Management’s report on internal control over financial reporting

Management of JPMorgan Chase & Co. (“JPMorgan Chase” or the “Firm”) is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed by, or under the supervision of, the Firm’s principal executive and principal financial officers, or persons performing similar functions, and effected by JPMorgan Chase’s Board of Directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America (“U.S. GAAP”).

JPMorgan Chase’s internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records, that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the Firm’s assets; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, and that receipts and expenditures of the Firm are being made only in accordance with authorizations of JPMorgan Chase’s management and directors; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Firm’s assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. Management has completed an assessment of the effectiveness of the Firm’s internal control over financial reporting as of December 31, 2022. In making the assessment, management used the “Internal Control — Integrated Framework” (“COSO 2013”) promulgated by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”).

Based upon the assessment performed, management concluded that as of December 31, 2022, JPMorgan Chase’s internal control over financial reporting was effective based upon the COSO 2013 framework. Additionally, based upon management’s assessment, the Firm determined that there were no material weaknesses in its internal control over financial reporting as of December 31, 2022.

The effectiveness of the Firm’s internal control over financial reporting as of December 31, 2022, has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which appears herein.

James Dimon
Chairman and Chief Executive Officer

Jeremy Barnum
Executive Vice President and Chief Financial Officer

February 21, 2023

To the Board of Directors and Shareholders of JPMorgan Chase & Co.:

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of JPMorgan Chase & Co. and its subsidiaries (the “Firm”) as of December 31, 2022 and 2021, and the related consolidated statements of income, comprehensive income, changes in stockholders’ equity and cash flows for each of the three years in the period ended December 31, 2022, including the related notes (collectively referred to as the “consolidated financial statements”). We also have audited the Firm’s internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Firm as of December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Firm maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on criteria established in *Internal Control – Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, the Firm changed the manner in which it accounts for credit losses on certain financial instruments in 2020.

Basis for Opinions

The Firm’s management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management’s report on internal control over financial reporting. Our responsibility is to express opinions on the Firm’s consolidated financial statements and on the Firm’s internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Firm in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company’s internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company’s internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company’s assets that could have a material effect on the financial statements.

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

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current period audit of the consolidated financial statements that were communicated or required to be communicated to the audit committee and that (i) relate to accounts or disclosures that are material to the consolidated financial statements and (ii) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Allowance for Loan Losses – Portfolio-based component of Wholesale Loan and Credit Card Loan Portfolios

As described in Note 13 to the consolidated financial statements, the allowance for loan losses for the portfolio-based component of the wholesale and credit card loan portfolios was $17.0 billion on total portfolio-based retained loans of $785.9 billion at December 31, 2022. The Firm’s allowance for loan losses represents management’s estimate of expected credit losses over the remaining expected life of the Firm's loan portfolios and considers expected future changes in macroeconomic conditions. The portfolio-based component of the Firm’s allowance for loan losses for the wholesale and credit card retained loan portfolios begins with a quantitative calculation of expected credit losses over the expected life of the loan by applying credit loss factors to the estimated exposure at default. The credit loss factors applied are determined based on the weighted average of five internally developed macroeconomic scenarios that take into consideration the Firm's economic outlook as derived through forecast macroeconomic variables, the most significant of which are U.S. unemployment and U.S. real gross domestic product. This quantitative calculation is further adjusted to take into consideration model imprecision, emerging risk assessments, trends and other subjective factors that are not yet otherwise reflected in the credit loss estimate.

The principal considerations for our determination that performing procedures relating to the allowance for loan losses for the portfolio-based component of the wholesale and credit card loan portfolios is a critical audit matter are (i) the significant judgment and estimation by management in the forecast of macroeconomic variables, specifically U.S. unemployment and U.S. real gross domestic product, as the Firm’s forecasts of economic conditions significantly affect its estimate of expected credit losses at the balance sheet date, (ii) the significant judgment and estimation by management in determining the quantitative calculation utilized in their credit loss estimates and the adjustments to take into consideration model imprecision, emerging risk assessments, trends and other subjective factors that are not yet otherwise reflected in the credit loss estimate, which both in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and in evaluating audit evidence obtained relating to the credit loss estimates and the appropriateness of the adjustments to the credit loss estimates, and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the Firm’s allowance for loan losses, including controls over model validation and generation of macroeconomic scenarios. These procedures also included, among others, testing management’s process for estimating the allowance for loan losses, which involved (i) evaluating the appropriateness of the models and methodologies used in quantitative calculations; (ii) evaluating the reasonableness of forecasts of U.S. unemployment and U.S. real gross domestic product; (iii) testing the completeness and accuracy of data used in the estimate; and (iv) evaluating the reasonableness of management’s adjustments to the quantitative output for the impacts of model imprecision, emerging risk assessments, trends and other subjective factors that are not yet otherwise reflected in the credit loss estimate. These procedures also included the use of professionals with specialized skill and knowledge to assist in evaluating the appropriateness of certain models, methodologies and macroeconomic variables.

Fair Value of Certain Level 3 Financial Instruments

As described in Notes 2 and 3 to the consolidated financial statements, the Firm carries $1.1 trillion of its assets and $453.7 billion of its liabilities at fair value on a recurring basis. Included in these balances are $13.6 billion of trading assets and $37.8 billion of liabilities measured at fair value on a recurring basis, collectively financial instruments, which are classified as level 3 as they contain one or more inputs to valuation which are unobservable and significant to their fair value measurement. The Firm utilized internally developed valuation models and unobservable inputs to estimate fair value of the level 3 financial instruments. The unobservable inputs used by management to estimate the fair value of certain of these financial instruments include volatility relating to interest rates, correlation relating to interest rates, equity prices, credit and foreign exchange rates, and Bermudan switch values.

The principal considerations for our determination that performing procedures relating to the fair value of certain level 3 financial instruments is a critical audit matter are (i) the significant judgment and estimation by management in determining the inputs to estimate fair value, which in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and in evaluating audit evidence obtained related to the fair value of these financial instruments, and (ii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the Firm's determination of the fair value, including controls over models, inputs, and data. These procedures also included, among others, the involvement of professionals with specialized skill and knowledge to assist in developing an independent estimate of fair value for a sample of these financial instruments and comparing management's estimate to the independently developed estimate of fair value. Developing the independent estimate involved testing the completeness and accuracy of data provided by management, developing independent inputs and, as appropriate, evaluating and utilizing management's aforementioned unobservable inputs.

PricewaterhouseCoopers LLP

February 21, 2023

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

JPMorgan Chase & Co.
Consolidated statements of income

Year ended December 31, (in millions, except per share data)	2022	2021	2020
Revenue			
Investment banking fees	$ 6,686	$ 13,216	$ 9,486
Principal transactions	19,912	16,304	18,021
Lending- and deposit-related fees	7,098	7,032	6,511
Asset management, administration and commissions	20,677	21,029	18,177
Investment securities gains/(losses)	(2,380)	(345)	802
Mortgage fees and related income	1,250	2,170	3,091
Card income	4,420	5,102	4,435
Other income	4,322	4,830	4,865
Noninterest revenue	61,985	69,338	65,388
Interest income	92,807	57,864	64,523
Interest expense	26,097	5,553	9,960
Net interest income	66,710	52,311	54,563
Total net revenue	128,695	121,649	119,951
Provision for credit losses	6,389	(9,256)	17,480
Noninterest expense			
Compensation expense	41,636	38,567	34,988
Occupancy expense	4,696	4,516	4,449
Technology, communications and equipment expense	9,358	9,941	10,338
Professional and outside services	10,174	9,814	8,464
Marketing	3,911	3,036	2,476
Other expense	6,365	5,469	5,941
Total noninterest expense	76,140	71,343	66,656
Income before income tax expense	46,166	59,562	35,815
Income tax expense	8,490	11,228	6,684
Net income	$ 37,676	$ 48,334	$ 29,131
Net income applicable to common stockholders	$ 35,892	$ 46,503	$ 27,410
Net income per common share data			
Basic earnings per share	$ 12.10	$ 15.39	$ 8.89
Diluted earnings per share	12.09	15.36	8.88
Weighted-average basic shares	2,965.8	3,021.5	3,082.4
Weighted-average diluted shares	2,970.0	3,026.6	3,087.4

The Notes to Consolidated Financial Statements are an integral part of these statements.

JPMorgan Chase & Co.
Consolidated statements of comprehensive income

Year ended December 31, (in millions)	2022	2021	2020
Net income	**$ 37,676**	$ 48,334	$ 29,131
Other comprehensive income/(loss), after-tax			
Unrealized gains/(losses) on investment securities	**(11,764)**	(5,540)	4,123
Translation adjustments, net of hedges	**(611)**	(461)	234
Fair value hedges	**98**	(19)	19
Cash flow hedges	**(5,360)**	(2,679)	2,320
Defined benefit pension and OPEB plans	**(1,241)**	922	212
DVA on fair value option elected liabilities	**1,621**	(293)	(491)
Total other comprehensive income/(loss), after-tax	**(17,257)**	(8,070)	6,417
Comprehensive income	**$ 20,419**	$ 40,264	$ 35,548

The Notes to Consolidated Financial Statements are an integral part of these statements.

JPMorgan Chase & Co.
Consolidated balance sheets

December 31, (in millions, except share data)	2022	2021
Assets		
Cash and due from banks	$ 27,697	$ 26,438
Deposits with banks	539,537	714,396
Federal funds sold and securities purchased under resale agreements (included **$311,883** and $252,720 at fair value)	315,592	261,698
Securities borrowed (included **$70,041** and $81,463 at fair value)	185,369	206,071
Trading assets (included assets pledged of **$93,687** and $102,710)	453,799	433,575
Available-for-sale securities (amortized cost of **$216,188** and $308,254; included assets pledged of **$9,158** and $18,268)	205,857	308,525
Held-to-maturity securities	425,305	363,707
Investment securities, net of allowance for credit losses	631,162	672,232
Loans (included **$42,079** and $58,820 at fair value)	1,135,647	1,077,714
Allowance for loan losses	(19,726)	(16,386)
Loans, net of allowance for loan losses	1,115,921	1,061,328
Accrued interest and accounts receivable	125,189	102,570
Premises and equipment	27,734	27,070
Goodwill, MSRs and other intangible assets	60,859	56,691
Other assets (included **$14,921** and $14,753 at fair value and assets pledged of **$7,998** and $5,298)	182,884	181,498
Total assets[(a)]	$ 3,665,743	$ 3,743,567
Liabilities		
Deposits (included **$28,620** and $11,333 at fair value)	$ 2,340,179	$ 2,462,303
Federal funds purchased and securities loaned or sold under repurchase agreements (included **$151,999** and $126,435 at fair value)	202,613	194,340
Short-term borrowings (included **$15,792** and $20,015 at fair value)	44,027	53,594
Trading liabilities	177,976	164,693
Accounts payable and other liabilities (included **$7,038** and $5,651 at fair value)	300,141	262,755
Beneficial interests issued by consolidated VIEs (included **$5** and $12 at fair value)	12,610	10,750
Long-term debt (included **$72,281** and $74,934 at fair value)	295,865	301,005
Total liabilities[(a)]	3,373,411	3,449,440
Commitments and contingencies (refer to Notes 28, 29 and 30)		
Stockholders' equity		
Preferred stock ($1 par value; authorized 200,000,000 shares: issued **2,740,375** and 3,483,750 shares)	27,404	34,838
Common stock ($1 par value; authorized 9,000,000,000 shares; issued **4,104,933,895** shares)	4,105	4,105
Additional paid-in capital	89,044	88,415
Retained earnings	296,456	272,268
Accumulated other comprehensive losses	(17,341)	(84)
Treasury stock, at cost (**1,170,676,094** and 1,160,784,750 shares)	(107,336)	(105,415)
Total stockholders' equity	292,332	294,127
Total liabilities and stockholders' equity	$ 3,665,743	$ 3,743,567

(a) The following table presents information on assets and liabilities related to VIEs that are consolidated by the Firm at December 31, 2022 and 2021. The assets of the consolidated VIEs are used to settle the liabilities of those entities. The holders of the beneficial interests do not have recourse to the general credit of JPMorgan Chase. The assets and liabilities in the table below include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation. Refer to Note 14 for a further discussion.

December 31, (in millions)	2022	2021
Assets		
Trading assets	$ 2,151	$ 2,010
Loans	34,411	33,024
All other assets	550	490
Total assets	$ 37,112	$ 35,524
Liabilities		
Beneficial interests issued by consolidated VIEs	$ 12,610	$ 10,750
All other liabilities	279	245
Total liabilities	$ 12,889	$ 10,995

The Notes to Consolidated Financial Statements are an integral part of these statements.

JPMorgan Chase & Co.
Consolidated statements of changes in stockholders' equity

Year ended December 31, (in millions, except per share data)	**2022**	2021	2020
Preferred stock			
Balance at January 1	**$ 34,838**	$ 30,063	$ 26,993
Issuance	**—**	7,350	4,500
Redemption	**(7,434)**	(2,575)	(1,430)
Balance at December 31	**27,404**	34,838	30,063
Common stock			
Balance at January 1 and December 31	**4,105**	4,105	4,105
Additional paid-in capital			
Balance at January 1	**88,415**	88,394	88,522
Shares issued and commitments to issue common stock for employee share-based compensation awards, and related tax effects	**629**	152	(72)
Other	**—**	(131)	(56)
Balance at December 31	**89,044**	88,415	88,394
Retained earnings			
Balance at January 1	**272,268**	236,990	223,211
Cumulative effect of change in accounting principles	**—**	—	(2,650)
Net income	**37,676**	48,334	29,131
Dividends declared:			
Preferred stock	**(1,595)**	(1,600)	(1,583)
Common stock (**$4.00**, $3.80 and $3.60 per share for 2022, 2021 and 2020, respectively)	**(11,893)**	(11,456)	(11,119)
Balance at December 31	**296,456**	272,268	236,990
Accumulated other comprehensive income/(loss)			
Balance at January 1	**(84)**	7,986	1,569
Other comprehensive income/(loss), after-tax	**(17,257)**	(8,070)	6,417
Balance at December 31	**(17,341)**	(84)	7,986
Shares held in restricted stock units ("RSU") Trust, at cost			
Balance at January 1	**—**	—	(21)
Liquidation of RSU Trust	**—**	—	21
Balance at December 31	**—**	—	—
Treasury stock, at cost			
Balance at January 1	**(105,415)**	(88,184)	(83,049)
Repurchase	**(3,122)**	(18,448)	(6,397)
Reissuance	**1,201**	1,217	1,262
Balance at December 31	**(107,336)**	(105,415)	(88,184)
Total stockholders' equity	**$ 292,332**	$ 294,127	$ 279,354

Effective January 1, 2020, the Firm adopted the CECL accounting guidance. Refer to Note 1 for further information.

The Notes to Consolidated Financial Statements are an integral part of these statements.

JPMorgan Chase & Co.
Consolidated statements of cash flows

Year ended December 31, (in millions)	**2022**	2021	2020
Operating activities			
Net income	**$ 37,676**	$ 48,334	$ 29,131
Adjustments to reconcile net income to net cash provided by/(used in) operating activities:			
Provision for credit losses	**6,389**	(9,256)	17,480
Depreciation and amortization	**7,051**	7,932	8,614
Deferred tax (benefit)/expense	**(2,738)**	3,748	(3,573)
Other	**5,174**	3,274	1,649
Originations and purchases of loans held-for-sale	**(149,167)**	(347,864)	(166,504)
Proceeds from sales, securitizations and paydowns of loans held-for-sale	**167,709**	336,413	175,490
Net change in:			
Trading assets	**(31,449)**	85,710	(148,749)
Securities borrowed	**20,203**	(45,635)	(20,734)
Accrued interest and accounts receivable	**(22,970)**	(12,401)	(18,012)
Other assets	**(2,882)**	(11,745)	(42,430)
Trading liabilities	**11,170**	(23,190)	77,198
Accounts payable and other liabilities	**58,614**	43,162	7,415
Other operating adjustments	**2,339**	(398)	3,115
Net cash provided by/(used in) operating activities	**107,119**	78,084	(79,910)
Investing activities			
Net change in:			
Federal funds sold and securities purchased under resale agreements	**(54,278)**	34,473	(47,115)
Held-to-maturity securities:			
Proceeds from paydowns and maturities	**48,626**	50,897	21,360
Purchases	**(33,676)**	(111,756)	(12,400)
Available-for-sale securities:			
Proceeds from paydowns and maturities	**39,159**	50,075	57,675
Proceeds from sales	**84,616**	162,748	149,758
Purchases	**(126,258)**	(248,785)	(397,145)
Proceeds from sales and securitizations of loans held-for-investment	**44,892**	35,845	23,559
Other changes in loans, net	**(128,968)**	(91,797)	(50,263)
All other investing activities, net	**(11,932)**	(11,044)	(7,341)
Net cash (used in) investing activities	**(137,819)**	(129,344)	(261,912)
Financing activities			
Net change in:			
Deposits	**(136,895)**	293,764	602,765
Federal funds purchased and securities loaned or sold under repurchase agreements	**8,455**	(20,799)	31,528
Short-term borrowings	**(8,984)**	7,773	4,438
Beneficial interests issued by consolidated VIEs	**2,205**	(4,254)	1,347
Proceeds from long-term borrowings	**78,442**	82,409	78,686
Payments of long-term borrowings	**(45,556)**	(54,932)	(105,055)
Proceeds from issuance of preferred stock	**—**	7,350	4,500
Redemption of preferred stock	**(7,434)**	(2,575)	(1,430)
Treasury stock repurchased	**(3,162)**	(18,408)	(6,517)
Dividends paid	**(13,562)**	(12,858)	(12,690)
All other financing activities, net	**234**	(1,477)	(927)
Net cash provided by/(used in) financing activities	**(126,257)**	275,993	596,645
Effect of exchange rate changes on cash and due from banks and deposits with banks	**(16,643)**	(11,508)	9,155
Net increase/(decrease) in cash and due from banks and deposits with banks	**(173,600)**	213,225	263,978
Cash and due from banks and deposits with banks at the beginning of the period	**740,834**	527,609	263,631
Cash and due from banks and deposits with banks at the end of the period	**$ 567,234**	$ 740,834	$ 527,609
Cash interest paid	**$ 23,143**	$ 5,142	$ 13,077
Cash income taxes paid, net	**4,355**	18,737	8,140

The Notes to Consolidated Financial Statements are an integral part of these statements.

Note 1 – Basis of presentation

JPMorgan Chase & Co. ("JPMorgan Chase" or the "Firm"), a financial holding company incorporated under Delaware law in 1968, is a leading financial services firm based in the U.S., with operations worldwide. The Firm is a leader in investment banking, financial services for consumers and small businesses, commercial banking, financial transaction processing and asset management. Refer to Note 32 for a further discussion of the Firm's business segments.

The accounting and financial reporting policies of JPMorgan Chase and its subsidiaries conform to U.S. GAAP. Additionally, where applicable, the policies conform to the accounting and reporting guidelines prescribed by regulatory authorities.

Certain amounts reported in prior periods have been revised to conform with the current presentation.

Consolidation

The Consolidated Financial Statements include the accounts of JPMorgan Chase and other entities in which the Firm has a controlling financial interest. All material intercompany balances and transactions have been eliminated.

Assets held for clients in an agency or fiduciary capacity by the Firm are not assets of JPMorgan Chase and are not included on the Consolidated balance sheets.

The Firm determines whether it has a controlling financial interest in an entity by first evaluating whether the entity is a voting interest entity or a variable interest entity.

Voting interest entities

Voting interest entities are entities that have sufficient equity and provide the equity investors voting rights that enable them to make significant decisions relating to the entity's operations. For these types of entities, the Firm's determination of whether it has a controlling interest is primarily based on the amount of voting equity interests held. Entities in which the Firm has a controlling financial interest, through ownership of the majority of the entities' voting equity interests, or through other contractual rights that give the Firm control, are consolidated by the Firm.

Investments in companies in which the Firm has significant influence over operating and financing decisions (but does not own a majority of the voting equity interests) are accounted for (i) in accordance with the equity method of accounting, or (ii) at fair value if the fair value option was elected. These investments are generally included in other assets, with income or loss included in noninterest revenue.

Certain Firm-sponsored asset management funds are structured as limited partnerships or limited liability companies. For many of these entities, the Firm is the general partner or managing member, but the non-affiliated partners or members have the ability to remove the Firm as the general partner or managing member without cause (i.e., kick-out rights), based on a simple majority vote, or the non-affiliated partners or members have rights to participate in important decisions. Accordingly, the Firm does not consolidate these voting interest entities. However, in the limited cases where the non-managing partners or members do not have substantive kick-out or participating rights, the Firm evaluates the funds as VIEs and consolidates the funds if the Firm is the general partner or managing member and has both power and a potentially significant interest.

The Firm's investment companies and asset management funds have investments in both publicly-held and privately-held entities, including investments in buyouts, growth equity and venture opportunities. These investments are accounted for under investment company guidelines and, accordingly, irrespective of the percentage of equity ownership interests held, are carried on the Consolidated balance sheets at fair value, and are recorded in other assets, with income or loss included in noninterest revenue. If consolidated, the Firm retains the accounting under such specialized investment company guidelines.

Variable interest entities

VIEs are entities that, by design, either (1) lack sufficient equity to permit the entity to finance its activities without additional subordinated financial support from other parties, or (2) have equity investors that do not have the ability to make significant decisions relating to the entity's operations through voting rights, or do not have the obligation to absorb the expected losses, or do not have the right to receive the residual returns of the entity.

The most common type of VIE is an SPE. SPEs are commonly used in securitization transactions in order to isolate certain assets and distribute the cash flows from those assets to investors. The basic SPE structure involves a company selling assets to the SPE; the SPE funds the purchase of those assets by issuing securities to investors. The legal documents that govern the transaction specify how the cash earned on the assets must be allocated to the SPE's investors and other parties that have rights to those cash flows. SPEs are generally structured to insulate investors from claims on the SPE's assets by creditors of other entities, including the creditors of the seller of the assets.

The primary beneficiary of a VIE (i.e., the party that has a controlling financial interest) is required to consolidate the assets and liabilities of the VIE. The primary beneficiary is the party that has both (1) the power to direct the activities of the VIE that most significantly impact the VIE's economic performance; and (2) through its interests in the VIE, the obligation to absorb losses or the right to receive benefits from the VIE that could potentially be significant to the VIE.

To assess whether the Firm has the power to direct the activities of a VIE that most significantly impact the VIE's economic performance, the Firm considers all the facts and circumstances, including its role in establishing the VIE and its ongoing rights and responsibilities. This assessment includes, first, identifying the activities that most significantly impact the VIE's economic performance; and second, identifying which party, if any, has power over those activities. In general, the parties that make the most significant decisions affecting the VIE (such as asset managers, collateral managers, servicers, or owners of call options or liquidation rights over the VIE's assets) or have the right to unilaterally remove those decision-makers are deemed to have the power to direct the activities of a VIE.

To assess whether the Firm has the obligation to absorb losses of the VIE or the right to receive benefits from the VIE that could potentially be significant to the VIE, the Firm considers all of its economic interests, including debt and equity investments, servicing fees, and derivatives or other arrangements deemed to be variable interests in the VIE. This assessment requires that the Firm apply judgment in determining whether these interests, in the aggregate, are considered potentially significant to the VIE. Factors considered in assessing significance include: the design of the VIE, including its capitalization structure; subordination of interests; payment priority; relative share of interests held across various classes within the VIE's capital structure; and the reasons why the interests are held by the Firm.

The Firm performs on-going reassessments of: (1) whether entities previously evaluated under the majority voting-interest framework have become VIEs, based on certain events, and are therefore subject to the VIE consolidation framework; and (2) whether changes in the facts and circumstances regarding the Firm's involvement with a VIE cause the Firm's consolidation conclusion to change.

Refer to Note 14 for further discussion of the Firm's VIEs.

Revenue recognition

Interest income

The Firm recognizes interest income on loans, debt securities, and other debt instruments, generally on a level-yield basis, based on the underlying contractual rate. Refer to Note 7 for further information.

Revenue from contracts with customers

JPMorgan Chase recognizes noninterest revenue from certain contracts with customers, in investment banking fees, deposit-related fees, asset management administration and commissions, and components of card income, when the Firm's related performance obligations are satisfied. Refer to Note 6 for further discussion of the Firm's revenue from contracts with customers.

Principal transactions revenue

JPMorgan Chase carries a portion of its assets and liabilities at fair value. Changes in fair value are reported primarily in principal transactions revenue. Refer to Notes 2 and 3 for further discussion of fair value measurement. Refer to Note 6 for further discussion of principal transactions revenue.

Use of estimates in the preparation of consolidated financial statements

The preparation of the Consolidated Financial Statements requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, revenue and expense, and disclosures of contingent assets and liabilities. Actual results could be different from these estimates.

Foreign currency translation

JPMorgan Chase revalues assets, liabilities, revenue and expense denominated in non-U.S. currencies into U.S. dollars using applicable exchange rates.

Gains and losses relating to translating functional currency financial statements for U.S. reporting are included in the Consolidated statements of comprehensive income. Gains and losses relating to nonfunctional currency transactions, including non-U.S. operations where the functional currency is the U.S. dollar, are reported in the Consolidated statements of income.

Offsetting assets and liabilities

U.S. GAAP permits entities to present derivative receivables and derivative payables with the same counterparty and the related cash collateral receivables and payables on a net basis on the Consolidated balance sheets when a legally enforceable master netting agreement exists. U.S. GAAP also permits securities sold and purchased under repurchase agreements and securities borrowed or loaned under securities loan agreements to be presented net when specified conditions are met, including the existence of a legally enforceable master netting agreement. The Firm has elected to net such balances where it has determined that the specified conditions are met.

The Firm uses master netting agreements to mitigate counterparty credit risk in certain transactions, including derivative contracts, resale, repurchase, securities borrowed and securities loaned agreements. A master netting agreement is a single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due). Upon the exercise of derivatives termination rights by the non-defaulting party (i) all transactions are terminated, (ii) all transactions are valued and the positive values of "in the money" transactions are netted against the negative values of "out of the money" transactions and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount. Upon exercise of default rights under repurchase agreements and securities loan agreements in general (i) all transactions are terminated and accelerated, (ii) all values of securities or cash held or to be delivered are calculated, and all such sums are netted against each other and (iii) the only remaining payment obligation is of one of the parties to pay the netted termination amount.

Typical master netting agreements for these types of transactions also often contain a collateral/margin agreement that provides for a security interest in, or title transfer of, securities or cash collateral/margin to the party that has the right to demand margin (the "demanding party"). The collateral/margin agreement typically requires a party to transfer collateral/margin to the demanding party with a value equal to the amount of the margin deficit on a net basis across all transactions governed by the master netting agreement, less any threshold. The collateral/margin agreement grants to the demanding party, upon default by the counterparty, the right to set-off any amounts payable by the counterparty against any posted collateral or the cash equivalent of any posted collateral/margin. It also grants to the demanding party the right to liquidate collateral/margin and to apply the proceeds to an amount payable by the counterparty.

Refer to Note 5 for further discussion of the Firm's derivative instruments. Refer to Note 11 for further discussion of the Firm's securities financing agreements.

Statements of cash flows

For JPMorgan Chase's Consolidated statements of cash flows, cash is defined as those amounts included in cash and due from banks and deposits with banks on the Consolidated balance sheets.

Accounting standard adopted January 1, 2023

Financial Instruments – Credit Losses: Troubled Debt Restructurings ("TDRs")

The adoption of this guidance eliminates the accounting and disclosure requirements for TDRs, including the requirement to measure the allowance using a discounted cash flow ("DCF") methodology, and allows the option of a non-DCF portfolio-based approach for modified loans to troubled borrowers. If a DCF methodology is still applied for these modified loans, the discount rate must be the post-modification effective interest rate, instead of the pre-modification effective interest rate.

The Firm elected to apply its non-DCF, portfolio-based allowance approach for modified loans to troubled borrowers for all portfolios except modified nonaccrual risk-rated loans which the Firm elected to continue applying a DCF methodology. See Note 13 for a description of the portfolio-based allowance approach and the asset-specific allowance approach.

This guidance was adopted on January 1, 2023 under the modified retrospective method which resulted in a net decrease to the allowance for credit losses of approximately $600 million and an increase to retained earnings of approximately $450 million, after-tax predominantly driven by residential real estate and credit card.

