businesses. In its wholesale businesses, the Firm is exposed to credit risk through its underwriting, lending, market-making, and hedging activities with and for clients and counterparties, as well as through its operating services activities (such as cash management and clearing activities), securities financing activities, investment securities portfolio, and cash placed with banks.

Credit Risk Management is an independent risk management function that monitors, measures and manages credit risk throughout the Firm and defines credit risk policies and procedures. The Firm's credit risk management governance includes the following activities:

- Establishing a credit risk policy framework
- Monitoring, measuring and managing credit risk across all portfolio segments, including transaction and exposure approval
- Setting industry and geographic concentration limits, as appropriate, and establishing underwriting guidelines
- Assigning and managing credit authorities in connection with the approval of credit exposure
- Managing criticized exposures and delinquent loans
- Estimating credit losses and ensuring appropriate credit risk-based capital management

Risk identification and measurement

The Credit Risk Management function monitors, measures, manages and limits credit risk across the Firm's businesses. To measure credit risk, the Firm employs several methodologies for estimating the likelihood of obligor or counterparty default. Methodologies for measuring credit risk vary depending on several factors, including type of asset (e.g., consumer versus wholesale), risk measurement parameters (e.g., delinquency status and borrower's credit score versus wholesale risk-rating) and risk management and collection processes (e.g., retail collection center versus centrally managed workout groups). Credit risk measurement is based on the probability of default of an obligor or counterparty, the loss severity given a default event and the exposure at default.

Based on these factors and the methodology and estimates described in Note 13, the Firm estimates credit losses for its exposures. The allowance for loan losses reflects credit losses related to the consumer and wholesale held-for-investment loan portfolios, and the allowance for lending-related commitments reflects credit losses related to the Firm's lending-related commitments. Refer to Note 13 and Critical Accounting Estimates used by the Firm on pages 136-138 for further information.

In addition, potential and unexpected credit losses are reflected in the allocation of credit risk capital and represent the potential volatility of actual losses relative to the established allowances for loan losses and lending-related commitments. The analyses for these losses include stress testing that considers alternative economic scenarios as described in the Stress testing section below.

Stress testing

Stress testing is important in measuring and managing credit risk in the Firm's credit portfolio. The process assesses the potential impact of alternative economic and business scenarios on estimated credit losses for the Firm. Economic scenarios and the underlying parameters are defined centrally, articulated in terms of macroeconomic factors and applied across the businesses. The stress test results may indicate credit migration, changes in delinquency trends and potential losses in the credit portfolio. In addition to the periodic stress testing processes, management also considers additional stresses outside these scenarios, including industry and country-specific stress scenarios, as necessary. The Firm uses stress testing to inform decisions on setting risk appetite both at a Firm and LOB level, as well as to assess the impact of stress on individual counterparties.

Risk monitoring and management

The Firm has developed policies and practices that are designed to preserve the independence and integrity of the approval and decision-making process of extending credit to ensure credit risks are assessed accurately, approved properly, monitored regularly and managed actively at both the transaction and portfolio levels. The policy framework establishes credit approval authorities, concentration limits, risk-rating methodologies, portfolio review parameters and guidelines for management of distressed exposures. In addition, certain models, assumptions and inputs used in evaluating and monitoring credit risk are independently validated by groups that are separate from the LOBs.

Consumer credit risk is monitored for delinquency and other trends, including any concentrations at the portfolio level, as certain of these trends can be modified through changes in underwriting policies and portfolio guidelines. Consumer Risk Management evaluates delinquency and other trends against business expectations, current and forecasted economic conditions, and industry benchmarks. Historical and forecasted economic performance and trends are incorporated into the modeling of estimated consumer credit losses and are part of the monitoring of the credit risk profile of the portfolio.

Wholesale credit risk is monitored regularly at an aggregate portfolio, industry, and individual client and counterparty level with established concentration limits that are reviewed and revised periodically as deemed appropriate by management. Industry and counterparty limits, as measured in terms of exposure and economic risk appetite, are subject to stress-based loss constraints. In addition, wrong-way risk, that is the risk that exposure to a counterparty is positively correlated with the impact of a default by the same counterparty, which could cause exposure to increase at the same time as the counterparty's capacity to meet its obligations is decreasing - is actively monitored as this risk could result in greater exposure at default compared with a transaction with another counterparty that does not have this risk.

Management of the Firm's wholesale credit risk exposure is accomplished through a number of means, including:

- Loan underwriting and credit approval process
- Loan syndications and participations
- Loan sales and securitizations
- Credit derivatives
- Master netting agreements
- Collateral and other risk-reduction techniques

In addition to Credit Risk Management, an independent Credit Review function is responsible for:

- Independently validating or changing the risk grades assigned to exposures in the Firm's wholesale and commercial-oriented retail credit portfolios, and assessing the timeliness of risk grade changes initiated by responsible business units; and
- Evaluating the effectiveness of business units' credit management processes, including the adequacy of credit analyses and risk grading/LGD rationales, proper monitoring and management of credit exposures, and compliance with applicable grading policies and underwriting guidelines.

Refer to Note 12 for further discussion of consumer and wholesale loans.

Risk reporting

To enable monitoring of credit risk and effective decision-making, aggregate credit exposure, credit quality forecasts, concentration levels and risk profile changes are reported regularly to senior members of Credit Risk Management. Detailed portfolio reporting of industry, clients, counterparties and customers, product and geography are prepared, and the appropriateness of the allowance for credit losses is reviewed by senior management at least on a quarterly basis. Through the risk reporting and governance structure, credit risk trends and limit exceptions are provided regularly to, and discussed with, risk committees, senior management and the Board of Directors as appropriate.

CREDIT PORTFOLIO

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

In the following tables, reported loans include loans retained (i.e., held-for-investment); loans held-for-sale; and certain loans accounted for at fair value. The following tables do not include loans which the Firm accounts for at fair value and classifies as trading assets; refer to Notes 2 and 3 for further information regarding these loans. Refer to Notes 12, 28, and 5 for additional information on the Firm's loans, lending-related commitments and derivative receivables, including the Firm's accounting policies.

Refer to Note 10 for information regarding the credit risk inherent in the Firm's investment securities portfolio; and refer to Note 11 for information regarding credit risk inherent in the securities financing portfolio. Refer to Consumer Credit Portfolio on pages 103–107 and Note 12 for a further discussion of the consumer credit environment and consumer loans. Refer to Wholesale Credit Portfolio on pages 108–115 and Note 12 for a further discussion of the wholesale credit environment and wholesale loans.

Total credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming[d][e]	
	2019	2018	**2019**	2018
Loans retained	**$ 945,601**	$ 969,415	**$ 3,983**	$ 4,611
Loans held-for-sale	**7,064**	11,988	**7**	–
Loans at fair value	**7,104**	3,151	**90**	220
Total loans – reported	**959,769**	984,554	**4,080**	4,831
Derivative receivables	**49,766**	54,213	**30**	60
Receivables from customers and other[a]	**33,706**	30,217	**–**	–
Total credit-related assets	**1,043,241**	1,068,984	**4,110**	4,891
Assets acquired in loan satisfactions				
Real estate owned	**NA**	NA	**344**	269
Other	**NA**	NA	**43**	30
Total assets acquired in loan satisfactions	**NA**	NA	**387**	299
Lending-related commitments	**1,106,247**	1,039,258	**474**	469
Total credit portfolio	**$ 2,149,488**	$ 2,108,242	**$ 4,971**	$ 5,659
Credit derivatives used in credit portfolio management activities[b]	**$ (18,030)**	$ (12,682)	**$ –**	$ –
Liquid securities and other cash collateral held against derivatives[c]	**(16,009)**	(15,322)	**NA**	NA

Year ended December 31, (in millions, except ratios)	**2019**	2018
Net charge-offs	**$ 5,629**	$ 4,856
Average retained loans		
Loans	**941,919**	936,829
Loans – reported, excluding residential real estate PCI loans	**919,702**	909,386
Net charge-off rates		
Loans	**0.60%**	0.52%
Loans – excluding PCI	**0.61**	0.53

(a) Receivables from customers and other primarily represents brokerage-related held-for-investment customer receivables.
(b) Represents the net notional amount of protection purchased and sold through credit derivatives used to manage both performing and nonperforming wholesale credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. Refer to Credit derivatives on page 115 and Note 5 for additional information.
(c) Includes collateral related to derivative instruments where appropriate legal opinions have not been either sought or obtained with respect to master netting agreements.
(d) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(e) At December 31, 2019 and 2018, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $41 million and $75 million, respectively. These amounts have been excluded based upon the government guarantee. In addition, the Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status as permitted by regulatory guidance issued by the Federal Financial Institutions Examination Council ("FFIEC").

CONSUMER CREDIT PORTFOLIO

The Firm's retained consumer portfolio consists primarily of residential real estate loans, credit card loans, auto loans, and business banking loans, as well as associated lending-related commitments. The Firm's focus is on serving primarily the prime segment of the consumer credit market. Originated mortgage loans are retained in the mortgage portfolio, securitized or sold to U.S. government agencies and U.S. government-sponsored enterprises; other types of consumer loans are typically retained on the balance sheet. The credit performance of the consumer portfolio continues to benefit from discipline in credit underwriting as well as improvement in the economy driven by low unemployment and increasing home prices. Refer to Note 12 for further information on the consumer loan portfolio. Refer to Note 28 for further information on lending-related commitments.

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

Consumer credit portfolio

As of or for the year ended December 31, (in millions, except ratios)	Credit exposure		Nonaccrual loans[f][g]		Net charge-offs/ (recoveries)[h]		Net charge-off/ (recovery) rate[h][i]	
	2019	2018	**2019**	2018	**2019**	2018	**2019**	2018
Consumer, excluding credit card								
Loans, excluding PCI loans and loans held-for-sale								
Residential mortgage	**$ 199,037**	$ 231,078	**$ 1,618**	$ 1,765	**$ (44)**	$ (291)	**(0.02)%**	(0.13)%
Home equity	**23,917**	28,340	**1,162**	1,323	**(46)**	(5)	**(0.18)**	(0.02)
Auto[a][b]	**61,522**	63,573	**113**	128	**206**	243	**0.33**	0.38
Consumer & Business Banking[b][c]	**27,199**	26,612	**247**	245	**296**	236	**1.11**	0.90
Total loans, excluding PCI loans and loans held-for-sale	**311,675**	349,603	**3,140**	3,461	**412**	183	**0.13**	0.05
Loans – PCI								
Home equity	**7,377**	8,963	**NA**	NA	**NA**	NA	**NA**	NA
Prime mortgage	**3,965**	4,690	**NA**	NA	**NA**	NA	**NA**	NA
Subprime mortgage	**1,740**	1,945	**NA**	NA	**NA**	NA	**NA**	NA
Option ARMs	**7,281**	8,436	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – PCI	**20,363**	24,034	**NA**	NA	**NA**	NA	**NA**	NA
Total loans – retained	**332,038**	373,637	**3,140**	3,461	**412**	183	**0.12**	0.05
Loans held-for-sale	**3,002**	95	**2**	—	**NA**	NA	**NA**	NA
Total consumer, excluding credit card loans	**335,040**	373,732	**3,142**	3,461	**412**	183	**0.12**	0.05
Lending-related commitments[d]	**51,412**	46,066						
Receivables from customers	**—**	154						
Total consumer exposure, excluding credit card	**386,452**	419,952						
Credit Card								
Loans retained[e]	**168,924**	156,616	**—**	—	**4,848**	4,518	**3.10**	3.10
Loans held-for-sale	**—**	16	**—**	—	**NA**	NA	**NA**	NA
Total credit card loans	**168,924**	156,632	**—**	—	**4,848**	4,518	**3.10**	3.10
Lending-related commitments[d]	**650,720**	605,379						
Total credit card exposure	**819,644**	762,011						
Total consumer credit portfolio	**$ 1,206,096**	$ 1,181,963	**$ 3,142**	$ 3,461	**$ 5,260**	$ 4,701	**1.04 %**	0.90 %
Memo: Total consumer credit portfolio, excluding PCI	**$ 1,185,733**	$ 1,157,929	**$ 3,142**	$ 3,461	**$ 5,260**	$ 4,701	**1.09 %**	0.95 %

(a) At December 31, 2019 and 2018, excluded operating lease assets of $22.8 billion and $20.5 billion, respectively. These operating lease assets are included in other assets on the Firm's Consolidated balance sheets. Refer to Note 18 for further information.
(b) Includes certain business banking and auto dealer risk-rated loans for which the wholesale methodology is applied for determining the allowance for loan losses; these loans are managed by CCB, and therefore, for consistency in presentation, are included within the consumer portfolio.
(c) Predominantly includes Business Banking loans.
(d) Credit card and home equity lending-related commitments represent the total available lines of credit for these products. The Firm has not experienced, and does not anticipate, that all available lines of credit would be used at the same time. For credit card commitments, and if certain conditions are met, home equity commitments, the Firm can reduce or cancel these lines of credit by providing the borrower notice or, in some cases as permitted by law, without notice. Refer to Note 28 for further information.
(e) Includes billed interest and fees net of an allowance for uncollectible interest and fees.
(f) At December 31, 2019 and 2018, nonaccrual loans excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively. These amounts have been excluded from nonaccrual loans based upon the government guarantee. In addition, the Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status, as permitted by regulatory guidance issued by the FFIEC.
(g) Excludes PCI loans. The Firm is recognizing interest income on each pool of PCI loans as each of the pools is performing.
(h) Net charge-offs/(recoveries) and net charge-off/(recovery) rates excluded write-offs in the PCI portfolio of $151 million and $187 million for the years ended December 31, 2019 and 2018, respectively. These write-offs decreased the allowance for loan losses for PCI loans. Refer to Allowance for Credit Losses on pages 116–117 for further information.
(i) Average consumer loans held-for-sale were $2.9 billion and $387 million for the years ended December 31, 2019 and 2018, respectively. These amounts were excluded when calculating net charge-off/(recovery) rates.

Consumer, excluding credit card

Portfolio analysis

Loan balances decreased from December 31, 2018 due to lower residential real estate loans, predominantly driven by loan sales.

The following discussions provide information concerning individual loan products, excluding PCI loans which are addressed separately. Refer to Note 12 for further information about this portfolio, including information about delinquencies, loan modifications and other credit quality indicators.

Residential mortgage: The residential mortgage portfolio, including loans held-for-sale, predominantly consists of prime mortgage loans. The portfolio decreased from December 31, 2018 driven by paydowns as well as loan sales in Home Lending, largely offset by originations of prime mortgage loans that have been retained on the balance sheet. Net recoveries for the year ended December 31, 2019 were lower when compared with the prior year as the prior year benefited from larger recoveries on loan sales.

At December 31, 2019 and 2018, the Firm's residential mortgage portfolio included $22.4 billion and $21.6 billion, respectively, of interest-only loans. These loans have an interest-only payment period generally followed by an adjustable-rate or fixed-rate fully amortizing payment period to maturity and are typically originated as higher-balance loans to higher-income borrowers, predominantly in AWM. Performance of this portfolio for the year ended December 31, 2019 was consistent with the performance of the broader residential mortgage portfolio for the same period.

The following table provides a summary of the Firm's residential mortgage portfolio insured and/or guaranteed by U.S. government agencies, including loans held-for-sale. The Firm monitors its exposure to certain potential unrecoverable claim payments related to government insured loans and considers this exposure in estimating the allowance for loan losses.

(in millions)	December 31, 2019	December 31, 2018
Current	$ 1,280	$ 2,884
30-89 days past due	695	1,528
90 or more days past due	961	2,600
Total government guaranteed loans	**$ 2,936**	$ 7,012

Home equity: The home equity portfolio declined from December 31, 2018 primarily reflecting paydowns.

At December 31, 2019, approximately 90% of the Firm's home equity portfolio consists of home equity lines of credit ("HELOCs") and the remainder consisted of home equity loans ("HELOANs"). HELOANs are generally fixed-rate, closed-end, amortizing loans, with terms ranging from 3–30 years. In general, HELOCs originated by the Firm are revolving loans for a 10-year period, after which time the HELOC recasts into a loan with a 20-year amortization period.

