JPMorgan Chase & Co.

PILLAR 3 REGULATORY CAPITAL DISCLOSURES

For the quarterly period ended December 31, 2018

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JPMorgan Chase & Co., ("JPMorgan Chase" or the "Firm") a financial holding company incorporated under Delaware law in 1968, is a leading global financial services firm and one of the largest banking institutions in the United States of America ("U.S."), with operations worldwide; JPMorgan Chase had $2.6 trillion in assets and $256.5 billion in stockholders' equity as of December 31, 2018. The Firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. Under the J.P. Morgan and Chase brands, the Firm serves millions of customers in the U.S. and globally many of the world's most prominent corporate, institutional and government clients.

JPMorgan Chase's principal bank subsidiaries are JPMorgan Chase Bank, National Association ("JPMorgan Chase Bank, N.A."), a national banking association with U.S. branches in 27 states and the District of Columbia as of December 31, 2018, and Chase Bank USA, National Association ("Chase Bank USA, N.A."), a national banking association that is the Firm's principal credit card-issuing bank. In January 2019, the Office of the Comptroller of the Currency ("OCC") approved an application of merger which was filed by JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. in December 2018 and which contemplates that Chase Bank USA, N.A. will merge with and into JPMorgan Chase Bank, N.A., with JPMorgan Chase Bank, N.A. as the surviving bank. JPMorgan Chase's principal nonbank subsidiary is J.P. Morgan Securities LLC ("J.P. Morgan Securities"), a U.S. broker-dealer. The bank and non-bank subsidiaries of JPMorgan Chase operate nationally as well as through overseas branches and subsidiaries, representative offices and subsidiary foreign banks. The Firm's principal operating subsidiary in the U.K is J.P. Morgan Securities plc, a subsidiary of JPMorgan Chase Bank, N.A.

➢ For additional information, refer to the Supervision and Regulation section on pages 1-3 of the JPMorgan Chase's Annual Report on Form 10-K for the year ended December 31, 2018 ("2018 Form 10-K ")

Pillar 3 report overview

This report provides information on the Firm's capital structure, capital adequacy, risk exposures, and risk-weighted assets ("RWA") under the Basel III advanced approach. This report describes the internal models used to translate risk exposures into required capital.

This report should be read in conjunction with the 2018 Form 10-K which has been filed with the U.S. Securities and Exchange Commission ("SEC").

Basel III overview

The Basel framework consists of a three "Pillar" approach:

- Pillar 1 establishes minimum capital requirements, defines eligible capital instruments, and prescribes rules for calculating RWA.
- Pillar 2 requires banks to have an internal capital adequacy assessment process and requires that banking supervisors evaluate each bank's overall risk profile as well as its risk management and internal control processes.
- Pillar 3 encourages market discipline through disclosure requirements which allow market participants to assess the risk and capital profiles of banks.

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

Basel III also includes a requirement for Advanced Approach banking organizations, including the Firm, to calculate the supplementary leverage ratio ("SLR") which also became fully phased-in as of January 1, 2018.

➢ Refer to pages 1-6 of the 2018 Form 10-K for information on Basel III Reforms.

ENTERPRISE-WIDE RISK MANAGEMENT

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

The Firm believes that effective risk management requires:

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

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

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

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

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

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

Governance and oversight

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

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

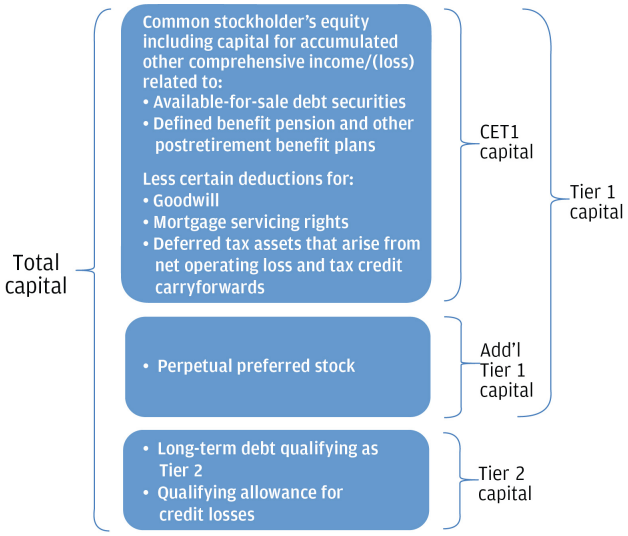
The Firm places reliance on each of its LOBs and other functional areas giving rise to risk to operate within the parameters identified by the IRM function, and within its own management-identified risk and control standards. Each LOB and Treasury and CIO, inclusive of their aligned Operations, Technology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

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

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

➢ Refer to pages 80-83 of the 2018 Form 10-K for information on Risk Governance and oversight.

The three components of regulatory capital under the Basel III Transitional rules are illustrated below:



Terms of capital instruments

The terms and conditions of the Firm's capital instruments are described in the Firm's SEC filings.

- Refer to Note 20 on page 259 and Note 21 on pages 260 respectively of the 2018 Form 10-K for additional information on preferred stock and common stock.
- Refer to Note 19 on pages 257–258 of the 2018 Form 10-K for information on trust preferred securities.
- Refer to the Supervision and Regulation section in Part 1, Item 1 on pages 1–2 of the 2018 Form 10-K.

Components of capital

A reconciliation of total stockholders' equity to Basel III Advanced Transitional CET1 capital, Tier 1 capital, Tier 2 capital and Total capital is presented in the table below.

- Refer to the Consolidated balance sheets on page 152 of the 2018 Form 10-K for the components of total stockholders' equity.

December 31, 2018 (in millions)		Basel III Advanced Transitional
Total stockholders' equity	**$**	**256,515**
Less: Preferred stock		26,068
Common stockholders' equity		**230,447**
Less:		
Goodwill		47,471
Other intangible assets		748
Other CET1 capital adjustments[(a)]		1,034
Add:		
Deferred tax liabilities[(b)]		2,280
CET1 capital		**183,474**
Preferred stock		26,068
Other Tier 1 capital adjustments		5
Less: Tier 1 capital deductions		454
Total Tier 1 capital		**209,093**
Long-term debt and other instruments qualifying as Tier 2 capital		13,772
Qualifying allowance for credit losses		4,424
Other Tier 2 capital adjustments		216
Less: Tier 2 capital deductions		70
Total Tier 2 capital		**18,342**
Total capital	**$**	**227,435**

(a) Includes debit valuation adjustments ("DVA ") related to structured notes recorded in accumulated other comprehensive income ("AOCI").

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

Restrictions on capital and transfer of funds
Regulations govern the amount of dividends the Firm's banking subsidiaries could pay without the prior approval of their relevant banking regulators. Certain of the Firm's cash and other assets are restricted as to withdrawal or usage. These restrictions are imposed by various regulatory authorities based on the particular activities of the Firm's subsidiaries.

➢ Refer to Note 25 on page 268 of the 2018 Form 10-K for information on restrictions on cash and intercompany funds transfers.

Capital management
For additional information on regulatory capital, capital actions and the regulatory capital outlook, refer to the Capital Risk Management section on pages 85-94 of the 2018 Form 10-K and Note 26 on pages 269–270 of the 2018 Form 10-K. The Capital Risk Management section of the Form 10-K reflects regulatory capital, RWA and capital ratios calculated under both the Basel III Advanced and Standardized Fully Phased-In and Transitional basis, whereas the related capital metrics presented in this report are calculated under Basel III Advanced Transitional rules, except where explicitly noted.

Risk-weighted assets
Basel III establishes two comprehensive approaches for calculating RWA (a Standardized approach and an Advanced approach) which include capital requirements for credit risk, market risk, and in the case of Basel III Advanced, also operational risk. Key differences in the calculation of credit risk RWA between the Standardized and Advanced approaches are that for Basel III Advanced, credit risk RWA is based on risk-sensitive approaches which largely rely on the use of internal credit models and parameters, whereas for Basel III Standardized, credit risk RWA is generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. Market risk RWA is calculated on a generally consistent basis between Basel III Standardized and Basel III Advanced.

Covered position definition

The covered position definition determines which positions are subject to market risk RWA treatment and, consequently, which positions are subject to credit risk RWA treatment.

Basel III capital rules define a covered position as:

(1) A trading asset or trading liability that meets both of the following conditions:

- The position is held for the purpose of short-term resale or with the intent to benefit from actual or expected short-term price movements, or to lock in arbitrage profits;
- The position is free of any restrictive covenants on its tradability or the Firm is able to hedge the material risk elements of the position in a two-way market;

(2) A hedge of a covered position; or

(3) A foreign exchange or commodity position, regardless of whether the position is a trading position (excluding structural foreign currency positions that has received prior supervisory approval).

Covered positions exclude certain positions such as equity positions that are not publicly traded, intangible assets including any servicing assets, and liquidity facilities that provide support to asset-backed commercial paper programs.

Basel III capital rules specify that characterization of an asset or liability as "trading" under accounting principles generally accepted in the U.S. ("U.S. GAAP") would not on its own determine whether the asset or liability meets the regulatory definition of a covered position.

Throughout this report, covered positions are also referred to as "trading book" positions. Similarly, non-covered positions are referred to as "banking book" positions. Both covered and non-covered derivative transactions are subject to counterparty credit risk RWA.

Components of risk-weighted assets

Basel III Advanced rules classify capital requirements into three broad categories:

- Credit risk RWA covers the risk of unexpected losses due to obligor, counterparty, or issuer default, and in certain cases adverse changes in credit quality. Credit risk RWA includes retail credit risk, wholesale credit risk, counterparty credit risk, certain securitization exposures, equity investments, other assets, and the credit valuation adjustment (CVA) capital charge.
- Market risk RWA covers 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 RWA covers the risk associated with inadequate or failed internal processes, people, and systems, or from external events.

The following table presents the components of the Firm's total risk-weighted assets under Basel III Advanced Transitional at December 31, 2018.

December 31, 2018 (in millions)	Basel III Advanced Transitional RWA
Credit risk	$ 926,647
Market risk	105,976
Operational risk	388,582
Total RWA	$ 1,421,205

RWA rollforward

The following table presents changes in the components of RWA under Basel III Advanced Transitional for the three months ended December 31, 2018. The amounts represented in the rollforward categories are an approximation, based on the predominant driver of the change.

	Basel III Advanced Transitional RWA			
Three months ended December 31, 2018 (in millions)	Credit risk	Market risk	Operational risk	Total
September 30, 2018	$927,901	$119,227	$ 391,401	$ 1,438,529
Model & data changes[a]	(862)	(9,641)	–	(10,503)
Portfolio runoff[b]	(1,177)	–	–	(1,177)
Movement in portfolio levels[c]	785	(3,610)	(2,819)	(5,644)
Changes in RWA	(1,254)	(13,251)	(2,819)	(17,324)
December 31, 2018	$926,647	$105,976	$ 388,582	$ 1,421,205

(a) Model & data changes refer to material movements in levels of RWA as a result of revised methodologies and/or treatment per regulatory guidance (exclusive of rule changes).
(b) Portfolio runoff for credit risk RWA primarily reflects reduced risk from position rolloffs in legacy portfolios in the Home Lending business.
(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.

Capital requirements

A strong capital position is essential to the Firm's business strategy and competitive position. Maintaining a strong balance sheet to manage through economic volatility is considered a strategic imperative of the Firm's Board of Directors, CEO and Operating Committee. The Firm's fortress balance sheet philosophy focuses on risk-adjusted returns, strong capital and robust liquidity. The Firm's capital risk management strategy focuses on maintaining long-term stability to enable it to build and invest in market-leading businesses, even in a highly stressed environment.

➢ Refer to the Capital Risk Management section on pages 85-94 of the 2018 Form 10-K for information on the Firm's strategy and governance.