Accounting standard adopted January 1, 2020

Financial Instruments – Credit Losses ("CECL")

The adoption of this guidance established a single allowance framework for all financial assets measured at amortized cost and certain off-balance sheet credit exposures. This framework requires that management's estimate reflects credit losses over the instrument's remaining expected life and considers expected future changes in macroeconomic conditions. Prior to the adoption of the CECL accounting guidance, the Firm's allowance for credit losses represented management's estimate of probable credit losses inherent in the Firm's retained loan portfolios and certain lending-related commitments.

Significant accounting policies

The following table identifies JPMorgan Chase's other significant accounting policies and the Note and page where a detailed description of each policy can be found.

Fair value measurement	Note 2	page 167
Fair value option	Note 3	page 188
Derivative instruments	Note 5	page 194
Noninterest revenue and noninterest expense	Note 6	page 208
Interest income and Interest expense	Note 7	page 211
Pension and other postretirement employee benefit plans	Note 8	page 212
Employee share-based incentives	Note 9	page 215
Investment securities	Note 10	page 217
Securities financing activities	Note 11	page 222
Loans	Note 12	page 225
Allowance for credit losses	Note 13	page 242
Variable interest entities	Note 14	page 247
Goodwill and Mortgage servicing rights	Note 15	page 255
Premises and equipment	Note 16	page 259
Leases	Note 18	page 260
Long-term debt	Note 20	page 263
Earnings per share	Note 23	page 268
Income taxes	Note 25	page 270
Off-balance sheet lending-related financial instruments, guarantees and other commitments	Note 28	page 276
Litigation	Note 30	page 283

Note 2 – Fair value measurement

JPMorgan Chase carries a portion of its assets and liabilities at fair value. These assets and liabilities are predominantly carried at fair value on a recurring basis (i.e., assets and liabilities that are measured and reported at fair value on the Firm's Consolidated balance sheets). Certain assets, liabilities and unfunded lending-related commitments are measured at fair value on a nonrecurring basis; that is, they are not measured at fair value on an ongoing basis but are subject to fair value adjustments only in certain circumstances (for example, when there is evidence of impairment).

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. Fair value is based on quoted market prices or inputs, where available. If prices or quotes are not available, fair value is based on valuation models and other valuation techniques that consider relevant transaction characteristics (such as maturity) and use, as inputs, observable or unobservable market parameters, including yield curves, interest rates, volatilities, prices (such as commodity, equity or debt prices), correlations, foreign exchange rates and credit curves. Valuation adjustments may be made to ensure that financial instruments are recorded at fair value, as described below.

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

The Firm uses various methodologies and assumptions in the determination of fair value. The use of different methodologies or assumptions by other market participants compared with those used by the Firm could result in the Firm deriving a different estimate of fair value at the reporting date.

Valuation process

Risk-taking functions are responsible for providing fair value estimates for assets and liabilities carried on the Consolidated balance sheets at fair value. The Firm's 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. In addition, the Firm's Valuation Governance Forum ("VGF"), which is composed of senior finance and risk executives, is responsible for overseeing the management of risks arising from valuation activities conducted across the Firm. The Firmwide VGF is chaired by the Firmwide head of the VCG (under the direction of the Firm's Controller), and includes sub-forums covering the CIB, CCB, CB, AWM and certain corporate functions including Treasury and CIO.

Price verification process

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

The VCG determines any valuation adjustments that may be required to the estimates provided by the risk-taking functions. No adjustments to quoted prices are applied for instruments classified within level 1 of the fair value hierarchy (refer to the discussion below for further information on the fair value hierarchy). For other positions, judgment is required to assess the need for valuation adjustments to appropriately reflect liquidity considerations, unobservable parameters, and, for certain portfolios that meet specified criteria, the size of the net open risk position. The determination of such adjustments follows a consistent framework across the Firm:

- Liquidity valuation adjustments are considered where an observable external price or valuation parameter exists but is of lower reliability, potentially due to lower market activity. Liquidity valuation adjustments are made based on current market conditions. Factors that may be considered in determining the liquidity adjustment include analysis of: (1) the estimated bid-offer spread for the instrument being traded; (2) alternative pricing points for similar instruments in active markets; and (3) the range of reasonable values that the price or parameter could take.
- The Firm manages certain portfolios of financial instruments on the basis of net open risk exposure and, as permitted by U.S. GAAP, has elected to estimate the fair value of such portfolios on the basis of a transfer of the entire net open risk position in an orderly transaction. Where this is the case, valuation adjustments may be necessary to reflect the cost of exiting a larger-than-normal market-size net open risk position. Where applied, such adjustments are based on factors that a relevant market participant would consider in the transfer of the net open risk position, including the size of the adverse market move that is likely to occur during the period required to reduce the net open risk position to a normal market-size.

- Uncertainty adjustments related to unobservable parameters may be made when positions are valued using prices or input parameters to valuation models that are unobservable due to a lack of market activity or because they cannot be implied from observable market data. Such prices or parameters must be estimated and are, therefore, subject to management judgment. Adjustments are made to reflect the uncertainty inherent in the resulting valuation estimate.
- Where appropriate, the Firm also applies adjustments to its estimates of fair value in order to appropriately reflect counterparty credit quality (CVA), the Firm's own creditworthiness (DVA) and the impact of funding (FVA), using a consistent framework across the Firm. Refer to Credit and funding adjustments on page 184 of this Note for more information on such adjustments.

Valuation model review and approval

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

Under the Firm's Estimations and Model Risk Management Policy, MRGR reviews and approves new models, as well as material changes to existing models, prior to implementation in the operating environment. In certain circumstances exceptions may be granted to the Firm's policy to allow a model to be used prior to review or approval. MRGR 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.

Fair value hierarchy

A three-level fair value hierarchy has been established under U.S. GAAP for disclosure of fair value measurements. The fair value hierarchy is based on the observability of inputs to the valuation of an asset or liability as of the measurement date. The three levels are defined as follows.

- Level 1 – inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets.
- Level 2 – inputs to the valuation methodology include quoted prices for similar assets and liabilities in active markets, and inputs that are observable for the asset or liability, either directly or indirectly, for substantially the full term of the financial instrument.
- Level 3 – one or more inputs to the valuation methodology are unobservable and significant to the fair value measurement.

A financial instrument's categorization within the fair value hierarchy is based on the lowest level of input that is significant to the fair value measurement.

The following table describes the valuation methodologies generally used by the Firm to measure its significant products/instruments at fair value, including the general classification of such instruments pursuant to the fair value hierarchy.

Product/instrument	Valuation methodology	Classifications in the fair value hierarchy
Securities financing agreements	Valuations are based on discounted cash flows, which consider: • Derivative features: refer to the discussion of derivatives below for further information • Market rates for the respective maturity • Collateral characteristics	Predominantly level 2
Loans and lending-related commitments – wholesale Loans carried at fair value (trading loans and non-trading loans) and associated lending-related commitments	Where observable market data is available, valuations are based on: • Observed market prices (circumstances are infrequent) • Relevant broker quotes • Observed market prices for similar instruments Where observable market data is unavailable or limited, valuations are based on discounted cash flows, which consider the following: • Credit spreads derived from the cost of CDS; or benchmark credit curves developed by the Firm, by industry and credit rating • Prepayment speed • Collateral characteristics	Level 2 or 3
Loans – consumer Loans carried at fair value – conforming residential mortgage loans expected to be sold	Fair value is based on observable market prices for mortgage-backed securities with similar collateral and incorporates adjustments to these prices to account for differences between the securities and the value of the underlying loans, which include credit characteristics, portfolio composition, and liquidity.	Predominantly level 2
Investment and trading securities	Quoted market prices	Level 1
	In the absence of quoted market prices, securities are valued based on: • Observable market prices for similar securities • Relevant broker quotes • Discounted cash flows In addition, the following inputs to discounted cash flows are used for the following products: Mortgage- and asset-backed securities specific inputs: • Collateral characteristics • Deal-specific payment and loss allocations • Current market assumptions related to yield, prepayment speed, conditional default rates and loss severity Collateralized loan obligations ("CLOs") specific inputs: • Collateral characteristics • Deal-specific payment and loss allocations • Expected prepayment speed, conditional default rates, loss severity • Credit spreads • Credit rating data	Level 2 or 3
Physical commodities	Valued using observable market prices or data.	Level 1 or 2

Product/instrument	Valuation methodology	Classifications in the fair value hierarchy
Derivatives	Actively traded derivatives, e.g., exchange-traded derivatives, that are valued using quoted prices.	Level 1
	Derivatives that are valued using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs as well as considering the contractual terms. The key valuation inputs used will depend on the type of derivative and the nature of the underlying instruments and may include equity prices, commodity prices, foreign exchange rates, volatilities, correlations, CDS spreads, recovery rates and prepayment speed. In addition, specific inputs used for derivatives that are valued based on models with significant unobservable inputs are as follows: Interest rate and FX exotic derivatives specific inputs include: • Interest rate curve • Interest rate volatility • Interest rate spread volatility • Bermudan switch value • Interest rate correlation • Interest rate-FX correlation • Foreign exchange correlation Credit derivatives specific inputs include: • Credit correlation between the underlying debt instruments Equity derivatives specific inputs include: • Forward equity price • Equity volatility • Equity correlation • Equity-FX correlation • Equity-IR correlation Commodity derivatives specific inputs include: • Forward commodity price • Commodity volatility • Commodity correlation Additionally, adjustments are made to reflect counterparty credit quality (CVA) and the impact of funding (FVA). Refer to page 184 of this Note.	Level 2 or 3
Mortgage servicing rights	Refer to Mortgage servicing rights in Note 15.	Level 3
Private equity direct investments	Fair value is estimated using all available information; the range of potential inputs include: • Transaction prices • Trading multiples of comparable public companies • Operating performance of the underlying portfolio company • Adjustments as required, since comparable public companies are not identical to the company being valued, and for company-specific issues and lack of liquidity • Additional available inputs relevant to the investment	Level 2 or 3
Fund investments (e.g., mutual/collective investment funds, private equity funds, hedge funds, and real estate funds)	Net asset value	
	• NAV is supported by the ability to redeem and purchase at the NAV level	Level 1
	• Adjustments to the NAV as required, for restrictions on redemption (e.g., lock-up periods or withdrawal limitations) or where observable activity is limited	Level 2 or 3[(a)]
Beneficial interests issued by consolidated VIEs	Valued using observable market information, where available. In the absence of observable market information, valuations are based on the fair value of the underlying assets held by the VIE.	Level 2 or 3

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

Product/instrument	Valuation methodology	Classification in the fair value hierarchy
Structured notes (included in deposits, short-term borrowings and long-term debt)	Valuations are based on discounted cash flow analyses that consider the embedded derivative and the terms and payment structure of the note. The embedded derivative features are considered using models such as the Black-Scholes option pricing model, simulation models, or a combination of models that may use observable or unobservable valuation inputs, depending on the embedded derivative. The specific inputs used vary according to the nature of the embedded derivative features, as described in the discussion above regarding derivatives valuation. Adjustments are then made to this base valuation to reflect the Firm’s own credit risk (DVA). Refer to page 184 of this Note.	Level 2 or 3

The following table presents the assets and liabilities reported at fair value as of December 31, 2022 and 2021, by major product category and fair value hierarchy.

Assets and liabilities measured at fair value on a recurring basis

	Fair value hierarchy				
December 31, 2022 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments[f]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ —	$ 311,883	$ —	$ —	$ 311,883
Securities borrowed	—	70,041	—	—	70,041
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	—	68,162	759	—	68,921
Residential – nonagency	—	2,498	5	—	2,503
Commercial – nonagency	—	1,448	7	—	1,455
Total mortgage-backed securities	—	72,108	771	—	72,879
U.S. Treasury, GSEs and government agencies[a]	61,191	8,546	—	—	69,737
Obligations of U.S. states and municipalities	—	6,608	7	—	6,615
Certificates of deposit, bankers' acceptances and commercial paper	—	2,009	—	—	2,009
Non-U.S. government debt securities	18,213	48,429	155	—	66,797
Corporate debt securities	—	25,626	463	—	26,089
Loans	—	5,744	759	—	6,503
Asset-backed securities	—	2,536	23	—	2,559
Total debt instruments	79,404	171,606	2,178	—	253,188
Equity securities	82,483	2,060	665	—	85,208
Physical commodities[b]	9,595	16,673	2	—	26,270
Other	—	18,146	64	—	18,210
Total debt and equity instruments[c]	171,482	208,485	2,909	—	382,876
Derivative receivables:					
Interest rate	3,390	292,956	4,069	(271,996)	28,419
Credit	—	9,722	607	(9,239)	1,090
Foreign exchange	169	240,207	1,203	(218,214)	23,365
Equity	—	57,485	4,428	(52,774)	9,139
Commodity	—	24,982	375	(16,490)	8,867
Total derivative receivables	3,559	625,352	10,682	(568,713)	70,880
Total trading assets[d]	175,041	833,837	13,591	(568,713)	453,756
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	3	71,500	—	—	71,503
Residential – nonagency	—	4,620	—	—	4,620
Commercial – nonagency	—	1,958	—	—	1,958
Total mortgage-backed securities	3	78,078	—	—	78,081
U.S. Treasury and government agencies	92,060	—	—	—	92,060
Obligations of U.S. states and municipalities	—	6,786	—	—	6,786
Non-U.S. government debt securities	10,591	9,105	—	—	19,696
Corporate debt securities	—	118	239	—	357
Asset-backed securities:					
Collateralized loan obligations	—	5,792	—	—	5,792
Other	—	3,085	—	—	3,085
Total available-for-sale securities	102,654	102,964	239	—	205,857
Loans[e]	—	40,661	1,418	—	42,079
Mortgage servicing rights	—	—	7,973	—	7,973
Other assets[d]	7,544	6,065	405	—	14,014
Total assets measured at fair value on a recurring basis	$ 285,239	$ 1,365,451	$ 23,626	$ (568,713)	$ 1,105,603
Deposits	$ —	$ 26,458	$ 2,162	$ —	$ 28,620
Federal funds purchased and securities loaned or sold under repurchase agreements	—	151,999	—	—	151,999
Short-term borrowings	—	14,391	1,401	—	15,792
Trading liabilities:					
Debt and equity instruments[c]	98,719	28,032	84	—	126,835
Derivative payables:					
Interest rate	2,643	284,280	3,368	(274,321)	15,970
Credit	—	9,377	594	(9,217)	754
Foreign exchange	160	250,647	714	(232,665)	18,856
Equity	—	57,649	4,812	(53,657)	8,804
Commodity	—	22,748	521	(16,512)	6,757
Total derivative payables	2,803	624,701	10,009	(586,372)	51,141
Total trading liabilities	101,522	652,733	10,093	(586,372)	177,976
Accounts payable and other liabilities	5,702	1,283	53	—	7,038
Beneficial interests issued by consolidated VIEs	—	5	—	—	5
Long-term debt	—	48,189	24,092	—	72,281
Total liabilities measured at fair value on a recurring basis	$ 107,224	$ 895,058	$ 37,801	$ (586,372)	$ 453,711

	Fair value hierarchy				
December 31, 2021 (in millions)	Level 1	Level 2	Level 3	Derivative netting adjustments[f]	Total fair value
Federal funds sold and securities purchased under resale agreements	$ –	$ 252,720	$ –	$ –	$ 252,720
Securities borrowed	–	81,463	–	–	81,463
Trading assets:					
Debt instruments:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	–	38,944	265	–	39,209
Residential – nonagency	–	2,358	28	–	2,386
Commercial – nonagency	–	1,506	10	–	1,516
Total mortgage-backed securities	–	42,808	303	–	43,111
U.S. Treasury, GSEs and government agencies[a]	68,527	9,181	–	–	77,708
Obligations of U.S. states and municipalities	–	7,068	7	–	7,075
Certificates of deposit, bankers' acceptances and commercial paper	–	852	–	–	852
Non-U.S. government debt securities	26,982	44,581	81	–	71,644
Corporate debt securities	–	24,491	332	–	24,823
Loans	–	7,366	708	–	8,074
Asset-backed securities	–	2,668	26	–	2,694
Total debt instruments	95,509	139,015	1,457	–	235,981
Equity securities	86,904	1,741	662	–	89,307
Physical commodities[b]	5,357	20,788	–	–	26,145
Other	–	24,850	160	–	25,010
Total debt and equity instruments[c]	187,770	186,394	2,279	–	376,443
Derivative receivables:					
Interest rate	1,072	267,493	2,020	(248,611)	21,974
Credit	–	9,321	518	(8,808)	1,031
Foreign exchange	134	168,590	855	(156,954)	12,625
Equity	–	65,139	3,492	(58,650)	9,981
Commodity	–	26,232	421	(15,183)	11,470
Total derivative receivables	1,206	536,775	7,306	(488,206)	57,081
Total trading assets[d]	188,976	723,169	9,585	(488,206)	433,524
Available-for-sale securities:					
Mortgage-backed securities:					
U.S. GSEs and government agencies[a]	4	72,539	–	–	72,543
Residential – nonagency	–	6,070	–	–	6,070
Commercial – nonagency	–	4,949	–	–	4,949
Total mortgage-backed securities	4	83,558	–	–	83,562
U.S. Treasury and government agencies	177,463	–	–	–	177,463
Obligations of U.S. states and municipalities	–	15,860	–	–	15,860
Non-U.S. government debt securities	5,430	10,779	–	–	16,209
Corporate debt securities	–	160	161	–	321
Asset-backed securities:					
Collateralized loan obligations	–	9,662	–	–	9,662
Other	–	5,448	–	–	5,448
Total available-for-sale securities	182,897	125,467	161	–	308,525
Loans[e]	–	56,887	1,933	–	58,820
Mortgage servicing rights	–	–	5,494	–	5,494
Other assets[d]	9,558	4,139	306	–	14,003
Total assets measured at fair value on a recurring basis	$ 381,431	$ 1,243,845	$ 17,479	$ (488,206)	$ 1,154,549
Deposits	$ –	$ 9,016	$ 2,317	$ –	$ 11,333
Federal funds purchased and securities loaned or sold under repurchase agreements	–	126,435	–	–	126,435
Short-term borrowings	–	17,534	2,481	–	20,015
Trading liabilities:					
Debt and equity instruments[c]	87,831	26,716	30	–	114,577
Derivative payables:					
Interest rate	981	237,714	2,036	(232,537)	8,194
Credit	–	10,468	444	(10,032)	880
Foreign exchange	123	174,349	1,274	(161,649)	14,097
Equity	–	72,609	7,118	(62,494)	17,233
Commodity	–	26,600	1,328	(18,216)	9,712
Total derivative payables	1,104	521,740	12,200	(484,928)	50,116
Total trading liabilities	88,935	548,456	12,230	(484,928)	164,693
Accounts payable and other liabilities	5,115	467	69	–	5,651
Beneficial interests issued by consolidated VIEs	–	12	–	–	12
Long-term debt	–	50,560	24,374	–	74,934
Total liabilities measured at fair value on a recurring basis	$ 94,050	$ 752,480	$ 41,471	$ (484,928)	$ 403,073

(a) At December 31, 2022 and 2021, included total U.S. GSE obligations of $73.8 billion and $73.9 billion, respectively, which were mortgage-related.

(b) Physical commodities inventories are generally accounted for at the lower of cost or net realizable value. "Net realizable value" is a term defined in U.S. GAAP as not exceeding fair value less costs to sell ("transaction costs"). Transaction costs for the Firm's physical commodities inventories are either not applicable or immaterial to the value of the inventory. Therefore, net realizable value approximates fair value for the Firm's physical commodities inventories. When fair value hedging has been applied (or when net realizable value is below cost), the carrying value of physical commodities approximates fair value, because under fair value hedge accounting, the cost basis is adjusted for changes in fair value. Refer to Note 5 for a further discussion of the Firm's hedge accounting relationships. To provide consistent fair value disclosure information, all physical commodities inventories have been included in each period presented.

(c) Balances reflect the reduction of securities owned (long positions) by the amount of identical securities sold but not yet purchased (short positions).

(d) Certain investments that are measured at fair value using the net asset value per share (or its equivalent) as a practical expedient are not required to be classified in the fair value hierarchy. At December 31, 2022 and 2021, the fair values of these investments, which include certain hedge funds, private equity funds, real estate and other funds, were $950 million and $801 million, respectively. Included in these balances at December 31, 2022 and 2021, were trading assets of $43 million and $51 million, respectively, and other assets of $907 million and $750 million, respectively.

(e) At December 31, 2022 and 2021, included $9.7 billion and $26.2 billion, respectively, of residential first-lien mortgages, and $6.8 billion and $8.2 billion, respectively, of commercial first-lien mortgages. Residential mortgage loans include conforming mortgage loans originated with the intent to sell to U.S. GSEs and government agencies of $2.4 billion and $13.6 billion, respectively.

(f) As permitted under U.S. GAAP, the Firm has elected to net derivative receivables and derivative payables and the related cash collateral received and paid when a legally enforceable master netting agreement exists. The level 3 balances would be reduced if netting were applied, including the netting benefit associated with cash collateral.

Level 3 valuations

The Firm has established well-structured processes for determining fair value, including for instruments where fair value is estimated using significant unobservable inputs (level 3). Refer to pages 167-171 of this Note for further information on the Firm's valuation process and a detailed discussion of the determination of fair value for individual financial instruments.

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

In arriving at an estimate of fair value for an instrument within level 3, management must first determine the appropriate valuation model or other valuation technique to use. Second, due to the lack of observability of significant inputs, management must assess relevant empirical data in deriving valuation inputs including transaction details, yield curves, interest rates, prepayment speed, default rates, volatilities, correlations, prices (such as commodity, equity or debt prices), valuations of comparable instruments, foreign exchange rates and credit curves.

The following table presents the Firm's primary level 3 financial instruments, the valuation techniques used to measure the fair value of those financial instruments, the significant unobservable inputs, the range of values for those inputs and the weighted or arithmetic averages of such inputs. While the determination to classify an instrument within level 3 is based on the significance of the unobservable inputs to the overall fair value measurement, level 3 financial instruments typically include observable components (that is, components that are actively quoted and can be validated to external sources) in addition to the unobservable components. The level 1 and/or level 2 inputs are not included in the table. In addition, the Firm manages the risk of the observable components of level 3 financial instruments using securities and derivative positions that are classified within levels 1 or 2 of the fair value hierarchy.

The range of values presented in the table is representative of the highest and lowest level input used to value the significant groups of instruments within a product/instrument classification. Where provided, the weighted averages of the input values presented in the table are calculated based on the fair value of the instruments that the input is being used to value.

In the Firm's view, the input range, weighted and arithmetic average values do not reflect the degree of input uncertainty or an assessment of the reasonableness of the Firm's estimates and assumptions. Rather, they reflect the characteristics of the various instruments held by the Firm and the relative distribution of instruments within the range of characteristics. For example, two option contracts may have similar levels of market risk exposure and valuation uncertainty, but may have significantly different implied volatility levels because the option contracts have different underlyings, tenors, or strike prices. The input range and weighted average values will therefore vary from period-to-period and parameter-to-parameter based on the characteristics of the instruments held by the Firm at each balance sheet date.

Level 3 inputs[a]

December 31, 2022						
Product/Instrument	**Fair value** (in millions)	**Principal valuation technique**	**Unobservable inputs[g]**	**Range of input values**		**Average[i]**
Residential mortgage-backed securities and loans[b]	$ 1,649	Discounted cash flows	Yield	4%	15%	7%
			Prepayment speed	3%	11%	8%
			Conditional default rate	0%	5%	0%
			Loss severity	0%	110%	3%
Commercial mortgage-backed securities and loans[c]	423	Market comparables	Price	$0	$99	$83
Corporate debt securities	702	Market comparables	Price	$0	$243	$95
Loans[d]	876	Market comparables	Price	$0	$356	$77
Non-U.S. government debt securities	155	Market comparables	Price	$6	$100	$84
Net interest rate derivatives	735	Option pricing	Interest rate volatility	28bps	674bps	141bps
			Interest rate spread volatility	23bps	35bps	26bps
			Bermudan switch value	0%	57%	17%
			Interest rate correlation	(82)%	89%	16%
			IR-FX correlation	(35)%	60%	7%
	(34)	Discounted cash flows	Prepayment speed	0%	21%	7%
Net credit derivatives	(9)	Discounted cash flows	Credit correlation	30%	60%	43%
			Credit spread	1bps	12,107bps	1,057bps
			Recovery rate	10%	67%	45%
	22	Market comparables	Price	$15	$115	$82
Net foreign exchange derivatives	577	Option pricing	IR-FX correlation	(40)%	60%	21%
	(88)	Discounted cash flows	Prepayment speed	9%		9%
			Interest rate curve	2%	29%	8%
Net equity derivatives	(384)	Option pricing	Forward equity price[h]	84%	144%	100%
			Equity volatility	5%	141%	37%
			Equity correlation	17%	99%	55%
			Equity-FX correlation	(86)%	60%	(27)%
			Equity-IR correlation	(5)%	50%	23%
Net commodity derivatives	(146)	Option pricing	Oil commodity forward	$72 / BBL	$251 / BBL	$162 / BBL
			Natural gas commodity forward	$1 / MMBTU	$24 / MMBTI	$13 / MMBTU
			Commodity volatility	4%	154%	79%
			Commodity correlation	(45)%	77%	16%
MSRs	7,973	Discounted cash flows	Refer to Note 15			
Long-term debt, short-term borrowings, and deposits[e]	26,583	Option pricing	Interest rate volatility	28bps	674bps	141bps
			Bermudan switch value	0%	57%	17%
			Interest rate correlation	(82)%	89%	16%
			IR-FX correlation	(35)%	60%	7%
			Equity correlation	17%	99%	55%
			Equity-FX correlation	(86)%	60%	(27)%
			Equity-IR correlation	(5)%	50%	23%
	1,072	Discounted cash flows	Credit correlation	30%	60%	43%
Other level 3 assets and liabilities, net[f]	1,029					

(a) The categories presented in the table have been aggregated based upon the product type, which may differ from their classification on the Consolidated balance sheets. Furthermore, the inputs presented for each valuation technique in the table are, in some cases, not applicable to every instrument valued using the technique as the characteristics of the instruments can differ.

(b) Comprises U.S. GSE and government agency securities of $752 million, nonagency securities of $5 million and non-trading loans of $892 million.

(c) Comprises U.S. GSE and government agency securities of $7 million, nonagency securities of $7 million, trading loans of $40 million and non-trading loans of $369 million.

(d) Comprises trading loans of $719 million and non-trading loans of $157 million.

(e) Long-term debt, short-term borrowings and deposits include structured notes issued by the Firm that are financial instruments that typically contain embedded derivatives. The estimation of the fair value of structured notes includes the derivative features embedded within the instrument. The significant unobservable inputs are broadly consistent with those presented for derivative receivables.

(f) Includes equity securities of $880 million including $216 million in Other assets, for which quoted prices are not readily available and the fair value is generally based on internal valuation techniques such as EBITDA multiples and comparable analysis. All other level 3 assets and liabilities are insignificant both individually and in aggregate.

(g) Price is a significant unobservable input for certain instruments. When quoted market prices are not readily available, reliance is generally placed on price-based internal valuation techniques. The price input is expressed assuming a par value of $100.

(h) Forward equity price is expressed as a percentage of the current equity price.

(i) Amounts represent weighted averages except for derivative related inputs where arithmetic averages are used.

Changes in and ranges of unobservable inputs

The following discussion provides a description of the impact on a fair value measurement of a change in each unobservable input in isolation, and the interrelationship between unobservable inputs, where relevant and significant. The impact of changes in inputs may not be independent, as a change in one unobservable input may give rise to a change in another unobservable input. Where relationships do exist between two unobservable inputs, those relationships are discussed below. Relationships may also exist between observable and unobservable inputs (for example, as observable interest rates rise, unobservable prepayment rates decline); such relationships have not been included in the discussion below. In addition, for each of the individual relationships described below, the inverse relationship would also generally apply.

The following discussion also provides a description of attributes of the underlying instruments and external market factors that affect the range of inputs used in the valuation of the Firm's positions.

Yield – The yield of an asset is the interest rate used to discount future cash flows in a discounted cash flow calculation. An increase in the yield, in isolation, would result in a decrease in a fair value measurement.