The carrying value of HELOCs outstanding was $22 billion at December 31, 2019. This amount included $10 billion of HELOCs that have recast from interest-only to fully amortizing payments or have been modified and $3 billion of interest-only balloon HELOCs, which primarily mature after 2030. The Firm manages the risk of HELOCs during their revolving period by closing or reducing the undrawn line to the extent permitted by law when borrowers are exhibiting a material deterioration in their credit risk profile.

Auto: The auto portfolio predominantly consists of prime-quality loans. The portfolio declined when compared with December 31, 2018, as paydowns and charge-offs or liquidation of delinquent loans were predominantly offset by new originations.

Consumer & Business Banking: Consumer & Business Banking loans increased when compared with December 31, 2018 as loan originations were predominantly offset by paydowns and charge-offs of delinquent loans. Net charge-offs for the year ended December 31, 2019 increased when compared with the prior year primarily due to higher deposit overdraft losses.

Purchased credit-impaired loans: PCI loans represent certain loans that were acquired and deemed to be credit-impaired on the acquisition date. PCI loans decreased from December 31, 2018 due to portfolio run-off. As of December 31, 2019, approximately 9% of the option ARM PCI loans were delinquent and approximately 71% of the portfolio has been modified into fixed-rate, fully amortizing loans. The borrowers for substantially all of the remaining option ARM loans are making amortizing payments, although such payments are not necessarily fully amortizing. This latter group of loans is subject to the risk of payment shock due to future payment recast. Default rates generally increase on option ARM loans when payment recast results in a payment increase. The expected increase in default rates is considered in the Firm's quarterly impairment assessment.

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

Summary of PCI loans lifetime principal loss estimates

	Lifetime loss estimates[a]		Life-to-date liquidation losses[b]	
December 31, (in billions)	**2019**	2018	**2019**	2018
Home equity	**$ 13.9**	$ 14.1	**$ 13.0**	$ 13.0
Prime mortgage	**4.1**	4.1	**3.9**	3.9
Subprime mortgage	**3.4**	3.3	**3.2**	3.2
Option ARMs	**10.3**	10.3	**10.0**	9.9
Total	**$ 31.7**	$ 31.8	**$ 30.1**	$ 30.0

(a) Includes the original nonaccretable difference established in purchase accounting of $30.5 billion for principal losses plus additional principal losses recognized subsequent to acquisition through the provision and allowance for loan losses. The remaining nonaccretable difference for principal losses was $466 million and $512 million at December 31, 2019 and 2018, respectively.
(b) Represents both realization of loss upon loan resolution and any principal forgiven upon modification.

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

Geographic composition of residential real estate loans

At December 31, 2019, $142.7 billion, or 64% of the total retained residential real estate loan portfolio, excluding mortgage loans insured by U.S. government agencies and PCI loans, were concentrated in California, New York, Illinois, Texas and Florida, compared with $160.3 billion, or 63%, at December 31, 2018. Refer to Note 12 for additional information on the geographic composition of the Firm's residential real estate loans.

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

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

Modified residential real estate loans

The following table presents information as of December 31, 2019 and 2018, relating to modified retained residential real estate loans for which concessions have been granted to borrowers experiencing financial difficulty. Refer to Note 12 for further information on modifications for the years ended December 31, 2019 and 2018.

	2019		2018	
December 31, (in millions)	Retained loans	Nonaccrual retained loans[d]	Retained loans	Nonaccrual retained loans[d]
Modified residential real estate loans, excluding PCI loans[a][b]				
Residential mortgage	**$ 4,005**	**$ 1,367**	$ 4,565	$ 1,459
Home equity	**1,921**	**965**	2,058	963
Total modified residential real estate loans, excluding PCI loans	**$ 5,926**	**$ 2,332**	$ 6,623	$ 2,422
Modified PCI loans[c]				
Home equity	**$ 1,986**	**NA**	$ 2,086	NA
Prime mortgage	**2,825**	**NA**	3,179	NA
Subprime mortgage	**1,869**	**NA**	2,041	NA
Option ARMs	**5,692**	**NA**	6,410	NA
Total modified PCI loans	**$12,372**	**NA**	$13,716	NA

(a) Amounts represent the carrying value of modified residential real estate loans.
(b) At December 31, 2019 and 2018, $14 million and $4.1 billion, respectively, of loans modified subsequent to repurchase from Ginnie Mae in accordance with the standards of the appropriate government agency (i.e., Federal Housing Administration ("FHA"), U.S. Department of Veterans Affairs ("VA"), Rural Housing Service of the U.S. Department of Agriculture ("RHS")) are not included in the table above. When such loans perform subsequent to modification in accordance with Ginnie Mae guidelines, they are generally sold back into Ginnie Mae loan pools. Modified loans that do not re-perform become subject to foreclosure. Refer to Note 14 for additional information about sales of loans in securitization transactions with Ginnie Mae.
(c) Amounts represent the unpaid principal balance of modified PCI loans.
(d) As of December 31, 2019 and 2018, nonaccrual loans included $1.9 billion and $2.0 billion, respectively, of troubled debt restructurings ("TDRs") for which the borrowers were less than 90 days past due. Refer to Note 12 for additional information about loans modified in a TDR that are on nonaccrual status.

Nonperforming assets

The following table presents information as of December 31, 2019 and 2018, about consumer, excluding credit card, nonperforming assets.

Nonperforming assets[a]

December 31, (in millions)	2019	2018
Nonaccrual loans[b]		
Residential real estate	**$ 2,782**	$ 3,088
Other consumer	**360**	373
Total nonaccrual loans	**3,142**	3,461
Assets acquired in loan satisfactions		
Real estate owned[c]	**214**	196
Other	**24**	30
Total assets acquired in loan satisfactions	**238**	226
Total nonperforming assets	**$ 3,380**	$ 3,687

(a) At December 31, 2019 and 2018, nonperforming assets excluded mortgage loans 90 or more days past due and insured by U.S. government agencies of $961 million and $2.6 billion, respectively, and real estate owned ("REO") insured by U.S. government agencies of $41 million and $75 million, respectively. These amounts have been excluded based upon the government guarantee.
(b) Excludes PCI loans, which are accounted for on a pool basis. Since each pool is accounted for as a single asset with a single composite interest rate and an aggregate expectation of cash flows, the past-due status of the pools, or that of individual loans within the pools, is not meaningful. The Firm is recognizing interest income on each pool of loans as each of the pools is performing.
(c) The prior period amount has been revised to conform with the current period presentation.

Nonaccrual loans: The following table presents changes in the consumer, excluding credit card, nonaccrual loans for the years ended December 31, 2019 and 2018.

Nonaccrual loan activity

Year ended December 31, (in millions)	2019	2018
Beginning balance	**$ 3,461**	$ 4,209
Additions	**2,210**	2,799
Reductions:		
Principal payments and other[a]	**1,026**	1,407
Charge-offs	**421**	468
Returned to performing status	**834**	1,399
Foreclosures and other liquidations	**248**	273
Total reductions	**2,529**	3,547
Net changes	**(319)**	(748)
Ending balance	**$ 3,142**	$ 3,461

(a) Other reductions includes loan sales.

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

Credit card

Total credit card loans increased from December 31, 2018 due to higher sales volume from existing customers and new account growth. Net charge-offs increased for the year ended December 31, 2019 when compared with the prior year, due to loan growth, in line with expectations.

Consistent with the Firm's policy, all credit card loans typically remain on accrual status until charged off. However, the Firm establishes an allowance, which is offset against loans and reduces interest income, for the estimated uncollectible portion of accrued and billed interest and fee income. Refer to Note 12 for further information about this portfolio, including information about delinquencies.

Geographic and FICO composition of credit card loans

At December 31, 2019, $77.5 billion, or 46% of the total retained credit card loan portfolio, was concentrated in California, Texas, New York, Florida and Illinois, compared with $71.2 billion, or 45%, at December 31, 2018. Refer to Note 12 for additional information on the geographic and FICO composition of the Firm's credit card loans.

Modifications of credit card loans

At December 31, 2019 and 2018, the Firm had $1.5 billion and $1.3 billion, respectively, of credit card loans outstanding that have been modified in TDRs. Refer to Note 12 for additional information about loan modification programs for borrowers.

WHOLESALE CREDIT PORTFOLIO

In its wholesale businesses, the Firm is exposed to credit risk primarily through its underwriting, lending, market-making, and hedging activities with and for clients and counterparties, as well as through various operating services (such as cash management and clearing activities), securities financing activities and cash placed with banks. A portion of the loans originated or acquired by the Firm's wholesale businesses is generally retained on the balance sheet. The Firm distributes a significant percentage of the loans that it originates into the market as part of its syndicated loan business and to manage portfolio concentrations and credit risk.

The credit performance of the wholesale portfolio remained favorable for the year ended December 31, 2019, characterized by continued low levels of criticized exposure, nonaccrual loans and charge-offs. Refer to the industry discussion on pages 109–111 for further information. Loans held-for-sale decreased, driven by a loan syndication in CIB. The wholesale portfolio is actively managed, in part by conducting ongoing, in-depth reviews of client credit quality and transaction structure inclusive of collateral where applicable, and of industry, product and client concentrations.

In the following tables, the Firm's wholesale credit portfolio includes exposure held in CIB, CB, AWM and Corporate. It excludes all exposure managed by CCB, scored prime mortgage and scored home equity loans held in AWM and scored prime mortgage loans held in Corporate.

Wholesale credit portfolio

December 31, (in millions)	Credit exposure		Nonperforming	
	2019	2018	**2019**	2018
Loans retained	**$444,639**	$439,162	**$ 843**	$ 1,150
Loans held-for-sale	**4,062**	11,877	**5**	–
Loans at fair value	**7,104**	3,151	**90**	220
Loans – reported	**455,805**	454,190	**938**	1,370
Derivative receivables	**49,766**	54,213	**30**	60
Receivables from customers and other[(a)]	**33,706**	30,063	**–**	–
Total wholesale credit-related assets	**539,277**	538,466	**968**	1,430
Assets acquired in loan satisfactions				
Real estate owned	**NA**	NA	**130**	73
Other	**NA**	NA	**19**	–
Total assets acquired in loan satisfactions	**NA**	NA	**149**	73
Lending-related commitments	**404,115**	387,813	**474**	469
Total wholesale credit portfolio	**$943,392**	$926,279	**$ 1,591**	$ 1,972
Credit derivatives used in credit portfolio management activities[(b)]	**$ (18,030)**	$ (12,682)	**$ –**	$ –
Liquid securities and other cash collateral held against derivatives	**(16,009)**	(15,322)	**NA**	NA

(a) Receivables from customers and other include $33.7 billion and $30.1 billion of brokerage-related held-for-investment customer receivables at December 31, 2019 and 2018, respectively, to clients in CIB and AWM; these are classified in accrued interest and accounts receivable on the Consolidated balance sheets.

(b) Represents the net notional amount of protection purchased and sold through credit derivatives used to manage both performing and nonperforming wholesale credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. Refer to Credit derivatives on page 115 and Note 5 for additional information.

The following tables present the maturity and internal risk ratings profiles of the wholesale credit portfolio as of December 31, 2019 and 2018. The Firm considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade. Refer to Note 12 for further information on internal risk ratings.

Wholesale credit exposure – maturity and ratings profile

December 31, 2019 (in millions, except ratios)	Maturity profile[d]				Ratings profile			
	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	**Total**	Investment-grade	Noninvestment -grade	**Total**	Total % of IG
Loans retained	**$ 128,430**	**$ 209,397**	**$ 106,812**	**$ 444,639**	**$ 344,199**	**$ 100,440**	**$ 444,639**	**77%**
Derivative receivables				**49,766**			**49,766**	
Less: Liquid securities and other cash collateral held against derivatives				**(16,009)**			**(16,009)**	
Total derivative receivables, net of all collateral	**6,561**	**6,960**	**20,236**	**33,757**	**26,966**	**6,791**	**33,757**	**80**
Lending-related commitments	**77,298**	**314,281**	**12,536**	**404,115**	**288,864**	**115,251**	**404,115**	**71**
Subtotal	**212,289**	**530,638**	**139,584**	**882,511**	**660,029**	**222,482**	**882,511**	**75**
Loans held-for-sale and loans at fair value[a]				**11,166**			**11,166**	
Receivables from customers and other				**33,706**			**33,706**	
Total exposure – net of liquid securities and other cash collateral held against derivatives				**$ 927,383**			**$ 927,383**	
Credit derivatives used in credit portfolio management activities[b][c]	**$ (4,912)**	**$ (10,031)**	**$ (3,087)**	**$ (18,030)**	**$ (16,276)**	**$ (1,754)**	**$ (18,030)**	**90%**

December 31, 2018 (in millions, except ratios)	Maturity profile[d]				Ratings profile			
	Due in 1 year or less	Due after 1 year through 5 years	Due after 5 years	Total	Investment-grade	Noninvestment-grade	Total	Total % of IG
Loans retained	$ 138,458	$ 196,974	$ 103,730	$ 439,162	$ 339,729	$ 99,433	$ 439,162	77%
Derivative receivables				54,213			54,213	
Less: Liquid securities and other cash collateral held against derivatives				(15,322)			(15,322)	
Total derivative receivables, net of all collateral	11,038	9,169	18,684	38,891	31,794	7,097	38,891	82
Lending-related commitments	79,400	294,855	13,558	387,813	288,724	99,089	387,813	74
Subtotal	228,896	500,998	135,972	865,866	660,247	205,619	865,866	76
Loans held-for-sale and loans at fair value[a]				15,028			15,028	
Receivables from customers and other				30,063			30,063	
Total exposure – net of liquid securities and other cash collateral held against derivatives				$ 910,957			$ 910,957	
Credit derivatives used in credit portfolio management activities [b][c]	$ (447)	$ (9,318)	$ (2,917)	$ (12,682)	$ (11,213)	$ (1,469)	$ (12,682)	88%

(a) Represents loans held-for-sale, primarily related to syndicated loans and loans transferred from the retained portfolio, and loans at fair value.
(b) These derivatives do not qualify for hedge accounting under U.S. GAAP.
(c) The notional amounts are presented on a net basis by underlying reference entity and the ratings profile shown is based on the ratings of the reference entity on which protection has been purchased. Predominantly all of the credit derivatives entered into by the Firm where it has purchased protection used in credit portfolio management activities are executed with investment-grade counterparties.
(d) The maturity profile of retained loans, lending-related commitments and derivative receivables is based on remaining contractual maturity. Derivative contracts that are in a receivable position at December 31, 2019, may become payable prior to maturity based on their cash flow profile or changes in market conditions.

Wholesale credit exposure – industry exposures

The Firm focuses on the management and diversification of its industry exposures, and pays particular attention to industries with actual or potential credit concerns. Exposures deemed criticized align with the U.S. banking regulators' definition of criticized exposures, which consist of the special mention, substandard and doubtful categories. The total criticized component of the portfolio, excluding loans held-for-sale and loans at fair value, was $14.3 billion at December 31, 2019, compared with $12.1 billion at December 31, 2018. The increase was driven by select client downgrades.

Below are summaries of the Firm's exposures as of December 31, 2019 and 2018. The industry of risk category is generally based on the client or counterparty's primary business activity. Refer to Note 4 for additional information on industry concentrations.