The Basel III framework applies to the consolidated results of JPMorgan Chase & Co. The basis of consolidation used for regulatory reporting is the same as that used under U.S. GAAP. There are no material entities within JPMorgan Chase that are deconsolidated and whose capital is deducted.

Under the risk-based and leverage-based capital guidelines of the Federal Reserve, JPMorgan Chase is required to maintain minimum ratios for CET1, Tier 1, Total, Tier 1 leverage and the SLR. Failure to meet these minimum requirements could cause the Federal Reserve to take action. IDI subsidiaries are also subject to these capital requirements by their respective primary regulators.

The following table presents the minimum and well-capitalized ratios to which the Firm and its IDI subsidiaries were subject as of December 31, 2018.

	Minimum capital ratios		Well-capitalized ratios	
	BHC[a][e]	IDI[b][e]	BHC[c]	IDI[d]
Capital ratios				
CET1	9.0%	6.375%	–%	6.5%
Tier 1	10.5	7.875	6.0	8.0
Total	12.5	9.875	10.0	10.0
Tier 1 leverage	4.0	4.000	5.0	5.0
SLR	5.0	6.000	–	6.0

Note: The table above is as defined by the regulations issued by the Federal Reserve, OCC and FDIC and to which the Firm and its IDI subsidiaries are subject.
a) Represents the Transitional minimum capital ratios applicable to the Firm under Basel III at December 31, 2018. At December 31, 2018, the CET1 minimum capital ratio includes 1.875% resulting from the phase in of the Firm's 2.5% capital conservation buffer, and 2.625% resulting from the phase in of the Firm's 3.5% global systematically important banks ("GSIB")surcharge.
(b) Represents requirements for JPMorgan Chase's IDI subsidiaries. The CET1 minimum capital ratio includes 1.875% resulting from the phase in of the 2.5% capital conservation buffer that is applicable to the IDI subsidiaries. The IDI subsidiaries are not subject to the GSIB surcharge.
(c) Represents requirements for bank holding companies pursuant to regulations issued by the Federal Reserve.
(d) Represents requirements for IDI subsidiaries pursuant to regulations issued under the FDIC Improvement Act.
(e) Represents minimum SLR requirement of 3.0%, as well as, supplementary leverage buffers of 2.0% and 3.0% for BHC and IDI, respectively.

Capital adequacy

As of December 31, 2018, JPMorgan Chase and all of its IDI subsidiaries were well-capitalized and met all capital requirements to which each was subject. Capital ratios for the Firm's significant IDI subsidiaries are presented on the following page.

In addition to its IDI subsidiaries, JPMorgan Chase also has other regulated subsidiaries, all of which meet applicable capital requirements.

The capital adequacy of the Firm and its IDI subsidiaries are evaluated against the Basel III approaches (Standardized or Advanced) which, for each quarter, results in the lower ratio as well as the supplementary leverage ratio.

Internal capital adequacy assessment process ("ICAAP")

Annually, the Firm prepares the ICAAP, which informs the Board of Directors of the ongoing assessment of the Firm's processes for managing the sources and uses of capital as well as compliance with supervisory expectations for capital planning and capital adequacy. The Firm's ICAAP integrates stress testing protocols with capital planning. The Firm's Audit Committee is responsible for reviewing and approving the capital stress testing control framework.

The CCAR and other stress testing processes assess the potential impact of alternative economic and business scenarios on the Firm's earnings and capital. Economic scenarios, and the parameters underlying those scenarios, are defined centrally and applied uniformly across the 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.

Comprehensive Capital Analysis and Review ("CCAR")

Banking supervisors requires large BHCs and their IDI subsidiaries, to submit on an annual basis a capital plan that has been reviewed and approved by the Board of Directors. The banking supervisors uses the CCAR and other stress testing processes to ensure that large BHCs and their IDI subsidiaries 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 and IDI subsidiary's unique risks to enable them to absorb losses under certain stress scenarios.

Through the CCAR and other stress testing processes, the banking supervisors evaluates each BHC and IDI subsidiary's capital adequacy and ICAAP, as well as its plans to make capital distributions, such as dividend payments or stock repurchases.

Regulatory capital metrics for JPMorgan Chase and its significant IDI subsidiaries

The following tables present the risk-based and leverage-based capital metrics for JPMorgan Chase and its significant IDI subsidiaries under both the Basel III Standardized Transitional and Basel III Advanced Transitional Approaches at December 31, 2018.

	JPMorgan Chase & Co.	
December 31, 2018 (in millions, except ratios)	**Basel III Standardized Transitional**	**Basel III Advanced Transitional**
Regulatory capital		
CET1 capital	$ 183,474	$ 183,474
Tier 1 capital	209,093	209,093
Total capital[a]	237,511	227,435
Assets		
Risk-weighted	$ 1,528,916	1,421,205
Adjusted average[b]	2,589,887	2,589,887
Capital ratios[c]		
CET1[d]	12.0%	12.9%
Tier 1	13.7	14.7
Total	15.5	16.0
Tier 1 leverage[e]	8.1	8.1

	JPMorgan Chase Bank, N.A.	
December 31, 2018 (in millions, except ratios)	**Basel III Standardized Transitional**	**Basel III Advanced Transitional**
Regulatory capital		
CET1 capital	$ 187,259	$ 187,259
Tier 1 capital	187,259	187,259
Total capital	198,494	192,250
Assets		
Risk-weighted	$ 1,348,230	$ 1,205,539
Adjusted average[b]	2,189,293	2,189,293
Capital ratios[c]		
CET1[d]	13.9%	15.5%
Tier 1	13.9	15.5
Total	14.7	15.9
Tier 1 leverage[e]	8.6	8.6

December 31, 2018 (in millions, except ratios)	Chase Bank USA, N.A. Basel III Standardized Transitional	Basel III Advanced Transitional
Regulatory capital		
CET1 capital	$ 23,696	$ 23,696
Tier 1 capital	23,696	23,696
Total capital	28,628	27,196
Assets		
Risk-weighted	$ 112,513	$ 174,469
Adjusted average[(b)]	118,036	118,036
Capital ratios[(c)]		
CET1[(d)]	21.1%	13.6%
Tier 1	21.1	13.6
Total	25.4	15.6
Tier 1 leverage[(e)]	20.1	20.1

(a) Total regulatory capital for JPMorgan Chase & Co. includes $547 million of surplus regulatory capital in insurance subsidiaries.
(b) 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.
(c) For each of the risk-based capital ratios, the capital adequacy of the Firm and its IDI subsidiaries is evaluated against the lower of the two ratios as calculated under Basel III approaches (Standardized or Advanced).
(d) At December 31, 2018, the Firm and its U.S. subsidiary banks are required to maintain a capital conservation buffer in addition to the 4.5% minimum CET1 requirement or be subject to limitations on the amount of capital that may be distributed, including dividends and common equity repurchases. The capital conservation buffer is calculated as the lowest of the: (i) CET1 ratio less the CET1 minimum requirement, (ii) Tier 1 ratio less the Tier1 minimum requirement and (iii) Total capital ratio less the Total capital minimum requirement. At December 31, 2018, the calculated capital conservation buffer of the Firm, JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. was 7.5%, 6.7% and 7.6%, respectively. This was in excess of the estimated required capital conservation buffer of 4.5% (inclusive of the GSIB surcharge) for the Firm and 1.875% for JPMorgan Chase Bank, N.A. and Chase Bank USA, N.A. at that date. In addition, the buffer for retained earnings for the Firm, JPMorgan Chase Bank, N.A and Chase Bank USA, N.A. was $2.8 billion, $2.3 billion and $0.3 billion respectively.
(e) The Tier 1 leverage ratio is not a risk-based measure of capital.

Supplementary leverage ratio ("SLR")

The following table presents the components of the Firm's Advanced Fully Phased-In SLR as of December 31, 2018.

(in millions, except ratio)	December 31, 2018
Basel III Advanced Fully Phased-In Tier 1 capital	**$ 209,093**
Total spot assets	**2,622,532**
Add: Adjustments for frequency of calculations[(a)]	13,973
Total average assets	**2,636,505**
Less: Adjustments for deductions from tier 1 capital	46,618
Total adjusted average assets[(b)]	**2,589,887**
Off-balance sheet exposures[(c)]	680,101
Total leverage exposure	**$ 3,269,988**
Basel III Advanced Fully Phased-In SLR	**6.4%**

(a) The adjustment for frequency of calculations represents the difference between total spot assets at December 31, 2018 and total average assets for the three months ended December 31, 2018.
(b) 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.
(c) Off-balance sheet exposures are calculated as the average of the three month-end spot balances during the reporting quarter.

Additional information on the components of the leverage exposure is provided in the SLR section of this report.

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

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

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

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

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

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

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

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

➢ For additional information on TLAC, refer to the Capital Risk Management section on pages 93 of the 2018 Form 10-K

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. The consumer credit portfolio refers to exposures held by the Consumer & Community Banking ("CCB") business segment as well as prime mortgage and home equity loans held in the Asset & Wealth Management ("AWM") business segment and and prime mortgage loans held in the Corporate segment. The 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 wholesale credit portfolio refers primarily to exposures held by the Corporate & Investment Bank ("CIB"), Commercial Banking ("CB"), AWM and Corporate segment. In addition to providing credit to clients, the Firm engages in client-related activities that give rise to counterparty credit risk such as securities financing, margin lending and market-making activities in derivatives. Finally, credit risk is also inherent in the Firm's investment securities portfolio held by Treasury and Chief Investment Office ("CIO") in connection with its asset-liability management objectives. Investment securities, as well as deposits with banks and cash due from banks, are classified as wholesale exposures for RWA reporting.

Basel III includes capital charges for counterparty default risk and credit valuation adjustments ("CVA"). CVA is a fair value adjustment to reflect counterparty credit risk in the valuation of over-the-counter ("OTC") derivatives. The Firm calculates CVA RWA using the Simple CVA approach, which uses internal ratings based probability of default ("PD") and a combination of the current exposure method ("CEM") and the internal model method ("IMM") exposure at default ("EAD") for each netting set.

➢ Refer to the Counterparty Credit Risk section on page 18 of this report for further description of the IMM and CEM EAD methodologies.

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/loss given default for regulatory purposes ("LGD"), rationales, proper monitoring and management of credit exposures, and compliance with applicable grading policies and underwriting guidelines.

For information on risk management policies and practices, governance and oversight and accounting policies related to these exposures:

➢ Refer to Credit and Investment Risk Management on pages 102–123 of the 2018 Form 10-K.

➢ Refer to the Notes to the Consolidated Financial Statements beginning on page 155 of the 2018 Form 10-K. Specific page references are contained in the Appendix of this report.

Summary of credit risk RWA

Credit risk RWA includes retail, wholesale and counterparty credit exposures described in this section as well as securitization and equity exposures in the banking book. Other exposures such as non-material portfolios, unsettled transactions and other assets that are not classified elsewhere are also included. The following table presents the Firm's total credit risk RWA at December 31, 2018.

December 31, 2018 (in millions)		Basel III Advanced Transitional RWA
Retail exposures	$	212,695
Wholesale exposures		422,560
Counterparty exposures		104,044
Securitization exposures[(a)]		26,153
Equity exposures		40,737
Other exposures[(b)]		76,603
CVA		43,855
Total credit risk RWA	$	926,647

(a) Represents banking book securitization RWA only.
(b) Includes other assets, non-material portfolios, and unsettled transactions.

Credit risk exposures

Credit risk exposures for the three months ended December 31, 2018 are contained in the 2018 Form 10-K as listed below.

Traditional credit products

- Refer to Credit Risk Management beginning on page 102 for credit-related information on the consumer and wholesale portfolios.
- Refer to Note 12 on pages 219-238 for the distribution of loans by geographic region and industry.
- Refer to Note 27 on pages 271-276 for the contractual amount and geographic distribution of lending-related commitments.