Credit spread – The credit spread is the amount of additional annualized return over the market interest rate that a market participant would demand for taking exposure to the credit risk of an instrument. The credit spread for an instrument forms part of the discount rate used in a discounted cash flow calculation. Generally, an increase in the credit spread would result in a decrease in a fair value measurement.

The yield and the credit spread of a particular mortgage-backed security primarily reflect the risk inherent in the instrument. The yield is also impacted by the absolute level of the coupon paid by the instrument (which may not correspond directly to the level of inherent risk). Therefore, the range of yield and credit spreads reflects the range of risk inherent in various instruments owned by the Firm. The risk inherent in mortgage-backed securities is driven by the subordination of the security being valued and the characteristics of the underlying mortgages within the collateralized pool, including borrower FICO scores, LTV ratios for residential mortgages and the nature of the property and/or any tenants for commercial mortgages. For corporate debt securities, obligations of U.S. states and municipalities and other similar instruments, credit spreads reflect the credit quality of the obligor and the tenor of the obligation.

Prepayment speed – The prepayment speed is a measure of the voluntary unscheduled principal repayments of a prepayable obligation in a collateralized pool. Prepayment speeds generally decline as borrower delinquencies rise. An increase in prepayment speeds, in isolation, would result in a decrease in a fair value measurement of assets valued at a premium to par and an increase in a fair value measurement of assets valued at a discount to par.

Prepayment speeds may vary from collateral pool to collateral pool, and are driven by the type and location of the underlying borrower, and the remaining tenor of the obligation as well as the level and type (e.g., fixed or floating) of interest rate being paid by the borrower. Typically collateral pools with higher borrower credit quality have a higher prepayment rate than those with lower borrower credit quality, all other factors being equal.

Conditional default rate – The conditional default rate is a measure of the reduction in the outstanding collateral balance underlying a collateralized obligation as a result of defaults. While there is typically no direct relationship between conditional default rates and prepayment speeds, collateralized obligations for which the underlying collateral has high prepayment speeds will tend to have lower conditional default rates. An increase in conditional default rates would generally be accompanied by an increase in loss severity and an increase in credit spreads. An increase in the conditional default rate, in isolation, would result in a decrease in a fair value measurement. Conditional default rates reflect the quality of the collateral underlying a securitization and the structure of the securitization itself. Based on the types of securities owned in the Firm's market-making portfolios, conditional default rates are most typically at the lower end of the range presented.

Loss severity – The loss severity (the inverse concept is the recovery rate) is the expected amount of future realized losses resulting from the ultimate liquidation of a particular loan, expressed as the net amount of loss relative to the outstanding loan balance. An increase in loss severity is generally accompanied by an increase in conditional default rates. An increase in the loss severity, in isolation, would result in a decrease in a fair value measurement.

The loss severity applied in valuing a mortgage-backed security investment depends on factors relating to the underlying mortgages, including the LTV ratio, the nature of the lender's lien on the property and other instrument-specific factors.

Correlation – Correlation is a measure of the relationship between the movements of two variables. Correlation is a pricing input for a derivative product where the payoff is driven by one or more underlying risks. Correlation inputs are related to the type of derivative (e.g., interest rate, credit, equity, foreign exchange and commodity) due to the nature of the underlying risks. When parameters are positively correlated, an increase in one parameter will result in an increase in the other parameter. When parameters are negatively correlated, an increase in one parameter will result in a decrease in the other parameter. An increase in correlation can result in an increase or a decrease in a fair value measurement. Given a short correlation position, an increase in correlation, in isolation, would generally result in a decrease in a fair value measurement.

The level of correlation used in the valuation of derivatives with multiple underlying risks depends on a number of factors including the nature of those risks. For example, the correlation between two credit risk exposures would be different than that between two interest rate risk exposures. Similarly, the tenor of the transaction may also impact the correlation input, as the relationship between the underlying risks may be different over different time periods. Furthermore, correlation levels are very much dependent on market conditions and could have a relatively wide range of levels within or across asset classes over time, particularly in volatile market conditions.

Volatility – Volatility is a measure of the variability in possible returns for an instrument, parameter or market index given how much the particular instrument, parameter or index changes in value over time. Volatility is a pricing input for options, including equity options, commodity options, and interest rate options. Generally, the higher the volatility of the underlying, the riskier the instrument. Given a long position in an option, an increase in volatility, in isolation, would generally result in an increase in a fair value measurement.

The level of volatility used in the valuation of a particular option-based derivative depends on a number of factors, including the nature of the risk underlying the option (e.g., the volatility of a particular equity security may be significantly different from that of a particular commodity index), the tenor of the derivative as well as the strike price of the option.

Bermudan switch value – The switch value is the difference between the overall value of a Bermudan swaption, which can be exercised at multiple points in time, and its most expensive European swaption and reflects the additional value that the multiple exercise dates provide the holder. Switch values are dependent on market conditions and can vary greatly depending on a number of factors, such as the tenor of the underlying swap as well as the strike price of the option. An increase in switch value, in isolation, would generally result in an increase in a fair value measurement.

Interest rate curve – represents the relationship of interest rates over differing tenors. The interest rate curve is used to set interest rate and foreign exchange derivative cash flows and is also a pricing input used in the discounting of any derivative cash flow.

Forward price – Forward price is the price at which the buyer agrees to purchase the asset underlying a forward contract on the predetermined future delivery date, and is such that the value of the contract is zero at inception.

The forward price is used as an input in the valuation of certain derivatives and depends on a number of factors including interest rates, the current price of the underlying asset, and the expected income to be received and costs to be incurred by the seller as a result of holding that asset until the delivery date. An increase in the forward can result in an increase or a decrease in a fair value measurement.

Changes in level 3 recurring fair value measurements

The following tables include a rollforward of the Consolidated balance sheets amounts (including changes in fair value) for financial instruments classified by the Firm within level 3 of the fair value hierarchy for the years ended December 31, 2022, 2021 and 2020. When a determination is made to classify a financial instrument within level 3, the determination is based on the significance of the unobservable inputs to the overall fair value measurement. However, level 3 financial instruments typically include, in addition to the unobservable or level 3 components, observable components (that is, components that are actively quoted and can be validated to external sources); accordingly, the gains and losses in the table below include changes in fair value due in part to observable factors that are part of the valuation methodology. Also, the Firm risk-manages the observable components of level 3 financial instruments using securities and derivative positions that are classified within level 1 or 2 of the fair value hierarchy; as these level 1 and level 2 risk management instruments are not included below, the gains or losses in the following tables do not reflect the effect of the Firm's risk management activities related to such level 3 instruments.

	Fair value measurements using significant unobservable inputs								
Year ended December 31, 2022 (in millions)	Fair value at January 1, 2022	Total realized/ unrealized gains/(losses)	Purchases[g]	Sales	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2022	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2022
Assets:[a]									
Federal funds sold and securities purchased under resale agreements	$ –	$ –	$ 1	$ (1)	$ (1)	$ 1	$ –	$ –	$ –
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	265	31	673	(125)	(84)	4	(5)	759	29
Residential – nonagency	28	(1)	7	(5)	(12)	–	(12)	5	–
Commercial – nonagency	10	–	–	(1)	–	3	(5)	7	–
Total mortgage-backed securities	303	30	680	(131)	(96)	7	(22)	771	29
Obligations of U.S. states and municipalities	7	–	–	–	–	–	–	7	–
Non-U.S. government debt securities	81	(92)	494	(338)	(4)	84	(70)	155	(153)
Corporate debt securities	332	(30)	404	(178)	(100)	357	(322)	463	(48)
Loans	708	(51)	652	(605)	(230)	925	(640)	759	(26)
Asset-backed securities	26	5	19	(24)	(1)	5	(7)	23	1
Total debt instruments	1,457	(138)	2,249	(1,276)	(431)	1,378	(1,061)	2,178	(197)
Equity securities	662	(1,036)	473	(377)	(2)	1,066	(121)	665	(840)
Physical commodities	–	(1)	3	–	–	–	–	2	(1)
Other	160	93	37	–	(221)	1	(6)	64	46
Total trading assets – debt and equity instruments	2,279	(1,082) [c]	2,762	(1,653)	(654)	2,445	(1,188)	2,909	(992) [c]
Net derivative receivables:[b]									
Interest rate	(16)	187	325	(483)	329	732	(373)	701	332
Credit	74	226	17	(9)	(271)	5	(29)	13	170
Foreign exchange	(419)	726	215	(114)	83	3	(5)	489	459
Equity	(3,626)	5,016	1,226	(2,530)	96	(656)	90	(384)	3,435
Commodity	(907)	571	110	(331)	350	5	56	(146)	369
Total net derivative receivables	(4,894)	6,726 [c]	1,893	(3,467)	587	89	(261)	673	4,765 [c]
Available-for-sale securities:									
Mortgage-backed securities	–	–	–	–	–	–	–	–	–
Corporate debt securities	161	5	88	–	(15)	–	–	239	5
Total available-for-sale securities	161	5 [d]	88	–	(15)	–	–	239	5 [d]
Loans	1,933	(158) [c]	568	(261)	(886)	1,053	(831)	1,418	(76) [c]
Mortgage servicing rights	5,494	2,039 [e]	2,198	(822)	(936)	–	–	7,973	2,039 [e]
Other assets	306	194 [c]	50	(38)	(103)	2	(6)	405	191 [c]

	Fair value measurements using significant unobservable inputs									
Year ended December 31, 2022 (in millions)	Fair value at January 1, 2022	Total realized/ unrealized (gains)/losses	Purchases	Sales	Issuances	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2022	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2022
Liabilities:[a]										
Deposits	$ 2,317	$ (292) [c][f]	$ –	$ –	$ 531	$ (114)	$ –	$ (280)	$ 2,162	$ (76) [c][f]
Short-term borrowings	2,481	(358) [c][f]	–	–	3,963	(4,685)	15	(15)	1,401	90 [c][f]
Trading liabilities – debt and equity instruments	30	(31) [c]	(41)	77	–	–	57	(8)	84	101 [c]
Accounts payable and other liabilities	69	(16) [c]	(37)	42	–	–	1	(6)	53	(16) [c]
Long-term debt	24,374	(3,869) [c][f]	–	–	12,714	(8,876)	793	(1,044)	24,092	(3,447) [c][f]

	Fair value measurements using significant unobservable inputs								
Year ended December 31, 2021 (in millions)	Fair value at January 1, 2021	Total realized/ unrealized gains/ (losses)	Purchases[g]	Sales	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2021	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2021
Assets:[a]									
Federal funds sold and securities purchased under resale agreements	$ –	$ –	$ –	$ –	$ –	$ –	$ –	$ –	$ –
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	449	(28)	21	(67)	(110)	1	(1)	265	(31)
Residential – nonagency	28	–	26	(24)	(5)	4	(1)	28	(3)
Commercial – nonagency	3	5	12	(7)	(17)	14	–	10	(2)
Total mortgage-backed securities	480	(23)	59	(98)	(132)	19	(2)	303	(36)
Obligations of U.S. states and municipalities	8	–	–	–	(1)	–	–	7	–
Non-U.S. government debt securities	182	(14)	359	(332)	(7)	–	(107)	81	(10)
Corporate debt securities	507	(23)	404	(489)	(4)	162	(225)	332	(16)
Loans	893	2	994	(669)	(287)	648	(873)	708	(20)
Asset-backed securities	28	28	76	(99)	(2)	2	(7)	26	(2)
Total debt instruments	2,098	(30)	1,892	(1,687)	(433)	831	(1,214)	1,457	(84)
Equity securities	476	(77)	378	(168)	–	164	(111)	662	(335)
Physical commodities	–	–	–	–	–	–	–	–	–
Other	49	74	233	–	(98)	5	(103)	160	31
Total trading assets – debt and equity instruments	2,623	(33) [c]	2,503	(1,855)	(531)	1,000	(1,428)	2,279	(388) [c]
Net derivative receivables:[b]									
Interest rate	258	1,789	116	(192)	(2,011)	112	(88)	(16)	282
Credit	(224)	130	6	(12)	146	34	(6)	74	141
Foreign exchange	(434)	(209)	110	(110)	222	(12)	14	(419)	13
Equity	(3,862)	(480)	1,285	(2,813)	1,758	315	171	(3,626)	(155)
Commodity	(731)	(728)	145	(493)	916	(4)	(12)	(907)	(426)
Total net derivative receivables	(4,993)	502 [c]	1,662	(3,620)	1,031	445	79	(4,894)	(145) [c]
Available-for-sale securities:									
Mortgage-backed securities	–	–	–	–	–	–	–	–	–
Corporate debt securities	–	(1)	162	–	–	–	–	161	(1)
Total available-for-sale securities	–	(1) [d]	162	–	–	–	–	161	(1) [d]
Loans	2,305	(87) [c]	612	(439)	(965)	1,301	(794)	1,933	(59) [c]
Mortgage servicing rights	3,276	98 [e]	3,022	(114)	(788)	–	–	5,494	98 [e]
Other assets	538	16 [c]	9	(17)	(239)	–	(1)	306	11 [c]

	Fair value measurements using significant unobservable inputs									
Year ended December 31, 2021 (in millions)	Fair value at January 1, 2021	Total realized/ unrealized (gains)/losses	Purchases	Sales	Issuances	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2021	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2021
Liabilities:[a]										
Deposits	$ 2,913	$ (80) [c][f]	$ –	$ –	$ 431	$ (467)	$ 2	$ (482)	$ 2,317	$ (77) [c][f]
Short-term borrowings	2,420	(1,391) [c][f]	–	–	6,823	(5,308)	9	(72)	2,481	(83) [c][f]
Trading liabilities – debt and equity instruments	51	(8) [c]	(101)	38	–	–	64	(14)	30	(157) [c]
Accounts payable and other liabilities	68	8 [c]	–	1	–	–	–	(8)	69	8 [c]
Long-term debt	23,397	369 [c][f]	–	–	13,505	(12,191)	103	(809)	24,374	87 [c][f]

	Fair value measurements using significant unobservable inputs								
Year ended December 31, 2020 (in millions)	Fair value at January 1, 2020	Total realized/ unrealized gains/(losses)	Purchases[g]	Sales	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2020	Change in unrealized gains/(losses) related to financial instruments held at Dec. 31, 2020
Assets:[a]									
Federal funds sold and securities purchased under resale agreements	$ –	$ –	$ –	$ –	$ –	$ –	$ –	$ –	$ –
Trading assets:									
Debt instruments:									
Mortgage-backed securities:									
U.S. GSEs and government agencies	797	(172)	134	(149)	(161)	–	–	449	(150)
Residential – nonagency	23	2	15	(5)	(4)	–	(3)	28	(1)
Commercial – nonagency	4	–	1	–	(1)	2	(3)	3	–
Total mortgage-backed securities	824	(170)	150	(154)	(166)	2	(6)	480	(151)
Obligations of U.S. states and municipalities	10	–	–	(1)	(1)	–	–	8	–
Non-U.S. government debt securities	155	21	281	(245)	(7)	–	(23)	182	11
Corporate debt securities	558	(23)	582	(205)	(236)	411	(580)	507	(25)
Loans	673	(73)	1,112	(484)	(182)	791	(944)	893	(40)
Asset-backed securities	37	(3)	44	(40)	(9)	9	(10)	28	(4)
Total debt instruments	2,257	(248)	2,169	(1,129)	(601)	1,213	(1,563)	2,098	(209)
Equity securities	196	(137)	412	(376)	(1)	535	(153)	476	(82)
Physical commodities	–	–	–	–	–	–	–	–	–
Other	232	333	229	(9)	(497)	6	(245)	49	268
Total trading assets – debt and equity instruments	2,685	(52) [c]	2,810	(1,514)	(1,099)	1,754	(1,961)	2,623	(23) [c]
Net derivative receivables:[b]									
Interest rate	(332)	2,682	308	(148)	(2,228)	(332)	308	258	325
Credit	(139)	(212)	73	(154)	181	59	(32)	(224)	(110)
Foreign exchange	(607)	49	49	(24)	83	13	3	(434)	116
Equity	(3,395)	(65)	1,664	(2,317)	1,162	(935)	24	(3,862)	(556)
Commodity	(16)	(546)	27	(241)	356	(310)	(1)	(731)	267
Total net derivative receivables	(4,489)	1,908 [c]	2,121	(2,884)	(446)	(1,505)	302	(4,993)	42 [c]
Available-for-sale securities:									
Mortgage-backed securities	1	–	–	–	(1)	–	–	–	–
Corporate debt securities	–	–	–	–	–	–	–	–	–
Total available-for-sale securities	1	–	–	–	(1)	–	–	–	–
Loans	516	(243) [c]	962	(84)	(733)	2,571	(684)	2,305	(18) [c]
Mortgage servicing rights	4,699	(1,540) [e]	1,192	(176)	(899)	–	–	3,276	(1,540) [e]
Other assets	917	(63) [c]	75	(104)	(320)	40	(7)	538	(3) [c]

	Fair value measurements using significant unobservable inputs									
Year ended December 31, 2020 (in millions)	Fair value at January 1, 2020	Total realized/ unrealized (gains)/losses	Purchases	Sales	Issuances	Settlements[h]	Transfers into level 3	Transfers (out of) level 3	Fair value at Dec. 31, 2020	Change in unrealized (gains)/losses related to financial instruments held at Dec. 31, 2020
Liabilities:[a]										
Deposits	$ 3,360	$ 165 [c][f]	$ –	$ –	$ 671	$ (605)	$ 265	$ (943)	$ 2,913	$ 455 [c][f]
Short-term borrowings	1,674	(338) [c][f]	–	–	5,140	(4,115)	105	(46)	2,420	143 [c][f]
Trading liabilities – debt and equity instruments	41	(2) [c]	(126)	14	–	(4)	136	(8)	51	(1) [c]
Accounts payable and other liabilities	45	33 [c]	(87)	37	–	–	47	(7)	68	28 [c]
Long-term debt	23,339	40 [c][f]	–	–	9,883	(9,833)	1,250	(1,282)	23,397	1,920 [c][f]

(a) Level 3 assets at fair value as a percentage of total Firm assets at fair value (including assets measured at fair value on a nonrecurring basis) were 2% at both December 31, 2022 and December 31, 2021 and 1% at December 31, 2020. Level 3 liabilities at fair value as a percentage of total Firm liabilities at fair value (including liabilities measured at fair value on a nonrecurring basis) were 8%, 10% and 9% at December 31, 2022, 2021 and 2020, respectively.
(b) All level 3 derivatives are presented on a net basis, irrespective of the underlying counterparty.
(c) Predominantly reported in principal transactions revenue, except for changes in fair value for CCB mortgage loans and lending-related commitments originated with the intent to sell, and mortgage loan purchase commitments, which are reported in mortgage fees and related income.
(d) Realized gains/(losses) on AFS securities are reported in investment securities gains/(losses). Unrealized gains/(losses) are reported in OCI. Realized and unrealized gains/(losses) recorded on AFS securities were not material for the years ended December 31, 2022, 2021 and 2020.
(e) Changes in fair value for MSRs are reported in mortgage fees and related income.
(f) Realized (gains)/losses due to DVA for fair value option elected liabilities are reported in principal transactions revenue, and were not material for the years ended December 31, 2022, 2021 and 2020. Unrealized (gains)/losses are reported in OCI, and they were $(529) million, $258 million and $221 million for the years ended December 31, 2022, 2021 and 2020, respectively.
(g) Loan originations are included in purchases.
(h) Includes financial assets and liabilities that have matured, been partially or fully repaid, impacts of modifications, deconsolidations associated with beneficial interests in VIEs and other items.

Level 3 analysis

Consolidated balance sheets changes

The following describes significant changes to level 3 assets since December 31, 2021, for those items measured at fair value on a recurring basis. Refer to Assets and liabilities measured at fair value on a nonrecurring basis on page 185 for further information on changes impacting items measured at fair value on a nonrecurring basis.

For the year ended December 31, 2022

Level 3 assets were $23.6 billion at December 31, 2022, reflecting an increase of $6.1 billion from December 31, 2021.

The increase for the year ended December 31, 2022 was predominantly driven by:

- $3.4 billion increase in gross derivative receivables due to gains and purchases partially offset by settlements.
- $2.5 billion increase in MSRs.

Refer to Note 15 for information on MSRs.

Refer to the sections below for additional information.

Transfers between levels for instruments carried at fair value on a recurring basis

During the year ended December 31, 2022, significant transfers from level 2 into level 3 included the following:

- $2.4 billion of total debt and equity instruments, predominantly due to equity securities of $1.1 billion driven by a decrease in observability predominantly as a result of restricted access to certain markets and trading loans of $925 million driven by a decrease in observability.
- $1.6 billion of gross interest rate derivative receivables and $878 million of gross interest rate derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.6 billion of gross equity derivative receivables and $2.3 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.1 billion of non-trading loans driven by a decrease in observability.
- $793 million of long-term debt driven by a decrease in observability and an increase in the significance of unobservable inputs for structured notes.

During the year ended December 31, 2022, significant transfers from level 3 into level 2 included the following:

- $1.2 billion of total debt and equity instruments, largely due to trading loans, driven by an increase in observability.
- $1.2 billion of gross interest rate derivative receivables and $807 million of gross interest rate derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $2.2 billion of gross equity derivative receivables and $2.3 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $831 million of non-trading loans driven by an increase in observability.
- $1.0 billion of long-term debt driven by an increase in observability and a decrease in the significance of unobservable inputs for structured notes.

During the year ended December 31, 2021, significant transfers from level 2 into level 3 included the following:

- $1.0 billion of total debt and equity instruments, largely due to trading loans, driven by a decrease in observability.
- $1.5 billion of gross equity derivative receivables and $1.2 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $1.3 billion of non-trading loans driven by a decrease in observability.

During the year ended December 31, 2021, significant transfers from level 3 into level 2 included the following:

- $1.4 billion of total debt and equity instruments, largely due to trading loans, driven by an increase in observability.
- $1.9 billion of gross equity derivative receivables and $2.1 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $794 million of non-trading loans driven by an increase in observability.
- $809 million of long-term debt driven by an increase in observability and a decrease in the significance of unobservable inputs for structured notes.

During the year ended December 31, 2020, significant transfers from level 2 into level 3 included the following:

- $1.8 billion of total debt and equity instruments, predominantly equity securities and trading loans, driven by a decrease in observability.
- $2.6 billion of gross equity derivative receivables and $3.5 billion of gross equity derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $880 million of gross interest rate derivative payables as a result of a decrease in observability and an increase in the significance of unobservable inputs.
- $2.6 billion of non-trading loans driven by a decrease in observability.
- $1.2 billion of long-term debt driven by a decrease in observability and an increase in the significance of unobservable inputs for structured notes.

During the year ended December 31, 2020, significant transfers from level 3 into level 2 included the following:

- $2.0 billion of total debt and equity instruments, predominantly due to corporate debt and trading loans, driven by an increase in observability
- $2.4 billion of gross equity derivative receivables and $2.4 billion of gross equity derivative payables as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $943 million of deposits as a result of an increase in observability and a decrease in the significance of unobservable inputs.
- $1.3 billion of long-term debt driven by an increase in observability and a decrease in the significance of unobservable inputs for structured notes.

All transfers are based on changes in the observability and/or significance of the valuation inputs and are assumed to occur at the beginning of the quarterly reporting period in which they occur.

Gains and losses

The following describes significant components of total realized/unrealized gains/(losses) for instruments measured at fair value on a recurring basis for the years ended December 31, 2022, 2021 and 2020. These amounts exclude any effects of the Firm's risk management activities where the financial instruments are classified as level 1 and 2 of the fair value hierarchy. Refer to Changes in level 3 recurring fair value measurements rollforward tables on pages 178-182 for further information on these instruments.

2022

- $7.7 billion of net gains on assets, predominantly driven by gains in net equity derivative receivables due to market movements and gains in MSRs reflecting lower prepayment speeds on higher rates.
- $4.6 billion of net gains on liabilities, predominantly driven by a decline in the fair value of long-term debt due to market movements.

2021

- $495 million of net gains on assets, driven by gains in net interest rate derivative receivables due to market movements, partially offset by losses in net equity derivative receivables and net commodity derivative receivables due to market movements.
- $1.1 billion of net gains on liabilities, driven by gains in short-term borrowings due to market movements.

2020

- $10 million of net gains on assets driven by gains in net interest rate derivative receivables due to market movements largely offset by losses in MSRs reflecting faster prepayment speeds on lower rates.
- $102 million of net gains on liabilities driven by market movements in short-term borrowings.

Refer to Note 15 for information on MSRs.

Credit and funding adjustments – derivatives

Derivatives are generally valued using models that use as their basis observable market parameters. These market parameters generally do not consider factors such as counterparty nonperformance risk, the Firm's own credit quality, and funding costs. Therefore, it is generally necessary to make adjustments to the base estimate of fair value to reflect these factors.

CVA represents the adjustment, relative to the relevant benchmark interest rate, necessary to reflect counterparty nonperformance risk. The Firm estimates CVA using a scenario analysis to estimate the expected positive credit exposure across all of the Firm's existing positions with each counterparty, and then estimates losses based on the probability of default and estimated recovery rate as a result of a counterparty credit event considering contractual factors designed to mitigate the Firm's credit exposure, such as collateral and legal rights of offset. The key inputs to this methodology are (i) the probability of a default event occurring for each counterparty, as derived from observed or estimated CDS spreads; and (ii) estimated recovery rates implied by CDS spreads, adjusted to consider the differences in recovery rates as a derivative creditor relative to those reflected in CDS spreads, which generally reflect senior unsecured creditor risk.

FVA represents the adjustment to reflect the impact of funding and is recognized where there is evidence that a market participant in the principal market would incorporate it in a transfer of the instrument. The Firm's FVA framework, applied to uncollateralized (including partially collateralized) over-the-counter ("OTC") derivatives incorporates key inputs such as: (i) the expected funding requirements arising from the Firm's positions with each counterparty and collateral arrangements; and (ii) the estimated market funding cost in the principal market which, for derivative liabilities, considers the Firm's credit risk (DVA). For collateralized derivatives, the fair value is estimated by discounting expected future cash flows at the relevant overnight indexed swap rate given the underlying collateral agreement with the counterparty, and therefore a separate FVA is not necessary.

The following table provides the impact of credit and funding adjustments on principal transactions revenue in the respective periods, excluding the effect of any associated hedging activities. The FVA presented below includes the impact of the Firm's own credit quality on the inception value of liabilities as well as the impact of changes in the Firm's own credit quality over time.

Year ended December 31, (in millions)	**2022**	2021	2020
Credit and funding adjustments:			
Derivatives CVA	**$ 22**	$ 362	$ (337)
Derivatives FVA	**42**	47	(64)

Valuation adjustments on fair value option elected liabilities

The valuation of the Firm's liabilities for which the fair value option has been elected requires consideration of the Firm's own credit risk. DVA on fair value option elected liabilities reflects changes (subsequent to the issuance of the liability) in the Firm's probability of default and LGD, which are estimated based on changes in the Firm's credit spread observed in the bond market. Realized (gains)/losses due to DVA for fair value option elected liabilities are reported in principal transactions revenue. Unrealized (gains)/losses are reported in OCI. Refer to page 182 in this Note and Note 24 for further information.

Assets and liabilities measured at fair value on a nonrecurring basis

The following tables present the assets and liabilities held as of December 31, 2022 and 2021, for which nonrecurring fair value adjustments were recorded during the years ended December 31, 2022 and 2021, by major product category and fair value hierarchy.

December 31, 2022 **(in millions)**		Fair value hierarchy						
		Level 1		Level 2		Level 3		Total fair value
Loans	**$**	**–**	**$**	**643**	**$**	**627** [(b)]	**$**	**1,270**
Other assets[(a)]		**–**		**36**		**1,352**		**1,388**
Total assets measured at fair value on a nonrecurring basis	**$**	**–**	**$**	**679**	**$**	**1,979**	**$**	**2,658**
Accounts payable and other liabilities		**–**		**–**		**84**		**84**
Total liabilities measured at fair value on a nonrecurring basis	**$**	**–**	**$**	**–**	**$**	**84**	**$**	**84**

December 31, 2021 (in millions)		Fair value hierarchy						
		Level 1		Level 2		Level 3		Total fair value
Loans	$	–	$	1,006	$	856	$	1,862
Other assets		–		4		1,612		1,616
Total assets measured at fair value on a nonrecurring basis	$	–	$	1,010	$	2,468	$	3,478
Accounts payable and other liabilities		–		–		3		3
Total liabilities measured at fair value on a nonrecurring basis	$	–	$	–	$	3	$	3

(a) Primarily includes equity securities without readily determinable fair values that were adjusted based on observable price changes in orderly transactions from an identical or similar investment of the same issuer (measurement alternative). Of the $1.4 billion in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2022, $1.2 billion related to equity securities adjusted based on the measurement alternative. These equity securities are classified as level 3 due to the infrequency of the observable prices and/or the restrictions on the shares.