Wholesale credit exposure – industries[a]

			Noninvestment-grade			Selected metrics			
As of or for the year ended December 31, 2019 (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	$ 149,267	$ 121,283	$ 26,534	$ 1,401	$ 49	$ 98	$ 12	$ (100)	$ –
Individuals and Individual Entities[b]	102,292	90,865	11,219	171	37	386	28	–	(641)
Consumer & Retail	99,331	57,587	39,524	2,062	158	80	112	(235)	(11)
Technology, Media & Telecommunications	59,021	35,602	20,368	2,923	128	13	26	(658)	(17)
Industrials	58,250	38,760	18,264	1,050	176	161	41	(746)	(9)
Asset Managers	51,775	45,208	6,550	4	13	18	–	–	(4,785)
Banks & Finance Cos	50,091	34,599	14,692	795	5	–	–	(834)	(2,112)
Healthcare	46,638	36,231	9,248	1,074	85	79	6	(405)	(145)
Oil & Gas	41,570	22,221	17,780	992	577	–	98	(429)	(10)
Utilities	34,753	22,196	12,246	301	10	1	39	(414)	(50)
State & Municipal Govt[c]	26,697	26,195	502	–	–	29	–	–	(46)
Automotive	17,317	10,000	6,759	558	–	5	–	(194)	–
Chemicals & Plastics	17,276	11,984	5,080	212	–	3	–	(10)	(13)
Metals & Mining	15,337	7,020	7,620	658	39	1	(1)	(33)	(6)
Central Govt	14,843	14,502	341	–	–	–	–	(9,018)	(1,963)
Transportation	13,917	8,644	4,863	347	63	29	7	(37)	(37)
Insurance	12,202	9,413	2,768	17	4	3	–	(36)	(1,998)
Securities Firms	7,335	5,969	1,339	27	–	–	–	(48)	(3,201)
Financial Markets Infrastructure	4,116	3,969	147	–	–	–	–	–	(6)
All other[d]	76,492	72,565	3,548	376	3	4	1	(4,833)	(959)
Subtotal	**$ 898,520**	**$ 674,813**	**$ 209,392**	**$ 12,968**	**$ 1,347**	**$ 910**	**$ 369**	**$ (18,030)**	**$ (16,009)**
Loans held-for-sale and loans at fair value	11,166								
Receivables from customers and other	33,706								
Total[e]	**$ 943,392**								

						Selected metrics			
			Noninvestment-grade						
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)
Asset Managers	42,807	36,722	6,067	4	14	10	–	–	(5,829)
Banks & Finance Cos	49,920	34,120	15,496	299	5	11	–	(575)	(2,290)
Healthcare	48,142	36,687	10,625	761	69	23	(5)	(150)	(133)
Oil & Gas	42,600	23,356	17,451	1,158	635	6	36	(248)	–
Utilities	28,172	23,558	4,326	138	150	–	38	(142)	(60)
State & Municipal Govt[c]	27,351	26,746	603	2	–	18	(1)	–	(42)
Automotive	17,339	9,637	7,310	392	–	1	–	(125)	–
Chemicals & Plastics	16,035	11,490	4,427	118	–	4	–	–	–
Metals & Mining	15,359	8,188	6,767	385	19	1	–	(174)	(22)
Central Govt	18,456	18,251	124	81	–	4	–	(7,994)	(2,130)
Transportation	15,660	10,508	4,699	393	60	21	6	(31)	(112)
Insurance	12,639	9,777	2,830	–	32	–	–	(36)	(2,080)
Securities Firms	4,558	3,099	1,459	–	–	–	–	(158)	(823)
Financial Markets Infrastructure	7,484	6,746	738	–	–	–	–	–	(26)
All other[d]	68,284	64,664	3,606	12	2	2	2	(1,581)	(804)
Subtotal	$ 881,188	$ 673,617	$ 195,442	$ 10,450	$ 1,679	$ 1,096	$ 155	$ (12,682)	$ (15,322)
Loans held-for-sale and loans at fair value	15,028								
Receivables from customers and other	30,063								
Total[e]	$ 926,279								

(a) The industry rankings presented in the table as of December 31, 2018, are based on the industry rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.
(b) Individuals and Individual Entities predominantly consists of Wealth Management clients within AWM and includes exposure to personal investment companies and personal and testamentary trusts.
(c) In addition to the credit risk exposure to states and municipal governments (both U.S. and non-U.S.) at December 31, 2019 and 2018, noted above, the Firm held: $6.5 billion and $7.8 billion, respectively, of trading assets; $29.8 billion and $37.7 billion, respectively, of AFS securities; and $4.8 billion at both periods of held-to-maturity ("HTM") securities, issued by U.S. state and municipal governments. Refer to Note 2 and Note 10 for further information.
(d) All other includes: SPEs and Private education and civic organizations, representing approximately 92% and 8%, respectively, at both December 31, 2019 and 2018.
(e) Excludes cash placed with banks of $254.0 billion and $268.1 billion, at December 31, 2019 and 2018, respectively, which is predominantly placed with various central banks, primarily Federal Reserve Banks.
(f) Credit exposure is net of risk participations and excludes the benefit of credit derivatives used in credit portfolio management activities held against derivative receivables or loans and liquid securities and other cash collateral held against derivative receivables.
(g) Represents the net notional amounts of protection purchased and sold through credit derivatives used to manage the credit exposures; these derivatives do not qualify for hedge accounting under U.S. GAAP. The All other category includes purchased credit protection on certain credit indices.

Real Estate

Presented below is additional information on the Real Estate industry, to which the Firm has significant exposure.

Real Estate exposure increased $6.0 billion to $149.3 billion during the year ended December 31, 2019, and the investment grade percentage of the portfolio remained relatively flat at 81%. Refer to Note 12 for further information on Real Estate loans.

	December 31, 2019				
(in millions, except ratios)	**Loans and Lending-related Commitments**	**Derivative Receivables**	**Credit exposure**	**% Investment-grade**	**% Drawn[c]**
Multifamily[a]	**$ 86,326**	**$ 58**	**$ 86,384**	**91%**	**92%**
Other	**62,322**	**561**	**62,883**	**68**	**59**
Total Real Estate Exposure[b]	**148,648**	**619**	**149,267**	**81**	**78**

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

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

Loans

In its wholesale businesses, the Firm provides loans to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals. Refer to Note 12 for a further discussion on loans, including information about delinquencies, loan modifications and other credit quality indicators.

The following table presents the change in the nonaccrual loan portfolio for the years ended December 31, 2019 and 2018.

Wholesale nonaccrual loan activity

Year ended December 31, (in millions)	**2019**	2018
Beginning balance	**$ 1,370**	$ 1,734
Additions	**2,141**	1,188
Reductions:		
Paydowns and other	**1,435**	692
Gross charge-offs	**376**	299
Returned to performing status	**556**	234
Sales	**206**	327
Total reductions	**2,573**	1,552
Net changes	**(432)**	(364)
Ending balance	**$ 938**	$ 1,370

The following table presents net charge-offs/recoveries, which are defined as gross charge-offs less recoveries, for the years ended December 31, 2019 and 2018. The amounts in the table below do not include gains or losses from sales of nonaccrual loans.

Wholesale net charge-offs/(recoveries)

Year ended December 31, (in millions, except ratios)	**2019**	2018
Loans – reported		
Average loans retained	**$ 435,876**	$ 416,828
Gross charge-offs	**411**	313
Gross recoveries	**(42)**	(158)
Net charge-offs/(recoveries)	**369**	155
Net charge-off/(recovery) rate	**0.08%**	0.04%

Lending-related commitments

The Firm uses lending-related financial instruments, such as commitments (including revolving credit facilities) and guarantees, to address the financing needs of its clients. The contractual amounts of these financial instruments represent the maximum possible credit risk should the clients draw down on these commitments or when the Firm fulfills its obligations under these guarantees, and the clients subsequently fail to perform according to the terms of these contracts. Most of these commitments and guarantees are refinanced, extended, cancelled, or expire without being drawn upon or a default occurring. As a result, the Firm does not believe that the total contractual amount of these wholesale lending-related commitments is representative of the Firm's expected future credit exposure or funding requirements. Refer to Note 28 for further information on wholesale lending-related commitments.

Receivables from Customers

Receivables from customers primarily represent held-for-investment margin loans to brokerage clients in CIB and AWM that are collateralized by assets maintained in the clients' brokerage accounts (e.g., cash on deposit, liquid and readily marketable debt or equity securities), as such no allowance is held against these receivables. To manage its credit risk the Firm establishes margin requirements and monitors the required margin levels on an ongoing basis, and requires clients to deposit additional cash or other collateral, or to reduce positions, when appropriate. These receivables are reported within accrued interest and accounts receivable on the Firm's Consolidated balance sheets.

Clearing services

The Firm provides clearing services for clients entering into certain securities and derivative contracts. Through the provision of these services the Firm is exposed to the risk of non-performance by its clients and may be required to share in losses incurred by CCPs. Where possible, the Firm seeks to mitigate its credit risk to its clients through the collection of adequate margin at inception and throughout the life of the transactions and can also cease the provision of clearing services if clients do not adhere to their obligations under the clearing agreement. Refer to Note 28 for a further discussion of clearing services.

Derivative contracts

Derivatives enable clients and counterparties to manage risks including credit risk and risks arising from fluctuations in interest rates, foreign exchange, equities, and commodities. The Firm makes markets in derivatives in order to meet these needs and uses derivatives to manage certain risks associated with net open risk positions from its market-making activities, including the counterparty credit risk arising from derivative receivables. The Firm also uses derivative instruments to manage its own credit and other market risk exposure. The nature of the counterparty and the settlement mechanism of the derivative affect the credit risk to which the Firm is exposed. For OTC derivatives the Firm is exposed to the credit risk of the derivative counterparty. For exchange-traded derivatives ("ETD"), such as futures and options, and cleared over-the-counter ("OTC-cleared") derivatives, the Firm is generally exposed to the credit risk of the relevant CCP. Where possible, the Firm seeks to mitigate its credit risk exposures arising from derivative contracts through the use of legally enforceable master netting arrangements and collateral agreements. Refer to Note 5 for a further discussion of derivative contracts, counterparties and settlement types.

The following table summarizes the net derivative receivables for the periods presented.

Derivative receivables

December 31, (in millions)	2019	2018
Total, net of cash collateral	**$ 49,766**	$ 54,213
Liquid securities and other cash collateral held against derivative receivables[(a)]	**(16,009)**	(15,322)
Total, net of all collateral	**$ 33,757**	$ 38,891

(a) Includes collateral related to derivative instruments where appropriate legal opinions have not been either sought or obtained with respect to master netting agreements.

The fair value of derivative receivables reported on the Consolidated balance sheets were $49.8 billion and $54.2 billion at December 31, 2019 and 2018, respectively. Derivative receivables represent the fair value of the derivative contracts after giving effect to legally enforceable master netting agreements and cash collateral held by the Firm. However, in management's view, the appropriate measure of current credit risk should also take into consideration additional liquid securities (primarily U.S. government and agency securities and other group of seven nations ("G7") government securities) and other cash collateral held by the Firm aggregating $16.0 billion and $15.3 billion at December 31, 2019 and 2018, respectively, that may be used as security when the fair value of the client's exposure is in the Firm's favor.

The Firm also holds additional collateral (primarily cash, G7 government securities, other liquid government agency and guaranteed securities, and corporate debt and equity securities) delivered by clients at the initiation of transactions, as well as collateral related to contracts that have a non-daily call frequency and collateral that the Firm has agreed to return but has not yet settled as of the reporting date. Although this collateral does not reduce the balances and is not included in the table above, it is available as security against potential exposure that could arise should the fair value of the client's derivative contracts move in the Firm's favor. The derivative receivables fair value, net of all collateral, also does not include other credit enhancements, such as letters of credit. Refer to Note 5 for additional information on the Firm's use of collateral agreements.

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

("AVG"). These measures all incorporate netting and collateral benefits, where applicable.

Peak represents a conservative measure of potential exposure to a counterparty calculated in a manner that is broadly equivalent to a 97.5% confidence level over the life of the transaction. Peak is the primary measure used by the Firm for setting credit limits for derivative contracts, senior management reporting and derivatives exposure management.

DRE exposure is a measure that expresses the risk of derivative exposure on a basis intended to be equivalent to the risk of loan exposures. DRE is a less extreme measure of potential credit loss than Peak and is used as an input for aggregating derivative credit risk exposures with loans and other credit risk.

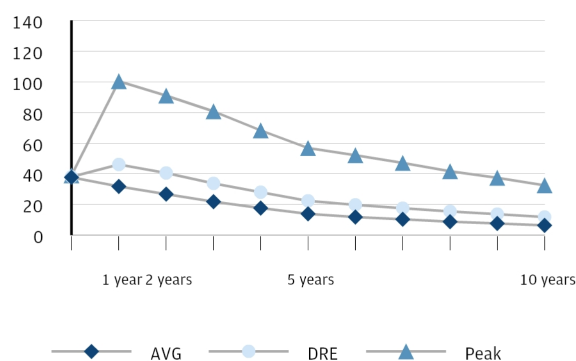
Finally, AVG is a measure of the expected fair value of the Firm's derivative receivables at future time periods, including the benefit of collateral. AVG over the total life of the derivative contract is used as the primary metric for pricing purposes and is used to calculate credit risk capital and CVA, as further described below.

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

The below graph shows exposure profiles to the Firm's current derivatives portfolio over the next 10 years as calculated by the Peak, DRE and AVG metrics. The three measures generally show that exposure will decline after the first year, if no new trades are added to the portfolio.

Exposure profile of derivatives measures

December 31, 2019
(in billions)



The following table summarizes the ratings profile of the Firm's derivative receivables, including credit derivatives, net of all collateral, at the dates indicated. The Firm considers internal ratings equivalent to BBB-/Baa3 or higher as investment grade. Refer to Note 12 for further information on internal risk ratings.

Ratings profile of derivative receivables

Internal rating equivalent	2019		2018	
December 31, (in millions, except ratios)	Exposure net of all collateral	% of exposure net of all collateral	Exposure net of all collateral	% of exposure net of all collateral
AAA/Aaa to AA-/Aa3	$ **8,347**	**25%**	$ 11,831	31%
A+/A1 to A-/A3	**5,471**	**16**	7,428	19
BBB+/Baa1 to BBB-/Baa3	**13,148**	**39**	12,536	32
BB+/Ba1 to B-/B3	**6,225**	**18**	6,373	16
CCC+/Caa1 and below	**566**	**2**	723	2
Total	$ **33,757**	**100%**	$ 38,891	100%

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

Credit derivatives

The Firm uses credit derivatives for two primary purposes: first, in its capacity as a market-maker, and second, as an end-user, to manage the Firm's own credit risk associated with various exposures.

Credit portfolio management activities

Included in the Firm's end-user activities are credit derivatives used to mitigate the credit risk associated with traditional lending activities (loans and unfunded commitments) and derivatives counterparty exposure in the Firm's wholesale businesses (collectively, "credit portfolio management" activities). Information on credit portfolio management activities is provided in the table below.

The Firm also uses credit derivatives as an end-user to manage other exposures, including credit risk arising from certain securities held in the Firm's market-making businesses. These credit derivatives are not included in credit portfolio management activities.

Credit derivatives used in credit portfolio management activities

	Notional amount of protection purchased and sold [(a)]	
December 31, (in millions)	**2019**	2018
Credit derivatives used to manage:		
Loans and lending-related commitments	**$ 2,047**	$ 1,272
Derivative receivables	**15,983**	11,410
Credit derivatives used in credit portfolio management activities	**$ 18,030**	$ 12,682

(a) Amounts are presented net, considering the Firm's net protection purchased or sold with respect to each underlying reference entity or index.

The credit derivatives used in credit portfolio management activities do not qualify for hedge accounting under U.S. GAAP; these derivatives are reported at fair value, with gains and losses recognized in principal transactions revenue. In contrast, the loans and lending-related commitments being risk-managed are accounted for on an accrual basis. This asymmetry in accounting treatment, between loans and lending-related commitments and the credit derivatives used in credit portfolio management activities, causes earnings volatility that is not representative, in the Firm's view, of the true changes in value of the Firm's overall credit exposure.

The effectiveness of credit default swaps ("CDS") as a hedge against the Firm's exposures may vary depending on a number of factors, including the named reference entity (i.e., the Firm may experience losses on specific exposures that are different than the named reference entities in the purchased CDS); the contractual terms of the CDS (which may have a defined credit event that does not align with an actual loss realized by the Firm); and the maturity of the Firm's CDS protection (which in some cases may be shorter than the Firm's exposures). However, the Firm generally seeks to purchase credit protection with a maturity date that is the same or similar to the maturity date of the exposure for which the protection was purchased, and remaining differences in maturity are actively monitored and managed by the Firm. Refer to Credit derivatives in Note 5 for a detailed description of credit derivatives.