Counterparty credit risk

- Refer to the Consumer Credit Portfolio section on pages 106-111, and to the Wholesale Credit Portfolio section on pages 112-119 for eligible margin loans balances.
- Refer to Wholesale Credit Portfolio footnote (d) on page 113, Country Risk on page 132.
- Refer to Note 5 on pages 184-197 for the gross positive fair value, netting benefits, and net exposure of derivative receivables.
- Refer to Derivative contracts on pages 117–118 for credit derivatives used in credit portfolio management activities.
- Refer to Note 11 on pages 216-218 for information on gross and net securities purchased under resale agreements and securities borrowed transactions, and for information regarding the credit risk inherent in the securities financing portfolio.

Investment securities

- Refer to Credit and Investment Risk Management on pages 102–122 and Note 10 on pages 211–215 for the investment securities portfolio by issuer type.

Country risk

- Refer to page 133 for the top 20 country exposures (excluding the U.S.).

Allowance for credit losses

- Refer to Allowance for Credit Losses on pages 120-122 for a summary of changes in the allowance for loan losses and allowance for lending-related commitments.
- Refer to Note 13 on page 242 for the allowance for credit losses and loans and lending-related commitments by impairment methodology.

Average balances

- Refer to page 285 for the Consolidated average balance sheet.

Credit risk concentrations

Concentrations of credit risk arise when a number of clients, counterparties or customers are engaged in similar business activities or activities in the same geographic region, or when they have similar economic features that would cause their ability to meet contractual obligations to be similarly affected by changes in economic conditions.

JPMorgan Chase regularly monitors various segments of its credit portfolios to assess potential credit risk concentrations and to obtain additional collateral when deemed necessary and permitted under the Firm's agreements. Senior management is significantly involved in the credit approval and review process, and risk levels are adjusted as needed to reflect the Firm's risk appetite.

In the Firm's consumer portfolio, concentrations are managed primarily by product and by U.S. geographic region, with a key focus on trends and concentrations at the portfolio level, where potential credit risk concentrations can be remedied through changes in underwriting policies and portfolio guidelines.

In the wholesale portfolio, credit risk concentrations are evaluated primarily by industry and monitored regularly on both an aggregate portfolio level and on an individual client or counterparty basis. The Firm's wholesale exposure is managed through loan syndications and participations, loan sales, securitizations, credit derivatives, master netting agreements, collateral and other risk-reduction techniques.

The Firm does not believe that its exposure to any particular loan product or industry segment (e.g., real estate), or its exposure to residential real estate loans with high LTV ratios, results in a significant concentration of credit risk.

Terms of loan products and collateral coverage are included in the Firm's assessment when extending credit and establishing its allowance for loan losses.

- Refer to Note 4 on pages 182-183 of the 2018 Form 10-K for additional information on credit risk concentrations.

The retail portfolio is comprised of exposures that are scored and managed on a pool basis rather than on an individual-exposure basis. For the retail portfolio, credit loss estimates are based on statistical analysis of credit losses over discrete periods of time. The statistical analysis uses portfolio modeling, credit scoring, and decision-support tools, which consider loan-level factors such as delinquency status, credit scores, collateral values, and other risk factors.

The population of exposures subject to retail capital treatment for regulatory reporting substantially overlaps with the consumer credit portfolio reflected in the Firm's SEC disclosures. The retail population consists of all scored exposures (mainly in CCB business segment), certain residential mortgages booked as trading assets (that do not meet the definition of a covered position) and certain wholesale loans under $1 million as required by the Basel III capital rules.

The retail capital population excludes certain risk-rated business banking and auto dealer loans that are included in the consumer portfolio in the Firm's SEC disclosures; these are subject to wholesale capital treatment as required by the Basel III capital rules.

Risk parameter estimation

The internal ratings process for retail exposures covers the assignment of individual loan, line of credit or off-balance exposures into homogeneous segments defined by the predominant product and borrower risk characteristics. The criteria for grouping loans into segments was developed using a combination of empirical analysis and management judgment. Predominant risk drivers used for segmentation vary by portfolio and exposure type, but include loan characteristics such as product type, collateral type and loan-to-value, exposure size, origination channel and documentation type and borrower information such as credit score, delinquency history and line of credit utilization rate.

The retail exposures are first broken down into their retail subcategories. Residential mortgage exposures include all exposures secured by residential real estate. This includes traditional mortgages, home equity loans, home equity lines of credit and business banking exposures that are primarily secured by residential real estate. Qualifying revolving exposures ("QRE") include credit cards where the overall credit limit is less than or equal to $100,000. Other retail includes all exposures not classified as residential mortgage or QRE. This includes personal auto finance loans, student loans, credit card accounts above $100,000, business card exposures without a personal guarantee and business banking loans that are less than $500,000 and that are scored or managed as a group of loans with homogeneous risk characteristics.

The segmentation process creates differentiated risk buckets spanning a wide-spectrum of relatively-low to relatively-high expected loss rates. The assignment of exposures to segments occurs on a monthly basis for the majority of the retail portfolio, and at least quarterly for all modeled retail exposures. The overall capital requirement for a given retail subcategory fluctuates based on changes in the mix of products and key risk drivers used for segmentation, and may be impacted by any model enhancements or modifications to parameter estimates.

For each retail sub-category, a separate segmentation model exists for PD, LGD and, for exposures with available undrawn credit exposure, EAD. EAD for a given segment is defined as the Firm's carrying value for on-balance sheet exposures plus a portion of the off-balance sheet exposures based on the Firm's best estimate of net additions to the balance sheet if the exposures were to enter into default in the upcoming year, assuming an economic downturn for that period. Quantification of EAD for off-balance sheet exposures is developed through empirical analysis of historical behavior of defaulted exposures in the months leading up to a default.

The probability of default for a segment estimates the likelihood a borrower will default on the exposure over the next year, based on historical observations over an economic cycle. The PD is quantified based on empirical analysis and observed default rate performance over five or more years, including during a period of stressed economic conditions. Generally, the PD rate for a given segment equates to the simple average of observed one-year default rates over the available historical reference data. However, in some instances the Firm makes adjustments to PD estimates to better reflect a full economic cycle.

LGD for a given segment is an estimate of expected loss during a period of stressed economic conditions. The LGD estimate is based on empirical analysis of post-default loss and recovery information over a historical observation period, and factors in the timing of expected cash flows, estimated recovery costs and accrued interest and fees. The Firm's final estimate is based on the higher of observed performance between the long-run reference data and the downturn-specific performance.

A dedicated independent function, Model RIsk Governance and Review ("MRGR"), conducts initial and ongoing reviews of the segmentation system and the risk parameter estimates (PD, LGD, and EAD). The risk drivers comprising the segments are evaluated on their ability to differentiate risk consistently over time. Modifications to the segments are made periodically, driven by the validation results, shifts in risk management strategies, regulatory guidance or risk modeling best practices. Changes to the segmentation model or parameter estimates are reviewed by the Model Risk function, and tested prior to being put into production. The risk characteristics used for segmentation are consistent with the predominant risk drivers used for other internal credit risk models used by the Firm.

Risk-weighted assets

To calculate retail credit RWA, the Firm inputs its risk parameter estimates (PD, LGD and EAD) into the Internal Ratings Based (IRB) risk weight formula, as specified by the Basel III capital rules. The IRB risk weight formula generates an estimate of unexpected losses at a 99.9% confidence level. Unexpected losses are converted to a RWA measure by an application of a 12.5 supervisory multiplier.

December 31, 2018 (in millions)		Basel III Advanced Transitional RWA
Residential mortgages	$	79,443
Qualifying revolving		110,968
Other retail		22,284
Total retail credit RWA	$	212,695

Residential mortgage exposures

The following table includes first lien and junior lien mortgages and revolving home equity lines of credit. First lien mortgages were 87.0% of the exposure amount, revolving exposures were 13.0%, and the remaining exposures related to junior lien mortgages. Revolving exposures were largely originated prior to 2010 and drive approximately 35.0% of the total risk weighted assets of this portfolio, with nearly 28.0% of the exposures in the equal to or greater than 0.75% PD ranges. Recent originations are primarily first lien mortgages and are predominantly reflected in the less than 0.75% PD ranges.

December 31, 2018
(in millions, except ratios)

PD range (%)	Balance sheet amount	Off balance sheet commitments	EAD	RWA	Exposure-weighted average PD	Exposure-weighted average LGD	Exposure-weighted average Risk weight
0.00 to < 0.10	$ 131,528	$ 19,703	$ 139,516	$ 7,457	0.05%	34.50%	5.34%
0.10 to < 0.20	72,550	2,297	74,398	9,488	0.16	36.17	12.75
0.20 to < 0.75	59,556	1,208	60,442	17,268	0.35	44.68	28.57
0.75 to < 5.50	23,368	2,360	23,937	23,528	1.90	51.49	98.29
5.50 to < 10.00	2,075	657	2,210	4,848	6.92	53.63	219.34
10.00 to < 100	2,802	15	2,804	6,665	29.61	45.64	237.71
100 (default)	11,033	161	11,195	10,189	100.00	– [a]	91.01 [b]
Total	$ 302,912	$ 26,401	$ 314,502	$ 79,443	4.15%	37.15%	25.26%

(a) The LGD rate is reported as zero for residential mortgage exposures in default because at the point they are classified as defaulted per the Basel III capital rules definition they have been charged off to the fair value of any underlying collateral less cost to sell.

(b) The exposure-weighted average risk weight for defaulted loans is less than 100% due to certain loans being insured and/or guaranteed by U.S. government agencies which attract lower than 100% risk weight.

Qualifying revolving exposures

The following table includes exposures to individuals that are revolving, unsecured and unconditionally cancelable by JPMorgan Chase; and they have a maximum exposure amount of up to $100,000 (i.e. credit card and overdraft lines on individual checking accounts).

December 31, 2018
(in millions, except ratios)

PD range (%)	Balance sheet amount	Off balance sheet commitments	EAD	RWA	Exposure-weighted average		
					PD	LGD	Risk weight
0.00 to < 0.50	$ 57,635	$ 526,552	$ 221,632	$ 11,831	0.10%	93.28%	5.34%
0.50 to < 2.00	37,327	50,332	46,952	18,625	1.09	93.33	39.67
2.00 to < 3.50	17,576	10,492	19,026	14,616	2.60	93.45	76.82
3.50 to < 5.00	15,431	2,535	15,608	15,470	3.75	93.05	99.11
5.00 to < 8.00	7,906	1,910	7,981	11,673	6.77	93.68	146.26
8.00 to < 100	20,142	1,387	20,144	38,753	20.67	93.24	192.38
Total	$ 156,017	$ 593,208	$ 331,343	$ 110,968	1.96%	93.29%	33.49%

Other retail exposures

The following table includes other retail exposures to individuals that are not classified as residential mortgage or qualifying revolving exposures (e.g. includes auto loans, credit card accounts above $100,000, business card exposures without a personal guarantee, scored business banking loans and certain wholesale loans under $1 million).

December 31, 2018
(in millions, except ratios)

PD range (%)	Balance sheet amount	Off balance sheet commitments	EAD	RWA	Exposure-weighted average		
					PD	LGD	Risk weight
0.00 to < 0.50	$ 33,834	$ 9,975	$ 37,182	$ 6,917	0.20%	43.94%	18.60%
0.50 to < 2.00	20,689	945	21,058	9,586	0.95	44.09	45.52
2.00 to < 3.50	2,832	407	2,924	2,104	2.95	49.07	71.96
3.50 to < 5.00	524	36	546	653	3.83	78.60	119.59
5.00 to < 8.00	1,233	68	1,248	897	6.76	44.34	71.86
8.00 to < 100	1,533	6	1,543	1,697	25.93	51.57	109.98
100 (default)	389	17	406	430	100.00	– [(a)]	106.00
Total	$ 61,034	$ 11,454	$ 64,907	$ 22,284	1.96%	44.42%	34.33%

(a) The LGD rate is reported as zero for retail exposures in default because at the point they are classified as defaulted per the Basel III capital rules definition they have been charged off to the fair value of any underlying collateral less cost to sell.