(b) Of the $627 million in level 3 assets measured at fair value on a nonrecurring basis as of December 31, 2022, $83 million related to residential real estate loans carried at the net realizable value of the underlying collateral (e.g., collateral-dependent loans). These amounts are classified as level 3 as they are valued using information from broker's price opinions, appraisals and automated valuation models and discounted based upon the Firm's experience with actual liquidation values. These discounts ranged from 9% to 56% with a weighted average of 23%.

Nonrecurring fair value changes

The following table presents the total change in value of assets and liabilities for which fair value adjustments have been recognized for the years ended December 31, 2022, 2021 and 2020, related to assets and liabilities held at those dates.

December 31, (in millions)		**2022**		2021		2020
Loans	**$**	**(55)**	$	(72)	$	(393)
Other assets[(a)]		**(409)**		344		(529)
Accounts payable and other liabilities		**(83)**		5		(11)
Total nonrecurring fair value gains/ (losses)	**$**	**(547)**	$	277	$	(933)

(a) Included $(338) million, $379 million and $(134) million for the years ended December 31, 2022, 2021 and 2020, respectively, of net gains/(losses) as a result of the measurement alternative.

Refer to Note 12 for further information about the measurement of collateral-dependent loans.

Equity securities without readily determinable fair values

The Firm measures certain equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer (i.e., measurement alternative), with such changes recognized in other income.

In its determination of the new carrying values upon observable price changes, the Firm may adjust the prices if deemed necessary to arrive at the Firm's estimated fair values. Such adjustments may include adjustments to reflect the different rights and obligations of similar securities, and other adjustments that are consistent with the Firm's valuation techniques for private equity direct investments.

The following table presents the carrying value of equity securities without readily determinable fair values held as of December 31, 2022 and 2021, that are measured under the measurement alternative and the related adjustments recorded during the periods presented for those securities with observable price changes. These securities are included in the nonrecurring fair value tables when applicable price changes are observable.

As of or for the year ended December 31, (in millions)		**2022**		2021
Other assets				
Carrying value[(a)]	$	**4,096**	$	3,642
Upward carrying value changes[(b)]		**488**		432
Downward carrying value changes/impairment[(c)]		**(826)**		(53)

(a) The period-end carrying values reflect cumulative purchases and sales in addition to upward and downward carrying value changes.
(b) The cumulative upward carrying value changes between January 1, 2018 and December 31, 2022 were $1.4 billion.
(c) The cumulative downward carrying value changes/impairment between January 1, 2018 and December 31, 2022 were $(918) million.

Included in other assets above is the Firm's interest in Visa Class B common shares ("Visa B shares") recorded at a nominal carrying value. In November 2022, the Firm sold approximately 3 million Visa B shares, resulting in a net pretax gain of $914 million recorded in other income. Visa B shares are subject to certain transfer restrictions and are convertible into Visa Class A common shares ("Visa A shares") at a specified conversion rate upon final resolution of certain litigation matters involving Visa. In connection with the sale, and consistent with the Firm's sale of 20 million Visa B shares in 2013, the Firm entered into a derivative instrument with the purchaser of the shares, under which the Firm retains the risk associated with changes in the conversion rate.

Under the terms of the derivative instrument, the Firm will (a) make or receive payments based on subsequent changes in the conversion rate and (b) make periodic interest payments to the purchaser of the Visa B shares. The payments under the derivative continue as long as the Visa B shares remain subject to transfer restrictions. The derivative is accounted for at fair value using a discounted cash flow methodology based upon the Firm's estimate of the timing and magnitude of final resolution of the litigation matters. The derivative is recorded in trading liabilities and changes in fair value are recognized in other income. As of December 31, 2022, the Firm held derivative instruments associated with the 23 million Visa B shares that it has sold, which are all subject to similar terms and conditions.

As of December 31, 2022, the Firm's remaining interest in Visa B shares was approximately 37 million shares. On January 5, 2023, Visa filed a Current Report on Form 8-K with the SEC indicating that the conversion rate of Visa B shares to Visa A shares decreased from 1.6059 to 1.5991 effective December 29, 2022. The conversion rate may be further adjusted by Visa depending on developments related to the litigation matters. The outcome of those litigation matters, and the effect that the resolution of those matters may have on the conversion rate, is unknown, and accordingly, as of December 31, 2022, there is significant uncertainty regarding the date of the termination of transfer restrictions and the value of the final conversion rate. As a result of this, as well as differences in voting rights, Visa B shares are not considered to be similar to Visa A shares, and they continue to be held at their nominal carrying value.

Additional disclosures about the fair value of financial instruments that are not carried on the Consolidated balance sheets at fair value

U.S. GAAP requires disclosure of the estimated fair value of certain financial instruments, which are included in the following table. However, this table does not include other items, such as nonfinancial assets, intangible assets, certain financial instruments, and customer relationships. In the opinion of management, these items, in the aggregate, add significant value to JPMorgan Chase, but their fair value is not disclosed in this table.

Financial instruments for which carrying value approximates fair value

Certain financial instruments that are not carried at fair value on the Consolidated balance sheets are carried at amounts that approximate fair value, due to their short-term nature and generally negligible credit risk. These instruments include cash and due from banks, deposits with banks, federal funds sold, securities purchased under resale agreements and securities borrowed, short-term receivables and accrued interest receivable, short-term borrowings, federal funds purchased, securities loaned and sold under repurchase agreements, accounts payable, and accrued liabilities. In addition, U.S. GAAP requires that the fair value of deposit liabilities with no stated maturity (i.e., demand, savings and certain money market deposits) be equal to their carrying value; recognition of the inherent funding value of these instruments is not permitted.

The following table presents, by fair value hierarchy classification, the carrying values and estimated fair values at December 31, 2022 and 2021, of financial assets and liabilities, excluding financial instruments that are carried at fair value on a recurring basis, and their classification within the fair value hierarchy.

	December 31, 2022					December 31, 2021				
	Estimated fair value hierarchy					Estimated fair value hierarchy				
(in billions)	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value	Level 1	Level 2	Level 3	Total estimated fair value
Financial assets										
Cash and due from banks	$ 27.7	$ 27.7	$ –	$ –	$ 27.7	$ 26.4	$ 26.4	$ –	$ –	$ 26.4
Deposits with banks	539.5	539.3	0.2	–	539.5	714.4	714.1 [b]	0.3 [b]	–	714.4
Accrued interest and accounts receivable	124.7	–	124.6	0.1	124.7	102.1	–	102.0	0.1	102.1
Federal funds sold and securities purchased under resale agreements	3.7	–	3.7	–	3.7	9.0	–	9.0	–	9.0
Securities borrowed	115.3	–	115.3	–	115.3	124.6	–	124.6	–	124.6
Investment securities, held-to-maturity	425.3	189.1	199.5	–	388.6	363.7	183.3	179.3	–	362.6
Loans, net of allowance for loan losses[a]	1,073.9	–	194.0	853.9	1,047.9	1,002.5	–	202.1	821.1	1,023.2
Other	101.2	–	99.6	1.7	101.3	98.7	–	97.4	1.4	98.8
Financial liabilities										
Deposits	$2,311.6	$ –	$2,311.5	$ –	$ 2,311.5	$2,451.0	$ –	$2,451.0	$ –	$ 2,451.0
Federal funds purchased and securities loaned or sold under repurchase agreements	50.6	–	50.6	–	50.6	67.9	–	67.9	–	67.9
Short-term borrowings	28.2	–	28.2	–	28.2	33.6	–	33.6	–	33.6
Accounts payable and other liabilities	257.5	–	251.2	5.6	256.8	217.6	–	212.1	4.9	217.0
Beneficial interests issued by consolidated VIEs	12.6	–	12.6	–	12.6	10.7	–	10.8	–	10.8
Long-term debt	223.6	–	216.5	2.8	219.3	226.0	–	229.5	3.1	232.6

(a) Fair value is typically estimated using a discounted cash flow model that incorporates the characteristics of the underlying loans (including principal, contractual interest rate and contractual fees) and other key inputs, including expected lifetime credit losses, interest rates, prepayment rates, and primary origination or secondary market spreads. For certain loans, the fair value is measured based on the value of the underlying collateral. Carrying value of the loan takes into account the loan's allowance for loan losses, which represents the loan's expected credit losses over its remaining expected life. The difference between the estimated fair value and carrying value of a loan is generally attributable to changes in market interest rates, including credit spreads, market liquidity premiums and other factors that affect the fair value of a loan but do not affect its carrying value.

(b) Prior-period amounts have been revised to conform with the current presentation.

The majority of the Firm's lending-related commitments are not carried at fair value on a recurring basis on the Consolidated balance sheets. The carrying value and the estimated fair value of these wholesale lending-related commitments were as follows for the periods indicated.

	December 31, 2022					December 31, 2021				
	Estimated fair value hierarchy					Estimated fair value hierarchy				
(in billions)	Carrying value[a][b]	Level 1	Level 2	Level 3	Total estimated fair value	Carrying value[a][b]	Level 1	Level 2	Level 3	Total estimated fair value
Wholesale lending-related commitments	$ 2.3	$ –	$ –	$ 3.2	$ 3.2	$ 2.1	$ –	$ –	$ 2.9	$ 2.9

(a) Excludes the current carrying values of the guarantee liability and the offsetting asset, each of which is recognized at fair value at the inception of the guarantees.

(b) Includes the wholesale allowance for lending-related commitments.

The Firm does not estimate the fair value of consumer off-balance sheet lending-related commitments. In many cases, the Firm can reduce or cancel these commitments by providing the borrower notice or, in some cases as permitted by law, without notice. Refer to page 169 of this Note for a further discussion of the valuation of lending-related commitments.

Note 3 – Fair value option

The fair value option provides an option to elect fair value for selected financial assets, financial liabilities, unrecognized firm commitments, and written loan commitments.

The Firm has elected to measure certain instruments at fair value for several reasons including to mitigate income statement volatility caused by the differences between the measurement basis of elected instruments (e.g., certain instruments that otherwise would be accounted for on an accrual basis) and the associated risk management arrangements that are accounted for on a fair value basis, as well as to better reflect those instruments that are managed on a fair value basis.

The Firm's election of fair value includes the following instruments:

- Loans purchased or originated as part of securitization warehousing activity, subject to bifurcation accounting, or managed on a fair value basis, including lending-related commitments
- Certain securities financing agreements
- Owned beneficial interests in securitized financial assets that contain embedded credit derivatives, which would otherwise be required to be separately accounted for as a derivative instrument
- Structured notes and other hybrid instruments, which are predominantly financial instruments that contain embedded derivatives, that are issued or transacted as part of client-driven activities
- Certain long-term beneficial interests issued by CIB's consolidated securitization trusts where the underlying assets are carried at fair value

Changes in fair value under the fair value option election

The following table presents the changes in fair value included in the Consolidated statements of income for the years ended December 31, 2022, 2021 and 2020, for items for which the fair value option was elected. The profit and loss information presented below only includes the financial instruments that were elected to be measured at fair value; related risk management instruments, which are required to be measured at fair value, are not included in the table.

	2022			2021			2020		
December 31, (in millions)	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]	Principal transactions	All other income	Total changes in fair value recorded[e]
Federal funds sold and securities purchased under resale agreements	**$ (384)**	**$ –**	**$ (384)**	$ (112)	$ –	$ (112)	$ 12	$ –	$ 12
Securities borrowed	**(499)**	**–**	**(499)**	(200)	–	(200)	143	–	143
Trading assets:									
Debt and equity instruments, excluding loans	**(1,703)**	**–**	**(1,703)**	(2,171)	(1) [c]	(2,172)	2,587	(1) [c]	2,586
Loans reported as trading assets:									
Changes in instrument-specific credit risk	**(136)**	**–**	**(136)**	353	–	353	135	–	135
Other changes in fair value	**(59)**	**–**	**(59)**	(8)	–	(8)	(19)	–	(19)
Loans:									
Changes in instrument-specific credit risk	**(242)**	**21** [c]	**(221)**	589	(7) [c]	582	190	7 [c]	197
Other changes in fair value	**(1,421)**	**(794)** [c]	**(2,215)**	(139)	2,056 [c]	1,917	470	3,239 [c]	3,709
Other assets	**39**	**(6)** [d]	**33**	12	(26) [d]	(14)	103	(65) [d]	38
Deposits[a]	**901**	**–**	**901**	(183)	–	(183)	(726)	–	(726)
Federal funds purchased and securities loaned or sold under repurchase agreements	**181**	**–**	**181**	69	–	69	(6)	–	(6)
Short-term borrowings[a]	**473**	**–**	**473**	(366)	–	(366)	294	–	294
Trading liabilities	**43**	**–**	**43**	7	–	7	2	–	2
Beneficial interests issued by consolidated VIEs	**(1)**	**–**	**(1)**	–	–	–	–	–	–
Other liabilities	**(11)**	**–**	**(11)**	(17)	–	(17)	(94)	–	(94)
Long-term debt[a][b]	**8,990**	98 [c][d]	**9,088**	(980)	4 [c][d]	(976)	(2,120)	(1) [c]	(2,121)

(a) Unrealized gains/(losses) due to instrument-specific credit risk (DVA) for liabilities for which the fair value option has been elected are recorded in OCI, while realized gains/(losses) are recorded in principal transactions revenue. Realized gains/(losses) due to instrument-specific credit risk recorded in principal transactions revenue were not material for the years ended December 31, 2022, 2021 and 2020.

(b) Long-term debt measured at fair value predominantly relates to structured notes. Although the risk associated with the structured notes is actively managed, the gains/(losses) reported in this table do not include the income statement impact of the risk management instruments used to manage such risk.

(c) Reported in mortgage fees and related income.

(d) Reported in other income.

(e) Changes in fair value exclude contractual interest, which is included in interest income and interest expense for all instruments other than certain hybrid financial instruments in CIB. Refer to Note 7 for further information regarding interest income and interest expense.

Determination of instrument-specific credit risk for items for which the fair value option was elected

The following describes how the gains and losses that are attributable to changes in instrument-specific credit risk, were determined.

- Loans and lending-related commitments: For floating-rate instruments, all changes in value are attributed to instrument-specific credit risk. For fixed-rate instruments, an allocation of the changes in value for the period is made between those changes in value that are interest rate-related and changes in value that are credit-related. Allocations are generally based on an analysis of borrower-specific credit spread and recovery information, where available, or benchmarking to similar entities or industries.
- Long-term debt: Changes in value attributable to instrument-specific credit risk were derived principally from observable changes in the Firm's credit spread as observed in the bond market.
- Securities financing agreements: Generally, for these types of agreements, there is a requirement that collateral be maintained with a market value equal to or in excess of the principal amount loaned; as a result, there would be no adjustment or an immaterial adjustment for instrument-specific credit risk related to these agreements.

Difference between aggregate fair value and aggregate remaining contractual principal balance outstanding

The following table reflects the difference between the aggregate fair value and the aggregate remaining contractual principal balance outstanding as of December 31, 2022 and 2021, for loans, long-term debt and long-term beneficial interests for which the fair value option has been elected.

	2022			2021		
December 31, (in millions)	Contractual principal outstanding	Fair value	Fair value over/ (under) contractual principal outstanding	Contractual principal outstanding	Fair value	Fair value over/ (under) contractual principal outstanding
Loans						
Nonaccrual loans						
Loans reported as trading assets	**$ 2,517**	**$ 368**	**$ (2,149)**	$ 3,263	$ 546	$ (2,717)
Loans	**967**	**829**	**(138)**	918	797	(121)
Subtotal	**3,484**	**1,197**	**(2,287)**	4,181	1,343	(2,838)
90 or more days past due and government guaranteed						
Loans[a]	**124**	**115**	**(9)**	293	281	(12)
All other performing loans[b]						
Loans reported as trading assets	**7,823**	**6,135**	**(1,688)**	8,529 [e]	7,528	(1,001) [e]
Loans	**42,588**	**41,135**	**(1,453)**	57,490 [e]	57,742	252 [e]
Subtotal	**50,411**	**47,270**	**(3,141)**	66,019	65,270	(749)
Total loans	**$ 54,019**	**$ 48,582**	**$ (5,437)**	$ 70,493	$ 66,894	$ (3,599)
Long-term debt						
Principal-protected debt	**$ 41,341** [d]	**$ 31,105**	**$ (10,236)**	$ 35,957 [d]	$ 33,799	$ (2,158)
Nonprincipal-protected debt[c]	**NA**	**41,176**	**NA**	NA	41,135	NA
Total long-term debt	**NA**	**$ 72,281**	**NA**	NA	$ 74,934	NA
Long-term beneficial interests						
Nonprincipal-protected debt[c]	**NA**	**$ 5**	**NA**	NA	$ 12	NA
Total long-term beneficial interests	**NA**	**$ 5**	**NA**	NA	$ 12	NA

(a) These balances are excluded from nonaccrual loans as the loans are insured and/or guaranteed by U.S. government agencies.

(b) There were no performing loans that were ninety days or more past due as of December 31, 2022 and 2021.

(c) Remaining contractual principal is not applicable to nonprincipal-protected structured notes and long-term beneficial interests. Unlike principal-protected structured notes and long-term beneficial interests, for which the Firm is obligated to return a stated amount of principal at maturity, nonprincipal-protected structured notes and long-term beneficial interests do not obligate the Firm to return a stated amount of principal at maturity, but for structured notes to return an amount based on the performance of an underlying variable or derivative feature embedded in the note. However, investors are exposed to the credit risk of the Firm as issuer for both nonprincipal-protected and principal-protected notes.

(d) Where the Firm issues principal-protected zero-coupon or discount notes, the balance reflects the contractual principal payment at maturity or, if applicable, the contractual principal payment at the Firm's next call date.

(e) Prior-period amounts have been revised to conform with the current presentation.

At December 31, 2022 and 2021, the contractual amount of lending-related commitments for which the fair value option was elected was $7.6 billion and $11.9 billion, respectively, with a corresponding fair value of $24 million and $10 million, respectively. Refer to Note 28 for further information regarding off-balance sheet lending-related financial instruments.

Structured note products by balance sheet classification and risk component

The following table presents the fair value of structured notes, by balance sheet classification and the primary risk type.

	December 31, 2022				December 31, 2021			
(in millions)	Long-term debt	Short-term borrowings	Deposits	Total	Long-term debt	Short-term borrowings	Deposits	Total
Risk exposure								
Interest rate	**$ 31,973**	**$ 260**	**$ 24,655**	**$ 56,888**	$ 34,127	$ 1	$ 4,860	$ 38,988
Credit	**4,105**	**170**	**–**	**4,275**	6,352	858	–	7,210
Foreign exchange	**2,674**	**788**	**50**	**3,512**	3,386	315	1,066	4,767
Equity	**30,864**	**4,272**	**3,545**	**38,681**	29,317	6,827	5,125	41,269
Commodity	**1,655**	**16**	**2** [a]	**1,673**	405	–	3 [a]	408
Total structured notes	**$ 71,271**	**$ 5,506**	**$ 28,252**	**$ 105,029**	$ 73,587	$ 8,001	$ 11,054	$ 92,642

[a] Excludes deposits linked to precious metals for which the fair value option has not been elected of $602 million and $692 million for the years ended December 31, 2022 and 2021, respectively.

Note 4 – Credit risk concentrations

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

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

In the Firm's consumer portfolio, concentrations are managed primarily by product and by U.S. geographic region, with a key focus on trends and concentrations at the portfolio level, where potential credit risk concentrations can be remedied through changes in underwriting policies and portfolio guidelines. Refer to Note 12 for additional information on the geographic composition of the Firm's consumer loan portfolios. In the wholesale portfolio, credit risk concentrations are evaluated primarily by industry and monitored regularly on both an aggregate portfolio level and on an individual client or counterparty basis.

The Firm's wholesale exposure is managed through loan syndications and participations, loan sales, securitizations, credit derivatives, master netting agreements, collateral and other risk-reduction techniques. Refer to Note 12 for additional information on loans.

The Firm does not believe that its exposure to any particular loan product or industry segment results in a significant concentration of credit risk.

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

The table below presents both on-balance sheet and off-balance sheet consumer and wholesale credit exposure by the Firm's three credit portfolio segments as of December 31, 2022 and 2021. The wholesale industry of risk category is generally based on the client or counterparty's primary business activity.

	2022				2021			
		On-balance sheet				On-balance sheet		
December 31, (in millions)	Credit exposure[h]	Loans	Derivatives	Off-balance sheet[j]	Credit exposure[h]	Loans	Derivatives	Off-balance sheet[j]
Consumer, excluding credit card	**$ 344,893**	**$ 311,375** [i]	**$ –**	**$ 33,518**	$ 368,640	$ 323,306 [i]	$ –	$ 45,334
Credit card[a]	**1,006,459**	**185,175**	**–**	**821,284**	884,830	154,296	–	730,534
Total consumer[a]	**1,351,352**	**496,550**	**–**	**854,802**	1,253,470	477,602	–	775,868
Wholesale[b]								
Real Estate	**170,857**	**131,681**	**249**	**38,927**	155,069	119,753	1,113	34,203
Individuals and Individual Entities[c]	**130,815**	**120,424**	**434**	**9,957**	141,973	130,576	1,317	10,080
Consumer & Retail	**120,555**	**45,867**	**1,650**	**73,038**	122,789	39,588	2,669	80,532
Asset Managers	**95,656**	**40,511**	**16,397**	**38,748**	81,228	41,031	9,351	30,846
Industrials	**72,483**	**26,960**	**1,770**	**43,753**	66,974	21,652	1,224	44,098
Technology, Media & Telecommunications	**72,286**	**21,622**	**2,950**	**47,714**	84,070	17,815	2,640	63,615
Healthcare	**62,613**	**22,970**	**1,683**	**37,960**	59,014	18,587	2,575	37,852
Banks & Finance Cos	**51,816**	**32,172**	**3,246**	**16,398**	54,684	34,217	4,418	16,049
Oil & Gas	**38,668**	**9,632**	**5,121**	**23,915**	42,606	11,039	6,034	25,533
Utilities	**36,218**	**9,107**	**3,269**	**23,842**	33,203	5,969	3,736	23,498
State & Municipal Govt[d]	**33,847**	**18,147**	**585**	**15,115**	33,216	15,322	1,563	16,331
Automotive	**33,287**	**14,735**	**529**	**18,023**	34,573	11,759	720	22,094
Insurance	**21,045**	**2,387**	**8,081**	**10,577**	13,926	1,303	2,700	9,923
Chemicals & Plastics	**20,030**	**5,771**	**407**	**13,852**	17,660	5,033	564	12,063
Central Govt	**19,095**	**3,167**	**12,955**	**2,973**	11,317	2,889	6,837	1,591
Metals & Mining	**15,915**	**5,398**	**475**	**10,042**	16,696	5,696	924	10,076
Transportation	**15,009**	**5,005**	**567**	**9,437**	14,635	5,453	782	8,400
Securities Firms	**8,066**	**556**	**3,387**	**4,123**	4,180	469	1,260	2,451
Financial Markets Infrastructure	**4,962**	**13**	**3,050**	**1,899**	4,377	5	2,487	1,885
All other[e]	**123,307**	**87,545**	**4,075**	**31,687**	111,690	72,198	4,167	35,325
Subtotal	**1,146,530**	**603,670**	**70,880**	**471,980**	1,103,880	560,354	57,081	486,445
Loans held-for-sale and loans at fair value	**35,427**	**35,427**	**–**	**–**	39,758	39,758	–	–
Receivables from customers[f]	**49,257**	**–**	**–**	**–**	59,645	–		–
Total wholesale	**1,231,214**	**639,097**	**70,880**	**471,980**	1,203,283	600,112	57,081	486,445
Total exposure[g][h]	**$ 2,582,566**	**$1,135,647**	**$ 70,880**	**$1,326,782**	$ 2,456,753	$1,077,714	$ 57,081	$1,262,313

(a) Also includes commercial card lending-related commitments primarily in CB and CIB.

(b) The industry rankings presented in the table as of December 31, 2021, are based on the industry rankings of the corresponding exposures at December 31, 2022, not actual rankings of such exposures at December 31, 2021.

(c) Individuals and Individual Entities predominantly consists of Global Private Bank clients within AWM and J.P. Morgan Wealth Management within CCB, and includes exposure to personal investment companies and personal and testamentary trusts.

(d) In addition to the credit risk exposure to states and municipal governments (both U.S. and non-U.S.) at December 31, 2022 and 2021, noted above, the Firm held: $6.6 billion and $7.1 billion, respectively, of trading assets; $6.8 billion and $15.9 billion, respectively, of AFS securities; and $19.7 billion and $14.0 billion, respectively, of HTM securities, issued by U.S. state and municipal governments. Refer to Note 2 and Note 10 for further information.

(e) All other includes: SPEs and Private education and civic organizations, representing approximately 95% and 5%, respectively, at December 31, 2022 and 94% and 6%, respectively, at December 31, 2021. Refer to Note 14 for more information on exposures to SPEs.

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

(g) Excludes cash placed with banks of $556.6 billion and $729.6 billion, at December 31, 2022 and 2021, respectively, which is predominantly placed with various central banks, primarily Federal Reserve Banks.

(h) Credit exposure is net of risk participations and excludes the benefit of credit derivatives used in credit portfolio management activities held against derivative receivables or loans and liquid securities and other cash collateral held against derivative receivables.

(i) At December 31, 2022 and 2021, included $350 million and $5.4 billion of loans in Business Banking under the PPP, respectively. PPP loans are guaranteed by the SBA. Other than in certain limited circumstances, the Firm typically does not recognize charge-offs, classify as nonaccrual nor record an allowance for loan losses on these loans.

(j) Represents lending-related financial instruments.

Note 5 – Derivative instruments

Derivative contracts derive their value from underlying asset prices, indices, reference rates, other inputs or a combination of these factors and may expose counterparties to risks and rewards of an underlying asset or liability without having to initially invest in, own or exchange the asset or liability. JPMorgan Chase makes markets in derivatives for clients and also uses derivatives to hedge or manage its own risk exposures. Predominantly all of the Firm's derivatives are entered into for market-making or risk management purposes.

Market-making derivatives

The majority of the Firm's derivatives are entered into for market-making purposes. Clients use derivatives to mitigate or modify interest rate, credit, foreign exchange, equity and commodity risks. The Firm actively manages the risks from its exposure to these derivatives by entering into other derivative contracts or by purchasing or selling other financial instruments that partially or fully offset the exposure from client derivatives.

Risk management derivatives

The Firm manages certain market and credit risk exposures using derivative instruments, including derivatives in hedge accounting relationships and other derivatives that are used to manage risks associated with specified assets and liabilities.

The Firm generally uses interest rate derivatives to manage the risk associated with changes in interest rates. Fixed-rate assets and liabilities appreciate or depreciate in market value as interest rates change. Similarly, interest income and expense increase or decrease as a result of variable-rate assets and liabilities resetting to current market rates, and as a result of the repayment and subsequent origination or issuance of fixed-rate assets and liabilities at current market rates. Gains and losses on the derivative instruments related to these assets and liabilities are expected to substantially offset this variability.

Foreign currency derivatives are used to manage the foreign exchange risk associated with certain foreign currency-denominated (i.e., non-U.S. dollar) assets and liabilities and forecasted transactions, as well as the Firm's net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. As a result of fluctuations in foreign currencies, the U.S. dollar-equivalent values of the foreign currency-denominated assets and liabilities or the forecasted revenues or expenses increase or decrease. Gains or losses on the derivative instruments related to these foreign currency-denominated assets or liabilities, or forecasted transactions, are expected to substantially offset this variability.

Commodities derivatives are used to manage the price risk of certain commodities inventories. Gains or losses on these derivative instruments are expected to substantially offset the depreciation or appreciation of the related inventory.

Credit derivatives are used to manage the counterparty credit risk associated with loans and lending-related commitments. Credit derivatives compensate the purchaser when the entity referenced in the contract experiences a credit event, such as bankruptcy or a failure to pay an obligation when due. Credit derivatives primarily consist of CDS. Refer to the Credit derivatives section on pages 205-207 of this Note for a further discussion of credit derivatives.