ALLOWANCE FOR CREDIT LOSSES

The Firm's allowance for credit losses covers the retained consumer and wholesale loan portfolios, as well as the Firm's wholesale and certain consumer lending-related commitments.

Refer to Critical Accounting Estimates Used by the Firm on pages 136–138 and Note 13 for further information on the components of the allowance for credit losses and related management judgments.

At least quarterly, the allowance for credit losses is reviewed by the CRO, the CFO and the Controller of the Firm. As of December 31, 2019, JPMorgan Chase deemed the allowance for credit losses to be appropriate and sufficient to absorb probable credit losses inherent in the portfolio.

The allowance for credit losses decreased compared with December 31, 2018 driven by:

- an $800 million reduction in the CCB allowance for loan losses, which included $650 million in the PCI residential real estate portfolio, reflecting continued improvement in home prices and delinquencies; $100 million in the non credit-impaired residential real estate portfolio; and $50 million in the business banking portfolio; as well as
- a $151 million reduction for write-offs of PCI loans,

predominantly offset by

- a $500 million addition to the allowance for loan losses in the credit card portfolio reflecting loan growth and higher loss rates as newer vintages season and become a larger part of the portfolio, and
- a $251 million addition in the wholesale allowance for credit losses driven by select client downgrades.

Refer to Consumer Credit Portfolio on pages 103–107, Wholesale Credit Portfolio on pages 108–115 and Note 12 for additional information on the consumer and wholesale credit portfolios.

Summary of changes in the allowance for credit losses

Year ended December 31, (in millions, except ratios)	2019 Consumer, excluding credit card	2019 Credit card	2019 Wholesale	2019 Total	2018 Consumer, excluding credit card	2018 Credit card	2018 Wholesale	2018 Total
Allowance for loan losses								
Beginning balance at January 1,	**$ 4,146**	**$ 5,184**	**$ 4,115**	**$ 13,445**	$ 4,579	$ 4,884	$ 4,141	$ 13,604
Gross charge-offs	**963**	**5,436**	**411**	**6,810**	1,025	5,011	313	6,349
Gross recoveries	**(551)**	**(588)**	**(42)**	**(1,181)**	(842)	(493)	(158)	(1,493)
Net charge-offs	**412**	**4,848**	**369**	**5,629**	183	4,518	155	4,856
Write-offs of PCI loans[a]	**151**	**–**	**–**	**151**	187	–	–	187
Provision for loan losses	**(383)**	**5,348**	**484**	**5,449**	(63)	4,818	130	4,885
Other	**(1)**	**(1)**	**11**	**9**	–	–	(1)	(1)
Ending balance at December 31,	**$ 3,199**	**$ 5,683**	**$ 4,241**	**$ 13,123**	$ 4,146	$ 5,184	$ 4,115	$ 13,445
Impairment methodology								
Asset-specific[b]	**$ 136**	**$ 477**	**$ 234**	**$ 847**	$ 196	$ 440	$ 297	$ 933
Formula-based	**2,076**	**5,206**	**4,007**	**11,289**	2,162	4,744	3,818	10,724
PCI	**987**	**–**	**–**	**987**	1,788	–	–	1,788
Total allowance for loan losses	**$ 3,199**	**$ 5,683**	**$ 4,241**	**$ 13,123**	$ 4,146	$ 5,184	$ 4,115	$ 13,445
Allowance for lending-related commitments								
Beginning balance at January 1,	**$ 33**	**$ –**	**$ 1,022**	**$ 1,055**	$ 33	$ –	$ 1,035	$ 1,068
Provision for lending-related commitments	**–**	**–**	**136**	**136**	–	–	(14)	(14)
Other	**–**	**–**	**–**	**–**	–	–	1	1
Ending balance at December 31,	**$ 33**	**$ –**	**$ 1,158**	**$ 1,191**	$ 33	$ –	$ 1,022	$ 1,055
Impairment methodology								
Asset-specific	**$ –**	**$ –**	**$ 102**	**$ 102**	$ –	$ –	$ 99	$ 99
Formula-based	**33**	**–**	**1,056**	**1,089**	33	–	923	956
Total allowance for lending-related commitments[c]	**$ 33**	**$ –**	**$ 1,158**	**$ 1,191**	$ 33	$ –	$ 1,022	$ 1,055
Total allowance for credit losses	**$ 3,232**	**$ 5,683**	**$ 5,399**	**$ 14,314**	$ 4,179	$ 5,184	$ 5,137	$ 14,500
Memo:								
Retained loans, end of period	**$ 332,038**	**$ 168,924**	**$ 444,639**	**$ 945,601**	$ 373,637	$ 156,616	$ 439,162	$ 969,415
Retained loans, average	**349,724**	**156,319**	**435,876**	**941,919**	374,395	145,606	416,828	936,829
PCI loans, end of period	**20,363**	**–**	**–**	**20,363**	24,034	–	3	24,037
Credit ratios								
Allowance for loan losses to retained loans	**0.96%**	**3.36%**	**0.95%**	**1.39%**	1.11%	3.31%	0.94%	1.39%
Allowance for loan losses to retained nonaccrual loans[d]	**102**	**NM**	**503**	**329**	120	NM	358	292
Allowance for loan losses to retained nonaccrual loans excluding credit card	**102**	**NM**	**503**	**187**	120	NM	358	179
Net charge-off rates	**0.12**	**3.10**	**0.08**	**0.60**	0.05	3.10	0.04	0.52
Credit ratios, excluding residential real estate PCI loans								
Allowance for loan losses to retained loans	**0.71**	**3.36**	**0.95**	**1.31**	0.67	3.31	0.94	1.23
Allowance for loan losses to retained nonaccrual loans[d]	**70**	**NM**	**503**	**305**	68	NM	358	253
Allowance for loan losses to retained nonaccrual loans excluding credit card	**70**	**NM**	**503**	**162**	68	NM	358	140
Net charge-off rates	**0.13%**	**3.10%**	**0.08%**	**0.61%**	0.05%	3.10%	0.04%	0.53%

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

(a) Write-offs of PCI loans are recorded against the allowance for loan losses when actual losses for a pool exceed estimated losses that were recorded as purchase accounting adjustments at the time of acquisition. A write-off of a PCI loan is recognized when the underlying loan is removed from a pool.

(b) Includes risk-rated loans that have been placed on nonaccrual status and loans that have been modified in a TDR. The asset-specific credit card allowance for loan losses modified in a TDR is calculated based on the loans' original contractual interest rates and does not consider any incremental penalty rates.

(c) The allowance for lending-related commitments is reported in accounts payable and other liabilities on the Consolidated balance sheets.

(d) The Firm's policy is generally to exempt credit card loans from being placed on nonaccrual status as permitted by regulatory guidance.

INVESTMENT PORTFOLIO RISK MANAGEMENT

Investment portfolio risk is the risk associated with the loss of principal or a reduction in expected returns on investments arising from the investment securities portfolio or from principal investments. The investment securities portfolio is predominantly held by Treasury and CIO in connection with the Firm's balance sheet or asset-liability management objectives. Principal investments are predominantly privately-held financial instruments and are managed in the LOBs and Corporate. Investments are typically intended to be held over extended periods and, accordingly, the Firm has no expectation for short-term realized gains with respect to these investments.

Investment securities risk

Investment securities risk includes the exposure associated with a default in the payment of principal and interest. This risk is mitigated given that the investment securities portfolio held by Treasury and CIO is predominantly invested in high-quality securities. At December 31, 2019, the Treasury and CIO investment securities portfolio was $396.4 billion, and the average credit rating of the securities comprising the portfolio was AA+ (based upon external ratings where available and where not available, based primarily upon internal risk ratings. Refer to Corporate segment results on pages 77–78 and Note 10 for further information on the investment securities portfolio and internal risk ratings. Refer to Market Risk Management on pages 119–126 for further information on the market risk inherent in the portfolio. Refer to Liquidity Risk Management on pages 93–98 for further information on related liquidity risk.

Governance and oversight

Investment securities risks are governed by the Firm's Risk Appetite framework, and reviewed at the CTC Risk Committee with regular updates to the Board Risk Committee.

The Firm's independent control functions are responsible for reviewing the appropriateness of the carrying value of investment securities in accordance with relevant policies. Approved levels for investment securities are established for each risk category, including capital and credit risks.

Principal investment risk

Principal investments are typically private non-traded financial instruments representing ownership or other forms of junior capital. Principal investments span multiple asset classes and are made either in stand-alone investing businesses or as part of a broader business platform. In general, new principal investments include tax-oriented investments, as well as investments made to enhance or accelerate LOB and Corporate strategic business initiatives. The Firm's principal investments are managed by the LOBs and Corporate and are reflected within their respective financial results.

As of December 31, 2019 and 2018, the aggregate carrying values of the principal investment portfolios were $24.2 billion and $22.2 billion, respectively, which included tax-oriented investments (e.g., affordable housing and alternative energy investments) of $18.2 billion and $16.6 billion, respectively, and private equity, various debt and equity instruments, and real assets of $6.0 billion and $5.6 billion, respectively.

Governance and oversight

The Firm's approach to managing principal risk is consistent with the Firm's risk governance structure. A Firmwide risk policy framework exists for all principal investing activities and includes approval by executives who are independent from the investing businesses, as appropriate.

The Firm's independent control functions are responsible for reviewing the appropriateness of the carrying value of investments in accordance with relevant policies. As part of the risk governance structure, approved levels for investments are established and monitored for each relevant business or segment in order to manage the overall size of the portfolios. The Firm also conducts stress testing on these portfolios using specific scenarios that estimate losses based on significant market moves and/or other risk events.

Market risk is the risk associated with the effect of changes in market factors, such as interest and foreign exchange rates, equity and commodity prices, credit spreads or implied volatilities, on the value of assets and liabilities held for both the short and long term.

Market Risk Management

Market Risk Management monitors market risks throughout the Firm and defines market risk policies and procedures.

Market Risk Management seeks to manage risk, facilitate efficient risk/return decisions, reduce volatility in operating performance and provide transparency into the Firm's market risk profile for senior management, the Board of Directors and regulators. Market Risk Management is responsible for the following functions:

- Establishing a market risk policy framework
- Independently measuring, monitoring and controlling LOB, Corporate, and Firmwide market risk
- Defining, approving and monitoring of limits
- Performing stress testing and qualitative risk assessments

Risk measurement

Measures used to capture market risk

There is no single measure to capture market risk and therefore Market Risk Management uses various metrics, both statistical and nonstatistical, to assess risk including:

- Value-at-risk (VaR)
- Stress testing
- Profit and loss drawdowns
- Earnings-at-risk
- Other sensitivity-based measures

Risk monitoring and control

Market risk exposure is managed primarily through a series of limits set in the context of the market environment and business strategy. In setting limits, Market Risk Management takes into consideration factors such as market volatility, product liquidity, accommodation of client business, and management experience. Market Risk Management maintains different levels of limits. Firm level limits include VaR and stress limits. Similarly, LOB and Corporate limits include VaR and stress limits and may be supplemented by certain nonstatistical risk measures such as profit and loss drawdowns. Limits may also be set within the LOBs and Corporate, as well as at the legal entity level.

Market Risk Management sets limits and regularly reviews and updates them as appropriate. Senior management is responsible for reviewing and approving certain of these risk limits on an ongoing basis. Limits that have not been reviewed within specified time periods by Market Risk Management are escalated to senior management. The LOBs and Corporate are responsible for adhering to established limits against which exposures are monitored and reported.

Limit breaches are required to be reported in a timely manner to limit approvers, which include Market Risk Management and senior management. In the event of a breach, Market Risk Management consults with appropriate members of the Firm to determine the suitable course of action required to return the applicable positions to compliance, which may include a reduction in risk in order to remedy the breach or granting a temporary increase in limits to accommodate an expected increase in client activity and/or market volatility. Certain Firm, Corporate or LOB-level limit breaches are escalated as appropriate.

The following table summarizes the predominant business activities and related market risks, as well as positions which give rise to market risk and certain measures used to capture those risks, for each LOB and Corporate.

In addition to the predominant business activities, each LOB and Corporate may engage in principal investing activities. To the extent principal investments are deemed market risk sensitive, they are reflected in relevant risk measures (i.e., VaR or Other sensitivity-based measures) and captured in the table below. Refer to Investment Portfolio Risk Management on page 118 for additional discussion on principal investments.

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

(a) The AWM and CB contributions to Firmwide average VaR were not material for the year ended December 31, 2019 and 2018.

Value-at-risk

JPMorgan Chase utilizes VaR, a statistical risk measure, to estimate the potential loss from adverse market moves in the current market environment. The Firm has a single VaR framework used as a basis for calculating Risk Management VaR and Regulatory VaR.

The framework is employed across the Firm using historical simulation based on data for the previous 12 months. The framework's approach assumes that historical changes in market values are representative of the distribution of potential outcomes in the immediate future. The Firm believes the use of Risk Management VaR provides a daily measure of risk that is closely aligned to risk management decisions made by the LOBs and Corporate and, along with other market risk measures, provides the appropriate information needed to respond to risk events.

The Firm's Risk Management VaR is calculated assuming a one-day holding period and an expected tail-loss methodology which approximates a 95% confidence level. Risk Management VaR provides a consistent framework to measure risk profiles and levels of diversification across product types and is used for aggregating risks and monitoring limits across businesses. VaR results are reported to senior management, the Board of Directors and regulators.

Under the Firm's Risk Management VaR methodology, assuming current changes in market values are consistent with the historical changes used in the simulation, the Firm would expect to incur VaR "back-testing exceptions," defined as losses greater than that predicted by VaR estimates, an average of five times every 100 trading days. The number of VaR back-testing exceptions observed can differ from the statistically expected number of back-testing exceptions if the current level of market volatility is materially different from the level of market volatility during the 12 months of historical data used in the VaR calculation.

Underlying the overall VaR model framework are individual VaR models that simulate historical market returns for individual risk factors and/or product types. To capture material market risks as part of the Firm's risk management framework, comprehensive VaR model calculations are performed daily for businesses whose activities give rise to market risk. These VaR models are granular and incorporate numerous risk factors and inputs to simulate daily changes in market values over the historical period; inputs are selected based on the risk profile of each portfolio, as sensitivities and historical time series used to generate daily market values may be different across product types or risk management systems. The VaR model results across all portfolios are aggregated at the Firm level.

As VaR is based on historical data, it is an imperfect measure of market risk exposure and potential future losses. In addition, based on their reliance on available historical data, limited time horizons, and other factors, VaR measures are inherently limited in their ability to measure certain risks and to predict losses, particularly those associated with market illiquidity and sudden or severe shifts in market conditions.

For certain products, specific risk parameters are not captured in VaR due to the lack of inherent liquidity and availability of appropriate historical data. The Firm uses proxies to estimate the VaR for these and other products when daily time series are not available. It is likely that using an actual price-based time series for these products, if available, would affect the VaR results presented. The Firm therefore considers other nonstatistical measures such as stress testing, in addition to VaR, to capture and manage its market risk positions.

The daily market data used in VaR models may be different than the independent third-party data collected for VCG price testing in its monthly valuation process. For example, in cases where market prices are not observable, or where proxies are used in VaR historical time series, the data sources may differ. Refer to Valuation process in Note 2 for further information on the Firm's valuation process. As VaR model calculations require daily data and a consistent source for valuation, it may not be practical to use the data collected in the VCG monthly valuation process for VaR model calculations.

The Firm's VaR model calculations are periodically evaluated and enhanced in response to changes in the composition of the Firm's portfolios, changes in market conditions, improvements in the Firm's modeling techniques and measurements, and other factors. Such changes may affect historical comparisons of VaR results. Refer to Estimations and Model Risk Management on page 135 for information regarding model reviews and approvals.