The wholesale portfolio is a risk-rated portfolio. Risk-rated portfolios are generally held in CIB, CB and AWM business segments and in Corporate but also include certain business banking and auto dealer loans held in the CCB business segment that are risk-rated because they have characteristics similar to commercial loans. For the risk-rated portfolio, credit loss estimates are based on estimates of the probability of default and loss severity given a default. The estimation process begins when risk-ratings are assigned to each obligor and credit facility to differentiate risk within the portfolio. These risk ratings are reviewed regularly by Credit Risk management and revised as needed to reflect the borrower's current financial position, risk profile and related collateral.

The population of risk-rated loans and lending-related commitments receiving wholesale treatment for regulatory capital purposes largely overlaps with the wholesale credit portfolio reflected in the Firm's SEC disclosures. In accordance with the Basel III capital rules, the wholesale population for regulatory capital consists of:

- All risk-rated loans and commitments (excluding certain wholesale loans under $1 million which receive retail regulatory capital treatment);
- Deposits with banks, and cash and due from banks;
- Exposures to issuer risk for debt securities in the banking book;
- Certain exposures recorded as trading assets that do not meet the definition of a covered position;

Certain off-balance sheet items, such as standby letters of credit and letters of credit, are reported net of risk participations for U.S. GAAP reporting, but are included gross of risk participations for regulatory reporting.

Risk parameter estimation

Risk weights are determined by using internal risk weight parameters. The estimation process for these parameters begins with internal risk-ratings assigned to the obligor and internal loss severity classifications assigned to the credit facility. The obligor ratings are mapped to estimates of PD and the loss severity classifications are mapped to estimates of LGD. Obligor ratings and loss severity classifications are used for both internal risk management and regulatory capital calculations.

For regulatory capital, probability of default is defined as the Firm's best estimate of the long-run, through-the-cycle average one-year default rate. The Firm's PD estimates used in RWA calculations are derived by mapping the internal rating for the relevant obligor to historical external credit rating agency default rates. The Firm's PD estimates are generally in line with rating agencies' default rates.

LGD is defined as an estimate of losses given a default event under stressed economic conditions. Loss severity classifications are assigned by Credit Risk taking into account the type of client, the type of collateral, and the facility's seniority, priority under law, and contractual and structural support, if any. The LGD estimate is based on empirical analysis of post-default loss and recovery information over the historical observation period, and factors in the timing of expected cash flows, estimated recovery costs, and accrued interest and fees. The regulatory LGD used in the RWA calculation reflects the higher of the loss experience over the entire historical observation period.

EAD for a non-defaulted obligor is the estimate of total exposure upon default of the obligor. EAD is a calculation of the full amount of the Firm's exposure to on-balance sheet loans plus a portion of the off-balance sheet exposure based on the Firm's best estimate of net additions of contingent exposure if the obligor were to enter into default in the upcoming year under stressed economic conditions. Quantification of EAD for off-balance sheet exposures is developed through empirical analysis of historical behavior of defaulted exposures in the months leading up to default.

Both the internal ratings process and the risk parameter estimation process are subject to independent review. The Model Risk function conducts initial and ongoing reviews of the risk parameter estimates (PD, LGD, and EAD), assessing both methodology and implementation.

Risk-weighted assets

To calculate wholesale credit RWA, the Firm inputs its risk parameter estimates (PD, LGD and EAD) into the IRB risk weight formula as specified by the U.S. banking supervisors. The IRB risk weight formula generates an estimate of unexpected losses at a 99.9% confidence level. Unexpected losses are converted to a RWA measure by an application of a 12.5 supervisory multiplier.

The adjacent table presents risk-weighted assets by Basel reporting classification. The Corporate classification includes both credit and issuer exposure to corporate entities. Similarly, the Bank and Sovereign classifications include both credit and issuer exposure to banks and sovereign entities respectively. High volatility commercial real estate ("HVCRE") refers to acquisition, development and construction lending. HVCRE is a separate Basel classification because these loans represent higher risk than loans financing income-producing real estate ("IPRE").

December 31, 2018 (in millions)	Basel III Advanced Transitional RWA
Corporate	$ 351,316
Bank	13,994
Sovereign	12,309
Income-producing real estate	44,269
High volatility commercial real estate	672
Total wholesale credit RWA	$ 422,560

Wholesale exposures

The following table presents exposures to wholesale clients and issuers by PD range. Exposures are comprised primarily of traditional credit products (i.e. loans and lending-related commitments), debt securities, and cash placed with various central banks, predominantly Federal Reserve Banks. Total EAD is $1.3 trillion, with 75% of this exposure in the first two PD ranges, which are predominantly investment-grade. Exposures meeting the Basel definition of default represent 0.2% of total EAD. The exposure-weighted average LGD for the wholesale portfolio is 30%.

December 31, 2018 (in millions, except ratios)

PD range (%)	Balance sheet amount	Off balance sheet commitments	EAD	RWA	Exposure-weighted average		
					PD	LGD	Risk weight
0.00 to < 0.15	$ 590,568	$ 163,986	$ 710,607	$ 103,655	0.05%	28.94%	14.59%
0.15 to < 0.50	152,907	133,150	232,527	104,717	0.26	36.54	45.03
0.50 to < 1.35	168,934	90,515	220,701	111,865	0.75	27.43	50.69
1.35 to < 10.00	62,173	55,656	91,938	88,056	3.82	32.33	95.78
10.00 to < 100	4,910	5,701	7,660	11,746	22.73	31.24	153.34
100 (default)	1,877	969	2,378	2,521	100.00	37.80	106.00
Total	$ 981,369	$ 449,977	$ 1,265,811	$ 422,560	0.81%	30.35%	33.38%

Credit risk mitigation

The risk mitigating benefit of eligible guarantees and credit derivative hedges are reflected in the RWA calculation as permitted by the Basel III capital rules. At December 31, 2018, $80.3 billion of EAD for wholesale exposures is covered by eligible guarantees or credit derivatives.

Counterparty credit risk exposures arise from OTC derivatives, repo-style transactions, eligible margin loans and cleared transactions.

Risk parameter estimation
Counterparty credit risk RWA calculations utilize the PD and LGD methodologies described in the Wholesale Credit Risk section of this report. The EAD methodologies are described below.

Over-the-counter ("OTC") derivatives

The Firm principally uses the internal model method ("IMM") under the Basel III capital rules for calculating counterparty credit risk regulatory capital for OTC derivatives.

The IMM methodology uses the Firm's internal models to calculate effective expected positive exposure ("EEPE"), which when multiplied by the regulatory-prescribed multiplier, produces the counterparty-level regulatory measure of EAD.

The Firm's IMM methodology simulates forward-looking market risk factors and uses product-specific pricing models to produce the expected exposure profile for the set of OTC derivatives under each legally enforceable master netting agreement ("netting set"). The IMM model computes two sets of expected exposure profiles and EADs: (1) unstressed expected exposure profiles and EADs using the current market data, and (2) stressed expected exposure profiles and EADs based on a historical period that includes a period of economic stress that results in wider credit default swap ("CDS") spreads. For RWA reporting purposes, the higher of the RWAs generated from these two produced profiles is used. In addition to the regulatory measure of exposure, the IMM model also produces a variety of other risk measures used for internal credit risk management and reporting.

For certain types of derivatives where the IMM model is not used, regulatory exposure is calculated using the current exposure method ("CEM"). In the CEM methodology, EAD for a netting set is the sum of the mark-to-market ("MTM") value, floored at zero and an add-on amount which is based on the notional amount and a regulatory conversion factor for each derivative transaction. In the EAD calculation, exposures at the transaction level are aggregated to incorporate the effects of legally enforceable master netting agreements.

In addition, both methods incorporate the effects of collateral received or posted. The EAD is used in the regulatory capital formula to calculate counterparty-level RWA.

All models are subject to initial and ongoing review by the Firm's independent Model Risk function prior to use. The model is also subject to periodic backtesting to demonstrate that performance continues to be acceptable. Further, the internal models are also used to project the impact of various internal and regulatory stress events to enhance knowledge of the impact potential events have on a credit exposure and capital adequacy.
Certain OTC derivatives are considered securitization exposures and reported in the Securitization section of this report.

Repo-style transactions and eligible margin loans

Counterparty credit risk for repo style transactions and eligible margin loans stems from the inability or unwillingness of a trading counterparty to fulfill their contractual obligations to the Firm. Upon a default, the amount of the risk is the market value of the exposure to the counterparty less the market value of collateral received from the counterparty.

Counterparty credit risk RWA for both repo style transactions and eligible margin loans is calculated using the Collateral Haircut Approach. Under this method the credit risk mitigation benefits of eligible collateral is recognized in the determination of EAD. Prior to the reporting period ending June 30, 2018 the risk mitigation benefits of collateral for eligible margin loans was recognized in the determination of LGD.

EAD is calculated as the amount of the market value of the exposure less the market value of the eligible collateral under a netting set. The collateral is reflected in EAD after applying the standard supervisory market price volatility haircuts.

EAD for repo-style transactions includes certain exposures which are not reflected on the Firm's Consolidated balance sheet such as:

- Securities borrowing and lending transactions collateralized by securities, and
- Securities lending indemnification agreements

Cleared transactions

Cleared transactions include exchange-traded derivatives such as futures and options, OTC derivatives and repo-style transactions that the Firm clears through a central counterparty ("CCP") for its own account or for client accounts. A CCP is a clearing house that interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the future performance of open contracts. A CCP becomes counterparty to trades with market participants through novation, an open offer system, or another legally binding arrangement.

Basel III introduced capital requirements for cleared transactions. There are two components of exposure used to calculate RWA: (1) trade exposure, which is the sum of the EAD (based on the same EAD calculation used for OTC derivatives or repo-style transactions) and collateral posted by the Firm that is not bankruptcy remote from the

CCP, and (2) contributions to the guarantee fund maintained by a CCP as part of the member loss sharing agreement. Only cleared trades where the counterparty is a CCP are classified as cleared transactions under the Basel III capital rules. A cleared derivative where the counterparty is a client is classified as an OTC derivative for regulatory reporting.

Wrong-way risk

Wrong-way risk is the risk that exposure to a counterparty is positively correlated with the probability of default of the same counterparty, which could cause exposure to increase at the same time as the counterparty's capacity to meet its obligations is decreasing. This risk would result in greater EAD when compared with a transaction with another counterparty that does not have this risk. The Firm has policies and processes in place to actively monitor and control wrong-way risk throughout the life cycle of each transaction. Wrong-way risk is factored into the Firm's EAD and RWA calculations in line with the Basel III capital rules.

Risk-weighted assets

To calculate counterparty credit risk RWA, the Firm inputs its risk parameter estimates (PD, LGD and EAD) into the same IRB risk weight formula as wholesale exposures. The IRB risk weight formula generates an estimate of unexpected losses at a 99.9% confidence level. Unexpected losses are converted to an RWA measure by an application of a 12.5 supervisory multiplier.

RWA for exposures where the counterparty is a CCP depends on whether the CCP meets the criteria for classification as a qualifying CCP. The appropriate risk weights are applied to the trade exposure and contributions to the CCP's guarantee fund.

The following table presents risk-weighted assets by transaction type.