Refer to the risk management derivatives gains and losses table on page 205 and the hedge accounting gains and losses tables on pages 202-204 of this Note for more information about risk management derivatives.

Derivative counterparties and settlement types

The Firm enters into OTC derivatives, which are negotiated and settled bilaterally with the derivative counterparty. The Firm also enters into, as principal, certain ETD such as futures and options, and OTC-cleared derivative contracts with CCPs. ETD contracts are generally standardized contracts traded on an exchange and cleared by the CCP, which is the Firm's counterparty from the inception of the transactions. OTC-cleared derivatives are traded on a bilateral basis and then novated to the CCP for clearing.

Derivative clearing services

The Firm provides clearing services for clients in which the Firm acts as a clearing member at certain exchanges and clearing houses. The Firm does not reflect the clients' derivative contracts in its Consolidated Financial Statements. Refer to Note 28 for further information on the Firm's clearing services.

Accounting for derivatives

All free-standing derivatives that the Firm executes for its own account are required to be recorded on the Consolidated balance sheets at fair value.

As permitted under U.S. GAAP, the Firm nets derivative assets and liabilities, and the related cash collateral receivables and payables, when a legally enforceable master netting agreement exists between the Firm and the derivative counterparty. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. The accounting for changes in value of a derivative depends on whether or not the transaction has been designated and qualifies for hedge accounting. Derivatives that are not designated as hedges are reported and measured at fair value through earnings. The tabular disclosures on pages 198-205 of this Note provide additional information on the amount of, and reporting for, derivative assets, liabilities, gains and losses. Refer to Notes 2 and 3 for a further discussion of derivatives embedded in structured notes.

Derivatives designated as hedges

The Firm applies hedge accounting to certain derivatives executed for risk management purposes – generally interest rate, foreign exchange and commodity derivatives. However, JPMorgan Chase does not seek to apply hedge accounting to all of the derivatives associated with the Firm's risk management activities. For example, the Firm does not apply hedge accounting to purchased CDS used to manage the credit risk of loans and lending-related commitments, because of the difficulties in qualifying such contracts as hedges. For the same reason, the Firm does not apply hedge accounting to certain interest rate, foreign exchange, and commodity derivatives used for risk management purposes.

To qualify for hedge accounting, a derivative must be highly effective at reducing the risk associated with the exposure being hedged. In addition, for a derivative to be designated as a hedge, the risk management objective and strategy must be documented. Hedge documentation must identify the derivative hedging instrument, the asset or liability or forecasted transaction and type of risk to be hedged, and how the effectiveness of the derivative is assessed prospectively and retrospectively. To assess effectiveness, the Firm uses statistical methods such as regression analysis, nonstatistical methods such as dollar-value comparisons of the change in the fair value of the derivative to the change in the fair value or cash flows of the hedged item, and qualitative comparisons of critical terms and the evaluation of any changes in those terms. The extent to which a derivative has been, and is expected to continue to be, highly effective at offsetting changes in the fair value or cash flows of the hedged item must be assessed and documented at least quarterly. If it is determined that a derivative is not highly effective at hedging the designated exposure, hedge accounting is discontinued.

There are three types of hedge accounting designations: fair value hedges, cash flow hedges and net investment hedges. JPMorgan Chase uses fair value hedges primarily to hedge fixed-rate long-term debt, AFS securities and certain commodities inventories. For qualifying fair value hedges, the changes in the fair value of the derivative, and in the value of the hedged item for the risk being hedged, are recognized in earnings. Certain amounts excluded from the assessment of effectiveness are recorded in OCI and recognized in earnings over the life of the derivative. If the hedge relationship is terminated, then the adjustment to the hedged item continues to be reported as part of the basis of the hedged item, and for benchmark interest rate hedges, is amortized to earnings as a yield adjustment. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily net interest income and principal transactions revenue.

JPMorgan Chase uses cash flow hedges primarily to hedge the exposure to variability in forecasted cash flows from floating-rate assets and liabilities and foreign currency–denominated revenue and expense. For qualifying cash flow hedges, changes in the fair value of the derivative are recorded in OCI and recognized in earnings as the hedged item affects earnings. Derivative amounts affecting earnings are recognized consistent with the classification of the hedged item – primarily noninterest revenue, net interest income and compensation expense. If the hedge relationship is terminated, then the change in value of the derivative recorded in AOCI is recognized in earnings when the cash flows that were hedged affect earnings. For hedge relationships that are discontinued because a forecasted transaction is expected to not occur according to the original hedge forecast, any related derivative values recorded in AOCI are immediately recognized in earnings.

JPMorgan Chase uses net investment hedges to protect the value of the Firm's net investments in certain non-U.S. subsidiaries or branches whose functional currencies are not the U.S. dollar. For qualifying net investment hedges, changes in the fair value of the derivatives due to changes in spot foreign exchange rates are recorded in OCI as translation adjustments. Amounts excluded from the assessment of effectiveness are recorded directly in earnings.

The following table outlines the Firm's primary uses of derivatives and the related hedge accounting designation or disclosure category.

Type of Derivative	Use of Derivative	Designation and disclosure	Affected segment or unit	Page reference
Manage specifically identified risk exposures in qualifying hedge accounting relationships:				
• Interest rate	Hedge fixed rate assets and liabilities	Fair value hedge	Corporate	202-203
• Interest rate	Hedge floating-rate assets and liabilities	Cash flow hedge	Corporate	204
• Foreign exchange	Hedge foreign currency-denominated assets and liabilities	Fair value hedge	Corporate	202-203
• Foreign exchange	Hedge foreign currency-denominated forecasted revenue and expense	Cash flow hedge	Corporate	204
• Foreign exchange	Hedge the value of the Firm's investments in non-U.S. dollar functional currency entities	Net investment hedge	Corporate	204
• Commodity	Hedge commodity inventory	Fair value hedge	CIB, AWM	202-203
Manage specifically identified risk exposures not designated in qualifying hedge accounting relationships:				
• Interest rate	Manage the risk associated with mortgage commitments, warehouse loans and MSRs	Specified risk management	CCB	205
• Credit	Manage the credit risk associated with wholesale lending exposures	Specified risk management	CIB	205
• Interest rate and foreign exchange	Manage the risk associated with certain other specified assets and liabilities	Specified risk management	Corporate	205
Market-making derivatives and other activities:				
• Various	Market-making and related risk management	Market-making and other	CIB	205
• Various	Other derivatives	Market-making and other	CIB, AWM, Corporate	205

Notional amount of derivative contracts

The following table summarizes the notional amount of free-standing derivative contracts outstanding as of December 31, 2022 and 2021.

	Notional amounts[b]	
December 31, (in billions)	**2022**	2021
Interest rate contracts		
Swaps	**$ 24,491**	$ 24,075
Futures and forwards	**2,636**	2,520
Written options	**3,047**	3,018
Purchased options	**2,992**	3,188
Total interest rate contracts	**33,166**	32,801
Credit derivatives[a]	**1,132**	1,053
Foreign exchange contracts		
Cross-currency swaps	**4,196**	4,112
Spot, futures and forwards	**7,017**	7,679
Written options	**775**	741
Purchased options	**759**	727
Total foreign exchange contracts	**12,747**	13,259
Equity contracts		
Swaps	**618**	612
Futures and forwards	**110**	139
Written options	**636**	654
Purchased options	**580**	598
Total equity contracts	**1,944**	2,003
Commodity contracts		
Swaps	**136**	185
Spot, futures and forwards	**136**	188
Written options	**117**	135
Purchased options	**98**	111
Total commodity contracts	**487**	619
Total derivative notional amounts	**$ 49,476**	$ 49,735

(a) Refer to the Credit derivatives discussion on pages 205-207 for more information on volumes and types of credit derivative contracts.

(b) Represents the sum of gross long and gross short third-party notional derivative contracts.

While the notional amounts disclosed above give an indication of the volume of the Firm's derivatives activity, the notional amounts significantly exceed, in the Firm's view, the possible losses that could arise from such transactions. For most derivative contracts, the notional amount is not exchanged; it is simply a reference amount used to calculate payments.

Impact of derivatives on the Consolidated balance sheets

The following table summarizes information on derivative receivables and payables (before and after netting adjustments) that are reflected on the Firm's Consolidated balance sheets as of December 31, 2022 and 2021, by accounting designation (e.g., whether the derivatives were designated in qualifying hedge accounting relationships or not) and contract type.

Free-standing derivative receivables and payables[(a)]

	Gross derivative receivables				Gross derivative payables			
December 31, 2022 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables[(b)]	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables[(b)]
Trading assets and liabilities								
Interest rate	**$ 300,411**	**$ 4**	**$ 300,415**	**$ 28,419**	**$ 290,291**	**$ –**	**$ 290,291**	**$ 15,970**
Credit	**10,329**	**–**	**10,329**	**1,090**	**9,971**	**–**	**9,971**	**754**
Foreign exchange	**239,946**	**1,633**	**241,579**	**23,365**	**248,911**	**2,610**	**251,521**	**18,856**
Equity	**61,913**	**–**	**61,913**	**9,139**	**62,461**	**–**	**62,461**	**8,804**
Commodity	**23,652**	**1,705**	**25,357**	**8,867**	**20,758**	**2,511**	**23,269**	**6,757**
Total fair value of trading assets and liabilities	**$ 636,251**	**$ 3,342**	**$ 639,593**	**$ 70,880**	**$ 632,392**	**$ 5,121**	**$ 637,513**	**$ 51,141**

	Gross derivative receivables				Gross derivative payables			
December 31, 2021 (in millions)	Not designated as hedges	Designated as hedges	Total derivative receivables	Net derivative receivables[(b)]	Not designated as hedges	Designated as hedges	Total derivative payables	Net derivative payables[(b)]
Trading assets and liabilities								
Interest rate	$ 270,562	$ 23	$ 270,585	$ 21,974	$ 240,731	$ –	$ 240,731	$ 8,194
Credit	9,839	–	9,839	1,031	10,912	–	10,912	880
Foreign exchange	169,186	393	169,579	12,625	174,622	1,124	175,746	14,097
Equity	68,631	–	68,631	9,981	79,727	–	79,727	17,233
Commodity	21,233	5,420	26,653	11,470	20,837	7,091	27,928	9,712
Total fair value of trading assets and liabilities	$ 539,451	$ 5,836	$ 545,287	$ 57,081	$ 526,829	$ 8,215	$ 535,044	$ 50,116

(a) Balances exclude structured notes for which the fair value option has been elected. Refer to Note 3 for further information.

(b) As permitted under U.S. GAAP, the Firm has elected to net derivative receivables and derivative payables and the related cash collateral receivables and payables when a legally enforceable master netting agreement exists.

Derivatives netting

The following tables present, as of December 31, 2022 and 2021, gross and net derivative receivables and payables by contract and settlement type. Derivative receivables and payables, as well as the related cash collateral from the same counterparty, have been netted on the Consolidated balance sheets where the Firm has obtained an appropriate legal opinion with respect to the master netting agreement. Where such a legal opinion has not been either sought or obtained, amounts are not eligible for netting on the Consolidated balance sheets, and those derivative receivables and payables are shown separately in the tables below.

In addition to the cash collateral received and transferred that is presented on a net basis with derivative receivables and payables, the Firm receives and transfers additional collateral (financial instruments and cash). These amounts mitigate counterparty credit risk associated with the Firm's derivative instruments, but are not eligible for net presentation:

- collateral that consists of liquid securities and other cash collateral held at third-party custodians, which are shown separately as "Collateral not nettable on the Consolidated balance sheets" in the tables below, up to the fair value exposure amount. For the purpose of this disclosure, the definition of liquid securities is consistent with the definition of high quality liquid assets as defined in the LCR rule;
- the amount of collateral held or transferred that exceeds the fair value exposure at the individual counterparty level, as of the date presented, which is excluded from the tables below; and
- collateral held or transferred that relates to derivative receivables or payables where an appropriate legal opinion has not been either sought or obtained with respect to the master netting agreement, which is excluded from the tables below.

	2022			2021		
December 31, (in millions)	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables	Gross derivative receivables	Amounts netted on the Consolidated balance sheets	Net derivative receivables
U.S. GAAP nettable derivative receivables						
Interest rate contracts:						
OTC	**$ 203,922**	**$ (178,261)**	**$ 25,661**	$ 251,953	$ (234,283)	$ 17,670
OTC-cleared	**93,800**	**(93,424)**	**376**	14,144	(13,839)	305
Exchange-traded[a]	**559**	**(311)**	**248**	498	(489)	9
Total interest rate contracts	**298,281**	**(271,996)**	**26,285**	266,595	(248,611)	17,984
Credit contracts:						
OTC	**8,474**	**(7,535)**	**939**	8,035	(7,177)	858
OTC-cleared	**1,746**	**(1,704)**	**42**	1,671	(1,631)	40
Total credit contracts	**10,220**	**(9,239)**	**981**	9,706	(8,808)	898
Foreign exchange contracts:						
OTC	**237,941**	**(216,796)**	**21,145**	166,185	(156,251)	9,934
OTC-cleared	**1,461**	**(1,417)**	**44**	789	(703)	86
Exchange-traded[a]	**15**	**(1)**	**14**	6	–	6
Total foreign exchange contracts	**239,417**	**(218,214)**	**21,203**	166,980	(156,954)	10,026
Equity contracts:						
OTC	**30,323**	**(25,665)**	**4,658**	25,704	(23,977)	1,727
Exchange-traded[a]	**28,467**	**(27,109)**	**1,358**	36,095	(34,673)	1,422
Total equity contracts	**58,790**	**(52,774)**	**6,016**	61,799	(58,650)	3,149
Commodity contracts:						
OTC	**14,430**	**(7,633)**	**6,797**	15,063	(6,868)	8,195
OTC-cleared	**120**	**(112)**	**8**	49	(49)	–
Exchange-traded[a]	**9,103**	**(8,745)**	**358**	8,279	(8,266)	13
Total commodity contracts	**23,653**	**(16,490)**	**7,163**	23,391	(15,183)	8,208
Derivative receivables with appropriate legal opinion	**630,361**	**(568,713)**	**61,648** [d]	528,471	(488,206)	40,265 [d]
Derivative receivables where an appropriate legal opinion has not been either sought or obtained	**9,232**		**9,232**	16,816		16,816
Total derivative receivables recognized on the Consolidated balance sheets	**$ 639,593**		**$ 70,880**	$ 545,287		$ 57,081
Collateral not nettable on the Consolidated balance sheets[b][c]			**(23,014)**			(10,102)
Net amounts			**$ 47,866**			$ 46,979

	2022			2021		
December 31, (in millions)	Gross derivative payables	Amounts netted on the Consolidated balance sheets	Net derivative payables	Gross derivative payables	Amounts netted on the Consolidated balance sheets	Net derivative payables
U.S. GAAP nettable derivative payables						
Interest rate contracts:						
OTC	$ 190,108	$ (176,890)	$ 13,218	$ 223,576	$ (216,757)	$ 6,819
OTC-cleared	97,417	(97,126)	291	15,695	(15,492)	203
Exchange-traded[a]	327	(305)	22	292	(288)	4
Total interest rate contracts	287,852	(274,321)	13,531	239,563	(232,537)	7,026
Credit contracts:						
OTC	8,054	(7,572)	482	9,021	(8,421)	600
OTC-cleared	1,674	(1,645)	29	1,679	(1,611)	68
Total credit contracts	9,728	(9,217)	511	10,700	(10,032)	668
Foreign exchange contracts:						
OTC	246,457	(231,248)	15,209	171,610	(160,946)	10,664
OTC-cleared	1,488	(1,417)	71	706	(703)	3
Exchange-traded[a]	20	–	20	7	–	7
Total foreign exchange contracts	247,965	(232,665)	15,300	172,323	(161,649)	10,674
Equity contracts:						
OTC	29,833	(26,554)	3,279	31,379	(27,830)	3,549
Exchange-traded[a]	28,291	(27,103)	1,188	40,621	(34,664)	5,957
Total equity contracts	58,124	(53,657)	4,467	72,000	(62,494)	9,506
Commodity contracts:						
OTC	11,954	(7,642)	4,312	14,874	(9,667)	5,207
OTC-cleared	112	(112)	–	73	(73)	–
Exchange-traded[a]	9,021	(8,758)	263	8,954	(8,476)	478
Total commodity contracts	21,087	(16,512)	4,575	23,901	(18,216)	5,685
Derivative payables with appropriate legal opinion	624,756	(586,372)	38,384 [d]	518,487	(484,928)	33,559 [d]
Derivative payables where an appropriate legal opinion has not been either sought or obtained	12,757		12,757	16,557		16,557
Total derivative payables recognized on the Consolidated balance sheets	$ 637,513		$ 51,141	$ 535,044		$ 50,116
Collateral not nettable on the Consolidated balance sheets[b][c]			(3,318)			(5,872)
Net amounts			$ 47,823			$ 44,244

(a) Exchange-traded derivative balances that relate to futures contracts are settled daily.

(b) Includes liquid securities and other cash collateral held at third-party custodians related to derivative instruments where an appropriate legal opinion has been obtained. For some counterparties, the collateral amounts of financial instruments may exceed the derivative receivables and derivative payables balances. Where this is the case, the total amount reported is limited to the net derivative receivables and net derivative payables balances with that counterparty.

(c) Derivative collateral relates only to OTC and OTC-cleared derivative instruments.

(d) Net derivatives receivable included cash collateral netted of $51.5 billion and $67.6 billion at December 31, 2022 and 2021, respectively. Net derivatives payable included cash collateral netted of $69.2 billion and $64.3 billion at December 31, 2022 and 2021, respectively. Derivative cash collateral relates to OTC and OTC-cleared derivative instruments.

Liquidity risk and credit-related contingent features

In addition to the specific market risks introduced by each derivative contract type, derivatives expose JPMorgan Chase to credit risk – the risk that derivative counterparties may fail to meet their payment obligations under the derivative contracts and the collateral, if any, held by the Firm proves to be of insufficient value to cover the payment obligation. It is the policy of JPMorgan Chase to actively pursue, where possible, the use of legally enforceable master netting arrangements and collateral agreements to mitigate derivative counterparty credit risk inherent in derivative receivables.

While derivative receivables expose the Firm to credit risk, derivative payables expose the Firm to liquidity risk, as the derivative contracts typically require the Firm to post cash or securities collateral with counterparties as the fair value of the contracts moves in the counterparties' favor or upon specified downgrades in the Firm's and its subsidiaries' respective credit ratings. Certain derivative contracts also provide for termination of the contract, generally upon a downgrade of either the Firm or the counterparty, at the fair value of the derivative contracts. The following table shows the aggregate fair value of net derivative payables related to OTC and OTC-cleared derivatives that contain contingent collateral or termination features that may be triggered upon a ratings downgrade, and the associated collateral the Firm has posted in the normal course of business, at December 31, 2022 and 2021.

OTC and OTC-cleared derivative payables containing downgrade triggers

(in millions)	**December 31, 2022**	December 31, 2021
Aggregate fair value of net derivative payables	**$ 16,023**	$ 20,114
Collateral posted	**15,505**	19,402

The following table shows the impact of a single-notch and two-notch downgrade of the long-term issuer ratings of JPMorgan Chase & Co. and its subsidiaries, predominantly JPMorgan Chase Bank, N.A., at December 31, 2022 and 2021, related to OTC and OTC-cleared derivative contracts with contingent collateral or termination features that may be triggered upon a ratings downgrade. Derivatives contracts generally require additional collateral to be posted or terminations to be triggered when the predefined rating threshold is breached. A downgrade by a single rating agency that does not result in a rating lower than a preexisting corresponding rating provided by another major rating agency will generally not result in additional collateral (except in certain instances in which additional initial margin may be required upon a ratings downgrade), nor in termination payment requirements. The liquidity impact in the table is calculated based upon a downgrade below the lowest current rating of the rating agencies referred to in the derivative contract.

Liquidity impact of downgrade triggers on OTC and OTC-cleared derivatives

	December 31, 2022		December 31, 2021	
(in millions)	Single-notch downgrade	Two-notch downgrade	Single-notch downgrade	Two-notch downgrade
Amount of additional collateral to be posted upon downgrade[(a)]	**$ 128**	**$ 1,293**	$ 219	$ 1,577
Amount required to settle contracts with termination triggers upon downgrade[(b)]	**88**	**925**	98	787

(a) Includes the additional collateral to be posted for initial margin.

(b) Amounts represent fair values of derivative payables, and do not reflect collateral posted.

Derivatives executed in contemplation of a sale of the underlying financial asset

In certain instances the Firm enters into transactions in which it transfers financial assets but maintains the economic exposure to the transferred assets by entering into a derivative with the same counterparty in contemplation of the initial transfer. The Firm generally accounts for such transfers as collateralized financing transactions as described in Note 11, but in limited circumstances they may qualify to be accounted for as a sale and a derivative under U.S. GAAP. The amount of such transfers accounted for as a sale where the associated derivative was outstanding was not material at both December 31, 2022 and 2021.

Impact of derivatives on the Consolidated statements of income

The following tables provide information related to gains and losses recorded on derivatives based on their hedge accounting designation or purpose.

Fair value hedge gains and losses

The following tables present derivative instruments, by contract type, used in fair value hedge accounting relationships, as well as pre-tax gains/(losses) recorded on such derivatives and the related hedged items for the years ended December 31, 2022, 2021 and 2020, respectively. The Firm includes gains/(losses) on the hedging derivative in the same line item in the Consolidated statements of income as the related hedged item.

	Gains/(losses) recorded in income			Income statement impact of excluded components[e]		OCI impact
Year ended December 31, 2022 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[f]
Contract type						
Interest rate[a][b]	**$ (14,352)**	**$ 14,047**	**$ (305)**	**$ –**	**$ (262)**	**$ –**
Foreign exchange[c]	**(1,317)**	**1,423**	**106**	**(528)**	**106**	**130**
Commodity[d]	**106**	**(70)**	**36**	**–**	**48**	**–**
Total	**$ (15,563)**	**$ 15,400**	**$ (163)**	**$ (528)**	**$ (108)**	**$ 130**

	Gains/(losses) recorded in income			Income statement impact of excluded components[e]		OCI impact
Year ended December 31, 2021 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[f]
Contract type						
Interest rate[a][b]	$ (4,323)	$ 3,765	$ (558)	$ –	$ (439)	$ –
Foreign exchange[c]	(1,317)	1,349	32	(286)	32	(26)
Commodity[d]	(9,609)	9,710	101	–	72	–
Total	$ (15,249)	$ 14,824	$ (425)	$ (286)	$ (335)	$ (26)

	Gains/(losses) recorded in income			Income statement impact of excluded components[e]		OCI impact
Year ended December 31, 2020 (in millions)	Derivatives	Hedged items	Income statement impact	Amortization approach	Changes in fair value	Derivatives - Gains/(losses) recorded in OCI[f]
Contract type						
Interest rate[a][b]	$ 2,962	$ (3,684)	$ (722)	$ –	$ (733)	$ –
Foreign exchange[c]	793	(619)	174	(457)	174	25
Commodity[d]	(2,507)	2,650	143	–	137	–
Total	$ 1,248	$ (1,653)	$ (405)	$ (457)	$ (422)	$ 25

(a) Primarily consists of hedges of the benchmark (e.g., Secured Overnight Financing Rate ("SOFR"), London Interbank Offered Rate ("LIBOR")) interest rate risk of fixed-rate long-term debt and AFS securities. Gains and losses were recorded in net interest income.

(b) Effective January 1, 2022, the Firm updated its presentation in the tables above to include the amortization of income/expense associated with the inception hedge accounting adjustment applied to the hedged item; prior-period amounts have been revised to conform with the current presentation. Excludes the accrual of interest on interest rate swaps and the related hedged items.

(c) Primarily consists of hedges of the foreign currency risk of long-term debt and AFS securities for changes in spot foreign currency rates. Gains and losses related to the derivatives and the hedged items due to changes in foreign currency rates and the income statement impact of excluded components were recorded primarily in principal transactions revenue and net interest income.

(d) Consists of overall fair value hedges of physical commodities inventories that are generally carried at the lower of cost or net realizable value (net realizable value approximates fair value). Gains and losses were recorded in principal transactions revenue.

(e) The assessment of hedge effectiveness excludes certain components of the changes in fair values of the derivatives and hedged items such as forward points on foreign exchange forward contracts, time values and cross-currency basis spreads. Excluded components may impact earnings either through amortization of the initial amount over the life of the derivative or through fair value changes recognized in the current period.

(f) Represents the change in value of amounts excluded from the assessment of effectiveness under the amortization approach, predominantly cross-currency basis spreads. The amount excluded at inception of the hedge is recognized in earnings over the life of the derivative.

As of December 31, 2022 and 2021, the following amounts were recorded on the Consolidated balance sheets related to certain cumulative fair value hedge basis adjustments that are expected to reverse through the income statement in future periods as an adjustment to yield.

		Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
December 31, 2022 **(in millions)**	Carrying amount of the hedged items[(a)(b)]	Active hedging relationships[(d)]	Discontinued hedging relationships[(d)(e)]	Total
Assets				
Investment securities - AFS	**$ 84,073** [(c)]	**$ (4,149)**	**$ (1,542)**	**$ (5,691)**
Liabilities				
Long-term debt	**$ 175,257**	**$ (11,879)**	**$ (3,313)**	**$ (15,192)**
Beneficial interests issued by consolidated VIEs	**—**	**—**	**—**	**—**

		Cumulative amount of fair value hedging adjustments included in the carrying amount of hedged items:		
December 31, 2021 (in millions)	Carrying amount of the hedged items[(a)(b)]	Active hedging relationships[(d)]	Discontinued hedging relationships[(d)(e)]	Total
Assets				
Investment securities - AFS	$ 65,746 [(c)]	$ 417	$ 661	$ 1,078
Liabilities				
Long-term debt	$ 195,642	$ (1,999)	$ 8,834	$ 6,835
Beneficial interests issued by consolidated VIEs	749	—	(1)	(1)

(a) Excludes physical commodities with a carrying value of $26.0 billion and $25.7 billion at December 31, 2022 and 2021, respectively, to which the Firm applies fair value hedge accounting. As a result of the application of hedge accounting, these inventories are carried at fair value, thus recognizing unrealized gains and losses in current periods. Since the Firm exits these positions at fair value, there is no incremental impact to net income in future periods.

(b) Excludes hedged items where only foreign currency risk is the designated hedged risk, as basis adjustments related to foreign currency hedges will not reverse through the income statement in future periods. At December 31, 2022 and 2021, the carrying amount excluded for AFS securities is $20.3 billion and $14.0 billion, respectively, and for long-term debt is $221 million and $9.7 billion, respectively. Prior-period amount has been revised to conform with the current presentation.

(c) Carrying amount represents the amortized cost, net of allowance if applicable. Refer to Note 10 for additional information.

(d) Positive (negative) amounts related to assets represent cumulative fair value hedge basis adjustments that will reduce (increase) net interest income in future periods. Positive (negative) amounts related to liabilities represent cumulative fair value hedge basis adjustments that will increase (reduce) net interest income in future periods.

(e) Represents basis adjustments existing on the balance sheet date associated with hedged items that have been de-designated from qualifying fair value hedging relationships.

Cash flow hedge gains and losses

The following tables present derivative instruments, by contract type, used in cash flow hedge accounting relationships, and the pre-tax gains/(losses) recorded on such derivatives, for the years ended December 31, 2022, 2021 and 2020, respectively. The Firm includes the gains/(losses) on the hedging derivative in the same line item in the Consolidated statements of income as the change in cash flows on the related hedged item.

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2022 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[(a)]	**$ (153)**	**$ (7,131)**	**$ (6,978)**
Foreign exchange[(b)]	**(267)**	**(342)**	**(75)**
Total	**$ (420)**	**$ (7,473)**	**$ (7,053)**

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2021 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[(a)]	$ 1,032	$ (2,370)	$ (3,402)
Foreign exchange[(b)]	190	67	(123)
Total	$ 1,222	$ (2,303)	$ (3,525)

	Derivatives gains/(losses) recorded in income and other comprehensive income/(loss)		
Year ended December 31, 2020 (in millions)	Amounts reclassified from AOCI to income	Amounts recorded in OCI	Total change in OCI for period
Contract type			
Interest rate[(a)]	$ 570	$ 3,582	$ 3,012
Foreign exchange[(b)]	–	41	41
Total	$ 570	$ 3,623	$ 3,053

(a) Primarily consists of hedges of SOFR-indexed and LIBOR-indexed floating-rate assets. Gains and losses were recorded in net interest income.