The Firm calculates separately a daily aggregated VaR in accordance with regulatory rules ("Regulatory VaR"), which is used to derive the Firm's regulatory VaR-based capital requirements under Basel III. This Regulatory VaR model framework currently assumes a ten business-day holding period and an expected tail loss methodology which approximates a 99% confidence level. Regulatory VaR is applied to "covered" positions as defined by Basel III, which may be different than the positions included in the Firm's Risk Management VaR. For example, credit derivative hedges of accrual loans are included in the Firm's Risk Management VaR, while Regulatory VaR excludes these credit derivative hedges. In addition, in contrast to the Firm's Risk Management VaR, Regulatory VaR currently excludes the diversification benefit for certain VaR models.

Refer to JPMorgan Chase's Basel III Pillar 3 Regulatory Capital Disclosures reports, which are available on the Firm's website, for additional information on Regulatory VaR and the other components of market risk regulatory capital for the Firm (e.g., VaR-based measure, stressed VaR-based measure and the respective backtesting).

The table below shows the results of the Firm's Risk Management VaR measure using a 95% confidence level. VaR can vary significantly as positions change, market volatility fluctuates, and diversification benefits change.

Total VaR

As of or for the year ended December 31,	2019			2018		
(in millions)	Avg.	Min	Max	Avg.	Min	Max
CIB trading VaR by risk type						
Fixed income	**$ 40**	**$ 31**	**$ 50**	$ 33	$ 25	$ 46
Foreign exchange	**7**	**4**	**15**	6	3	15
Equities	**20**	**13**	**31**	17	13	26
Commodities and other	**8**	**6**	**12**	8	4	13
Diversification benefit to CIB trading VaR	**(33)** (a)	**NM** (b)	**NM** (b)	(26) (a)	NM (b)	NM (b)
CIB trading VaR	**42**	**29** (b)	**61** (b)	38	26 (b)	58 (b)
Credit portfolio VaR	**5**	**3**	**7**	3	3	4
Diversification benefit to CIB VaR	**(5)** (a)	**NM** (b)	**NM** (b)	(2) (a)	NM (b)	NM (b)
CIB VaR	**42**	**29** (b)	**63** (b)	39	26 (b)	59 (b)
CCB VaR	**5**	**1**	**11**	1	–	3
Corporate and other LOB VaR	**10**	**9**	**13**	12	9	14
Diversification benefit to other VaR	**(4)** (a)	**NM** (b)	**NM** (b)	(1) (a)	NM (b)	NM (b)
Other VaR	**11**	**8** (b)	**17** (b)	12	9 (b)	14 (b)
Diversification benefit to CIB and other VaR	**(10)** (a)	**NM** (b)	**NM** (b)	(10) (a)	NM (b)	NM (b)
Total VaR	**$ 43**	**$ 30** (b)	**$ 65** (b)	$ 41	$ 28 (b)	$ 62 (b)

(a) Average portfolio VaR is less than the sum of the VaR of the components described above, which is due to portfolio diversification. The diversification effect reflects that the risks are not perfectly correlated.
(b) Diversification benefit represents the difference between the total VaR and each reported level and the sum of its individual components. Diversification benefit reflects the non-additive nature of VaR due to imperfect correlation across LOBs, Corporate, and risk types. The maximum and minimum VaR for each portfolio may have occurred on different trading days than the components and consequently diversification benefit is not meaningful.

Average Total VaR increased $2 million for the year-ended December 31, 2019 as compared with the prior year. This was predominantly due to increased exposure in the Fixed Income risk type, increases in the Equities risk type driven by the inclusion of Tradeweb following its IPO in the second quarter of 2019, and increased volatility in the one-year historical look-back period, partially offset by increases in diversification benefit.

In addition, average CCB VaR increased by $4 million, driven by MSR risk management activities.

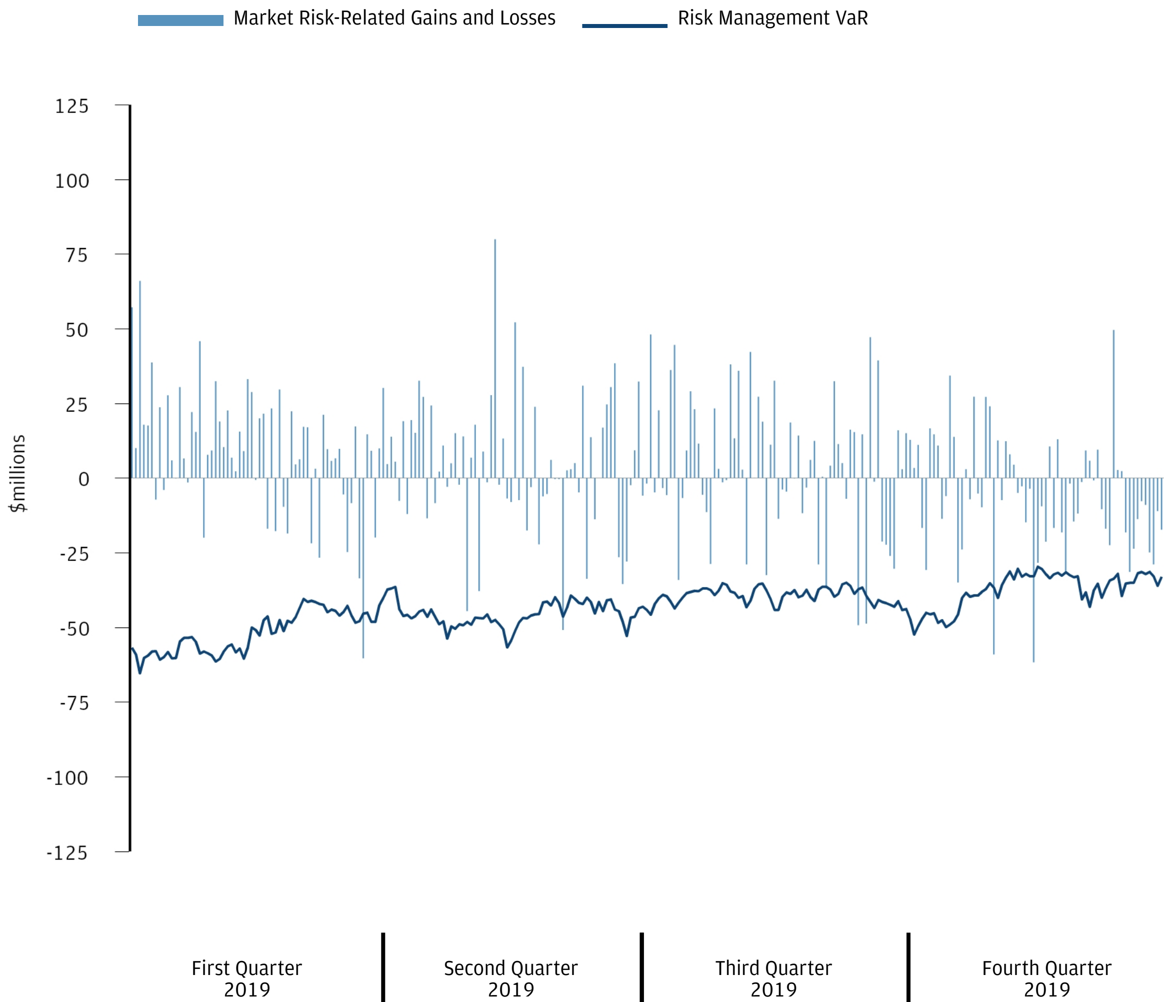
VaR back-testing

The Firm performs daily VaR model back-testing, which compares the daily Risk Management VaR results with the daily gains and losses actually recognized on market-risk related revenue.

The Firm's definition, of market risk-related gains and losses is consistent with the definition used by the banking regulators under Basel III. Under this definition, market risk-related gains and losses are defined as: gains and losses on the positions included in the Firm's Risk Management VaR excluding select components of revenue such as fees, commissions, certain valuation adjustments, net interest income, and gains and losses arising from intraday trading.

The following chart compares actual daily market risk-related gains and losses with the Firm’s Risk Management VaR for the year ended December 31, 2019. As the chart presents market risk-related gains and losses related to those positions included in the Firm’s Risk Management VaR, the results in the table below differ from the results of back-testing disclosed in the Market Risk section of the Firm’s Basel III Pillar 3 Regulatory Capital Disclosures reports, which are based on Regulatory VaR applied to the Firm’s covered positions. For the year ended December 31, 2019 the Firm observed eight VaR back-testing exceptions and posted market risk-related gains on 141 of the 259 days.

Daily Market Risk-Related Gains and Losses
vs. Risk Management VaR (1-day, 95% Confidence level)
Year ended December 31, 2019



Other risk measures

Stress testing

Along with VaR, stress testing is an important tool used to assess risk. While VaR reflects the risk of loss due to adverse changes in markets using recent historical market behavior, stress testing reflects the risk of loss from hypothetical changes in the value of market risk sensitive positions applied simultaneously. Stress testing measures the Firm's vulnerability to losses under a range of stressed but possible economic and market scenarios. The results are used to understand the exposures responsible for those potential losses and are measured against limits.

The Firm's stress framework covers Corporate and all LOBs with market risk sensitive positions. The framework is used to calculate multiple magnitudes of potential stress for both market rallies and market sell-offs, assuming significant changes in market factors such as credit spreads, equity prices, interest rates, currency rates and commodity prices, and combines them in multiple ways to capture an array of hypothetical economic and market scenarios.

The Firm generates a number of scenarios that focus on tail events in specific asset classes and geographies, including how the event may impact multiple market factors simultaneously. Scenarios also incorporate specific idiosyncratic risks and stress basis risk between different products. The flexibility in the stress framework allows the Firm to construct new scenarios that can test the outcomes against possible future stress events. Stress testing results are reported on a regular basis to senior management of the Firm, as appropriate.

Stress scenarios are governed by an overall stress framework and are subject to the standards outlined in the Firm's policies related to model risk management. Significant changes to the framework are reviewed as appropriate.

The Firm's stress testing framework is utilized in calculating the Firm's CCAR and other stress test results, which are reported to the Board of Directors. In addition, stress testing results are incorporated into the Firm's Risk Appetite framework, and are reported periodically to the Board Risk Committee.

Profit and loss drawdowns

Profit and loss drawdowns are used to highlight trading losses above certain levels of risk tolerance. A profit and loss drawdown is a decline in revenue from its year-to-date peak level.

Earnings-at-risk

The effect of interest rate exposure on the Firm's reported net income is important as interest rate risk represents one of the Firm's significant market risks. Interest rate risk arises not only from trading activities but also from the Firm's traditional banking activities, which include extension of loans and credit facilities, taking deposits and issuing debt as well as from the investment securities portfolio. Refer to the table on page 120 for a summary by LOB and Corporate, identifying positions included in earnings-at-risk.

The CTC Risk Committee establishes the Firm's structural interest rate risk policy and related limits, which are subject to approval by the Board Risk Committee. Treasury and CIO, working in partnership with the LOBs, calculates the Firm's structural interest rate risk profile and reviews it with senior management, including the CTC Risk Committee. In addition, oversight of structural interest rate risk is managed through a dedicated risk function reporting to the CTC. This risk function is responsible for providing independent oversight and governance around assumptions and establishing and monitoring limits for structural interest rate risk. The Firm manages structural interest rate risk generally through its investment securities portfolio and interest rate derivatives.

Structural interest rate risk can occur due to a variety of factors, including:

- Differences in timing among the maturity or repricing of assets, liabilities and off-balance sheet instruments
- Differences in the amounts of assets, liabilities and off-balance sheet instruments that are maturing or repricing at the same time
- Differences in the amounts by which short-term and long-term market interest rates change (for example, changes in the slope of the yield curve)
- The impact of changes in the maturity of various assets, liabilities or off-balance sheet instruments as interest rates change

The Firm manages interest rate exposure related to its assets and liabilities on a consolidated, Firmwide basis. Business units transfer their interest rate risk to Treasury and CIO through funds transfer pricing, which takes into account the elements of interest rate exposure that can be risk-managed in financial markets. These elements include asset and liability balances and contractual rates of interest, contractual principal payment schedules, expected prepayment experience, interest rate reset dates and maturities, rate indices used for repricing, and any interest rate ceilings or floors for adjustable rate products. All transfer-pricing assumptions are dynamically reviewed.

One way the Firm evaluates its structural interest rate risk is through earnings-at-risk. Earnings-at-risk estimates the Firm's interest rate exposure for a given interest rate scenario. It is presented as a sensitivity to a baseline, which includes net interest income and certain interest rate sensitive fees. The baseline uses market interest rates and in the case of deposits, pricing assumptions. The Firm conducts simulations of changes to this baseline for interest rate-sensitive assets and liabilities denominated in U.S. dollars and other currencies ("non-U.S. dollar" currencies). These simulations primarily include retained loans, deposits, deposits with banks, investment securities, long-term debt and any related interest rate hedges, and exclude other positions in risk management VaR and other sensitivity-based measures as described on page 120.

Earnings-at-risk scenarios estimate the potential change to a net interest income baseline, over the following 12 months, utilizing multiple assumptions. These scenarios include a parallel shift involving changes to both short-term and long-term rates by an equal amount; a steeper yield curve involving holding short-term rates constant and increasing long-term rates or decreasing short-term rates and holding long-term rates constant; and a flatter yield curve involving increasing short-term rates and holding long-term rates constant or holding short-term rates constant and decreasing long-term rates. These scenarios consider many different factors, including:

- The impact on exposures as a result of instantaneous changes in interest rates from baseline rates.
- Forecasted balance sheet, as well as modeled prepayment and reinvestment behavior, but do not include assumptions about actions that could be taken by the Firm in response to any such instantaneous rate changes. Mortgage prepayment assumptions are based on the interest rates used in the scenarios compared with underlying contractual rates, the time since origination, and other factors which are updated periodically based on historical experience.
- The pricing sensitivity of deposits, using normalized deposit betas which represent the amount by which deposit rates paid could change upon a given change in market interest rates over the cycle. The deposit rates paid in these scenarios differ from actual deposit rates paid, particularly for retail deposits, due to repricing lags and other factors.

The Firm's earnings-at-risk scenarios are periodically evaluated and enhanced in response to changes in the composition of the Firm's balance sheet, changes in market conditions, improvements in the Firm's simulation and other factors. While a relevant measure of the Firm's interest rate exposure, the earnings at risk analysis does not represent a forecast of the Firm's net interest income (Refer to the 2020 Outlook on page 45 for additional information).

The Firm's U.S. dollar sensitivities are presented in the table below.

December 31, (in billions)	**2019**	2018
Parallel shift:		
+100 bps shift in rates	**$ 0.3**	$ 0.9
-100 bps shift in rates	**(2.0)**	(2.1)
Steeper yield curve:		
+100 bps shift in long-term rates	**1.2**	0.5
-100 bps shift in short-term rates	**(0.2)**	(1.2)
Flatter yield curve:		
+100 bps shift in short-term rates	**(0.9)**	0.4
-100 bps shift in long-term rates	**(1.8)**	(0.9)

The change in the Firm's U.S. dollar sensitivities as of December 31, 2019 compared to December 31, 2018 reflected updates to the Firm's baseline for lower short-term and long-term rates as well as the impact of changes in the Firm's balance sheet. The Firm's sensitivity to short-term rates reflected updates to the Firm's baseline for lower rates but changes in the Firm's balance sheet more than offset the impacts of the lower rates. The Firm's sensitivity to long-term rates increased as a result of updates to the Firm's baseline to reflect lower rates in addition to changes in the Firm's balance sheet. The increased sensitivity to long-term rates is more impactful to the downward scenario due to the Firm's sensitivity to mortgage prepayments.

The Firm's non-U.S. dollar sensitivities are presented in the table below.

December 31, (in billions)	**2019**	2018
Parallel shift:		
+100 bps shift in rates	**$ 0.5**	$ 0.5
Flatter yield curve:		
+100 bps shift in short-term rates	**0.5**	0.5

The results of the non-U.S. dollar interest rate scenario involving a steeper yield curve with long-term rates rising by 100 basis points and short-term rates staying at current levels were not material to the Firm's earnings-at-risk at December 31, 2019 and 2018.