December 31, 2018 (in millions)	Basel III Advanced Transitional RWA
OTC derivatives	$ 49,679
Repo-style transactions	33,743
Eligible margin loans	10,857
Cleared transactions	9,765
Total counterparty credit RWA	$ 104,044

Counterparty credit exposures

The following table presents counterparty credit risk exposures for OTC derivatives, repo-style transactions and eligible margin loans by PD range. The table does not include cleared transactions. Total EAD is $236.8 billion, with 79% of this exposure in the first two PD ranges, which are predominantly investment-grade. Exposures meeting the Basel definition of default represent 0.1% of total EAD. The exposure-weighted average LGD for this portfolio is 42%. The collateral benefit is reflected primarily in the EAD.

December 31, 2018
(in millions, except ratios)

			Exposure-weighted average		
PD range (%)	EAD	RWA	PD	LGD	Risk weight
0.00 to < 0.15	$ 143,436	$ 31,776	0.09%	41.86%	22.15%
0.15 to < 0.50	43,937	22,010	0.27	44.88	50.09
0.50 to < 1.35	36,879	24,158	0.74	41.45	65.51
1.35 to < 10.00	11,739	14,258	3.50	43.02	121.46
10.00 to < 100	717	1,937	22.70	46.67	270.10
100 (default)	131	140	100.00	42.25	106.81
Total	$ 236,839	$ 94,279	0.52%	42.43%	39.81%

Credit risk mitigation

The risk mitigating benefit of eligible guarantees and credit derivative hedges are reflected in the RWA calculation as permitted by the Basel III capital rules. At December 31, 2018, $3.4 billion of EAD for OTC derivatives is covered by eligible guarantees.

Securitizations are transactions in which:

- The credit risk of the underlying exposure is transferred to third parties and has been separated into two or more tranches;
- The performance of the securitization depends upon the performance of the underlying exposures or reference assets; and
- All or substantially all of the underlying exposures or reference assets are financial exposures.

Securitizations are classified as either traditional or synthetic. In a traditional securitization, the originator establishes a special purpose entity ("SPE") and sells assets (either originated or purchased) off its balance sheet into the SPE, which issues securities to investors. In a synthetic securitization, credit risk is transferred to an investor through the use of credit derivatives or guarantees. In a synthetic securitization, there is no change in accounting treatment for the assets securitized.

Securitizations include on- or off-balance sheet exposures (including credit enhancements) that arise from a securitization or re-securitization transaction; or an exposure that directly or indirectly references a securitization (e.g. credit derivative). A re-securitization is a securitization transaction in which one or more of the underlying exposures that have been securitized is itself a securitization.

On-balance sheet exposures include securities, loans, as well as servicing advances related to private-label mortgage backed securitizations for which the Firm acts as servicer. Off-balance sheet exposures include liquidity commitments, certain recourse obligations, and derivatives for which the counterparty risk or the reference obligation is a securitization exposure.

The Firm plays a variety of roles in asset securitizations such as investor or originator in traditional and synthetic securitization transactions and servicer/collateral manager of assets transferred into traditional securitizations. The Firm also provides liquidity facilities to securitization transactions.

This section includes both banking book and trading book securitizations with the exception of modeled correlation trading positions which are included in the Market Risk section.

Due diligence

For each securitization and re-securitization exposure, under the Basel III capital rules the Firm is required to perform due diligence prior to acquiring these exposures and document such due diligence within three business days. The Firm's due diligence procedures are designed to provide it with a comprehensive understanding of the features that would materially affect the performance of a securitization or re-securitization.

The Firm's due diligence procedures include analyzing and monitoring:

- The quality of the credit risk, including information regarding the performance of the underlying credit exposures and relevant market data;
- The structural and other enhancement features that may affect the credit quality of a securitization or re-securitization; and
- For re-securitization positions, information on the performance of the underlying securitization exposures.

The level of detail included in the due diligence process is commensurate with the complexity of each securitization or re-securitization exposure held. In addition to pre-trade due diligence, ongoing due diligence is also performed no less frequently than quarterly as required by the Basel III capital rules.

Risk management

The risks related to securitization and re-securitization transactions are managed in accordance with the Firm's credit risk and market risk management policies.

Credit risk mitigation

Various strategies are employed by the Firm to mitigate the risks that arise from securitization and re-securitization positions. These include credit risk mitigation at both the transaction and portfolio levels through diversification and hedging.

Market risk monitoring

Each line of business that transacts in securitizations and re-securitizations, and the Market Risk function work together to monitor the positions, position changes, and the composition of the total portfolio. This includes, but is not limited to, the review of daily positions against approved risk limits using risk measures such as market values, risk factor sensitivities and stress loss scenarios. Covered securitization and re-securitization positions are included in the Firm's Risk Management VaR and Regulatory VaR. These positions are included in the market risk and limit reports that are distributed on a daily basis to the trading desks, Risk Management and senior managers within the lines of business.

Securitization and re-securitization positions can be sensitive to interest rate levels and the overall credit environment. The Firm may hedge credit spread and interest rate risk, and non-U.S. dollar foreign exchange risk associated with non-U.S. dollar denominated assets, as needed, related to its securitization and re-securitization positions. JPMorgan Chase's policies allow various financial instruments to be employed to mitigate or hedge the risks of securitization and re-securitization positions. Examples of these instruments include U.S. Treasuries, interest rate swaps, FX forwards, and various credit derivatives.

Hierarchy of approaches

Basel III Advanced capital rules prescribe a hierarchy of approaches for calculating securitization RWA. First, any after-tax gain-on-sale resulting from a securitization is deducted from CET1 and a 1250% risk weight is applied to any credit-enhancing interest only strips ("CEIOs") that are not required to be deducted. RWA for securitization exposures that are not required to be deducted or assigned a 1250% risk weight is computed under the Supervisory Formula Approach ("SFA"), which leverages internal models to compute the input parameters that determine RWA. Where SFA cannot be utilized, RWA is calculated under the Simplified Supervisory Formula Approach ("SSFA"), which leverages supervisory risk weights and other inputs to determine RWA or assigned a 1250% risk weight.

Risk-weighted assets

The following table presents banking book and trading book exposures receiving securitization capital treatment (with the exception of modeled correlation trading positions which are presented in the Market Risk section). The amounts include traditional and synthetic securitization exposures with re-securitizations shown separately.

	Securitization							
	SFA		SSFA		1250%		Total	
December 31, 2018 (in millions)	Exposure	RWA	Exposure	RWA	Exposure	RWA	Exposure	RWA
Risk weight								
= 0% ≤ 20%	$ 48,093	$ 10,192	$ 62,779	$ 13,243	$ –	$ –	$ 110,873	$ 23,435
> 20% ≤ 50%	1,532	389	4,657	1,571	–	–	6,189	1,961
> 50% ≤ 100%	134	96	615	466	–	–	749	562
> 100% < 1250%	121	320	495	1,086	–	–	616	1,406
= 1250%	25	309	8	100	75	990	107	1,399
Securitization, excluding re-securitization	$ 49,905	$ 11,306	$ 68,554	$ 16,466	$ 75	$ 990	$ 118,534	$ 28,763

	Re-securitization							
	SFA		SSFA		1250%		Total	
December 31, 2018 (in millions)	Exposure	RWA	Exposure	RWA	Exposure	RWA	Exposure	RWA
Risk weight								
= 0% ≤ 20%	$ 1,658	$ 352	$ 9	$ 2	$ –	$ –	$ 1,667	$ 353
> 20% ≤ 50%	–	–	1	–	–	–	1	–
> 50% ≤ 100%	–	–	–	–	–	–	–	–
> 100% < 1250%	–	–	50	97	–	–	49	97
= 1250%	–	–	1	18	–	1	2	19
Re-securitization[a]	$ 1,658	$ 352	$ 61	$ 117	$ –	$ 1	$ 1,719	$ 469
Total securitization [b]	$ 51,563	$ 11,658	$ 68,615	$ 16,583	$ 75	$ 991	$ 120,253	$ 29,232

(a) As of December 31, 2018, there were no re-securitizations to which credit risk mitigation has been applied.
(b) Total securitization RWA includes $3.1 billion of RWA on trading book exposure of $5.9 billion. The trading book RWA represents non-modeled securitization charges in the Market Risk section of this report.

Any gain-on-sale in connection with a securitization exposure must be deducted from CET1 capital. The amount deducted as of December 31, 2018 was immaterial.

Exposure by collateral type

The following table presents banking book and trading book exposures receiving securitization capital treatment (with the exception of modeled correlation trading positions which are presented in the Market Risk section). The amounts below include traditional and synthetic securitization exposures.

	Exposure			
December 31, 2018 (in millions)	On-balance sheet	Off-balance sheet[a]	Total	RWA
Collateral type:				
Residential mortgages	$ 20,304	$ 612	$ 20,916	$ 5,216
Commercial mortgages	14,403	516	14,919	4,136
Commercial and industrial loans	30,028	3,457	33,485	7,933
Consumer auto loans	18,089	4,854	22,942	4,897
Student loans	9,120	331	9,451	2,417
Municipal bonds	66	4,755	4,822	1,079
Other	10,827	2,891	13,718	3,554
Total securitization exposure	$ 102,837	$ 17,416	$ 120,253	$ 29,232

(a) Includes the counterparty credit risk EAD associated with derivative transactions for which the counterparty credit risk is a securitization exposure.

Assets securitized

The following table presents the total outstanding principal balance of JPMorgan Chase-sponsored securitization trusts in which the Firm has retained exposure in either the banking book or the trading book. Third-party assets in deals sponsored by JPMorgan Chase are shown separately.

	Principal amount outstanding			
December 31, 2018 (in millions)	JPMorgan Chase assets held in traditional securitizations[a]	Third-party assets held in traditional securitizations[a]	JPMorgan Chase assets held in synthetic securitizations	Assets impaired or past due[b]
Collateral type:				
Residential mortgages	$ 71,332	$ 9	$ –	$ 6,651
Commercial mortgages	44,062	41,841	–	199
Commercial and industrial loans	–	–	–	–
Consumer auto loans	–	–	–	–
Student loans	255	–	–	12
Municipal bonds		–	–	–
Other	–	–	–	–
Total	$ 115,649	$ 41,850	$ –	$ 6,862

(a) Represents assets held in nonconsolidated securitization VIEs.
(b) Represents assets 90 days or more past due or on nonaccrual status.

Securitization activity

The following table presents assets pending securitization (i.e., assets held with the intent to securitize) at December 31, 2018, and the Firm's securitization activities for the year ended December 31, 2018, related to assets held in Firm-sponsored securitization entities that were not consolidated by the Firm and where sale accounting was achieved based on the accounting rules in effect at the time of the securitization. All instruments transferred into securitization trusts during the year ended December 31, 2018, were accounted for at fair value, with changes in fair value recorded in principal transactions revenue.

	Carrying value	Original principal amount	
December 31, 2018 (in millions)	Assets pending securitization	Assets securitized with retained exposure	Assets securitized without retained exposure
Collateral type:			
Residential mortgages	$ 10,652	$ 6,431	$ –
Commercial mortgages	2,095	7,861	2,298
Commercial and industrial loans		–	–
Consumer auto loans		–	–
Student loans		–	–
Municipal bonds		–	–
Other		–	–
Total	$ 12,747	$ 14,292	$ 2,298

EQUITY RISK IN THE BANKING BOOK

Equity investments in the banking book include principal investments, investments in unconsolidated subsidiaries, other equity investments classified within other assets and certain equity investments classified within trading assets that do not meet the definition of a covered position. These investments are held primarily for reasons other than capital gains, including client relationships, strategic initiatives and employee benefits.

Principal investments are typically private non-traded financial instruments representing ownership or other forms of junior capital. Principal investments cover multiple asset classes and are made either in stand-alone investing businesses or as part of a broader business platform. Asset classes include tax-oriented investments (e.g., affordable housing and alternative energy investments), private equity, various debt and equity instruments, real assets and investment funds (including separate accounts).