(b) Primarily consists of hedges of the foreign currency risk of non-U.S. dollar-denominated revenue and expense. The income statement classification of gains and losses follows the hedged item – primarily noninterest revenue and compensation expense.

The Firm did not experience any forecasted transactions that failed to occur for the years ended 2022, 2021 and 2020.

Over the next 12 months, the Firm expects that approximately $(1.5) billion (after-tax) of net losses recorded in AOCI at December 31, 2022, related to cash flow hedges will be recognized in income. For cash flow hedges that have been terminated, the maximum length of time over which the derivative results recorded in AOCI will be recognized in earnings is approximately seven years, corresponding to the timing of the originally hedged forecasted cash flows. For open cash flow hedges, the maximum length of time over which forecasted transactions are hedged is approximately seven years. The Firm's longer-dated forecasted transactions relate to core lending and borrowing activities.

Net investment hedge gains and losses

The following table presents hedging instruments, by contract type, that were used in net investment hedge accounting relationships, and the pre-tax gains/(losses) recorded on such instruments for the years ended December 31, 2022, 2021 and 2020.

	2022		2021		2020	
Year ended December 31, (in millions)	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI	Amounts recorded in income[(a)(b)]	Amounts recorded in OCI
Foreign exchange derivatives	**$(123)**	**$3,591**	$(228)	$2,452	$(122)	$(1,408)

(a) Certain components of hedging derivatives are permitted to be excluded from the assessment of hedge effectiveness, such as forward points on foreign exchange forward contracts. The Firm elects to record changes in fair value of these amounts directly in other income.

(b) Excludes amounts reclassified from AOCI to income on the sale or liquidation of hedged entities. The Firm reclassified net pre-tax gains of $38 million and $3 million to other income/expense related to the liquidation of certain legal entities during the years ended December 31, 2022 and 2020, respectively. The amount reclassified for the year ended December 31, 2021 was not material. Refer to Note 24 for further information.

Gains and losses on derivatives used for specified risk management purposes

The following table presents pre-tax gains/(losses) recorded on a limited number of derivatives, not designated in hedge accounting relationships, that are used to manage risks associated with certain specified assets and liabilities, including certain risks arising from mortgage commitments, warehouse loans, MSRs, wholesale lending exposures, and foreign currency denominated assets and liabilities.

	Derivatives gains/(losses) recorded in income		
Year ended December 31, (in millions)	**2022**	2021	2020
Contract type			
Interest rate[a]	**$ (827)**	$ 1,078	$ 2,994
Credit[b]	**51**	(94)	(176)
Foreign exchange[c]	**(48)**	94	43
Total	**$ (824)**	$ 1,078	$ 2,861

(a) Primarily represents interest rate derivatives used to hedge the interest rate risk inherent in mortgage commitments, warehouse loans and MSRs, as well as written commitments to originate warehouse loans. Gains and losses were recorded predominantly in mortgage fees and related income.

(b) Relates to credit derivatives used to mitigate credit risk associated with lending exposures in the Firm's wholesale businesses. These derivatives do not include credit derivatives used to mitigate counterparty credit risk arising from derivative receivables, which is included in gains and losses on derivatives related to market-making activities and other derivatives. Gains and losses were recorded in principal transactions revenue.

(c) Primarily relates to derivatives used to mitigate foreign exchange risk of specified foreign currency-denominated assets and liabilities. Gains and losses were recorded in principal transactions revenue.

Gains and losses on derivatives related to market-making activities and other derivatives

The Firm makes markets in derivatives in order to meet the needs of customers and uses derivatives to manage certain risks associated with net open risk positions from its market-making activities, including the counterparty credit risk arising from derivative receivables. All derivatives not included in the hedge accounting or specified risk management categories above are included in this category. Gains and losses on these derivatives are primarily recorded in principal transactions revenue. Refer to Note 6 for information on principal transactions revenue.

Credit derivatives

Credit derivatives are financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) and which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Credit derivatives expose the protection purchaser to the creditworthiness of the protection seller, as the protection seller is required to make payments under the contract when the reference entity experiences a credit event, such as a bankruptcy, a failure to pay its obligation or a restructuring. The seller of credit protection receives a premium for providing protection but has the risk that the underlying instrument referenced in the contract will be subject to a credit event.

The Firm is both a purchaser and seller of protection in the credit derivatives market and uses these derivatives for two primary purposes. First, in its capacity as a market-maker, the Firm actively manages a portfolio of credit derivatives by purchasing and selling credit protection, predominantly on corporate debt obligations, to meet the needs of customers. Second, as an end-user, the Firm uses credit derivatives to manage credit risk associated with lending exposures (loans and unfunded commitments) in its wholesale and consumer businesses and derivatives counterparty exposures in its wholesale businesses, and to manage the credit risk arising from certain financial instruments in the Firm's market-making businesses. Following is a summary of various types of credit derivatives.

Credit default swaps

Credit derivatives may reference the credit of either a single reference entity ("single-name"), broad-based index or portfolio. The Firm purchases and sells protection on both single- name and index-reference obligations. Single-name CDS and index CDS contracts are either OTC or OTC-cleared derivative contracts. Single-name CDS are used to manage the default risk of a single reference entity, while index CDS contracts are used to manage the credit risk associated with the broader credit markets or credit market segments. Like the S&P 500 and other market indices, a CDS index consists of a portfolio of CDS across many reference entities. New series of CDS indices are periodically established with a new underlying portfolio of reference entities to reflect changes in the credit markets. If one of the reference entities in the index experiences a credit event, then the reference entity that defaulted is removed from the index. CDS can also be referenced against specific portfolios of reference names or against customized exposure levels based on specific client demands: for example, to provide protection against the first $1 million of realized credit losses in a $10 million portfolio of exposure. Such structures are commonly known as tranche CDS.

For both single-name CDS contracts and index CDS contracts, upon the occurrence of a credit event, under the terms of a CDS contract neither party to the CDS contract has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value of the reference obligation at settlement of the credit derivative contract, also known as the recovery value. The protection purchaser does not need to hold the debt instrument of the underlying reference entity in order to receive amounts due under the CDS contract when a credit event occurs.

Credit-related notes

A credit-related note is a funded derivative with a credit risk component where the issuer of the credit-related note purchases from the note investor credit protection on a reference entity or an index. Under the contract, the investor pays the issuer the par value of the note at the inception of the transaction, and in return, the issuer pays periodic payments to the investor, based on the credit risk of the referenced entity. The issuer also repays the investor the par value of the note at maturity unless the reference entity (or one of the entities that makes up a reference index) experiences a specified credit event. If a credit event occurs, the issuer is not obligated to repay the par value of the note, but rather, the issuer pays the investor the difference between the par value of the note and the fair value of the defaulted reference obligation at the time of settlement. Neither party to the credit-related note has recourse to the defaulting reference entity.

The following tables present a summary of the notional amounts of credit derivatives and credit-related notes the Firm sold and purchased as of December 31, 2022 and 2021. Upon a credit event, the Firm as a seller of protection would typically pay out only a percentage of the full notional amount of net protection sold, as the amount actually required to be paid on the contracts takes into account the recovery value of the reference obligation at the time of settlement. The Firm manages the credit risk on contracts to sell protection by purchasing protection with identical or similar underlying reference entities. Other purchased protection referenced in the following tables includes credit derivatives bought on related, but not identical, reference positions (including indices, portfolio coverage and other reference points) as well as protection purchased by CIB through credit-related notes primarily in its market-making businesses. In addition, the Firm obtains credit protection against certain loans in the retained consumer portfolio through the issuance of credit-related notes. Since these credit-related notes are not part of the market-making businesses they are not included in the table below.

The Firm does not use notional amounts of credit derivatives as the primary measure of risk management for such derivatives, because the notional amount does not take into account the probability of the occurrence of a credit event, the recovery value of the reference obligation, or related cash instruments and economic hedges, each of which reduces, in the Firm's view, the risks associated with such derivatives.

Total credit derivatives and credit-related notes

	Maximum payout/Notional amount			
December 31, 2022 (in millions)	Protection sold	Protection purchased with identical underlyings[c]	Net protection (sold)/ purchased[d]	Other protection purchased[e]
Credit derivatives				
Credit default swaps	**$ (495,557)**	**$ 509,846**	**$ 14,289**	**$ 2,917**
Other credit derivatives[a]	**(47,165)**	**65,029**	**17,864**	**11,746**
Total credit derivatives	**(542,722)**	**574,875**	**32,153**	**14,663**
Credit-related notes[b]	–	–	–	**7,863**
Total	**$ (542,722)**	**$ 574,875**	**$ 32,153**	**$ 22,526**

	Maximum payout/Notional amount			
December 31, 2021 (in millions)	Protection sold	Protection purchased with identical underlyings[c]	Net protection (sold)/ purchased[d]	Other protection purchased[e]
Credit derivatives				
Credit default swaps	$ (443,481)	$ 458,180	$ 14,699	$ 2,269
Other credit derivatives[a]	(56,130)	79,586	23,456	13,435
Total credit derivatives	(499,611)	537,766	38,155	15,704
Credit-related notes[b]	–	–	–	9,437
Total	$ (499,611)	$ 537,766	$ 38,155	$ 25,141

(a) Other credit derivatives predominantly consist of credit swap options and total return swaps.
(b) Represents Other protection purchased by CIB, primarily in its market-making businesses.
(c) Represents the total notional amount of protection purchased where the underlying reference instrument is identical to the reference instrument on protection sold; the notional amount of protection purchased for each individual identical underlying reference instrument may be greater or lower than the notional amount of protection sold.
(d) Does not take into account the fair value of the reference obligation at the time of settlement, which would generally reduce the amount the seller of protection pays to the buyer of protection in determining settlement value.
(e) Represents protection purchased by the Firm on referenced instruments (single-name, portfolio or index) where the Firm has not sold any protection on the identical reference instrument.

The following tables summarize the notional amounts by the ratings, maturity profile, and total fair value, of credit derivatives as of December 31, 2022 and 2021, where JPMorgan Chase is the seller of protection. The maturity profile is based on the remaining contractual maturity of the credit derivative contracts. The ratings profile is based on the rating of the reference entity on which the credit derivative contract is based. The ratings and maturity profile of credit derivatives where JPMorgan Chase is the purchaser of protection are comparable to the profile reflected below.

Protection sold – credit derivatives ratings[a]/maturity profile

December 31, 2022 (in millions)	<1 year	1–5 years	>5 years	Total notional amount	Fair value of receivables[b]	Fair value of payables[b]	Net fair value
Risk rating of reference entity							
Investment-grade	**$ (90,484)**	**$ (294,791)**	**$ (30,822)**	**$ (416,097)**	**$ 2,324**	**$ (1,495)**	**$ 829**
Noninvestment-grade	**(33,244)**	**(87,011)**	**(6,370)**	**(126,625)**	**1,267**	**(3,209)**	**(1,942)**
Total	**$ (123,728)**	**$ (381,802)**	**$ (37,192)**	**$ (542,722)**	**$ 3,591**	**$ (4,704)**	**$ (1,113)**

December 31, 2021 (in millions)	<1 year	1–5 years	>5 years	Total notional amount	Fair value of receivables[b]	Fair value of payables[b]	Net fair value
Risk rating of reference entity							
Investment-grade	$ (91,155)	$ (255,106)	$ (29,035)	$ (375,296)	$ 3,645	$ (623)	$ 3,022
Noninvestment-grade	(32,175)	(84,851)	(7,289)	(124,315)	2,630	(2,003)	627
Total	$ (123,330)	$ (339,957)	$ (36,324)	$ (499,611)	$ 6,275	$ (2,626)	$ 3,649

(a) The ratings scale is primarily based on external credit ratings defined by S&P and Moody's.
(b) Amounts are shown on a gross basis, before the benefit of legally enforceable master netting agreements including cash collateral netting.

Note 6 – Noninterest revenue and noninterest expense

Noninterest revenue

The Firm records noninterest revenue from certain contracts with customers in investment banking fees, deposit-related fees, asset management, administration, and commissions, and components of card income. The related contracts are often terminable on demand and the Firm has no remaining obligation to deliver future services. For arrangements with a fixed term, the Firm may commit to deliver services in the future. Revenue associated with these remaining performance obligations typically depends on the occurrence of future events or underlying asset values, and is not recognized until the outcome of those events or values are known.

Investment banking fees

This revenue category includes debt and equity underwriting and advisory fees. As an underwriter, the Firm helps clients raise capital via public offering and private placement of various types of debt and equity instruments. Underwriting fees are primarily based on the issuance price and quantity of the underlying instruments, and are recognized as revenue typically upon execution of the client's transaction. The Firm also manages and syndicates loan arrangements. Credit arrangement and syndication fees, included within debt underwriting fees, are recorded as revenue after satisfying certain retention, timing and yield criteria.

The Firm also provides advisory services, by assisting its clients with mergers and acquisitions, divestitures, restructuring and other complex transactions. Advisory fees are recognized as revenue typically upon execution of the client's transaction.

The following table presents the components of investment banking fees.

Year ended December 31, (in millions)	**2022**	2021	2020
Underwriting			
Equity	**$ 975**	$ 3,969	$ 2,759
Debt	**2,732**	4,853	4,362
Total underwriting	**3,707**	8,822	7,121
Advisory	**2,979**	4,394	2,365
Total investment banking fees	**$ 6,686**	$ 13,216	$ 9,486

Investment banking fees are earned primarily by CIB. Refer to Note 32 for segment results.

Principal transactions

Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Firm transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit, foreign exchange and interest rate risks.

Refer to Note 5 for further information on the income statement classification of gains and losses from derivatives activities.

In the financial commodity markets, the Firm transacts in OTC derivatives (e.g., swaps, forwards, options) and ETD that reference a wide range of underlying commodities. In the physical commodity markets, the Firm primarily purchases and sells precious and base metals and may hold other commodities inventories under financing and other arrangements with clients.

The following table presents all realized and unrealized gains and losses recorded in principal transactions revenue. This table excludes interest income and interest expense on trading assets and liabilities, which are an integral part of the overall performance of the Firm's client-driven market-making activities in CIB and fund deployment activities in Treasury and CIO. Refer to Note 7 for further information on interest income and interest expense.

Trading revenue is presented primarily by instrument type. The Firm's client-driven market-making businesses generally utilize a variety of instrument types in connection with their market-making and related risk-management activities; accordingly, the trading revenue presented in the table below is not representative of the total revenue of any individual LOB.

Year ended December 31, (in millions)	2022		2021	2020
Trading revenue by instrument type				
Interest rate[a]	**$ 3,010**		$ 1,646	$ 2,575
Credit[b]	**1,412**	[c]	2,691	2,753
Foreign exchange	**5,119**		2,787	4,253
Equity	**8,068**		7,773	6,171
Commodity	**2,348**		1,428	2,088
Total trading revenue	**19,957**		16,325	17,840
Private equity gains/(losses)	**(45)**		(21)	181
Principal transactions	**$ 19,912**		$ 16,304	$ 18,021

(a) Includes the impact of changes in funding valuation adjustments on derivatives.
(b) Includes the impact of changes in credit valuation adjustments on derivatives, net of the associated hedging activities.
(c) Includes net markdowns on held-for-sale positions, primarily unfunded commitments, in the bridge financing portfolio.

Principal transactions revenue is earned primarily by CIB. Refer to Note 32 for segment results.

Lending- and deposit-related fees

Lending-related fees include fees earned from loan commitments, standby letters of credit, financial guarantees, and other loan-servicing activities. Deposit-related fees include fees earned from providing overdraft and other deposit account services, and from performing cash management activities. Lending- and deposit-related fees in this revenue category are recognized over the period in which the related service is provided.

The following table presents the components of lending- and deposit-related fees.

Year ended December 31, (in millions)	2022	2021	2020
Lending-related fees	**$ 1,468**	$ 1,472	$ 1,271
Deposit-related fees	**5,630**	5,560	5,240
Total lending- and deposit-related fees	**$ 7,098**	$ 7,032	$ 6,511

Lending- and deposit-related fees are earned by CCB, CIB, CB, and AWM. Refer to Note 32 for segment results.

Asset management, administration and commissions

This revenue category includes fees from investment management and related services, custody, brokerage services and other products. The Firm manages assets on behalf of its clients, including investors in Firm-sponsored funds and owners of separately managed investment accounts. Management fees are typically based on the value of assets under management and are collected and recognized at the end of each period over which the management services are provided and the value of the managed assets is known. The Firm also receives performance-based management fees, which are earned based on exceeding certain benchmarks or other performance targets and are accrued and recognized when the probability of reversal is remote, typically at the end of the related billing period. The Firm has contractual arrangements with third parties to provide distribution and other services in connection with its asset management activities. Amounts paid to these third-party service providers are generally recorded in professional and outside services expense.

The following table presents the components of Firmwide asset management, administration and commissions.

Year ended December 31, (in millions)	2022	2021	2020
Asset management fees			
Investment management fees[a]	**$ 13,765**	$ 14,027	$ 11,694
All other asset management fees[b]	**331**	378	338
Total asset management fees	**14,096**	14,405	12,032
Total administration fees[c]	**2,348**	2,554	2,249
Commissions and other fees			
Brokerage commissions[d]	**2,831**	3,046	2,959
All other commissions and fees[e]	**1,402**	1,024	937
Total commissions and fees	**4,233**	4,070	3,896
Total asset management, administration and commissions	**$ 20,677**	$ 21,029	$ 18,177

(a) Represents fees earned from managing assets on behalf of the Firm's clients, including investors in Firm-sponsored funds and owners of separately managed investment accounts.
(b) Represents fees for services that are ancillary to investment management services, such as commissions earned on the sales or distribution of mutual funds to clients. These fees are recorded as revenue at the time the service is rendered or, in the case of certain distribution fees based on the underlying fund's asset value and/or investor redemption, recorded over time as the investor remains in the fund or upon investor redemption.
(c) Predominantly includes fees for custody, securities lending, funds services and securities clearance. These fees are recorded as revenue over the period in which the related service is provided.
(d) Represents commissions earned when the Firm acts as a broker, by facilitating its clients' purchases and sales of securities and other financial instruments. Brokerage commissions are collected and recognized as revenue upon occurrence of the client transaction. The Firm reports certain costs paid to third-party clearing houses and exchanges net against commission revenue.
(e) Includes travel-related and annuity sales commissions, depositary receipt-related service fees, as well as other service fees, which are recognized as revenue when the services are rendered.

Asset management, administration and commissions are earned primarily by AWM, CIB and CCB. Refer to Note 32 for segment results.

Mortgage fees and related income

This revenue category reflects CCB's Home Lending production and net mortgage servicing revenue.

Production revenue includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option. Net mortgage servicing revenue includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Refer to Note 15 for further information on risk management activities and MSRs.

Net interest income from mortgage loans is recorded in interest income.

Card income

This revenue category includes interchange and other income from credit and debit card transactions; and fees earned from processing card transactions for merchants, both of which are recognized when purchases are made by a cardholder and presented net of certain transaction-related costs. Card income also includes account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

Certain credit card products offer the cardholder the ability to earn points based on account activity, which the cardholder can choose to redeem for cash and non-cash rewards. The cost to the Firm related to these proprietary rewards programs varies based on multiple factors including the terms and conditions of the rewards programs, cardholder activity, cardholder reward redemption rates and cardholder reward selections. The Firm maintains a liability for its obligations under its rewards programs and reports the current-period cost as a reduction of card income.

Credit card revenue sharing agreements

The Firm has contractual agreements with numerous co-brand partners that grant the Firm exclusive rights to issue co-branded credit card products and market them to the customers of such partners. These partners endorse the co-brand credit card programs and provide their customer or member lists to the Firm. The partners may also conduct marketing activities and provide rewards redeemable under their own loyalty programs that the Firm will grant to co-brand credit cardholders based on account activity. The terms of these agreements generally range from five to ten years.

The Firm typically makes payments to the co-brand credit card partners based on the cost of partners' marketing activities and loyalty program rewards provided to credit cardholders, new account originations and sales volumes. Payments to partners based on marketing efforts undertaken by the partners are expensed by the Firm as incurred and reported as marketing expense. Payments for partner loyalty program rewards are reported as a reduction of card income when incurred. Payments to partners based on new credit card account originations are accounted for as direct loan origination costs and are deferred and recognized as a reduction of card income on a straight-line basis over a 12-month period. Payments to partners based on sales volumes are reported as a reduction of card income when the related interchange income is earned.

The following table presents the components of card income:

Year ended December 31, (in millions)	**2022**	2021	2020
Interchange and merchant processing income	**$ 28,085**	$ 23,592	$ 18,563
Reward costs and partner payments	**(22,162)**	(17,868)	(13,637)
Other card income[(a)]	**(1,503)**	(622)	(491)
Total card income	**$ 4,420**	$ 5,102	$ 4,435

(a) Predominantly represents the amortization of account origination costs and annual fees, which are deferred and recognized on a straight-line basis over a 12-month period.

Card income is earned primarily by CCB, CIB and CB. Refer to Note 32 for segment results.

Other income

This revenue category includes operating lease income, as well as losses associated with the Firm's tax-oriented investments, predominantly alternative energy equity-method investments in CIB.

The following table presents certain components of other income:

Year ended December 31, (in millions)	**2022**	2021	2020
Operating lease income	**$ 3,654**	$ 4,914	$ 5,539
Losses on tax-oriented investments[(a)]	**(1,491)**	(1,570)	(1,280)
Gain on sale of Visa B shares	**914**	–	–

(a) The losses associated with these tax-oriented investments are more than offset by lower income tax expense from the associated tax credits.

Refer to Note 2 and 18 for additional information on Visa B shares and operating leases, respectively.

Noninterest expense

Other expense

Other expense on the Firm's Consolidated statements of income included:

Year ended December 31, (in millions)	**2022**	2021	2020
Legal expense	**$ 266**	$ 426	$ 1,115

Note 7 – Interest income and Interest expense

Interest income and interest expense are recorded in the Consolidated statements of income and classified based on the nature of the underlying asset or liability.

The following table presents the components of interest income and interest expense:

Year ended December 31, (in millions)	2022	2021	2020
Interest income			
Loans[a]	**$ 52,736**	$ 41,537	$ 43,758
Taxable securities	**10,372**	6,460	7,843
Non-taxable securities[b]	**975**	1,063	1,184
Total investment securities[a]	**11,347**	7,523	9,027
Trading assets - debt instruments	**9,053**	6,825	7,832
Federal funds sold and securities purchased under resale agreements	**4,632**	958	2,436
Securities borrowed[c]	**2,237**	(385)	(302)
Deposits with banks	**9,039**	512	749
All other interest-earning assets[d]	**3,763**	894	1,023
Total interest income	**$ 92,807**	$ 57,864	$ 64,523
Interest expense			
Interest bearing deposits	**$ 10,082**	$ 531	$ 2,357
Federal funds purchased and securities loaned or sold under repurchase agreements	**3,721**	274	1,058
Short-term borrowings[e]	**747**	126	372
Trading liabilities - debt and all other interest-bearing liabilities[f]	**3,246**	257	195
Long-term debt	**8,075**	4,282	5,764
Beneficial interest issued by consolidated VIEs	**226**	83	214
Total interest expense	**$ 26,097**	$ 5,553	$ 9,960
Net interest income	**$ 66,710**	$ 52,311	$ 54,563
Provision for credit losses	**6,389**	(9,256)	17,480
Net interest income after provision for credit losses	**$ 60,321**	$ 61,567	$ 37,083

(a) Includes the amortization/accretion of unearned income (e.g., purchase premiums/discounts and net deferred fees/costs).
(b) Represents securities that are tax-exempt for U.S. federal income tax purposes.
(c) Negative interest and rates reflect the net impact of interest earned offset by fees paid on client-driven prime brokerage securities borrowed transactions.
(d) Includes interest earned on brokerage-related held-for-investment customer receivables, which are classified in accrued interest and accounts receivable, and all other interest-earning assets, which are classified in other assets on the Consolidated balance sheets.
(e) Includes commercial paper.
(f) All other interest-bearing liabilities includes interest expense on brokerage-related customer payables.

Interest income and interest expense includes the current-period interest accruals for financial instruments measured at fair value, except for derivatives and financial instruments containing embedded derivatives that would be separately accounted for in accordance with U.S. GAAP, absent the fair value option election; for those instruments, all changes in fair value including any interest elements, are primarily reported in principal transactions revenue. For financial instruments that are not measured at fair value, the related interest is included within interest income or interest expense, as applicable. Refer to Notes 12, 10, 11 and 20 for further information on accounting for interest income and interest expense related to loans, investment securities, securities financing activities (i.e., securities purchased or sold under resale or repurchase agreements; securities borrowed; and securities loaned) and long-term debt, respectively.

Note 8 – Pension and other postretirement employee benefit plans

The Firm has various defined benefit pension plans and OPEB plans that provide benefits to its employees in the U.S. and certain non-U.S. locations. Substantially all the defined benefit pension plans are closed to new participants. The principal defined benefit pension plan in the U.S., which covered substantially all U.S. employees, was closed to new participants and frozen for existing participants on January 1, 2020, (and January 1, 2019 for new hires on or after December 2, 2017). Interest credits continue to accrue to participants' accounts based on their accumulated balances.

The Firm maintains funded and unfunded postretirement benefit plans that provide medical and life insurance for certain eligible employees and retirees as well as their dependents covered under these programs. None of these plans have a material impact on the Firm's Consolidated Financial Statements.

The Firm also provides a qualified defined contribution plan in the U.S. and maintains other similar arrangements in certain non-U.S. locations. The most significant of these plans is the JPMorgan Chase 401(k) Savings Plan ("the 401(k) Savings Plan"), which covers substantially all U.S. employees. Employees can contribute to the 401(k) Savings Plan on a pretax and/or Roth 401(k) after-tax basis. The Firm makes an annual matching contribution as well as an annual profit-sharing contribution to the 401(k) Savings Plan on behalf of eligible participants.

The following table presents the pretax benefit obligations, plan assets, the net funded status, and the amounts recorded in AOCI on the Consolidated balance sheets for the Firm's significant defined benefit pension and OPEB plans.

As of or for the year ended December 31,	Defined benefit pension and OPEB plans	
(in millions)	**2022**	2021
Projected benefit obligations	**$ (13,545)**	$ (18,046)
Fair value of plan assets	**19,890**	25,692
Net funded status	**6,345**	7,646
Accumulated other comprehensive income/(loss)	**(1,916)**	(453)

The weighted-average discount rate used to value the benefit obligations as of December 31, 2022 and 2021, was 5.14% and 2.54%, respectively.

Gains and losses

Gains or losses resulting from changes in the benefit obligation and the fair value of plan assets are recorded in OCI. Amortization of net gains or losses are recognized as part of the net periodic benefit cost over subsequent periods, if, as of the beginning of the year, the net gain or loss exceeds 10% of the greater of the projected benefit obligation or the fair value of the plan assets. Amortization is generally over the average expected remaining lifetime of plan participants, given the frozen status of most plans. During the year ended December 31, 2022, a remeasurement of the Firm's U.S. principal defined benefit plan in the third quarter, was required as a result of a pension settlement. The remeasurement resulted in a reduction in the fair value of the Firm's U.S. principal defined benefit plan assets, reflecting market conditions at the time of remeasurement, and a reduction in the plan's projected benefit obligation totaling $4.0 billion and $2.6 billion, respectively, resulting in a net decrease of $1.4 billion in pre-tax AOCI. For the year ended December 31, 2021, the net gain was predominantly attributable to market-driven increases in the fair value of plan assets and the discount rate.

The following table presents the net periodic benefit costs reported in the Consolidated statements of income for the Firm's defined benefit pension, defined contribution and OPEB plans, and in other comprehensive income for the defined benefit pension and OPEB plans.

	Pension and OPEB plans		
Year ended December 31, (in millions)	**2022**	2021	2020
Total net periodic defined benefit plan cost/(credit)[(a)]	**$ (192)**	$ (201)	$ (285)
Total defined contribution plans	**1,408**	1,333	1,332
Total pension and OPEB cost included in noninterest expense	**$ 1,216**	$ 1,132	$ 1,047
Total recognized in other comprehensive (income)/loss	**$ 1,459**	$ (1,129)	$ (214)

(a) Includes pension settlement loss of $92 million and $33 million, respectively, for the years ended December 31, 2022 and 2021.