Non-U.S. dollar foreign exchange risk

Non-U.S. dollar FX risk is the risk that changes in foreign exchange rates affect the value of the Firm's assets or liabilities or future results. The Firm has structural non-U.S. dollar FX exposures arising from capital investments, forecasted expense and revenue, the investment securities portfolio and non-U.S. dollar-denominated debt issuance. Treasury and CIO, working in partnership with the LOBs, primarily manage these risks on behalf of the Firm. Treasury and CIO may hedge certain of these risks using derivatives.

Other sensitivity-based measures

The Firm quantifies the market risk of certain investment and funding activities by assessing the potential impact on net revenue and other comprehensive income ("OCI") due to changes in relevant market variables. Refer to the table Predominant business activities that give rise to market risk on page 120 for additional information on the positions captured in other sensitivity-based measures.

The table below represents the potential impact to net revenue or OCI for market risk sensitive instruments that are not included in VaR or earnings-at-risk. Where appropriate, instruments used for hedging purposes are reported along with the positions being hedged. The sensitivities disclosed in the table below may not be representative of the actual gain or loss that would have been realized at December 31, 2019 and 2018, as the movement in market parameters across maturities may vary and are not intended to imply management's expectation of future changes in these sensitivities.

Year ended December 31, **Gain/(loss)** (in millions) **Activity**	**Description**	**Sensitivity measure**	**2019**	**2018**
Investment activities[a]				
Investment management activities	Consists of seed capital and related hedges; and fund co-investments	10% decline in market value	$ (68)	$ (102)
Other investments	Consists of privately held equity and other investments held at fair value	10% decline in market value	(192)	(218)
Funding activities				
Non-USD LTD cross-currency basis	Represents the basis risk on derivatives used to hedge the foreign exchange risk on the non-USD LTD[b]	1 basis point parallel tightening of cross currency basis	(17)	(13)
Non-USD LTD hedges foreign currency ("FX") exposure	Primarily represents the foreign exchange revaluation on the fair value of the derivative hedges[b]	10% depreciation of currency	15	17
Derivatives – funding spread risk	Impact of changes in the spread related to derivatives FVA	1 basis point parallel increase in spread	(5)	(4)
Fair value option elected liabilities – funding spread risk	Impact of changes in the spread related to fair value option elected liabilities DVA[b]	1 basis point parallel increase in spread	29	30
Fair value option elected liabilities – interest rate sensitivity	Interest rate sensitivity on fair value option liabilities resulting from a change in the Firm's own credit spread[b]	1 basis point parallel increase in spread	(2)	1

(a) Excludes equity securities without readily determinable fair values that are measured under the measurement alternative. Refer to Note 2 for additional information.
(b) Impact recognized through OCI.

The Firm, through its LOBs and Corporate, may be exposed to country risk resulting from financial, economic, political or other significant developments which adversely affect the value of the Firm's exposures related to a particular country or set of countries. The Country Risk Management group actively monitors the various portfolios which may be impacted by these developments and measures the extent to which the Firm's exposures are diversified given the Firm's strategy and risk tolerance relative to a country.

Organization and management

Country Risk Management is an independent risk management function that assesses, manages and monitors country risk originated across the Firm.

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

- Establishing policies, procedures and standards consistent with a comprehensive country risk framework
- Assigning sovereign ratings, assessing country risks and establishing risk tolerance relative to a country
- Measuring and monitoring country risk exposure and stress across the Firm
- Managing and approving country limits and reporting trends and limit breaches to senior management
- Developing surveillance tools, such as signaling models and ratings indicators, for early identification of potential country risk concerns
- Providing country risk scenario analysis

Sources and measurement

The Firm is exposed to country risk through its lending and deposits, investing, and market-making activities, whether cross-border or locally funded. Country exposure includes activity with both government and private-sector entities in a country. Under the Firm's internal country risk management approach, attribution of exposure to a specific country is based on the country where the largest proportion of the assets of the counterparty, issuer, obligor or guarantor are located or where the largest proportion of its revenue is derived, which may be different than the domicile (i.e. legal residence) or country of incorporation of the counterparty, issuer, obligor or guarantor. Country exposures are generally measured by considering the Firm's risk to an immediate default of the counterparty, issuer, obligor or guarantor, with zero recovery. Assumptions are sometimes required in determining the measurement and allocation of country exposure, particularly in the case of certain non-linear or index exposures. The use of different measurement approaches or assumptions could affect the amount of reported country exposure.

Under the Firm's internal country risk measurement framework:

- Lending exposures are measured at the total committed amount (funded and unfunded), net of the allowance for credit losses and eligible cash and marketable securities collateral received
- Deposits are measured as the cash balances placed with central and commercial banks
- Securities financing exposures are measured at their receivable balance, net of eligible collateral received
- Debt and equity securities are measured at the fair value of all positions, including both long and short positions
- Counterparty exposure on derivative receivables is measured at the derivative's fair value, net of the fair value of the eligible collateral received
- Credit derivatives protection purchased and sold is reported based on the underlying reference entity and is measured at the notional amount of protection purchased or sold, net of the fair value of the recognized derivative receivable or payable. Credit derivatives protection purchased and sold in the Firm's market-making activities is measured on a net basis, as such activities often result in selling and purchasing protection related to the same underlying reference entity; this reflects the manner in which the Firm manages these exposures

Some activities may create contingent or indirect exposure related to a country (for example, providing clearing services or secondary exposure to collateral on securities financing receivables). These exposures are managed in the normal course of business through the Firm's credit, market, and operational risk governance, rather than through Country Risk Management.

The Firm's internal country risk reporting differs from the reporting provided under the FFIEC bank regulatory requirements. Refer to Cross-border outstandings on page 306 of the 2019 Form 10-K for further information on the FFIEC's reporting methodology.

Stress testing

Stress testing is an important component of the Firm's country risk management framework, which aims to estimate and limit losses arising from a country crisis by measuring the impact of adverse asset price movements to a country based on market shocks combined with counterparty specific assumptions. Country Risk Management periodically designs and runs tailored stress scenarios to test vulnerabilities to individual countries or sets of countries in response to specific or potential market events, sector performance concerns, sovereign actions and geopolitical risks. These tailored stress results are used to inform potential risk reduction across the Firm, as necessary.

Risk reporting

Country exposure and stress are measured and reported regularly, and used by Country Risk Management to identify trends, and monitor high usages and breaches against limits.

For country risk management purposes, the Firm may report exposure to jurisdictions that are not fully autonomous, including Special Administrative Regions ("SAR") and dependent territories, separately from the independent sovereign states with which they are associated.

The following table presents the Firm's top 20 exposures by country (excluding the U.S.) as of December 31, 2019, and their comparative exposures as of December 31, 2018. The selection of countries represents the Firm's largest total exposures by country, based on the Firm's internal country risk management approach, and does not represent the Firm's view of any actual or potentially adverse credit conditions.

Country exposures may fluctuate from period to period due to client activity and market flows. The increase in exposure in Japan is largely due to increased cash balances placed with the central bank of Japan, driven by client activity.

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

December 31, (in billions)	2019				2018[e]
	Lending and deposits[b]	Trading and investing[c]	Other[d]	Total exposure	Total exposure
Germany	$ 45.8	$ 5.4	$ 0.4	$ 51.6	$ 62.1
Japan	35.5	8.0	0.3	43.8	29.1
United Kingdom	31.0	9.9	1.5	42.4	40.7
China	11.3	6.5	1.4	19.2	19.3
Switzerland	10.9	0.8	6.6	18.3	12.8
France	10.7	6.5	0.9	18.1	17.9
Canada	12.0	1.1	0.1	13.2	14.3
Luxembourg	12.1	0.8	–	12.9	11.0
Australia	6.9	4.8	–	11.7	13.0
India	4.6	3.6	3.1	11.3	11.8
Netherlands	4.4	0.8	3.8	9.0	5.8
Brazil	4.8	2.4	–	7.2	7.3
Singapore	4.3	1.6	0.9	6.8	6.8
Italy	2.4	4.2	0.2	6.8	6.4
South Korea	4.5	1.8	0.1	6.4	7.6
Spain	3.2	2.6	–	5.8	5.1
Saudi Arabia	4.7	0.5	–	5.2	5.3
Hong Kong SAR	2.6	1.7	0.8	5.1	5.4
Mexico	3.9	0.8	–	4.7	5.5
Malaysia	1.8	0.8	0.8	3.4	4.3

(a) Top 20 country exposures reflect approximately 88% and 87% of total Firmwide non-U.S. exposure, where exposure is attributed to a specific country, at December 31, 2019 and 2018, respectively.
(b) Lending and deposits includes loans and accrued interest receivable (net of eligible collateral and the allowance for loan losses), deposits with banks (including central banks), acceptances, other monetary assets, issued letters of credit net of participations, and unused commitments to extend credit. Excludes intra-day and operating exposures, such as those from settlement and clearing activities.
(c) Includes market-making inventory, AFS securities, and counterparty exposure on derivative and securities financings net of eligible collateral and hedging. Includes exposure from single reference entity ("single-name"), index and other multiple reference entity transactions for which one or more of the underlying reference entities is in a country listed in the above table.
(d) Predominantly includes physical commodity inventory.
(e) The country rankings presented in the table as of December 31, 2018, are based on the country rankings of the corresponding exposures at December 31, 2019, not actual rankings of such exposures at December 31, 2018.

Operational risk is the risk associated with an adverse outcome resulting from inadequate or failed internal processes or systems; human factors; or external events impacting the Firm's processes or systems; it includes compliance, conduct, legal, and estimations and model risk. Operational risk is inherent in the Firm's activities and can manifest itself in various ways, including fraudulent acts, business interruptions, cybersecurity attacks, inappropriate employee behavior, failure to comply with applicable laws and regulations or failure of vendors to perform in accordance with their agreements. Operational Risk Management attempts to manage operational risk at appropriate levels in light of the Firm's financial position, the characteristics of its businesses, and the markets and regulatory environments in which it operates.

Operational Risk Management Framework

The Firm's Compliance, Conduct, and Operational Risk ("CCOR") Management Framework is designed to enable the Firm to govern, identify, measure, monitor and test, manage and report on the Firm's operational risk.

Operational Risk Governance

The LOBs and Corporate hold ownership, responsibility and accountability for the management of operational risk. The Control Management Organization, which consists of control managers within each LOB and Corporate, is responsible for the day-to-day execution of the CCOR Framework and the evaluation of the effectiveness of their control environments to determine where targeted remediation efforts may be required.

LOBs and Corporate control committees are responsible for reviewing data that indicates the quality and stability of processes, addressing key operational risk issues, focusing on processes with control concerns, and overseeing control remediation.

The Firm's Global Chief Compliance Officer ("CCO") and FRE for Operational Risk is responsible for defining the CCOR Management Framework and establishing minimum standards for its execution. Operational Risk Officers ("OROs") report to both the LOB CROs and to the FRE for Operational Risk, and are independent of the respective businesses or functions they oversee.

The Firm's CCOR Management policy establishes the CCOR Management Framework for the Firm. The CCOR Management Framework is articulated in the Risk Governance and Oversight Policy which is reviewed and approved by the Board Risk Committee periodically.

Operational Risk identification

The Firm utilizes a structured risk and control self-assessment process that is executed by the LOBs and Corporate. As part of this process, the LOBs and Corporate evaluate the effectiveness of their control environment to assess where controls have failed, and to determine where remediation efforts may be required. CCOR Management provides oversight of these activities and may also perform independent assessments of significant operational risk events and areas of concentrated or emerging risk.

Operational Risk Measurement

CCOR Management performs independent risk assessments of the Firm's operational risks, which includes assessing the effectiveness of the control environment and reporting the results to senior management.

In addition, operational risk measurement includes operational risk-based capital and operational risk loss projections under both baseline and stressed conditions.

The primary component of the operational risk capital estimate is the Loss Distribution Approach ("LDA") statistical model, which simulates the frequency and severity of future operational risk loss projections based on historical data. The LDA model is used to estimate an aggregate operational risk loss over a one-year time horizon, at a 99.9% confidence level. The LDA model incorporates actual internal operational risk losses in the quarter following the period in which those losses were realized, and the calculation generally continues to reflect such losses even after the issues or business activities giving rise to the losses have been remediated or reduced.

As required under the Basel III capital framework, the Firm's operational risk-based capital methodology, which uses the Advanced Measurement Approach ("AMA"), incorporates internal and external losses as well as management's view of tail risk captured through operational risk scenario analysis, and evaluation of key business environment and internal control metrics. The Firm does not reflect the impact of insurance in its AMA estimate of operational risk capital.

The Firm considers the impact of stressed economic conditions on operational risk losses and develops a forward looking view of material operational risk events that may occur in a stressed environment. The Firm's operational risk stress testing framework is utilized in calculating results for the Firm's CCAR and other stress testing processes.

Refer to Capital Risk Management section, on pages 85-92 for information related to operational risk RWA, and CCAR.

Operational Risk Monitoring and testing

The results of risk assessments performed by CCOR Management are leveraged as one of the key criteria in the independent monitoring and testing of the LOBs and Corporate's compliance with laws and regulation. Through monitoring and testing, CCOR Management independently identifies areas of operational risk and tests the effectiveness of controls within the LOBs and Corporate.

Management of Operational Risk
The operational risk areas or issues identified through monitoring and testing are escalated to the LOBs and Corporate to be remediated through action plans, as needed, to mitigate operational risk. CCOR Management may advise the LOBs and Corporate in the development and implementation of action plans.

Operational Risk Reporting
Escalation of risks is a fundamental expectation for employees at the Firm. Risks identified by CCOR Management are escalated to the appropriate LOB and Corporate Control Committees, as needed. CCOR Management has established standards to ensure that consistent operational risk reporting and operational risk reports are produced on a Firmwide basis as well as by LOBs and Corporate. Reporting includes the evaluation of key risk indicators and key performance indicators against established thresholds as well as the assessment of different types of operational risk against stated risk appetite. The standards reinforce escalation protocols to senior management and to the Board of Directors.

Subcategories and examples of operational risks

Operational risk can manifest itself in various ways. Operational risk subcategories such as Compliance risk, Conduct risk, Legal risk, and Estimations and Model risk as well as other operational risks, can lead to losses which are captured through the Firm's operational risk measurement processes. Refer to pages 132, 133, and 134, respectively for more information on Compliance, Conduct, Legal, and Estimations and Model risk. Details on other select examples of operational risks are provided below.

Cybersecurity risk
Cybersecurity risk is an important, continuous and evolving focus for the Firm. The Firm devotes significant resources to protecting and continuing to improve the security of its computer systems, software, networks and other technology assets. The Firm's security efforts are designed to protect against, among other things, cybersecurity attacks by unauthorized parties attempting to obtain access to confidential information, destroy data, disrupt or degrade service, sabotage systems or cause other damage. The Firm continues to make significant investments in enhancing its cyberdefense capabilities and to strengthen its partnerships with the appropriate government and law enforcement agencies and other businesses in order to understand the full spectrum of cybersecurity risks in the operating environment, enhance defenses and improve resiliency against cybersecurity threats. The Firm actively participates in discussions of cybersecurity risks with law enforcement, government officials, peer and industry groups, and has significantly increased efforts to educate employees and certain clients on the topic.

Third parties with which the Firm does business or that facilitate the Firm's business activities (e.g., vendors, exchanges, clearing houses, central depositories, and financial intermediaries) are also sources of cybersecurity risk to the Firm. Third party cybersecurity incidents such as system breakdowns or failures, misconduct by the employees of such parties, or cyberattacks could affect their ability to deliver a product or service to the Firm or result in lost or compromised information of the Firm or its clients. Clients are also sources of cybersecurity risk to the Firm, particularly when their activities and systems are beyond the Firm's own security and control systems. As a result, the Firm engages in regular and ongoing discussions with certain vendors and clients regarding cybersecurity risks and opportunities to improve security. However, where cybersecurity incidents occur as a result of client failures to maintain the security of their own systems and processes, clients are responsible for losses incurred.