In general, new principal investments are made to enhance or accelerate LOB strategic business initiatives.

Investments in separate accounts are held in connection with corporate- and bank-owned life insurance ("COLI/BOLI") and certain asset management activities.

- Refer to Note 8 on pages 202–208 of the 2018 Form 10-K for a discussion of COLI and the related investment strategy and asset allocation.

Investments in equity securities in the banking book are accounted for using one of the following methods:

- Equity method (which requires the Firm to recognize its proportionate share of the entity's net earnings), or fair value if the fair value option was elected, for investments in which the Firm has significant influence over operating and financing decisions (but does not own a majority of the voting equity interests).
- Fair value for the Firm's investment companies and asset management funds accounted for under investment company guidelines, irrespective of the percentage of equity ownership interests held. These include investments in both publicly-held and privately held entities, including investments in buyouts, growth equity and venture opportunities.

Effective January 1, 2018, the Firm adopted the new accounting standard related to recognition and measurement of financial assets and financial liabilities. The adoption of this guidance requires that certain equity instruments be measured at fair value, with changes in fair value recognized in earnings. The guidance also provides an alternative to measure equity securities without readily determinable fair values at:

- Cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer (i.e., the "measurement alternative").

Accounting and valuation policies for equity investments

- Refer to Principal risk, on page 123 of the 2018 Form 10-K for a discussion of investment risk management related to principal investments.
- Refer to Note 1 on pages 155-158 of 2018 Form 10-K for a discussion of the accounting for investments in unconsolidated subsidiaries and other non-trading (i.e., banking book) equity investments.
- Refer to Note 2 on pages 159–178 of the 2018 Form 10-K for more information on the Firm's methodologies regarding the valuation of private equity direct investments and fund investments (i.e., mutual/collective investment funds, private equity funds, hedge funds and real estate funds).

Risk-weight approaches

For equity exposures to investment funds, the Firm uses either the Full Look-Through Approach ("FLTA") or the Simple Modified Look-Through Approach ("SML-TA") to calculate RWA. For all other equity exposures, the Firm uses the Simple Risk-Weight Approach ("SRWA"). Under FLTA, RWA is calculated on the underlying exposures held by the fund as if they were held directly by the Firm then multiplying that amount by the Firm's proportional ownership share of the fund. Under the SML-TA, the Firm uses a fund's prospectus to determine appropriate risk weights to assign to its exposure to the fund. Under the SRWA, the Firm applies regulatory prescribed risk weights to the adjusted carrying value of each equity exposure.

Equity risk-weighted assets

The table below presents the exposure and RWA by risk weight.

December 31, 2018 (in millions)				
Risk-weight category	Exposure[a]		RWA	
0%	$ 6,124	[b]	$ –	
20%	2,109		447	
100%	23,441		24,848	
250%	776		2,056	
600%	142		903	
Look-through	21,053		12,483	
Total	$ 53,645		$ 40,737	

(a) Includes off-balance sheet unfunded commitments for equity investments of $1.2 billion.
(b) Consists of Federal Reserve Bank stock.

Carrying value and fair value

The following table presents the carrying value and fair value of equity investments in the banking book.

December 31, 2018 (in millions)	Carrying value	Fair value
Publicly traded	$ 24,024	$ 24,036
Non-publicly traded	27,462	33,486
Total	$ 51,486	$ 57,522

Realized gains/(losses)

Cumulative realized gains/(losses) from sales and liquidations during the three months ended December 31, 2018 were $324 million. This includes previously recognized unrealized gains/(losses) that have been reversed and booked as realized gains/(losses).

Unrealized gains/(losses)

Total net gains that have not been recognized on the Consolidated balance sheet or through earnings on equity investments in the banking book that are accounted for under the cost, measurement alternative and equity method were $6.0 billion as of December 31, 2018.

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.

- For a discussion of the Firm's Market Risk Management organization, various metrics, both statistical and nonstatistical, used to assess risk and risk monitoring and control, see Market Risk Management on pages 124–131 of the 2018 Form 10-K

Measures included in market risk RWA

The following table presents the Firm's market risk-based capital and risk-weighted assets at December 31, 2018. The components of market risk RWA are discussed in detail in the Regulatory market risk capital models section on pages 26–29 of this report. RWA is calculated as RBC times a multiplier of 12.5; any calculation differences are due to rounding.

Three months ended December 31, 2018 (in millions)	Risk-based capital	RWA
Internal models:		
Value-at-Risk based measure ("VBM")	$ 784	$ 9,798
Stressed Value-at-Risk based measure ("SVBM")	2,212	27,654
Incremental risk charge ("IRC")	430	5,374
Comprehensive risk measure ("CRM")	72	904
Total internal models	3,498	43,730
Non-modeled specific risk[(a)]	4,130	51,634
Other charges	849	10,612
Total Market risk	$ 8,478	$ 105,976

(a) Non-modeled specific risk includes trading book securitization RWA of $3.1 billion.

Material portfolio of covered positions

The Firm's market risks arise predominantly from activities in the CIB business. CIB makes markets in products across fixed income, foreign exchange, equities, commodities and credit markets; hence the Firm's portfolio of covered positions under the Basel III capital rules is predominantly comprised of positions held by the CIB.

- Refer to pages 66–70 of the 2018 Form 10-K for a discussion of CIB's Business Segment Results.

Value-at-Risk ("VaR")

VaR is a statistical risk measure used 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.

- Refer to Market Risk Management on pages 124–128 of the 2018 Form 10-K for information on the Firm's VaR framework.

Since 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.

The Firm therefore considers other nonstatistical measures such as stress testing, in addition to VaR, to capture and manage its market risk positions.

- Refer to the stress testing section on page 31 of this report for further information on stress testing.

Risk management VaR comparison to Regulatory VaR

Risk Management VaR is calculated assuming a one-day holding period and an expected tail-loss methodology which approximates a 95% confidence level. 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. For risk management purposes, the Firm believes the use of a 95% confidence level with a one-day holding period provides a daily measure of risk that is closely aligned to risk management decisions made by the lines of business and Corporate, and provides the appropriate information needed to respond to risk events. The Firm's Risk Management VaR is disclosed in its SEC filings.

As required by the Basel III capital rules, the Firm calculates Regulatory VaR assuming a 10-day holding period and an expected tail loss methodology, which approximates a 99% confidence level. Under this methodology, the Firm would expect to incur Regulatory VaR "back-testing exceptions", defined as losses greater than that predicted by Regulatory VaR estimates, on average once every 100 trading days. However, the Firm expects that, under normal market conditions, it may experience fewer "back-testing exceptions" because the Firm's Regulatory VaR models are calibrated to exclude certain diversification benefits, which generally results in higher VaR measures. The Firm's Risk Management VaR as reported in the Firm's Form 10-Q and Form 10-K does not exclude these diversification benefits.

As noted above, Regulatory VaR is applied to "covered positions" as defined by the Basel III capital rules, which may be different from 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.

Regulatory market risk capital models

VaR-Based Measure ("VBM")

The VBM is an aggregate loss measure that combines Regulatory VaR and modeled specific risk ("SR") assuming a 10-day holding period and a 99% confidence level. While Regulatory VaR measures the risk of loss due to market price or rate movements, the modeled SR portion of the VBM measures the risk of loss from factors other than broad market movements. Modeled SR includes risk factors such as event risk and idiosyncratic risk for a subset of covered positions for which the model is approved by the Firm's banking supervisors.

CIB VaR-Based Measure ("VBM")

For the three months ended December 31, 2018, average CIB VBM was $260 million, compared with CIB average Risk Management VaR of $49 million. The CIB VBM was higher due to the longer holding period (10 days), the higher confidence level (99%), differences in population, and the exclusion of the diversification benefit for certain VaR models.

The following table presents the average, minimum, maximum and period-end VBM by risk type for the CIB and total VBM for the Firm. In addition, the table presents the reduction of total risk resulting from the diversification of the portfolio, which is the sum of the CIB VBMs for each risk type less the total CIB VBM.

	Three months ended December 31, 2018			
(in millions)	Avg	Min	Max	December 31, 2018
CIB VBM by risk type				
Interest rate[a]	$112	$ 75	$140	$ 119
Credit spread[a]	141	118	169	149
Foreign exchange	30	17	56	18
Equities	80	70	103	89
Commodities and other	68	56	79	68
Diversification benefit	(171) [b]	NM [c]	NM [c]	(154) [b]
Total CIB VBM	260	175	311	289
Total Firm VBM	$261	$176	$313	$ 292

(a) For certain products and portfolios, a full revaluation model is used to calculate VBM, which considers both interest rate and credit spread risks together. As such, the Firm allocates the results of the full revaluation model between interest rate and credit spread risk based on the predominant characteristics of the product or portfolio.
(b) Average portfolio VBM and period-end portfolio VBM were less than the sum of the components described above due to portfolio diversification.
(c) Designated as not meaningful ("NM"), because the minimum and maximum may occur on different days for different risk components, and hence it is not meaningful to compute a portfolio-diversification effect.

The following table presents the results of the Firm's VBM converted to risk-based capital based on the application of a regulatory multiplier of 3, and the risk-weighted assets which are calculated by multiplying the risk-based capital measure by 12.5 as prescribed by the Basel III capital rules.

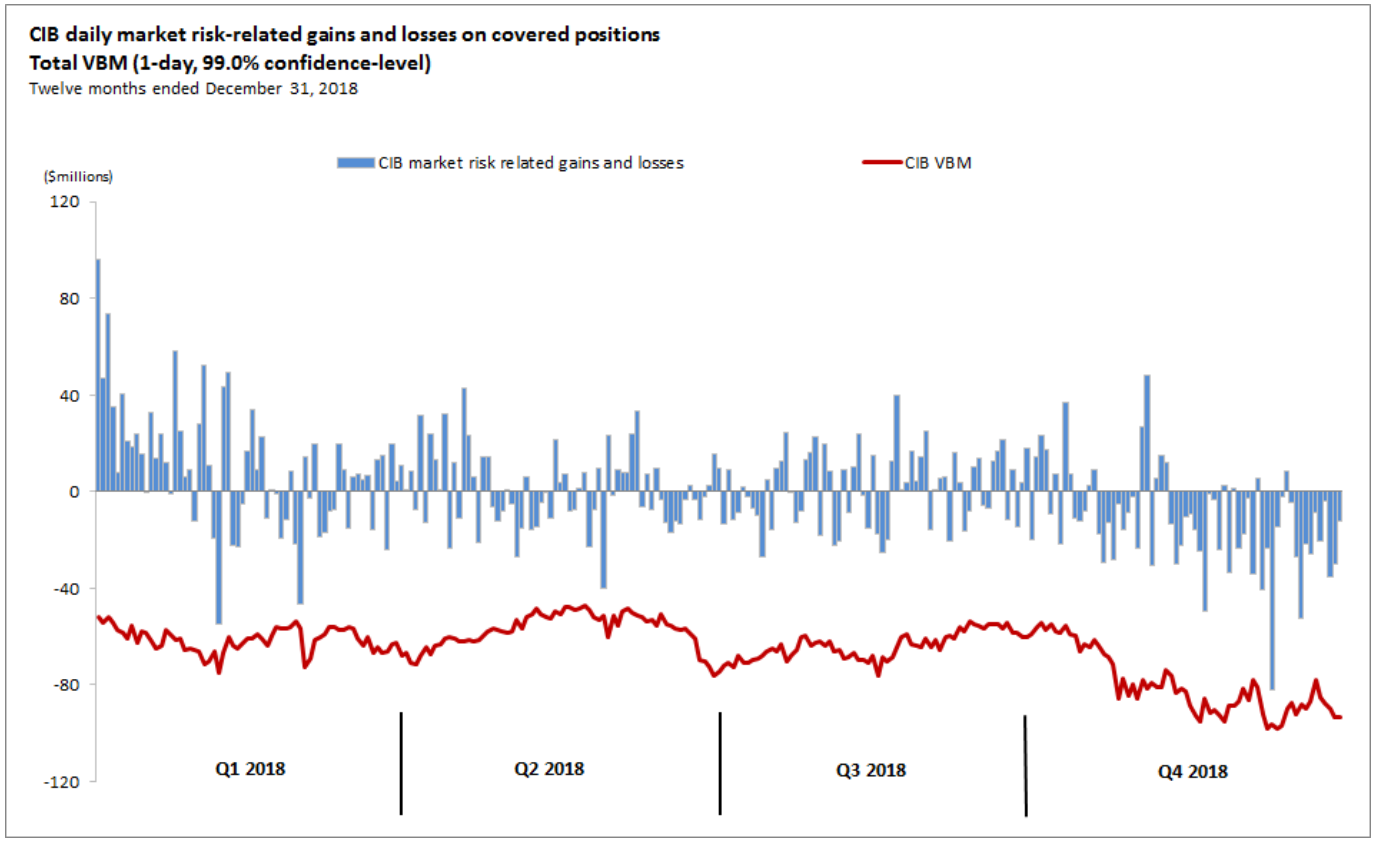
Three months ended December 31, 2018 (in millions)	Average VBM	Risk-based capital	RWA
Firm modeled VBM	$ 261	$ 784	$ 9,798

➢ Refer to pages 126–128 of the 2018 Form 10-K for additional information on Value-at-risk and Risk Management VaR in the Market Risk Management section.