The following table presents the weighted-average actuarial assumptions used to determine the net periodic benefit costs for the defined benefit pension and OPEB plans.

	Defined benefit pension and OPEB plans		
Year ended December 31,	**2022**	2021	2020
Discount rate	**2.54 %**	2.17 %	2.93 %
Expected long-term rate of return on plan assets	**3.68 %**	2.97 %	3.91 %

Plan assumptions

The Firm's expected long-term rate of return is a blended weighted average, by asset allocation of the projected long-term returns for the various asset classes, taking into consideration local market conditions and the specific allocation of plan assets. Returns on asset classes are developed using a forward-looking approach and are not strictly based on historical returns, with consideration given to current market conditions and the portfolio mix of each plan.

The discount rates used in determining the benefit obligations are generally provided by the Firm's actuaries, with the Firm's principal defined benefit pension plan using a rate that was selected by reference to the yields on portfolios of bonds with maturity dates and coupons that closely match each of the plan's projected cash flows.

Investment strategy and asset allocation

The assets of the Firm's defined benefit pension plans are held in various trusts and are invested in well-diversified portfolios of equity and fixed income securities, cash and cash equivalents, and alternative investments. The Firm regularly reviews the asset allocations and asset managers, as well as other factors that could impact the portfolios, which are rebalanced when deemed necessary. The approved asset allocation ranges by asset class for the Firm's principal defined benefit plan are 42-100% debt securities, 0-40% equity securities, 0-3% real estate, and 0-12% alternatives as of December 31, 2022.

As of December 31, 2022, assets held by the Firm's defined benefit pension and OPEB plans do not include securities issued by JPMorgan Chase or its affiliates, except through indirect exposures through investments in exchange traded funds, mutual funds and collective investment funds managed by third-parties. The defined benefit pension and OPEB plans hold investments that are sponsored or managed by affiliates of JPMorgan Chase in the amount of $1.7 billion and $2.5 billion, as of December 31, 2022 and 2021, respectively.

Fair value measurement of the plans' assets and liabilities

Refer to Note 2 for information on fair value measurements, including descriptions of level 1, 2, and 3 of the fair value hierarchy and the valuation methods employed by the Firm.

Pension plan assets and liabilities measured at fair value

	Defined benefit pension and OPEB plans							
	2022				2021			
December 31, (in millions)	Level 1[(a)]	Level 2[(b)]	Level 3[(c)]	Total fair value	Level 1[(a)]	Level 2[(b)]	Level 3[(c)]	Total fair value
Assets measured at fair value classified in fair value hierarchy	**$ 5,308**	**$ 9,617**	**$ 2,613**	**$ 17,538**	$ 6,541	$ 12,315	$ 3,172	$ 22,028
Assets measured at fair value using NAV as practical expedient not classified in fair value hierarchy				**2,593**				3,960
Net defined benefit pension plan payables not classified in fair value hierarchy				**(241)**				(296)
Total fair value of plan assets				**$ 19,890**				$ 25,692

(a) Consists predominantly of equity securities, U.S. federal, state, and local and non-U.S. government debt securities, and cash equivalents.
(b) Consists predominantly of corporate debt securities and U.S. federal, state, and local and non-U.S. government debt securities.
(c) Consists of corporate-owned life insurance policies and participating annuity contracts.

Changes in level 3 fair value measurements using significant unobservable inputs

Investments classified in level 3 of the fair value hierarchy decreased in 2022 to $2.6 billion, due to $501 million in unrealized losses and $54 million in settlements, and increased in 2021 to $3.2 billion, predominantly due to $332 million in unrealized gains, partially offset by $94 million in settlements.

Estimated future benefit payments

The following table presents benefit payments expected to be paid for the defined benefit pension and OPEB plans for the years indicated.

Year ended December 31, (in millions)	Defined benefit pension and OPEB plans
2023	$ 1,022
2024	1,016
2025	1,007
2026	980
2027	977
Years 2028–2032	4,720

Note 9 – Employee share-based incentives

Employee share-based awards

In 2022, 2021 and 2020, JPMorgan Chase granted long-term share-based awards to certain employees under its LTIP, as amended and restated effective May 15, 2018, and subsequently amended effective May 18, 2021. Under the terms of the LTIP, as of December 31, 2022, 69 million shares of common stock were available for issuance through May 2025. The LTIP is the only active plan under which the Firm is currently granting share-based incentive awards. In the following discussion, the LTIP, plus prior Firm plans and plans assumed as the result of acquisitions, are referred to collectively as the "LTI Plans," and such plans constitute the Firm's share-based incentive plans.

RSUs are awarded at no cost to the recipient upon their grant. Generally, RSUs are granted annually and vest at a rate of 50% after two years and 50% after three years and are converted into shares of common stock as of the vesting date. In addition, RSUs typically include full-career eligibility provisions, which allow employees to continue to vest upon voluntary termination based on age and/or service-related requirements, subject to post-employment and other restrictions. All RSU awards are subject to forfeiture until vested and contain clawback provisions that may result in cancellation under certain specified circumstances. Predominantly all RSUs entitle the recipient to receive cash payments equivalent to any dividends paid on the underlying common stock during the period the RSUs are outstanding.

Performance share units ("PSUs") are granted annually, and approved by the Firm's Board of Directors, to members of the Firm's Operating Committee under the variable compensation program. PSUs are subject to the Firm's achievement of specified performance criteria over a three-year period. The number of awards that vest can range from zero to 150% of the grant amount. In addition, dividends that accrue during the vesting period are reinvested in dividend equivalent share units. PSUs and the related dividend equivalent share units are converted into shares of common stock after vesting.

Once the PSUs and dividend equivalent share units have vested, the shares of common stock that are delivered, after applicable tax withholding, must be retained for an additional holding period, for a total combined vesting and holding period of approximately five to eight years from the grant date depending on regulations in certain countries.

Under the LTI Plans, stock appreciation rights ("SARs") and stock options have generally been granted with an exercise price equal to the fair value of JPMorgan Chase's common stock on the grant date. SARs and stock options generally expire ten years after the grant date. In 2021, the Firm awarded its Chairman and CEO and its President and Chief Operating Officer 1.5 million and 750,000 SARs, respectively. There were no grants of SARs or stock options in 2022 and grants in 2020 were not material.

The Firm separately recognizes compensation expense for each tranche of each award, net of estimated forfeitures, as if it were a separate award with its own vesting date. Generally, for each tranche granted, compensation expense is recognized on a straight-line basis from the grant date until the vesting date of the respective tranche, provided that the employees will not become full-career eligible during the vesting period. For awards with full-career eligibility provisions and awards granted with no future substantive service requirement, the Firm accrues the estimated value of awards expected to be awarded to employees as of the grant date without giving consideration to the impact of post-employment restrictions. For each tranche granted to employees who will become full-career eligible during the vesting period, compensation expense is recognized on a straight-line basis from the grant date until the earlier of the employee's full-career eligibility date or the vesting date of the respective tranche.

The Firm's policy for issuing shares upon settlement of employee share-based incentive awards is to issue either new shares of common stock or treasury shares. During 2022, 2021 and 2020, the Firm settled all of its employee share-based awards by issuing treasury shares.

Refer to Note 23 for further information on the classification of share-based awards for purposes of calculating earnings per share.

RSUs, PSUs, SARs and stock options activity

Generally, compensation expense for RSUs and PSUs is measured based on the number of units granted multiplied by the stock price at the grant date, and for SARs and stock options, is measured at the grant date using the Black-Scholes valuation model. Compensation expense for these awards is recognized in net income as described previously. The following table summarizes JPMorgan Chase's RSUs, PSUs, SARs and stock options activity for 2022.

Year ended December 31, 2022 (in thousands, except weighted-average data, and where otherwise stated)	RSUs/PSUs Number of units	RSUs/PSUs Weighted-average grant date fair value	SARs/Options Number of awards	SARs/Options Weighted-average exercise price	SARs/Options Weighted-average remaining contractual life (in years)	SARs/Options Aggregate intrinsic value
Outstanding, January 1	**45,405**	**$ 126.32**	**3,369**	**$ 116.62**		
Granted	**23,729**	**147.17**	**—**	**—**		
Exercised or vested	**(19,517)**	**117.06**	**(858)**	**44.70**		
Forfeited	**(1,891)**	**141.74**	**—**	**—**		
Canceled	**NA**	**NA**	**—**	**—**		
Outstanding, December 31	**47,726**	**$ 139.90**	**2,511**	**$ 141.19**	**7.8**	**$ 22,695**
Exercisable, December 31	**NA**	**NA**	**261**	**46.58**	**0.1**	**22,695**

The total fair value of RSUs that vested during the years ended December 31, 2022, 2021 and 2020, was $3.2 billion, $2.9 billion and $2.8 billion, respectively. The total intrinsic value of options exercised during the years ended December 31, 2022, 2021 and 2020, was $75 million, $232 million and $182 million, respectively.

Compensation expense

The Firm recognized the following noncash compensation expense related to its various employee share-based incentive plans in its Consolidated statements of income.

Year ended December 31, (in millions)	**2022**	2021	2020
Cost of prior grants of RSUs, PSUs, SARs and stock options that are amortized over their applicable vesting periods	**$ 1,253**	$ 1,161	$ 1,101
Accrual of estimated costs of share-based awards to be granted in future periods, predominantly those to full-career eligible employees	**1,541**	1,768	1,350
Total noncash compensation expense related to employee share-based incentive plans	**$ 2,794**	$ 2,929	$ 2,451

At December 31, 2022, approximately $1.0 billion (pretax) of compensation expense related to unvested awards had not yet been charged to net income. That cost is expected to be amortized into compensation expense over a weighted-average period of 1.8 years. The Firm does not capitalize any compensation expense related to share-based compensation awards to employees.

Tax benefits

Income tax benefits (including tax benefits from dividends or dividend equivalents) related to share-based incentive arrangements recognized in the Firm's Consolidated statements of income for the years ended December 31, 2022, 2021 and 2020, were $901 million, $957 million and $837 million, respectively.

Note 10 – Investment securities

Investment securities consist of debt securities that are classified as AFS or HTM. Debt securities classified as trading assets are discussed in Note 2. Predominantly all of the Firm's AFS and HTM securities are held by Treasury and CIO in connection with its asset-liability management activities.

AFS securities are carried at fair value on the Consolidated balance sheets. Unrealized gains and losses, after any applicable hedge accounting adjustments or allowance for credit losses, are reported in AOCI. The specific identification method is used to determine realized gains and losses on AFS securities, which are included in investment securities gains/(losses) on the Consolidated statements of income. HTM securities, which the Firm has the intent and ability to hold until maturity, are carried at amortized cost, net of allowance for credit losses, on the Consolidated balance sheets.

For both AFS and HTM securities, purchase discounts or premiums are generally amortized into interest income on a level-yield basis over the contractual life of the security. However, premiums on certain callable debt securities are amortized to the earliest call date.

During 2022 and 2021, the Firm transferred $78.3 billion and $104.5 billion of investment securities, respectively, from AFS to HTM for capital management purposes. AOCI included pretax unrealized gains/(losses) of $(4.8) billion and $425 million, respectively, on the securities at the dates of transfer.

Unrealized gains or losses at the date of transfer of these securities continue to be reported in AOCI and are amortized into interest income on a level-yield basis over the remaining life of the securities. This amortization will offset the effect on interest income of the amortization of the premium or discount resulting from the transfer recorded at fair value.

Transfers of securities from AFS to HTM are non-cash transactions and are recorded at fair value.

The amortized costs and estimated fair values of the investment securities portfolio were as follows for the dates indicated.

	2022				2021			
December 31, (in millions)	Amortized cost[b][c]	Gross unrealized gains	Gross unrealized losses	Fair value	Amortized cost[b][c]	Gross unrealized gains	Gross unrealized losses	Fair value
Available-for-sale securities								
Mortgage-backed securities:								
U.S. GSEs and government agencies	$ 77,194	$ 479	$ 6,170	$ 71,503	$ 72,800	$ 736	$ 993	$ 72,543
Residential:								
U.S.	1,576	1	111	1,466	2,128	38	2	2,164
Non-U.S.	3,176	5	27	3,154	3,882	25	1	3,906
Commercial	2,113	—	155	1,958	4,944	22	17	4,949
Total mortgage-backed securities	84,059	485	6,463	78,081	83,754	821	1,013	83,562
U.S. Treasury and government agencies	95,217	302	3,459	92,060	178,038	668	1,243	177,463
Obligations of U.S. states and municipalities	7,103	86	403	6,786	14,890	972	2	15,860
Non-U.S. government debt securities	20,360	14	678	19,696	16,163	92	46	16,209
Corporate debt securities	381	—	24	357	332	8	19	321
Asset-backed securities:								
Collateralized loan obligations	5,916	1	125	5,792	9,674	6	18	9,662
Other	3,152	2	69	3,085	5,403	47	2	5,448
Total available-for-sale securities	216,188	890	11,221	205,857	308,254	2,614	2,343	308,525
Held-to-maturity securities[a]								
Mortgage-backed securities:								
U.S. GSEs and government agencies	113,492	35	13,709	99,818	102,556	1,400	853	103,103
U.S. Residential	10,503	3	1,244	9,262	7,316	1	106	7,211
Commercial	10,361	10	734	9,637	3,730	11	54	3,687
Total mortgage-backed securities	134,356	48	15,687	118,717	113,602	1,412	1,013	114,001
U.S. Treasury and government agencies	207,463	—	18,363	189,100	185,204	169	2,103	183,270
Obligations of U.S. states and municipalities	19,747	53	1,080	18,720	13,985	453	44	14,394
Asset-backed securities:								
Collateralized loan obligations	61,414	4	1,522	59,896	48,869	75	22	48,922
Other	2,325	—	110	2,215	2,047	1	7	2,041
Total held-to-maturity securities	425,305	105	36,762	388,648	363,707	2,110	3,189	362,628
Total investment securities, net of allowance for credit losses	$ 641,493	$ 995	$ 47,983	$ 594,505	$ 671,961	$ 4,724	$ 5,532	$ 671,153

(a) The Firm purchased $33.7 billion, $111.8 billion and $12.4 billion of HTM securities for the years ended December 31, 2022, 2021 and 2020, respectively.

(b) The amortized cost of investment securities is reported net of allowance for credit losses of $96 million and $42 million at December 31, 2022 and 2021, respectively.

(c) Excludes $2.5 billion and $1.9 billion of accrued interest receivable at December 31, 2022 and 2021, respectively, included in accrued interest and accounts receivable on the Consolidated balance sheets. The Firm generally does not recognize an allowance for credit losses on accrued interest receivable, consistent with its policy to write them off no later than 90 days past due by reversing interest income. The Firm did not reverse through interest income any accrued interest receivable for the years ended December 31, 2022 and 2021.

At December 31, 2022, the investment securities portfolio consisted of debt securities with an average credit rating of AA+ (based upon external ratings where available, and where not available, based primarily upon internal risk ratings). Risk ratings are used to identify the credit quality of securities and differentiate risk within the portfolio. The Firm's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., probability of default ("PD") and loss given default ("LGD")) may differ as they reflect internal historical experiences and assumptions. Risk ratings are assigned at acquisition, reviewed on a regular and ongoing basis by Credit Risk Management and adjusted as necessary over the life of the investment for updated information affecting the issuer's ability to fulfill its obligations.

AFS securities impairment

The following tables present the fair value and gross unrealized losses by aging category for AFS securities at December 31, 2022 and 2021. The tables exclude U.S. Treasury and government agency securities and U.S. GSE and government agency MBS with unrealized losses of $9.6 billion and $2.2 billion, at December 31, 2022 and 2021, respectively; changes in the value of these securities are generally driven by changes in interest rates rather than changes in their credit profile given the explicit or implicit guarantees provided by the U.S. government.

	Available-for-sale securities with gross unrealized losses					
	Less than 12 months		12 months or more			
December 31, 2022 (in millions)	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
Residential:						
U.S.	**$ 1,187**	**$ 71**	**$ 260**	**$ 40**	**$ 1,447**	**$ 111**
Non-U.S.	**2,848**	**25**	**70**	**2**	**2,918**	**27**
Commercial	**1,131**	**74**	**813**	**81**	**1,944**	**155**
Total mortgage-backed securities	**5,166**	**170**	**1,143**	**123**	**6,309**	**293**
Obligations of U.S. states and municipalities	**3,051**	**241**	**364**	**162**	**3,415**	**403**
Non-U.S. government debt securities	**6,941**	**321**	**3,848**	**357**	**10,789**	**678**
Corporate debt securities	**150**	**2**	**207**	**22**	**357**	**24**
Asset-backed securities:						
Collateralized loan obligations	**3,010**	**61**	**2,701**	**64**	**5,711**	**125**
Other	**2,586**	**51**	**256**	**18**	**2,842**	**69**
Total available-for-sale securities with gross unrealized losses	**$ 20,904**	**$ 846**	**$ 8,519**	**$ 746**	**$ 29,423**	**$ 1,592**

	Available-for-sale securities with gross unrealized losses					
	Less than 12 months		12 months or more			
December 31, 2021 (in millions)	Fair value	Gross unrealized losses	Fair value	Gross unrealized losses	Total fair value	Total gross unrealized losses
Available-for-sale securities						
Mortgage-backed securities:						
Residential:						
U.S.	$ 303	$ 1	$ 45	$ 1	$ 348	$ 2
Non-U.S.	133	1	—	—	133	1
Commercial	2,557	5	349	12	2,906	17
Total mortgage-backed securities	2,993	7	394	13	3,387	20
Obligations of U.S. states and municipalities	120	2	—	—	120	2
Non-U.S. government debt securities	5,060	37	510	9	5,570	46
Corporate debt securities	166	1	46	18	212	19
Asset-backed securities:						
Collateralized loan obligations	8,110	18	208	—	8,318	18
Other	89	—	178	2	267	2
Total available-for-sale securities with gross unrealized losses	$ 16,538	$ 65	$ 1,336	$ 42	$ 17,874	$ 107

AFS securities are considered impaired if the fair value is less than the amortized cost.

The Firm recognizes impairment losses in earnings if the Firm has the intent to sell the debt security, or if it is more likely than not that the Firm will be required to sell the debt security before recovery of its amortized cost. In these circumstances the impairment loss is recognized in investment securities gains/(losses) in the Consolidated Statements of Income and is equal to the full difference between the amortized cost (net of allowance if applicable) and the fair value of the security.

For impaired debt securities that the Firm has the intent and ability to hold, the securities are evaluated to determine if a credit loss exists. If it is determined that a credit loss exists, that loss is recognized as an allowance for credit losses through the provision for credit losses in the Consolidated Statements of Income, limited by the amount of impairment. Any impairment on debt securities that the Firm has the intent and ability to hold not due to credit losses is recorded in OCI.

Factors considered in evaluating credit losses include adverse conditions specifically related to the industry, geographic area or financial condition of the issuer or underlying collateral of a security; and payment structure of the security.

When assessing securities issued in a securitization for credit losses, the Firm estimates cash flows considering relevant market and economic data, underlying loan-level data, and structural features of the securitization, such as subordination, excess spread, overcollateralization or other forms of credit enhancement, and compares the losses projected for the underlying collateral ("pool losses") against the level of credit enhancement in the securitization structure to determine whether these features are sufficient to absorb the pool losses, or whether a credit loss exists.

For beneficial interests in securitizations that are rated below "AA" at their acquisition, or that can be contractually prepaid or otherwise settled in such a way that the Firm would not recover substantially all of its recorded investment, the Firm evaluates impairment for credit losses when there is an adverse change in expected cash flows.

HTM securities – credit risk

Allowance for credit losses
The allowance for credit losses represents expected credit losses over the remaining expected life of HTM securities.

The allowance for credit losses on HTM obligations of U.S. states and municipalities and commercial mortgage-backed securities is calculated by applying statistical credit loss factors (estimated PD and LGD) to the amortized cost. The credit loss factors are derived using a weighted average of five internally developed eight-quarter macroeconomic scenarios, followed by a single year straight-line interpolation to revert to long run historical information for periods beyond the forecast period. Refer to Note 13 for further information on the eight-quarter macroeconomic forecast.

The allowance for credit losses on HTM collateralized loan obligations and U.S. residential mortgage-backed securities is calculated as the difference between the amortized cost and the present value of the cash flows expected to be collected, discounted at the security's effective interest rate. These cash flow estimates are developed based on expectations of underlying collateral performance derived using the eight-quarter macroeconomic forecast and the single year straight-line interpolation, as well as considering the structural features of the security.

The application of different inputs and assumptions into the calculation of the allowance for credit losses is subject to significant management judgment, and emphasizing one input or assumption over another, or considering other inputs or assumptions, could affect the estimate of the allowance for credit losses on HTM securities.

Credit quality indicator
The primary credit quality indicator for HTM securities is the risk rating assigned to each security. At both December 31, 2022 and 2021, all HTM securities were rated investment grade and were current and accruing, with approximately 98% rated at least AA+.

Allowance for credit losses on investment securities

The allowance for credit losses on investment securities was $96 million, $42 million and $78 million as of December 31, 2022, 2021 and 2020, respectively.

Selected impacts of investment securities on the Consolidated statements of income

Year ended December 31, (in millions)	**2022**	2021	2020
Realized gains	**$ 198**	$ 595	$ 3,080
Realized losses	**(2,578)**	(940)	(2,278)
Investment securities gains/ (losses)	**$(2,380)**	$ (345)	$ 802
Provision for credit losses	**$ 54**	$ (36)	$ 68

Contractual maturities and yields

The following table presents the amortized cost and estimated fair value at December 31, 2022, of JPMorgan Chase's investment securities portfolio by contractual maturity.

By remaining maturity December 31, 2022 (in millions)	Due in one year or less	Due after one year through five years	Due after five years through 10 years	Due after 10 years[b]	Total
Available-for-sale securities					
Mortgage-backed securities					
Amortized cost	$ 14	$ 3,634	$ 4,534	$ 75,877	$ 84,059
Fair value	14	3,459	4,573	70,035	78,081
Average yield[a]	2.21 %	3.58 %	5.25 %	3.62 %	3.71 %
U.S. Treasury and government agencies					
Amortized cost	$ 16,335	$ 54,936	$ 17,749	$ 6,197	$ 95,217
Fair value	16,011	52,703	17,167	6,179	92,060
Average yield[a]	1.27 %	3.00 %	3.99 %	6.01 %	3.08 %
Obligations of U.S. states and municipalities					
Amortized cost	$ 18	$ 47	$ 215	$ 6,823	$ 7,103
Fair value	18	46	216	6,506	6,786
Average yield[a]	5.03 %	3.96 %	5.24 %	5.85 %	5.81 %
Non-U.S. government debt securities					
Amortized cost	$ 12,803	$ 3,228	$ 4,329	$ –	$ 20,360
Fair value	12,795	3,107	3,794	–	19,696
Average yield[a]	3.54 %	2.59 %	1.37 %	– %	2.93 %
Corporate debt securities					
Amortized cost	$ 125	$ 272	$ 13	$ –	$ 410
Fair value	76	268	13	–	357
Average yield[a]	16.22 %	12.07 %	5.78 %	– %	13.14 %
Asset-backed securities					
Amortized cost	$ 99	$ 1,517	$ 3,665	$ 3,787	$ 9,068
Fair value	95	1,487	3,605	3,690	8,877
Average yield[a]	5.11 %	3.11 %	4.98 %	5.19 %	4.76 %
Total available-for-sale securities					
Amortized cost	$ 29,394	$ 63,634	$ 30,505	$ 92,684	$ 216,217
Fair value	29,009	61,070	29,368	86,410	205,857
Average yield[a]	2.34 %	3.05 %	3.94 %	4.01 %	3.49 %
Held-to-maturity securities					
Mortgage-backed securities					
Amortized cost	$ 98	$ 1,718	$ 12,350	$ 120,206	$ 134,372
Fair value	96	1,584	10,909	106,128	118,717
Average yield[a]	5.54 %	2.23 %	2.56 %	2.93 %	2.89 %
U.S. Treasury and government agencies					
Amortized cost	$ 34,157	$ 106,325	$ 66,981	$ –	$ 207,463
Fair value	33,433	99,345	56,322	–	189,100
Average yield[a]	0.57 %	0.71 %	1.27 %	– %	0.87 %
Obligations of U.S. states and municipalities					
Amortized cost	$ –	$ 106	$ 2,741	$ 16,951	$ 19,798
Fair value	–	100	2,710	15,910	18,720
Average yield[a]	– %	3.39 %	4.03 %	4.24 %	4.21 %
Asset-backed securities					
Amortized cost	$ –	$ 30	$ 19,398	$ 44,311	$ 63,739
Fair value	–	29	19,085	42,997	62,111
Average yield[a]	– %	5.69 %	4.80 %	4.74 %	4.76 %
Total held-to-maturity securities					
Amortized cost	$ 34,255	$ 108,179	$ 101,470	$ 181,468	$ 425,372
Fair value	33,529	101,058	89,026	165,035	388,648
Average yield[a]	0.58 %	0.74 %	2.18 %	3.50 %	2.25 %

(a) Average yield is computed using the effective yield of each security owned at the end of the period, weighted based on the amortized cost of each security. The effective yield considers the contractual coupon, amortization of premiums and accretion of discounts, and the effect of related hedging derivatives. Taxable-equivalent amounts are used where applicable. The effective yield excludes unscheduled principal prepayments; and accordingly, actual maturities of securities may differ from their contractual or expected maturities as certain securities may be prepaid. However, for certain callable debt securities, the average yield is calculated to the earliest call date.

(b) Substantially all of the Firm's U.S. residential MBS and collateralized mortgage obligations are due in 10 years or more, based on contractual maturity. The estimated weighted-average life, which reflects anticipated future prepayments, is approximately eight years for agency residential MBS, and six years for both agency residential collateralized mortgage obligations and nonagency residential collateralized mortgage obligations.

Note 11 – Securities financing activities

JPMorgan Chase enters into resale, repurchase, securities borrowed and securities loaned agreements (collectively, "securities financing agreements") primarily to finance the Firm's inventory positions, acquire securities to cover short sales, accommodate customers' financing needs, settle other securities obligations and to deploy the Firm's excess cash.

Securities financing agreements are treated as collateralized financings on the Firm's Consolidated balance sheets. Where appropriate under applicable accounting guidance, securities financing agreements with the same counterparty are reported on a net basis. Refer to Note 1 for further discussion of the offsetting of assets and liabilities. Fees received and paid in connection with securities financing agreements are recorded over the life of the agreement in interest income and interest expense on the Consolidated statements of income.

The Firm has elected the fair value option for certain securities financing agreements. Refer to Note 3 for further information regarding the fair value option. The securities financing agreements for which the fair value option has been elected are reported within securities purchased under resale agreements, securities loaned or sold under repurchase agreements, and securities borrowed on the Consolidated balance sheets. Generally, for agreements carried at fair value, current-period interest accruals are recorded within interest income and interest expense, with changes in fair value reported in principal transactions revenue. However, for financial instruments containing embedded derivatives that would be separately accounted for in accordance with accounting guidance for hybrid instruments, all changes in fair value, including any interest elements, are reported in principal transactions revenue.

Securities financing agreements not elected under the fair value option are measured at amortized cost. As a result of the Firm's credit risk mitigation practices described below, the Firm did not hold any allowance for credit losses with respect to resale and securities borrowed arrangements as of December 31, 2022 and 2021.

Credit risk mitigation practices

Securities financing agreements expose the Firm primarily to credit and liquidity risk. To manage these risks, the Firm monitors the value of the underlying securities (predominantly high-quality securities collateral, including government-issued debt and U.S. GSEs and government agencies MBS) that it has received from or provided to its counterparties compared to the value of cash proceeds and exchanged collateral, and either requests additional collateral or returns securities or collateral when appropriate. Margin levels are initially established based upon the counterparty, the type of underlying securities, and the permissible collateral, and are monitored on an ongoing basis.

In resale and securities borrowed agreements, the Firm is exposed to credit risk to the extent that the value of the securities received is less than initial cash principal advanced and any collateral amounts exchanged. In repurchase and securities loaned agreements, credit risk exposure arises to the extent that the value of underlying securities advanced exceeds the value of the initial cash principal received, and any collateral amounts exchanged.