To protect the confidentiality, integrity and availability of the Firm's infrastructure, resources and information, the Firm maintains a cybersecurity program designed to prevent, detect, and respond to cyberattacks. The Audit Committee is updated periodically on the Firm's Information Security Program, recommended changes, cybersecurity policies and practices, ongoing efforts to improve security, as well as its efforts regarding significant cybersecurity events. In addition, the Firm has a cybersecurity incident response plan ("IRP") designed to enable the Firm to respond to attempted cybersecurity incidents, coordinate such responses with law enforcement and other government agencies, and notify clients and customers, as applicable. Among other key focus areas, the IRP is designed to mitigate the risk of insider trading connected to a cybersecurity incident, and includes various escalation points.

The Cybersecurity and Technology Control functions are responsible for governance and oversight of the Firm's Information Security Program. In partnership with the Firm's LOBs and Corporate, the Cybersecurity and Technology Control organization identifies information security risk issues and oversees programs for the technological protection of the Firm's information resources including applications, infrastructure as well as confidential and personal information related to the Firm's customers. The Cybersecurity and Technology organization is comprised of business aligned information security managers that are supported within the organization by the following products that execute the Information Security Program for the Firm:

- Cyber Defense & Fraud
- Data Management, Protection & Privacy
- Identity & Access Management
- Governance & Controls
- Production Management & Resiliency
- Software & Platform Enablement

The Global Cybersecurity and Technology Control governance structure is designed to identify, escalate, and mitigate information security risks. This structure uses key governance forums to disseminate information and monitor

technology efforts. These forums are established at multiple levels throughout the Firm and include representatives from each LOB and Corporate. Reports containing overviews of key technology risks and efforts to enhance related controls are produced for these forums, and are reviewed by management at multiple levels. The forums are used to escalate information security risks or other matters as appropriate.

The IRM function provides oversight of the activities designed to identify, assess, measure, and mitigate cybersecurity risk.

The Firm's Security Awareness Program includes training that reinforces the Firm's Information Technology Risk and Security Management policies, standards and practices, as well as the expectation that employees comply with these policies. The Security Awareness Program engages personnel through training on how to identify potential cybersecurity risks and protect the Firm's resources and information. This training is mandatory for all employees globally on a periodic basis, and it is supplemented by Firmwide testing initiatives, including periodic phishing tests. Finally, the Firm's Global Privacy Program requires all employees to take periodic awareness training on data privacy. This privacy-focused training includes information about confidentiality and security, as well as responding to unauthorized access to or use of information.

Business and technology resiliency risk

Business disruptions can occur due to forces beyond the Firm's control such as severe weather, power or telecommunications loss, accidents, failure of a third party to provide expected services, cyberattack, flooding, transit strikes, terrorism, health emergencies, the spread of infectious diseases or pandemics. The safety of the Firm's employees and customers is of the highest priority. The Firmwide resiliency program is intended to enable the Firm to recover its critical business functions and supporting assets (i.e., staff, technology and facilities) in the event of a business interruption. The program includes governance, awareness training, and testing of recovery strategies, as well as strategic and tactical initiatives to identify, assess, and manage business interruption and public safety risks. The strength and proficiency of the Firmwide resiliency program has played an integral role in maintaining the Firm's business operations during and after various events.

Payment fraud risk

Payment fraud risk is the risk of external and internal parties unlawfully obtaining personal monetary benefit through misdirected or otherwise improper payment. The risk of payment fraud remains at a heightened level across the industry. The complexities of these incidents and the strategies used by perpetrators continue to evolve. Under the Payments Control Program, methods are developed for managing the risk, implementing controls, and providing employee and client education and awareness trainings. The Firm's monitoring of customer behavior is periodically evaluated and enhanced in an effort to detect and mitigate new strategies implemented by fraud perpetrators.

Third-party outsourcing risk

The Firm's Third-Party Oversight ("TPO") and Inter-affiliates Oversight ("IAO") framework assist the LOBs and Corporate in selecting, documenting, onboarding, monitoring and managing their supplier relationships including services provided by affiliates. The objectives of the TPO framework is to hold suppliers to a high level of operational performance and to mitigate key risks including data loss and business disruption. The Corporate Third-Party Oversight group is responsible for Firmwide training, monitoring, reporting and standards.

Insurance

One of the ways in which operational risk may be mitigated is through insurance maintained by the Firm. The Firm purchases insurance from commercial insurers and maintains a wholly-owned captive insurer, Park Assurance Company. Insurance may also be required by third parties with whom the Firm does business.

COMPLIANCE RISK MANAGEMENT

Compliance risk, a subcategory of operational risk, is the risk of failing to comply with laws, rules, regulations or codes of conduct and standards of self-regulatory organizations.

Overview

Each LOB and Corporate hold primary ownership of and accountability for managing compliance risk. The Firm's Compliance Organization ("Compliance"), which is independent of the LOBs, provides independent review, monitoring and oversight of business operations with a focus on compliance with the legal and regulatory obligations applicable to the delivery of the Firm's products and services to clients and customers.

These compliance risks relate to a wide variety of legal and regulatory obligations, depending on the LOB and the jurisdiction, and include risks related to financial products and services, relationships and interactions with clients and customers, and employee activities. For example, compliance risks include those associated with anti-money laundering compliance, trading activities, market conduct, and complying with the rules and regulations related to the offering of products and services across jurisdictional borders. Compliance risk is also inherent in the Firm's fiduciary activities, including the failure to exercise the applicable standard of care (such as the duties of loyalty or care), to act in the best interest of clients and customers or to treat clients and customers fairly.

Other functions provide oversight of significant regulatory obligations that are specific to their respective areas of responsibility.

CCOR Management implements policies and standards designed to govern, identify, measure, monitor and test, manage, and report compliance risk.

Governance and oversight

Compliance is led by the Firm's Global CCO and FRE for Operational Risk.

The Firm maintains oversight and coordination of its compliance risk through the implementation of the CCOR Risk Management Framework. The Firm's CCO also provides regular updates to the Audit Committee and the Board Risk Committee. In addition, certain Special Purpose Committees of the Board have previously been established to oversee the Firm's compliance with regulatory Consent Orders.

Code of Conduct

The Firm has a Code of Conduct (the "Code") that sets forth the Firm's expectation that employees will conduct themselves with integrity at all times and provides the principles that govern employee conduct with clients, customers, shareholders and one another, as well as with the markets and communities in which the Firm does business. The Code requires employees to promptly report any known or suspected violation of the Code, any internal Firm policy, or any law or regulation applicable to the Firm's business. It also requires employees to report any illegal conduct, or conduct that violates the underlying principles of the Code, by any of the Firm's employees, clients, customers, suppliers, contract workers, business partners, or agents. All newly hired employees are assigned Code training and current employees are periodically assigned Code training on an ongoing basis. Employees are required to affirm their compliance with the Code periodically.

Employees can report any potential or actual violations of the Code through the Code Reporting Hotline by phone or the internet. The Hotline is anonymous, except in certain non-U.S. jurisdictions where laws prohibit anonymous reporting, and is available at all times globally, with translation services. It is administered by an outside service provider. The Code prohibits retaliation against anyone who raises an issue or concern in good faith. Periodically, the Audit Committee receives reports on the Code of Conduct program.

Conduct risk, a subcategory of operational risk, is the risk that any action or inaction by an employee or employees could lead to unfair client or customer outcomes, impact the integrity of the markets in which the Firm operates, or compromise the Firm's reputation.

Overview

Each LOB and Corporate is accountable for identifying and managing its conduct risk to provide appropriate engagement, ownership and sustainability of a culture consistent with the Firm's How We Do Business Principles (the "Principles"). The Principles serve as a guide for how employees are expected to conduct themselves. With the Principles serving as a guide, the Firm's Code sets out the Firm's expectations for each employee and provides information and resources to help employees conduct business ethically and in compliance with the laws everywhere the Firm operates. Refer to Compliance Risk Management on page 132 for further discussion of the Code.

Governance and oversight

The Conduct Risk Program is governed by the CCOR Management policy, which establishes the framework for governance, identification, measurement, monitoring and testing, management and reporting conduct risk in the Firm.

The Conduct Risk Steering Committee (CRSC) provides oversight of the Firm's conduct initiatives to develop a more holistic view of conduct risks and to connect key programs across the Firm in order to identify opportunities and emerging areas of focus.

Each committee of the Board oversees conduct risks within its scope of responsibilities, and the CRSC may escalate to such committees as appropriate.

Conduct risk management encompasses various aspects of people management practices throughout the employee life cycle, including recruiting, onboarding, training and development, performance management, promotion and compensation processes. Each LOB, Treasury and CIO, and designated corporate functions completes an assessment of conduct risk periodically, reviews metrics and issues which may involve conduct risk, and provides business conduct training as appropriate.

LEGAL RISK MANAGEMENT

Legal risk, a subcategory of operational risk, is the risk of loss primarily caused by the actual or alleged failure to meet legal obligations that arise from the rule of law in jurisdictions in which the Firm operates, agreements with clients and customers, and products and services offered by the Firm.

Overview

The global Legal function ("Legal") provides legal services and advice to the Firm. Legal is responsible for managing the Firm's exposure to legal risk by:

- managing actual and potential litigation and enforcement matters, including internal reviews and investigations related to such matters
- advising on products and services, including contract negotiation and documentation
- advising on offering and marketing documents and new business initiatives
- managing dispute resolution
- interpreting existing laws, rules and regulations, and advising on changes thereto
- advising on advocacy in connection with contemplated and proposed laws, rules and regulations, and
- providing legal advice to the LOBs and Corporate, in alignment with the lines of defense described under Firmwide Risk Management on pages 79–83.

Legal selects, engages and manages outside counsel for the Firm on all matters in which outside counsel is engaged. In addition, Legal advises the Firm's Conflicts Office which reviews the Firm's wholesale transactions that may have the potential to create conflicts of interest for the Firm.

Governance and oversight

The Firm's General Counsel reports to the CEO and is a member of the Operating Committee, the Firmwide Risk Committee and the Firmwide Control Committee. The Firm's General Counsel and other members of Legal report on significant legal matters to the Firm's Board of Directors and periodically to the Audit Committee.

Legal serves on and advises various committees (including new business initiative and reputation risk committees) and advises the Firm's LOBs and Corporate on potential reputation risk issues.

ESTIMATIONS AND MODEL RISK MANAGEMENT

Estimations and Model risk, a subcategory of operational risk, is the potential for adverse consequences from decisions based on incorrect or misused estimation outputs.

The Firm uses models and other analytical and judgment-based estimations across various businesses and functions. The estimation methods are of varying levels of sophistication and are used for many purposes, such as the valuation of positions and measurement of risk, assessing regulatory capital requirements, conducting stress testing, and making business decisions. A dedicated independent function, Model Risk Governance and Review ("MRGR"), defines and governs the Firm's policies relating to the management of model risk and risks associated with certain analytical and judgment-based estimations, such as those used in risk management, budget forecasting and capital planning and analysis.

The governance of analytical and judgment-based estimations within MRGR's scope follows a consistent approach to the approach used for models, which is described in detail below.

Model risks are owned by the users of the models within the Firm based on the specific purposes of such models. Users and developers of models are responsible for developing, implementing and testing their models, as well as referring models to the Model Risk function for review and approval. Once models have been approved, model users and developers are responsible for maintaining a robust operating environment, and must monitor and evaluate the performance of the models on an ongoing basis. Model users and developers may seek to enhance models in response to changes in the portfolios and in product and market developments, as well as to capture improvements in available modeling techniques and systems capabilities.

Models are tiered based on an internal standard according to their complexity, the exposure associated with the model and the Firm's reliance on the model. This tiering is subject to the approval of the Model Risk function. In its review of a model, the Model Risk function considers whether the model is suitable for the specific purposes for which it will be used. When reviewing a model, the Model Risk function analyzes and challenges the model methodology and the reasonableness of model assumptions, and may perform or require additional testing, including back-testing of model outcomes. Model reviews are approved by the appropriate level of management within the Model Risk function based on the relevant model tier.

Under the Firm's Estimations and Model Risk Management Policy, the Model Risk function reviews and approves new models, as well as material changes to existing models, prior to implementation in the operating environment. In certain circumstances exceptions may be granted to the Firm's policy to allow a model to be used prior to review or approval. The Model Risk function may also require the user to take appropriate actions to mitigate the model risk if it is to be used in the interim. These actions will depend on the model and may include, for example, limitation of trading activity.

Refer to Critical Accounting Estimates Used by the Firm on pages 136–138 and Note 2 for a summary of model-based valuations and other valuation techniques.

CRITICAL ACCOUNTING ESTIMATES USED BY THE FIRM

JPMorgan Chase's accounting policies and use of estimates are integral to understanding its reported results. The Firm's most complex accounting estimates require management's judgment to ascertain the appropriate carrying value of assets and liabilities. The Firm has established policies and control procedures intended to ensure that estimation methods, including any judgments made as part of such methods, are well-controlled, independently reviewed and applied consistently from period to period. The methods used and judgments made reflect, among other factors, the nature of the assets or liabilities and the related business and risk management strategies, which may vary across the Firm's businesses and portfolios. In addition, the policies and procedures are intended to ensure that the process for changing methodologies occurs in an appropriate manner. The Firm believes its estimates for determining the carrying value of its assets and liabilities are appropriate. The following is a brief description of the Firm's critical accounting estimates involving significant judgments.

Allowance for credit losses

The Firm's allowance for credit losses covers the retained consumer and wholesale loan portfolios, as well as the Firm's wholesale and certain consumer lending-related commitments. The allowance for loan losses is intended to adjust the carrying value of the Firm's loans to reflect probable credit losses inherent in the loan portfolio as of the balance sheet date. Similarly, the allowance for lending-related commitments is established to cover probable credit losses inherent in the lending-related commitments portfolio as of the balance sheet date.

The allowance for credit losses includes a formula-based component, an asset-specific component, and a component related to PCI loans. The determination of each of these components involves significant judgment on a number of matters. Refer to Allowance for credit losses on pages 116–117 and Note 13 for further information on these components, areas of judgment and methodologies used in establishing the Firm's allowance for credit losses.

Allowance for credit losses sensitivity

The Firm's allowance for credit losses is sensitive to numerous factors, which may differ depending on the portfolio. Changes in economic conditions or in the Firm's assumptions and estimates could affect its estimate of probable credit losses inherent in the portfolio at the balance sheet date. The Firm uses its best judgment to assess these economic conditions and loss data in estimating the allowance for credit losses and these estimates are subject to periodic refinement based on changes to underlying external or Firm-specific historical data. Refer to Note 13 for further discussion.

To illustrate the potential magnitude of certain alternate judgments, the Firm estimates that changes in the following inputs would have the following effects on the Firm's modeled credit loss estimates as of December 31, 2019, without consideration of any offsetting or correlated effects of other inputs in the Firm's allowance for loan losses:

- A combined 5% decline in housing prices and a 100 basis point increase in unemployment rates from expectations could imply:
  - an increase to modeled credit loss estimates of approximately $250 million for PCI loans.
  - an increase to modeled annual credit loss estimates of approximately $50 million for residential real estate loans, excluding PCI loans.
- For credit card loans, a 100 basis point increase in unemployment rates from expectations could imply an increase to modeled annual credit loss estimates of approximately $850 million.
- An increase in probability of default ("PD") factors consistent with a one-notch downgrade in the Firm's internal risk ratings for its entire wholesale loan portfolio could imply an increase in the Firm's modeled credit loss estimates of approximately $1.6 billion.
- A 100 basis point increase in estimated loss given default ("LGD") for the Firm's entire wholesale loan portfolio could imply an increase in the Firm's modeled credit loss estimates of approximately $200 million.

The purpose of these sensitivity analyses is to provide an indication of the isolated impacts of hypothetical alternative assumptions on modeled loss estimates. The changes in the inputs presented above are not intended to imply management's expectation of future deterioration of those risk factors. In addition, these analyses are not intended to estimate changes in the overall allowance for loan losses, which would also be influenced by the judgment management applies to the modeled loss estimates to reflect the uncertainty and imprecision of these modeled loss estimates based on then-current circumstances and conditions.