VBM back-testing

The Firm evaluates the effectiveness of its VBM methodology by back-testing, which compares daily market risk-related gains and losses with daily VBM results for a one-day holding period and a 99% confidence level as prescribed by the Basel III capital rules. Market risk-related gains and losses are defined as: gains and losses on covered positions, excluding fees, commissions, certain valuation adjustments, net interest income, and gains and losses arising from intraday trading. VBM "back-testing exceptions" occur when market risk-related losses are greater than the estimate predicted by the VBM for the corresponding day.

The following chart presents the VBM back-testing results for CIB's covered positions. The VBM presented in the chart excludes the diversification benefit for certain VaR models. The chart shows that for the year ended December 31, 2018, the CIB observed no back-testing exceptions and posted market risk related gains on 128 of the 259 trading days. The results in the chart below are different from the results of VaR back-testing disclosed in the Firm's SEC filings due to the differences between the Risk Management VaR and Regulatory VaR as described on page 25-26 of this report.



Stressed VaR-Based Measure ("SVBM")

The SVBM is an aggregate loss measure based on Regulatory VaR and SR models whose inputs are calibrated using historical data from a continuous 12-month period that reflects a period of significant financial stress relevant to the Firm's current portfolio. SVBM is calculated weekly assuming a 10-day holding period and a 99% confidence level. The Firm's selection of the one-year period of significant financial stress is evaluated on an ongoing basis.

The following table presents the average, minimum, maximum and final week of the quarter SVBM for the CIB and the Firm.

	Three months ended December 31, 2018			
(in millions)	Avg.	Min	Max	December 31, 2018[a]
Total CIB SVBM	$ 735	$ 661	$ 835	$ 717
Total Firm SVBM	$ 737	$ 665	$ 838	$ 727

(a) Represents the SVBM for the final week of the quarter, in line with Basel III rules. The measurement date need not coincide with the quarter-end date.

The following table presents the results of the Firm's SVBM converted to risk-based capital based on the application of a regulatory multiplier of 3, and the risk-weighted assets which are calculated by multiplying the risk-based capital measure by 12.5 as prescribed by the Basel III capital rules.

Three months ended December 31, 2018 (in millions)	Average SVBM	Risk-based capital	RWA
Firm modeled SVBM	$ 737	2,212	$ 27,654

Incremental Risk Charge ("IRC")

The IRC measure captures the risks of issuer default and credit migration that are incremental to the risks already captured in the VBM. The model is intended to measure the potential loss over a one-year holding period at a 99.9% confidence level and is applicable to debt positions that are not correlation trading or securitization positions. The IRC is calculated on a weekly basis.

The Firm has developed a Monte Carlo simulation-based model to compute the IRC measure. Modeling of default events is based on a multi-factor asset approach, which incorporates the effects of issuer, regional and industry risk concentrations. Credit migration risk is captured in the IRC model by an explicit simulation of credit spreads. The underlying simulation model is calibrated to provide joint distributions across all risk factors (e.g., default, spread, recovery, basis effects), including important cross-effects that can have a significant impact on the tail risk of the portfolio, such as the correlation between defaults and recoveries.

The IRC model assumes the trading positions remain constant in order to model profit and loss distributions over a one-year holding period. This approach assumes a one-year liquidity horizon for all positions and all risk factor shocks are applied to the portfolio instantaneously. The IRC measures the potential loss in the current value of the portfolio at a 99.9% confidence level. The IRC model uses a full revaluation approach to capture the re-pricing risk of all positions due to credit migration and default events. This approach requires full economic details on all positions for re-pricing to capture the non-linear effects of risk factors on the value of the portfolio during large market moves.

The IRC is validated through the evaluation of modeling assumptions, sensitivity analysis, ongoing monitoring, benchmarking and outcomes analysis. In order to ensure continued applicability and relevance, the IRC model's calibration to historical market data is updated quarterly. In addition, as market conditions and portfolios change over time, ongoing testing and monitoring of the model (including sensitivity analysis, accuracy and convergence testing) is conducted to ensure the appropriateness and accuracy of model settings, parameters and outputs.

The following table presents the average, minimum, maximum and period-end IRC for the CIB.

	Three months ended December 31, 2018			
(in millions)	Avg.	Min	Max	December 31, 2018
CIB IRC on trading positions	$ 315	$ 235	$ 437	$ 430

The following table presents the IRC risk-based capital requirement for the CIB, which is the same as the risk measure itself, and the risk-weighted assets which are calculated by multiplying the risk measure by 12.5 as prescribed by the Basel III capital rules.

Three months ended December 31, 2018 (in millions)	IRC[a]	RWA
Total CIB IRC	$ 430	$ 5,374

(a) IRC reflects the higher of the quarterly average and period-end spot measure under the Basel III capital rules.

Comprehensive Risk Measure ("CRM")

The CRM captures the material price risks of portfolios of correlation trading positions. Correlation trading positions refer to client-driven, market-making activities in credit index and bespoke tranche swaps that are hedged with single-name and index credit default swap positions. The CRM risk-based capital requirement is the greater of modeled CRM and a floor, which is equal to 8% of the total specific risk add-on for such positions using a non-modeled approach.

Similar to the IRC, the CRM model measures potential losses over a one-year holding period at a 99.9% confidence level. The CRM is calculated on a weekly basis.

The CRM model is an extension of the previously described Monte-Carlo simulation-based IRC model, and it includes additional risk factors that are relevant for index tranches,

bespoke tranches, and first-to-default positions in the Firm's correlation trading portfolio. The range of risk factors simulated by the CRM model includes default events, credit spreads, recovery rates, implied correlations and inherent basis risks within these products.

The CRM model assumes the trading positions remain constant in order to model profit and loss distributions over a one-year holding period. This approach assumes a one-year liquidity horizon for all positions and all risk factor shocks are applied to the portfolio instantaneously. The CRM measures the potential loss in the current value of the portfolio at a 99.9% confidence level. The CRM model uses a full revaluation approach to capture the re-pricing risk of all correlation trading positions, including the non-linear effects of risk factors on the value of the portfolio during large market moves.

The CRM model is validated through the evaluation of modeling assumptions, sensitivity analysis, ongoing monitoring, benchmarking and outcomes analysis. In order to ensure continued applicability and relevance, the CRM model's calibration to historical market data is updated quarterly. As an additional validation, and to comply with the requirements of the Basel III capital rules, weekly CRM stress testing is performed for all correlation trading positions. The weekly CRM stress testing leverages pre-defined stress scenarios across major risk factors including default, spread, index-CDS basis spreads, and base correlation. In addition, as market conditions and portfolios change over time, ongoing testing and monitoring of the model (including sensitivity analysis, accuracy and convergence testing) is conducted to ensure the appropriateness and accuracy of model settings, parameters and outputs.

The following table presents the average, minimum, maximum and period-end CRM for the CIB

	Three months ended December 31, 2018			
(in millions)	Avg.	Min	Max	December 31, 2018
CIB CRM Capital	$ 72	$ 64	$ 83	$ 64

The following table presents the CRM risk-based capital requirement for the CIB, which is the same as the risk measure itself, and the risk-weighted assets which are calculated by multiplying the risk-based capital measure by 12.5 as prescribed by the Basel III capital rules.

Three months ended December 31, 2018 (in millions)	CRM[a]	RWA
Total CIB CRM Capital	$ 72	$ 904

(a) CRM reflects the higher of the quarterly average and period-end spot measure under the Basel III capital rules.

Aggregate securitization positions

- For information on the aggregate amount of on-balance sheet and off-balance sheet securitization positions by exposure type, refer to Securitization on page 22 of this report.

Aggregate correlation trading positions

The following table presents the net notional amount and fair value of the Firm's aggregate correlation trading positions and the associated credit hedges. Credit hedges of the correlation trading positions are included as they are considered to be part of the aggregate correlation trading positions.

December 31, 2018 (in millions)	Notional amount[a]	Fair value[b]
Positions modeled in CRM	$ (2,199)	$ (30)
Positions not modeled in CRM	173	1
Total correlation trading positions	$ (2,026)	$ (30)

(a) Reflects the net of the notional amount of the correlation trading portfolio, including credit hedges. Negative balances, if any, reflect aggregate net short correlation trading positions.
(b) Reflects the fair value of securities and derivatives, including credit hedges.

Non-modeled specific risk

Non-modeled specific risk is calculated using supervisory-prescribed risk weights and methodologies for covered debt, equity and securitization positions that are not included in modeled SR. The market risk-based capital and risk-weighted assets (which are calculated by multiplying the capital requirement by 12.5 as prescribed by the Basel III capital rules) for non-modeled specific risk are shown in the table below.

December 31, 2018 (in millions)	Risk-based capital	RWA
Securitization positions	$ 246	$ 3,079
Nonsecuritization positions	3,884	48,555
Total Non-modeled specific risk	$ 4,130	$ 51,634

Other charges

Other charges reflect exposures receiving alternative capital treatments. The capital requirement is translated to risk-weighted assets by multiplying by 12.5 as prescribed by the Basel III capital rules.

December 31, 2018 (in millions)	Risk-based capital	RWA
Total Firm other charges	$ 849	$ 10,612

Independent review of market risk regulatory capital models

A dedicated independent model risk function, the Model Risk Governance and Review group, is responsible for approving new models, as well as material changes to existing models, prior to implementation in the operating environment. Market risk regulatory capital models are in scope for this process. The critical elements of the review process are:

- An evaluation of the conceptual soundness of the model specifications such as risk factor representation of the products and the associated simulation methods;
- An analysis of model outcomes, including a comparison of the outputs with empirical experience and, where relevant, with alternative model specifications;
- An evaluation of the adequacy of model calibration procedures and model implementation testing performed by model developers.

The evaluation of the conceptual soundness of a model seeks to assess the reasonableness of model specifications, and takes into consideration the purpose of the model. This process also seeks to identify the main model assumptions, evaluate their adequacy, understand their strengths and weaknesses, and the impact that such assumptions may have on model output. The Model Risk function may requires that a remediation plan be developed for critical weaknesses that have been identified in models, which should include specific action steps and analysis to resolve deficiencies, within a specified period of time, and address the need for any compensating controls if the model is to be used in the interim.

The output of models, and the models' response to changes in inputs, are evaluated via outcomes analysis which includes: comparing model results against empirical evidence; comparing model results against the results obtained with alternative settings, or models; and assessing the reasonableness of the sensitivity of model results to changes in portfolio and market inputs.

While evidence of the integrity of model implementation is obtained throughout the entire review process, the Model Risk function dedicates a stand-alone work stream to assess the completeness and quality of the testing performed by model developers. The Model Risk function also evaluates the approach used by model developers to assess the numerical accuracy of the results, such as the setting of the number of trials in a Monte Carlo simulation. Additional model testing may be requested of the model development team by the Model Risk function or may be performed directly by the Model Risk function. 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.

For further information, refer to Model Risk Management on page 140 of the 2018 Form 10-K.

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 lines of business 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 the respective LOBs, Corporate and the Firm's senior management.

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 by the relevant LOB Risk Committees on an annual basis or as changing market conditions warrant and may be redefined to reflect current or expected market conditions.

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 quarterly to the DRPC.

Operational risk is the risk associated with inadequate or failed internal processes, people and systems, or from external events and includes compliance risk, conduct risk, legal risk, and estimations and model risk. Operational risk is inherent in the Firm's activities and can manifest itself in various ways, including fraudulent acts, business interruptions, cybersecurity attacks, inappropriate employee behavior, failure to comply with applicable laws and regulations or failure of vendors to perform in accordance with their agreements. These events could result in financial losses, litigation and regulatory fines, as well as other damages to the Firm. The goal is to keep operational risk at appropriate levels in light of the Firm's financial position, the characteristics of its businesses, and the markets and regulatory environments in which it operates.

One of the ways in which operational risk may be mitigated is through insurance maintained by the Firm. The Firm purchases insurance from commercial insurers and utilizes a wholly-owned captive insurer, Park Assurance Company, as needed to comply with local laws and regulations (e.g., workers compensation), as well as to serve other needs (e.g., property loss and public liability). Insurance may also be required by third parties with whom the Firm does business. The insurance purchased is reviewed and approved by senior management.

- Refer to pages 134–136 of the 2018 Form 10-K for a discussion of Operational Risk Management.

Operational Risk Measurement

In addition to the level of actual operational risk losses, operational risk measurement includes operational risk-based capital and operational risk loss projections under both baseline and stressed conditions.

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

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

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

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 Operational Risk Management on page 134–136 of the 2018 Form 10-K for information related to operational risk measurement and page 91 of Capital Risk Management for operational risk RWA.

Earnings-at-risk

The effect of interest rate exposure on the Firm's reported net income is also 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. The Firm evaluates its structural interest rate risk exposure through earnings-at-risk, which measures the extent to which changes in interest rates will affect the Firm's net interest income and interest rate-sensitive fees.

➢ Refer to the table on page 125 of the 2018 Form 10-K for a summary of 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 DRPC. Treasury and CIO, working in partnership with the lines of business, 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 CRO. 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.

The Firm generates a baseline for net interest income and certain interest rate-sensitive fees, and then conducts simulations of changes for interest rate-sensitive assets and liabilities denominated in U.S. dollars and other currencies ("non-U.S. dollar" currencies). This simulation primarily includes retained loans, deposits, deposits with banks, investment securities, long term debt and any related interest rate hedges, and excludes other positions in risk management VaR and other sensitivity-based measures.

Earnings-at-risk scenarios estimate the potential change in this 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 holding short-term rates constant and decreasing long-term rates or increasing short-term rates and holding long-term rates constant. These scenarios consider the impact on exposures as a result of changes in interest rates from baseline rates, as well as pricing sensitivities of deposits, optionality and changes in product mix. The scenarios include forecasted balance sheet changes, 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 in the baseline and scenarios use assumed rates paid which may differ from actual rates paid due to timing 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.

➢ Refer to page 129-130 of the 2018 Form 10-K for a detailed discussion of Earnings-at-risk.

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

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

The Firm's sensitivity to rates is largely a result of assets repricing at a faster pace than deposits.

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

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

The SLR is defined as Tier 1 capital under the Basel III capital rules divided by the Firm's total leverage exposure. The tables below present the components of the Firm's SLR as of December 31, 2018 with on-balance sheet amounts calculated as the quarterly average and off-balance sheet amounts calculated as the average of each of the three month's period-end balances.

Summary comparison of accounting assets and total leverage exposure

(in millions, except ratio)	December 31, 2018
Basel III Advanced Fully Phased-In Tier 1 capital	**$ 209,093**
Total spot assets	**2,622,532**
Add: Adjustments for frequency of calculations[a]	13,973
Total average assets	**2,636,505**
Less: Adjustments for deductions from Tier 1 capital	46,618
Total adjusted average assets	**2,589,887**
Adjustment for derivative transactions	340,544
Adjustment for repo-style transactions	31,470
Adjustment for off-balance sheet exposures	308,087
Total leverage exposure	**$ 3,269,988**
Basel III Advanced Fully Phased-In SLR	**6.4%**

(a) The adjustment for frequency of calculations represents the difference between total spot assets at December 31, 2018, and average assets for the three months ended December 31, 2018.

Derivative transactions

The following table presents the components of total derivative exposure.

(in millions)	December 31, 2018
Replacement cost for all derivative transactions[a]	$ 61,056
Add-on amounts for potential future exposure ("PFE") for all derivative transactions	388,143
Gross-up for collateral posted in derivative transactions if collateral is deducted from on-balance sheet assets	1,174
Less: Exempted exposures to central counterparties ("CCPs") in cleared transactions	77,044
Adjusted effective notional principal amount of sold credit protection	786,972
Less: Effective notional principal amount offsets and PFE deductions for sold credit protection	760,637
Total derivative exposure[b]	**399,664**
Less: On-balance-sheet average derivative receivables	59,120
Adjustment for derivative transactions	**$ 340,544**

(a) Includes cash collateral received of $1.9 billion.
(b) Receivables for cash variation margin that are posted under a qualifying derivative contract where the Firm has obtained an appropriate legal opinion with respect to master netting agreements with the same counterparty, and where other relevant criteria under U.S. GAAP are met, are netted against derivative liabilities and are not included in on-balance sheet assets.

Repo-style transactions

The following table presents the components of total exposures for repo-style transactions.

(in millions)	December 31, 2018
Gross assets for repo-style transactions[a]	$ 730,157
Less: amounts netted[b]	354,433
Counterparty credit risk for all repo-style transactions	32,611
Exposure amount for repo-style transactions where the Firm acts as an agent[c]	268
Total exposures for repo-style exposures	**408,603**
Less: on-balance sheet amounts	
Securities purchased under resale agreements	256,203
Securities borrowed	120,929
Adjustment for repo-style transactions	**$ 31,470**

(a) Includes adjustments for securities received where the securities lender has not sold or rehypothecated securities received.
(b) Reflects netting of transactions where the Firm has obtained an appropriate legal opinion with respect to master netting agreements with the same counterparty, and where other relevant criteria under U.S. GAAP are met.
(c) Includes exposures where the Firm's guarantee is greater than the difference between the fair value of the security or cash the Firm's customer has lent and the value of the collateral provided.

Other off-balance sheet exposures

The following table presents wholesale and retail commitments after applying the relevant credit conversion factors.

(in millions)	December 31, 2018
Off-balance sheet exposures - gross notional amounts	$ 1,109,593
Less: Adjustments for conversion to credit equivalent amounts	801,506
Adjustment for other off-balance sheet exposures	**$ 308,087**

Valuation process

The accounting and financial reporting policies of JPMorgan Chase and its subsidiaries conform to U.S. GAAP. Additionally, where applicable, the policies conform to the accounting and reporting guidelines prescribed by regulatory authorities. It is JPMorgan Chase's policy to carry its covered positions at fair value.

Risk-taking functions are responsible for providing fair value estimates for assets and liabilities carried on the Consolidated balance sheets at fair value. The Firm's Valuation Control Group ("VCG"), which is part of the Firm's Finance function and independent of the risk-taking functions, is responsible for verifying these estimates and determining any fair value adjustments that may be required to ensure that the Firm's positions are recorded at fair value. The Valuation Governance Forum ("VGF") is composed of senior finance and risk executives and is responsible for overseeing the management of risks arising from valuation activities conducted across the Firm. The Firmwide VGF is chaired by the Firmwide head of the VCG (under the direction of the Firm's Controller), and includes sub-forums covering the CIB, CCB, CB, AWM and certain corporate functions including Treasury and CIO.

Price verification process

The VCG verifies fair value estimates provided by the risk-taking functions by leveraging independently derived prices, valuation inputs and other market data, where available. Where independent prices or inputs are not available, the VCG performs additional review to ensure the reasonableness of the estimates. The additional review may include evaluating the limited market activity including client unwinds, benchmarking valuation inputs to those used for similar instruments, decomposing the valuation of structured instruments into individual components, comparing expected to actual cash flows, reviewing profit and loss trends, and reviewing trends in collateral valuation. There are also additional levels of management review for more significant or complex positions.

The VCG determines any valuation adjustments that may be required to the estimates provided by the risk-taking functions. No adjustments to quoted prices are applied for instruments classified within level 1 of the fair value hierarchy.

➢ Refer to Note 2 on pages 159-178 of the 2018 Form 10-K, for information on the fair value hierarchy.

For other positions, judgment is required to assess the need for valuation adjustments to appropriately reflect liquidity considerations, unobservable parameters, and, for certain portfolios that meet specified criteria, the size of the net open risk position. The determination of such adjustments follows a consistent framework across the Firm:

- Liquidity valuation adjustments are considered where an observable external price or valuation parameter exists but is of lower reliability, potentially due to lower market activity. Liquidity valuation adjustments are applied and determined based on current market conditions. Factors that may be considered in determining the liquidity adjustment include analysis of: (1) the estimated bid-offer spread for the instrument being traded; (2) alternative pricing points for similar instruments in active markets; and (3) the range of reasonable values that the price or parameter could take.
- The Firm manages certain portfolios of financial instruments on the basis of net open risk exposure and, as permitted by U.S. GAAP, has elected to estimate the fair value of such portfolios on the basis of a transfer of the entire net open risk position in an orderly transaction. Where this is the case, valuation adjustments may be necessary to reflect the cost of exiting a larger-than-normal market-size net open risk position. Where applied, such adjustments are based on factors that a relevant market participant would consider in the transfer of the net open risk position, including the size of the adverse market move that is likely to occur during the period required to reduce the net open risk position to a normal market-size.
- Unobservable parameter valuation adjustments may be made when positions are valued using prices or input parameters to valuation models that are unobservable due to a lack of market activity or because they cannot be implied from observable market data. Such prices or parameters must be estimated and are, therefore, subject to management judgment. Unobservable parameter valuation adjustments are applied to reflect the uncertainty inherent in the resulting valuation estimate.
- Where appropriate, the Firm also applies adjustments to its estimates of fair value in order to appropriately reflect counterparty credit quality (CVA), the Firm's own creditworthiness (DVA) and the impact of funding (FVA), using a consistent framework across the Firm.

➢ Refer to Note 2 on page 175 of the 2018 Form 10-K, for information on credit and funding valuation adjustments.

Valuation model review and approval
If prices or quotes are not available for an instrument or a similar instrument, fair value is generally determined using valuation models that consider relevant transaction data such as maturity and use as inputs market-based or independently sourced parameters. Where this is the case the price verification process described above is applied to the inputs to those models.

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

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

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

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

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

➢ Refer to the Estimations and Model Risk Management section on page 140 of the 2018 Form 10-K for additional information.

References to JPMorgan Chase's 2018 Form 10-K

JPMorgan Chase's 2018 Form 10-K contains important information on the Firm's risk management policies and practices, capital management processes, and accounting policies relevant to this report. Specific references are listed below.

Management's discussion and analysis

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