It is difficult to estimate how potential changes in specific factors might affect the overall allowance for credit losses because management considers a variety of factors and inputs in estimating the allowance for credit losses. Changes in these factors and inputs may not occur at the same rate and may not be consistent across all geographies or product types, and changes in factors may be directionally inconsistent, such that improvement in one factor may offset deterioration in other factors. In addition, it is difficult to predict how changes in specific economic conditions or assumptions could affect borrower behavior or other factors considered by management in estimating the allowance for credit losses. Given the process the Firm follows and the judgments made in evaluating the risk factors related to its loss estimates, management believes that its current estimate of the allowance for credit losses is appropriate.

Fair value

JPMorgan Chase carries a portion of its assets and liabilities at fair value. The majority of such assets and liabilities are measured at fair value on a recurring basis, including, derivatives and structured note products. Certain assets and liabilities are measured at fair value on a nonrecurring basis, including certain mortgage, home equity and other

loans, where the carrying value is based on the fair value of the underlying collateral.

Assets measured at fair value

The following table includes the Firm's assets measured at fair value and the portion of such assets that are classified within level 3 of the valuation hierarchy. Refer to Note 2 for further information.

December 31, 2019 (in billions, except ratios)	Total assets at fair value	Total level 3 assets
Trading debt and equity instruments	$ 361.3	$ 3.4
Derivative receivables[(a)]	49.7	4.7
Trading assets	411.0	8.1
AFS securities	350.7	–
Loans	7.1	–
MSRs	4.7	4.7
Other	29.3	0.7
Total assets measured at fair value on a recurring basis	802.8	13.5
Total assets measured at fair value on a nonrecurring basis	4.8	1.3
Total assets measured at fair value	$ 807.6	$ 14.8
Total Firm assets	$ 2,687.4	
Level 3 assets as a percentage of total Firm assets[(a)]		0.6%
Level 3 assets as a percentage of total Firm assets at fair value[(a)]		1.8%

(a) For purposes of the table above, the derivative receivables total reflects the impact of netting adjustments; however, the $4.7 billion of derivative receivables classified as level 3 does not reflect the netting adjustment as such netting is not relevant to a presentation based on the transparency of inputs to the valuation of an asset. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral.

Valuation

Details of the Firm's processes for determining fair value are set out in Note 2. Estimating fair value requires the application of judgment. The type and level of judgment required is largely dependent on the amount of observable market information available to the Firm. For instruments valued using internally developed valuation models and other valuation techniques that use significant unobservable inputs and are therefore classified within level 3 of the valuation hierarchy, judgments used to estimate fair value are more significant than those required when estimating the fair value of instruments classified within levels 1 and 2.

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation technique to use. Second, the lack of observability of certain significant inputs requires management to assess all relevant empirical data in deriving valuation inputs including, for example, transaction details, yield curves, interest rates, prepayment rates, default rates, volatilities, correlations, equity or debt prices, valuations of comparable instruments, foreign exchange rates and credit curves. Refer to Note 2 for a further discussion of the valuation of level 3 instruments, including unobservable inputs used.

For instruments classified in levels 2 and 3, management judgment must be applied to assess the appropriate level of valuation adjustments to reflect counterparty credit quality, the Firm's creditworthiness, market funding rates, liquidity considerations, unobservable parameters, and for portfolios that meet specified criteria, the size of the net open risk position. The judgments made are typically affected by the type of product and its specific contractual terms, and the level of liquidity for the product or within the market as a whole. Refer to Note 2 for a further discussion of valuation adjustments applied by the Firm.

Imprecision in estimating unobservable market inputs or other factors can affect the amount of gain or loss recorded for a particular position. Furthermore, while the Firm believes its valuation methods are appropriate and consistent with those of other market participants, the methods and assumptions used reflect management judgment and may vary across the Firm's businesses and portfolios.

The Firm uses various methodologies and assumptions in the determination of fair value. The use of methodologies or assumptions different than those used by the Firm could result in a different estimate of fair value at the reporting date. Refer to Note 2 for a detailed discussion of the Firm's valuation process and hierarchy, and its determination of fair value for individual financial instruments.

Goodwill impairment

Under U.S. GAAP, goodwill must be allocated to reporting units and tested for impairment at least annually. The Firm's process and methodology used to conduct goodwill impairment testing is described in Note 15.

Management applies significant judgment when testing goodwill for impairment. The goodwill associated with each business combination is allocated to the related reporting units for goodwill impairment testing.

For the year ended December 31, 2019, the Firm reviewed current economic conditions, estimated market cost of equity, as well as actual and projections of business performance for all its businesses. Based upon such reviews, the Firm concluded that the goodwill allocated to its reporting units was not impaired as of December 31, 2019. The fair values of these reporting units exceeded their carrying values by approximately 15% or higher and did not indicate a significant risk of goodwill impairment based on current projections and valuations.

The projections for all of the Firm's reporting units are consistent with management's current short-term business outlook assumptions, and in the longer term, incorporate a set of macroeconomic assumptions and the Firm's best estimates of long-term growth and returns on equity of its businesses. Where possible, the Firm uses third-party and peer data to benchmark its assumptions and estimates.

Refer to Note 15 for additional information on goodwill, including the goodwill impairment assessment as of December 31, 2019.

Credit card rewards liability

JPMorgan Chase offers credit cards with various rewards programs which allow cardholders to earn rewards points based on their account activity and the terms and conditions of the rewards program. Generally, there are no limits on the points that an eligible cardholder can earn, nor

do the points expire, and the points can be redeemed for a variety of rewards, including cash (predominantly in the form of account credits), gift cards and travel. The Firm maintains a rewards liability which represents the estimated cost of rewards points earned and expected to be redeemed by cardholders. The rewards liability is sensitive to various assumptions, including cost per point and redemption rates for each of the various rewards programs, which are evaluated periodically. The liability is accrued as the cardholder earns the benefit and is reduced when the cardholder redeems points. This liability was $6.4 billion and $5.8 billion at December 31, 2019 and 2018, respectively, and is recorded in accounts payable and other liabilities on the Consolidated balance sheets.

Income taxes

JPMorgan Chase is subject to the income tax laws of the various jurisdictions in which it operates, including U.S. federal, state and local, and non-U.S. jurisdictions. These laws are often complex and may be subject to different interpretations. To determine the financial statement impact of accounting for income taxes, including the provision for income tax expense and unrecognized tax benefits, JPMorgan Chase must make assumptions and judgments about how to interpret and apply these complex tax laws to numerous transactions and business events, as well as make judgments regarding the timing of when certain items may affect taxable income in the U.S. and non-U.S. tax jurisdictions.

JPMorgan Chase's interpretations of tax laws around the world are subject to review and examination by the various taxing authorities in the jurisdictions where the Firm operates, and disputes may occur regarding its view on a tax position. These disputes over interpretations with the various taxing authorities may be settled by audit, administrative appeals or adjudication in the court systems of the tax jurisdictions in which the Firm operates. JPMorgan Chase regularly reviews whether it may be assessed additional income taxes as a result of the resolution of these matters, and the Firm records additional reserves as appropriate. In addition, the Firm may revise its estimate of income taxes due to changes in income tax laws, legal interpretations, and business strategies. It is possible that revisions in the Firm's estimate of income taxes may materially affect the Firm's results of operations in any reporting period.

The Firm's provision for income taxes is composed of current and deferred taxes. Deferred taxes arise from differences between assets and liabilities measured for financial reporting versus income tax return purposes. Deferred tax assets are recognized if, in management's judgment, their realizability is determined to be more likely than not. The Firm has also recognized deferred tax assets in connection with certain tax attributes, including net operating loss ("NOL") carryforwards and foreign tax credit ("FTC") carryforwards. The Firm performs regular reviews to ascertain whether its deferred tax assets are realizable. These reviews include management's estimates and assumptions regarding future taxable income, which also incorporates various tax planning strategies, including strategies that may be available to utilize NOLs before they expire. In connection with these reviews, if it is determined that a deferred tax asset is not realizable, a valuation allowance is established. The valuation allowance may be reversed in a subsequent reporting period if the Firm determines that, based on revised estimates of future taxable income or changes in tax planning strategies, it is more likely than not that all or part of the deferred tax asset will become realizable. As of December 31, 2019, management has determined it is more likely than not that the Firm will realize its deferred tax assets, net of the existing valuation allowance.

The Firm adjusts its unrecognized tax benefits as necessary when additional information becomes available. Uncertain tax positions that meet the more-likely-than-not recognition threshold are measured to determine the amount of benefit to recognize. An uncertain tax position is measured at the largest amount of benefit that management believes is more likely than not to be realized upon settlement. It is possible that the reassessment of JPMorgan Chase's unrecognized tax benefits may have a material impact on its effective income tax rate in the period in which the reassessment occurs.

Refer to Note 25 for additional information on income taxes.

Litigation reserves

Refer to Note 30 for a description of the significant estimates and judgments associated with establishing litigation reserves.

Financial Accounting Standards Board ("FASB") Standards Adopted during 2019

Standard	Summary of guidance	Effects on financial statements
Leases *Issued February 2016*	• Requires lessees to recognize all leases longer than twelve months on the Consolidated balance sheets as a lease liability with a corresponding right-of-use asset. • Requires lessees and lessors to classify most leases using principles similar to existing lease accounting, but eliminates the "bright line" classification tests. • Expands qualitative and quantitative leasing disclosures.	• Adopted January 1, 2019. • The Firm elected the available practical expedient to not reassess whether existing contracts contain a lease or whether classification or unamortized initial lease costs would be different under the new lease guidance. The Firm elected the modified retrospective transition method, through a cumulative-effect adjustment to retained earnings without revising prior periods. • Refer to Note 18 for further information.

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

Standard	Summary of guidance	Effects on financial statements
Financial Instruments – Credit Losses ("CECL") *Issued June 2016*	• Establishes a single allowance framework for all financial assets carried at amortized cost and certain off-balance sheet credit exposures. This framework requires that management's estimate reflects credit losses over the full remaining expected life and considers expected future changes in macroeconomic conditions. • Eliminates existing guidance for PCI loans, and requires recognition of the nonaccretable difference as an increase to the allowance for expected credit losses on financial assets purchased with more than insignificant credit deterioration since origination, with a corresponding increase in the recorded investment of the related loans. • Requires inclusion of expected recoveries, limited to the cumulative amount of prior write-offs, when estimating the allowance for credit losses for in scope financial assets (including collateral dependent assets). • Amends existing impairment guidance for AFS securities to incorporate an allowance, which will allow for reversals of credit impairments in the event that the credit of an issuer improves. • Requires a cumulative-effect adjustment to retained earnings as of the beginning of the reporting period of adoption.	• Adopted January 1, 2020. • The adoption of this guidance resulted in a net increase to the allowance for credit losses of $4.3 billion and a decrease to retained earnings of $2.7 billion, primarily driven by Card. Under the CECL framework, the Firm estimates losses over a two-year forecast period using the weighted-average of a range of macroeconomic scenarios (established on a Firmwide basis), and then reverts to longer term historical loss experience to estimate losses over more extended periods. • The Firm elected to phase-in the impact to retained earnings of $2.7 billion to regulatory capital, at 25 percent per year in each of 2020 to 2023 ("CECL transitional period"). Based on the Firm's capital as of December 31, 2019, the estimated impact to the Standardized CET1 capital ratio will be a reduction of approximately 4 bps for each transitional year. • As permitted by the guidance, the Firm elected the fair value option for certain securities financing agreements. The difference between their carrying amount and fair value was immaterial and was recorded as part of the Firm's cumulative-effect adjustment. • Refer to Note 1 for further information.
Goodwill *Issued January 2017*	• Requires recognition of an impairment loss when the estimated fair value of a reporting unit falls below its carrying value. • Eliminates the requirement that an impairment loss be recognized only if the estimated implied fair value of the goodwill is below its carrying value.	• Adopted January 1, 2020. • No impact upon adoption as the guidance is to be applied prospectively.

FORWARD-LOOKING STATEMENTS

From time to time, the Firm has made and will make forward-looking statements. These statements can be identified by the fact that they do not relate strictly to historical or current facts. Forward-looking statements often use words such as "anticipate," "target," "expect," "estimate," "intend," "plan," "goal," "believe," or other words of similar meaning. Forward-looking statements provide JPMorgan Chase's current expectations or forecasts of future events, circumstances, results or aspirations. JPMorgan Chase's disclosures in this 2019 Form 10-K contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. The Firm also may make forward-looking statements in its other documents filed or furnished with the SEC. In addition, the Firm's senior management may make forward-looking statements orally to investors, analysts, representatives of the media and others.

All forward-looking statements are, by their nature, subject to risks and uncertainties, many of which are beyond the Firm's control. JPMorgan Chase's actual future results may differ materially from those set forth in its forward-looking statements. While there is no assurance that any list of risks and uncertainties or risk factors is complete, below are certain factors which could cause actual results to differ from those in the forward-looking statements:

- Local, regional and global business, economic and political conditions and geopolitical events;
- Changes in laws and regulatory requirements, including capital and liquidity requirements affecting the Firm's businesses, and the ability of the Firm to address those requirements;
- Heightened regulatory and governmental oversight and scrutiny of JPMorgan Chase's business practices, including dealings with retail customers;
- Changes in trade, monetary and fiscal policies and laws;
- Changes in income tax laws and regulations;
- Securities and capital markets behavior, including changes in market liquidity and volatility;
- Changes in investor sentiment or consumer spending or savings behavior;
- Ability of the Firm to manage effectively its capital and liquidity, including approval of its capital plans by banking regulators;
- Changes in credit ratings assigned to the Firm or its subsidiaries;
- Damage to the Firm's reputation;
- Ability of the Firm to appropriately address social, environmental and sustainability concerns that may arise from its business activities;
- Ability of the Firm to deal effectively with an economic slowdown or other economic or market disruption, including, but not limited to, in the interest rate environment;
- Technology changes instituted by the Firm, its counterparties or competitors;
- The effectiveness of the Firm's control agenda;
- Ability of the Firm to develop or discontinue products and services, and the extent to which products or services previously sold by the Firm (including but not limited to mortgages and asset-backed securities) require the Firm to incur liabilities or absorb losses not contemplated at their initiation or origination;
- Acceptance of the Firm's new and existing products and services by the marketplace and the ability of the Firm to innovate and to increase market share;
- Ability of the Firm to attract and retain qualified employees;
- Ability of the Firm to control expenses;
- Competitive pressures;
- Changes in the credit quality of the Firm's clients, customers and counterparties;
- Adequacy of the Firm's risk management framework, disclosure controls and procedures and internal control over financial reporting;
- Adverse judicial or regulatory proceedings;
- Changes in applicable accounting policies, including the introduction of new accounting standards;
- Ability of the Firm to determine accurate values of certain assets and liabilities;
- Occurrence of natural or man-made disasters or calamities, including health emergencies, the spread of infectious diseases, pandemics or outbreaks of hostilities, or the effects of climate change, and the Firm's ability to deal effectively with disruptions caused by the foregoing;
- Ability of the Firm to maintain the security of its financial, accounting, technology, data processing and other operational systems and facilities;
- Ability of the Firm to withstand disruptions that may be caused by any failure of its operational systems or those of third parties;
- Ability of the Firm to effectively defend itself against cyberattacks and other attempts by unauthorized parties to access information of the Firm or its customers or to disrupt the Firm's systems; and
- The other risks and uncertainties detailed in Part I, Item 1A: Risk Factors in the JPMorgan Chase's 2019 Form 10-K.

Any forward-looking statements made by or on behalf of the Firm speak only as of the date they are made, and JPMorgan Chase does not undertake to update any forward-looking statements. The reader should, however, consult any further disclosures of a forward-looking nature the Firm may make in any subsequent Form 10-Ks, Quarterly Reports on Form 10-Qs, or Current Reports on Form 8-K.