Additionally, the Firm typically enters into master netting agreements and other similar arrangements with its counterparties, which provide for the right to liquidate the underlying securities and any collateral amounts exchanged in the event of a counterparty default. It is also the Firm's policy to take possession, where possible, of the securities underlying resale and securities borrowed agreements. Refer to Note 29 for further information regarding assets pledged and collateral received in securities financing agreements.

The table below summarizes the gross and net amounts of the Firm's securities financing agreements, as of December 31, 2022 and 2021. When the Firm has obtained an appropriate legal opinion with respect to a master netting agreement with a counterparty and where other relevant netting criteria under U.S. GAAP are met, the Firm nets, on the Consolidated balance sheets, the balances outstanding under its securities financing agreements with the same counterparty. In addition, the Firm exchanges securities and/or cash collateral with its counterparty to reduce the economic exposure with the counterparty, but such collateral is not eligible for net Consolidated balance sheet presentation. Where the Firm has obtained an appropriate legal opinion with respect to the counterparty master netting agreement, such collateral, along with securities financing balances that do not meet all these relevant netting criteria under U.S. GAAP, is presented in the table below as "Amounts not nettable on the Consolidated balance sheets," and reduces the "Net amounts" presented. Where a legal opinion has not been either sought or obtained, the securities financing balances are presented gross in the "Net amounts" below. In transactions where the Firm is acting as the lender in a securities-for-securities lending agreement and receives securities that can be pledged or sold as collateral, the Firm recognizes the securities received at fair value within other assets and the obligation to return those securities within accounts payable and other liabilities on the Consolidated balance sheets.

	December 31, 2022				
(in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[(b)]	Net amounts[(c)]
Assets					
Securities purchased under resale agreements	**$ 597,912**	**$ (282,411)**	**$ 315,501**	**$ (304,120)**	**$ 11,381**
Securities borrowed	**228,279**	**(42,910)**	**185,369**	**(131,578)**	**53,791**
Liabilities					
Securities sold under repurchase agreements	**$ 480,793**	**$ (282,411)**	**$ 198,382**	**$ (167,427)**	**$ 30,955**
Securities loaned and other[(a)]	**52,443**	**(42,910)**	**9,533**	**(9,527)**	**6**

	December 31, 2021				
(in millions)	Gross amounts	Amounts netted on the Consolidated balance sheets	Amounts presented on the Consolidated balance sheets	Amounts not nettable on the Consolidated balance sheets[(b)]	Net amounts[(c)]
Assets					
Securities purchased under resale agreements	$ 604,724	$ (343,093)	$ 261,631	$ (245,588)	$ 16,043
Securities borrowed	250,333	(44,262)	206,071	(154,599)	51,472
Liabilities					
Securities sold under repurchase agreements	$ 532,899	$ (343,093)	$ 189,806	$ (166,456)	$ 23,350
Securities loaned and other[(a)]	52,610	(44,262)	8,348	(8,133)	215

(a) Includes securities-for-securities lending agreements of $7.0 billion and $5.6 billion at December 31, 2022 and 2021, respectively, accounted for at fair value, where the Firm is acting as lender.

(b) In some cases, collateral exchanged with a counterparty exceeds the net asset or liability balance with that counterparty. In such cases, the amounts reported in this column are limited to the related net asset or liability with that counterparty.

(c) Includes securities financing agreements that provide collateral rights, but where an appropriate legal opinion with respect to the master netting agreement has not been either sought or obtained. At December 31, 2022 and 2021, included $6.0 billion and $13.9 billion, respectively, of securities purchased under resale agreements; $49.0 billion and $46.4 billion, respectively, of securities borrowed; $29.1 billion and $21.6 billion, respectively, of securities sold under repurchase agreements. At December 31, 2021 included $198 million of securities loaned and other, and the amount was not material at December 31, 2022.

The tables below present as of December 31, 2022 and 2021 the types of financial assets pledged in securities financing agreements and the remaining contractual maturity of the securities financing agreements.

	Gross liability balance			
	2022		2021	
December 31, (in millions)	Securities sold under repurchase agreements	Securities loaned and other	Securities sold under repurchase agreements	Securities loaned and other
Mortgage-backed securities:				
U.S. GSEs and government agencies	**$ 58,050**	**$ –**	$ 37,046	$ –
Residential - nonagency	**2,414**	**–**	1,508	–
Commercial - nonagency	**2,007**	**–**	1,463	–
U.S. Treasury, GSEs and government agencies	**191,254**	**1,464**	241,578	358
Obligations of U.S. states and municipalities	**1,735**	**5**	1,916	7
Non-U.S. government debt	**155,156**	**1,259**	174,971	1,572
Corporate debt securities	**37,121**	**461**	38,180	1,619
Asset-backed securities	**2,981**	**–**	1,211	–
Equity securities	**30,075**	**49,254**	35,026	49,054
Total	**$ 480,793**	**$ 52,443**	$ 532,899	$ 52,610

	Remaining contractual maturity of the agreements				
December 31, 2022 (in millions)	Overnight and continuous	Up to 30 days	30 - 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	**$ 205,235**	**$ 170,696**	**$ 37,120**	**$ 67,742**	**$ 480,793**
Total securities loaned and other	**50,138**	**1,285**	**3**	**1,017**	**52,443**

	Remaining contractual maturity of the agreements				
December 31, 2021 (in millions)	Overnight and continuous	Up to 30 days	30 - 90 days	Greater than 90 days	Total
Total securities sold under repurchase agreements	$ 195,035	$ 231,171	$ 47,201	$ 59,492	$ 532,899
Total securities loaned and other	50,034	1,701	–	875	52,610

Transfers not qualifying for sale accounting

At December 31, 2022 and 2021, the Firm held $692 million and $440 million, respectively, of financial assets for which the rights have been transferred to third parties; however, the transfers did not qualify as a sale in accordance with U.S. GAAP. These transfers have been recognized as collateralized financing transactions. The transferred assets are recorded in trading assets and loans, and the corresponding liabilities are recorded predominantly in short-term borrowings on the Consolidated balance sheets.

Note 12 – Loans

Loan accounting framework

The accounting for a loan depends on management's strategy for the loan. The Firm accounts for loans based on the following categories:

- Originated or purchased loans held-for-investment (i.e., "retained")
- Loans held-for-sale
- Loans at fair value

The following provides a detailed accounting discussion of the Firm's loans by category:

Loans held-for-investment

Originated or purchased loans held-for-investment, including PCD, are recorded at amortized cost, reflecting the principal amount outstanding, net of the following: unamortized deferred loan fees, costs, premiums or discounts; charge-offs; collection of cash; and foreign exchange. Credit card loans also include billed finance charges and fees.

Interest income

Interest income on performing loans held-for-investment is accrued and recognized as interest income at the contractual rate of interest. Purchase price discounts or premiums, as well as net deferred loan fees or costs, are amortized into interest income over the contractual life of the loan as an adjustment of yield.

The Firm classifies accrued interest on loans, including accrued but unbilled interest on credit card loans, in accrued interest and accounts receivables on the Consolidated balance sheets. For credit card loans, accrued interest once billed is then recognized in the loan balances, with the related allowance recorded in the allowance for credit losses. Changes in the allowance for credit losses on accrued interest on credit card loans are recognized in the provision for credit losses and charge-offs are recognized by reversing interest income. For other loans, the Firm generally does not recognize an allowance for credit losses on accrued interest receivables, consistent with its policy to write them off no later than 90 days past due by reversing interest income.

Nonaccrual loans

Nonaccrual loans are those on which the accrual of interest has been suspended. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status and considered nonperforming when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest has been in default for a period of 90 days or more, unless the loan is both well-secured and in the process of collection. A loan is determined to be past due when the minimum payment is not received from the borrower by the contractually specified due date or for certain loans (e.g., residential real estate loans), when a monthly payment is due and unpaid for 30 days or more. Finally, collateral-dependent loans are typically maintained on nonaccrual status.

On the date a loan is placed on nonaccrual status, all interest accrued but not collected is reversed against interest income. In addition, the amortization of deferred amounts is suspended. Interest income on nonaccrual loans may be recognized as cash interest payments are received (i.e., on a cash basis) if the recorded loan balance is deemed fully collectible; however, if there is doubt regarding the ultimate collectibility of the recorded loan balance, all interest cash receipts are applied to reduce the carrying value of the loan (the cost recovery method). For consumer loans, application of this policy typically results in the Firm recognizing interest income on nonaccrual consumer loans on a cash basis.

A loan may be returned to accrual status when repayment is reasonably assured and there has been demonstrated performance under the terms of the loan or, if applicable, the terms of the restructured loan.

As permitted by regulatory guidance, credit card loans are generally exempt from being placed on nonaccrual status; accordingly, interest and fees related to credit card loans continue to accrue until the loan is charged off or paid in full.

Allowance for loan losses

The allowance for loan losses represents the estimated expected credit losses in the held-for-investment loan portfolio at the balance sheet date and is recognized on the balance sheet as a contra asset, which brings the amortized cost to the net carrying value. Changes in the allowance for loan losses are recorded in the provision for credit losses on the Firm's Consolidated statements of income. Refer to Note 13 for further information on the Firm's accounting policies for the allowance for loan losses.

Charge-offs

Consumer loans are generally charged off or charged down to the lower of the amortized cost or the net realizable value of the underlying collateral (i.e., fair value less estimated costs to sell), with an offset to the allowance for loan losses, upon reaching specified stages of delinquency in accordance with standards established by the FFIEC. Residential real estate loans, unmodified credit card loans and scored business banking loans are generally charged off no later than 180 days past due. Scored auto and modified credit card loans are charged off no later than 120 days past due.

Certain consumer loans are charged off or charged down to their net realizable value earlier than the FFIEC charge-off standards in the following circumstances:

- Loans modified in a TDR that are determined to be collateral-dependent.
- Loans to borrowers who have experienced an event that suggests a loss is either known or highly certain are subject to accelerated charge-off standards (e.g.,

residential real estate and auto loans are charged off or charged down within 60 days of receiving notification of a bankruptcy filing).

- Auto loans upon repossession of the automobile.

Other than in certain limited circumstances, the Firm typically does not recognize charge-offs on the government-guaranteed portion of loans.

Wholesale loans are charged off when it is highly certain that a loss has been realized. The determination of whether to recognize a charge-off includes many factors, including the prioritization of the Firm's claim in bankruptcy, expectations of the workout/restructuring of the loan and valuation of the borrower's equity or the loan collateral.

When a loan is charged down to the lower of its amortized cost or the estimated net realizable value of the underlying collateral, the determination of the fair value of the collateral depends on the type of collateral (e.g., securities, real estate). In cases where the collateral is in the form of liquid securities, the fair value is based on quoted market prices or broker quotes. For illiquid securities or other financial assets, the fair value of the collateral is generally estimated using a discounted cash flow model.

For residential real estate loans, collateral values are based upon external valuation sources. When it becomes likely that a borrower is either unable or unwilling to pay, the Firm utilizes a broker's price opinion, appraisal and/or an automated valuation model of the home based on an exterior-only valuation ("exterior opinions"), which is then updated at least every 12 months, or more frequently depending on various market factors. As soon as practicable after the Firm receives the property in satisfaction of a debt (e.g., by taking legal title or physical possession), the Firm generally obtains an appraisal based on an inspection that includes the interior of the home ("interior appraisals"). Exterior opinions and interior appraisals are discounted based upon the Firm's experience with actual liquidation values as compared with the estimated values provided by exterior opinions and interior appraisals, considering state-specific factors.

For commercial real estate loans, collateral values are generally based on appraisals from internal and external valuation sources. Collateral values are typically updated every six to twelve months, either by obtaining a new appraisal or by performing an internal analysis, in accordance with the Firm's policies. The Firm also considers both borrower- and market-specific factors, which may result in obtaining appraisal updates or broker price opinions at more frequent intervals.

Loans held-for-sale

Loans held-for-sale are measured at the lower of cost or fair value, with valuation changes recorded in noninterest revenue. For consumer loans, the valuation is performed on a portfolio basis. For wholesale loans, the valuation is performed on an individual loan basis.

Interest income on loans held-for-sale is accrued and recognized based on the contractual rate of interest.

Loan origination fees or costs and purchase price discounts or premiums are deferred in a contra loan account until the related loan is sold. The deferred fees or costs and discounts or premiums are an adjustment to the basis of the loan and therefore are included in the periodic determination of the lower of cost or fair value adjustments and/or the gain or loss recognized at the time of sale.

Because these loans are recognized at the lower of cost or fair value, the Firm's allowance for loan losses and charge-off policies do not apply to these loans. However, loans held-for-sale are subject to the nonaccrual policies described above.

Loans at fair value

Loans for which the fair value option has been elected are measured at fair value, with changes in fair value recorded in noninterest revenue.

Interest income on these loans is accrued and recognized based on the contractual rate of interest. Changes in fair value are recognized in noninterest revenue. Loan origination fees are recognized upfront in noninterest revenue. Loan origination costs are recognized in the associated expense category as incurred.

Because these loans are recognized at fair value, the Firm's allowance for loan losses and charge-off policies do not apply to these loans. However, loans at fair value are subject to the nonaccrual policies described above.

Refer to Note 3 for further information on the Firm's elections of fair value accounting under the fair value option. Refer to Note 2 and Note 3 for further information on loans carried at fair value and classified as trading assets.

Loan classification changes

Loans in the held-for-investment portfolio that management decides to sell are transferred to the held-for-sale portfolio at the lower of cost or fair value on the date of transfer. Credit-related losses are charged against the allowance for loan losses; non-credit related losses such as those due to changes in interest rates or foreign currency exchange rates are recognized in noninterest revenue.

In the event that management decides to retain a loan in the held-for-sale portfolio, the loan is transferred to the held-for-investment portfolio at amortized cost on the date of transfer. These loans are subsequently assessed for impairment based on the Firm's allowance methodology. Refer to Note 13 for a further discussion of the methodologies used in establishing the Firm's allowance for loan losses.

Loan modifications

The Firm seeks to modify certain loans in conjunction with its loss mitigation activities. Through the modification, JPMorgan Chase grants one or more concessions to a borrower who is experiencing financial difficulty in order to minimize the Firm's economic loss and avoid foreclosure or repossession of the collateral, and to ultimately maximize payments received by the Firm from the borrower. The concessions granted vary by program and by borrower-specific characteristics, and may include interest rate reductions, term extensions, payment delays, principal forgiveness, or the acceptance of equity or other assets in lieu of payments. Such modifications are accounted for and reported as TDRs. Loans with short-term and other insignificant modifications that are not considered concessions are not TDRs.

Loans, except for credit card loans, modified in a TDR are generally placed on nonaccrual status, although in many cases such loans were already on nonaccrual status prior to modification. These loans may be returned to performing status (the accrual of interest is resumed) if the following criteria are met: (i) the borrower has performed under the modified terms for a minimum of six months and/or six payments, and (ii) the Firm has an expectation that repayment of the modified loan is reasonably assured based on, for example, the borrower's debt capacity and level of future earnings, collateral values, LTV ratios, and other current market considerations. In certain limited and well-defined circumstances in which the loan is current at the modification date, such loans are not placed on nonaccrual status at the time of modification.

Loans modified in TDRs are generally measured for impairment using the Firm's established asset-specific allowance methodology, which considers the expected re-default rates for the modified loans. A loan modified in a TDR generally remains subject to the asset-specific component of the allowance throughout its remaining life, regardless of whether the loan is performing and has been returned to accrual status. Refer to Note 13 for further discussion of the methodology used to estimate the Firm's asset-specific allowance.

Foreclosed property

The Firm acquires property from borrowers through loan restructurings, workouts, and foreclosures. Property acquired may include real property (e.g., residential real estate, land, and buildings) and commercial and personal property (e.g., automobiles, aircraft, railcars, and ships).

The Firm recognizes foreclosed property upon receiving assets in satisfaction of a loan (e.g., by taking legal title or physical possession). For loans collateralized by real property, the Firm generally recognizes the asset received at foreclosure sale or upon the execution of a deed in lieu of foreclosure transaction with the borrower. Foreclosed assets are reported in other assets on the Consolidated balance sheets and initially recognized at fair value less estimated costs to sell. Each quarter the fair value of the acquired property is reviewed and adjusted, if necessary, to the lower of cost or fair value. Subsequent adjustments to fair value are charged/credited to noninterest revenue. Operating expense, such as real estate taxes and maintenance, are charged to other expense.

Loan portfolio

The Firm's loan portfolio is divided into three portfolio segments, which are the same segments used by the Firm to determine the allowance for loan losses: Consumer, excluding credit card; Credit card; and Wholesale. Within each portfolio segment the Firm monitors and assesses the credit risk in the following classes of loans, based on the risk characteristics of each loan class.

Consumer, excluding credit card	Credit card	Wholesale[c][d]
• Residential real estate[a] • Auto and other[b]	• Credit card loans	• Secured by real estate • Commercial and industrial • Other[e]

(a) Includes scored mortgage and home equity loans held in CCB and AWM, and scored mortgage loans held in CIB and Corporate.
(b) Includes scored auto and business banking loans and overdrafts.
(c) Includes loans held in CIB, CB, AWM, Corporate, as well as risk-rated BWM and auto dealer loans held in CCB, for which the wholesale methodology is applied when determining the allowance for loan losses.
(d) The wholesale portfolio segment's classes align with loan classifications as defined by the bank regulatory agencies, based on the loan's collateral, purpose, and type of borrower.
(e) Includes loans to financial institutions, states and political subdivisions, SPEs, nonprofits, personal investment companies and trusts, as well as loans to individuals and individual entities (predominantly Global Private Bank clients within AWM and J.P. Morgan Wealth Management within CCB). Refer to Note 14 for more information on SPEs.

The following tables summarize the Firm's loan balances by portfolio segment.

December 31, 2022 (in millions)	Consumer, excluding credit card	Credit card	Wholesale	Total[a][b]
Retained	**$ 300,753**	**$ 185,175**	**$ 603,670**	**$ 1,089,598**
Held-for-sale	**618**	**–**	**3,352**	**3,970**
At fair value	**10,004**	**–**	**32,075**	**42,079**
Total	**$ 311,375**	**$ 185,175**	**$ 639,097**	**$ 1,135,647**

December 31, 2021 (in millions)	Consumer, excluding credit card	Credit card	Wholesale	Total[a][b]
Retained	$ 295,556	$ 154,296	$ 560,354	$ 1,010,206
Held-for-sale	1,287	–	7,401	8,688
At fair value	26,463	–	32,357	58,820
Total	$ 323,306	$ 154,296	$ 600,112	$ 1,077,714

(a) Excludes $5.2 billion and $2.7 billion of accrued interest receivable at December 31, 2022 and 2021, respectively. The Firm wrote off accrued interest receivable of $39 million and $56 million for the years ended December 31, 2022 and 2021, respectively.
(b) Loans (other than those for which the fair value option has been elected) are presented net of unamortized discounts and premiums and net deferred loan fees or costs. These amounts were not material as of December 31, 2022 and 2021.

The following tables provide information about the carrying value of retained loans purchased, sold and reclassified to held-for-sale during the periods indicated. Loans that were reclassified to held-for-sale and sold in a subsequent period are excluded from the sales line of this table.

	2022			
Year ended December 31, (in millions)	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	**$ 1,625** [b][c]	**$ –**	**$ 1,088**	**$ 2,713**
Sales	**2,884**	**–**	**41,934**	**44,818**
Retained loans reclassified to held-for-sale[a]	**229**	**–**	**1,055**	**1,284**

	2021			
Year ended December 31, (in millions)	Consumer, excluding credit card	Credit card	Wholesale	Total
Purchases	$ 515 [b][c]	$ –	$ 1,122	$ 1,637
Sales	799	–	31,022	31,821
Retained loans reclassified to held-for-sale[a]	1,225	–	2,178	3,403

Year ended December 31, (in millions)	2020 Consumer, excluding credit card		Credit card	Wholesale	Total
Purchases	$ 3,474	[(b)(c)]	$ –	$ 1,159	$ 4,633
Sales	352		–	17,916	18,268
Retained loans reclassified to held-for-sale[(a)]	2,084		787	1,580	4,451

(a) Reclassifications of loans to held-for-sale are non-cash transactions.

(b) Predominantly includes purchases of residential real estate loans, including the Firm's voluntary repurchases of certain delinquent loans from loan pools as permitted by Government National Mortgage Association ("Ginnie Mae") guidelines for the years ended December 31, 2022, 2021 and 2020. The Firm typically elects to repurchase these delinquent loans as it continues to service them and/or manage the foreclosure process in accordance with applicable requirements of Ginnie Mae, FHA, RHS, and/or VA.

(c) Excludes purchases of retained loans of $12.4 billion, $25.8 billion and $16.3 billion for the years ended December 31, 2022, 2021 and 2020, respectively, which are predominantly sourced through the correspondent origination channel and underwritten in accordance with the Firm's standards. The amount of purchases of retained loans at December 31, 2020 has been revised to conform with the current presentation.

Gains and losses on sales of loans

Net gains/(losses) on sales of loans and lending-related commitments (including adjustments to record loans and lending-related commitments held-for-sale at the lower of cost or fair value) recognized in noninterest revenue was $(186) million for the year ended December 31, 2022 of which $(48) million was related to loans. Net gains/(losses) on sales of loans and lending-related commitments was $261 million for the year ended December 31, 2021 of which $253 million was related to loans. Net losses on sales of loans was $(36) million for the year ended December 31, 2020. In addition, the sale of loans may also result in write downs, recoveries or changes in the allowance recognized in the provision for credit losses.

Consumer, excluding credit card loan portfolio

Consumer loans, excluding credit card loans, consist primarily of scored residential mortgages, home equity loans and lines of credit, auto and business banking loans, with a focus on serving the prime consumer credit market. The portfolio also includes home equity loans secured by junior liens, prime mortgage loans with an interest-only payment period, and certain payment-option loans that may result in negative amortization.

The following table provides information about retained consumer loans, excluding credit card, by class.

December 31, (in millions)	2022	2021
Residential real estate	**$ 237,561**	$ 224,795
Auto and other[(a)]	**63,192**	70,761
Total retained loans	**$ 300,753**	$ 295,556

(a) At December 31, 2022 and 2021, included $350 million and $5.4 billion of loans, respectively, in Business Banking under the PPP.

Delinquency rates are the primary credit quality indicator for consumer loans. Loans that are more than 30 days past due provide an early warning of borrowers who may be experiencing financial difficulties and/or who may be unable or unwilling to repay the loan. As the loan continues to age, it becomes more clear whether the borrower is likely to be unable or unwilling to pay. In the case of residential real estate loans, late-stage delinquencies (greater than 150 days past due) are a strong indicator of loans that will ultimately result in a foreclosure or similar liquidation transaction. In addition to delinquency rates, other credit quality indicators for consumer loans vary based on the class of loan, as follows:

- For residential real estate loans, the current estimated LTV ratio, or the combined LTV ratio in the case of junior lien loans, is an indicator of the potential loss severity in the event of default. Additionally, LTV or combined LTV ratios can provide insight into a borrower’s continued willingness to pay, as the delinquency rate of high-LTV loans tends to be greater than that for loans where the borrower has equity in the collateral. The geographic distribution of the loan collateral also provides insight as to the credit quality of the portfolio, as factors such as the regional economy, home price changes and specific events such as natural disasters, will affect credit quality. The borrower’s current or “refreshed” FICO score is a secondary credit quality indicator for certain loans, as FICO scores are an indication of the borrower’s credit payment history. Thus, a loan to a borrower with a low FICO score (less than 660) is considered to be of higher risk than a loan to a borrower with a higher FICO score. Further, a loan to a borrower with a high LTV ratio and a low FICO score is at greater risk of default than a loan to a borrower that has both a high LTV ratio and a high FICO score.
- For scored auto and business banking loans, geographic distribution is an indicator of the credit performance of the portfolio. Similar to residential real estate loans, geographic distribution provides insights into the portfolio performance based on regional economic activity and events.

Residential real estate

The following tables provide information on delinquency, which is the primary credit quality indicator for retained residential real estate loans.

	December 31, 2022								
	Term loans by origination year[d]						Revolving loans		
(in millions, except ratios)	2022	2021	2020	2019	2018	Prior to 2018	Within the revolving period	Converted to term loans	Total
Loan delinquency[a][b]									
Current	**$ 39,934**	**$ 66,072**	**$ 43,315**	**$ 15,397**	**$ 6,339**	**$ 49,632**	**$ 5,589**	**$ 9,685**	**$ 235,963**
30–149 days past due	**29**	**11**	**14**	**20**	**20**	**597**	**15**	**208**	**914**
150 or more days past due	**1**	**1**	**6**	**10**	**7**	**480**	**4**	**175**	**684**
Total retained loans	**$ 39,964**	**$ 66,084**	**$ 43,335**	**$ 15,427**	**$ 6,366**	**$ 50,709**	**$ 5,608**	**$ 10,068**	**$ 237,561**
% of 30+ days past due to total retained loans[c]	**0.08 %**	**0.02 %**	**0.05 %**	**0.19 %**	**0.42 %**	**2.07 %**	**0.34 %**	**3.80 %**	**0.66 %**

	December 31, 2021								
	Term loans by origination year[d]						Revolving loans		
(in millions, except ratios)	2021	2020	2019	2018	2017	Prior to 2017	Within the revolving period	Converted to term loans	Total
Loan delinquency[a][b]									
Current	$ 68,742	$ 48,334	$ 18,428	$ 7,929	$ 11,684	$ 49,147	$ 6,392	$ 11,807	$ 222,463
30–149 days past due	13	23	27	27	22	578	11	182	883
150 or more days past due	–	11	21	25	33	1,069	6	284	1,449
Total retained loans	$ 68,755	$ 48,368	$ 18,476	$ 7,981	$ 11,739	$ 50,794	$ 6,409	$ 12,273	$ 224,795
% of 30+ days past due to total retained loans[c]	0.02 %	0.07 %	0.26 %	0.65 %	0.47 %	3.18 %	0.27 %	3.80 %	1.02 %

(a) Individual delinquency classifications include mortgage loans insured by U.S. government agencies which were not material at December 31, 2022 and 2021.

(b) At December 31, 2022 and 2021, loans under payment deferral programs offered in response to the COVID-19 pandemic which are still within their deferral period and performing according to their modified terms are generally not considered delinquent.

(c) Excludes mortgage loans that are 30 or more days past due insured by U.S. government agencies which were not material at December 31, 2022 and 2021. These amounts have been excluded based upon the government guarantee.

(d) Purchased loans are included in the year in which they were originated.

Approximately 37% of the total revolving loans are senior lien loans; the remaining balance are junior lien loans. The lien position the Firm holds is considered in the Firm's allowance for credit losses. Revolving loans that have been converted to term loans have higher delinquency rates than those that are still within the revolving period. That is primarily because the fully-amortizing payment that is generally required for those products is higher than the minimum payment options available for revolving loans within the revolving period.

Nonaccrual loans and other credit quality indicators

The following table provides information on nonaccrual and other credit quality indicators for retained residential real estate loans.

(in millions, except weighted-average data)	**December 31, 2022**	December 31, 2021
Nonaccrual loans[(a)(b)(c)(d)(e)]	**$ 3,745**	$ 4,759
Current estimated LTV ratios[(f)(g)(h)]		
Greater than 125% and refreshed FICO scores:		
Equal to or greater than 660	**$ 2**	$ 2
Less than 660	**—**	2
101% to 125% and refreshed FICO scores:		
Equal to or greater than 660	**174**	37
Less than 660	**6**	15
80% to 100% and refreshed FICO scores:		
Equal to or greater than 660	**12,034**	2,701
Less than 660	**184**	89
Less than 80% and refreshed FICO scores:		
Equal to or greater than 660	**215,096**	209,295
Less than 660	**8,659**	9,658
No FICO/LTV available	**1,360**	2,930
U.S. government-guaranteed	**46**	66
Total retained loans	**$ 237,561**	$ 224,795
Weighted average LTV ratio[(f)(i)]	**51 %**	50 %
Weighted average FICO[(g)(i)]	**769**	765
Geographic region[(j)]		
California	**$ 73,111**	$ 71,383
New York	**34,469**	32,545
Florida	**18,868**	16,182
Texas	**14,961**	13,865
Illinois	**11,293**	11,565
Colorado	**9,968**	8,885
Washington	**9,059**	8,292
New Jersey	**7,106**	6,832
Massachusetts	**6,379**	6,105
Connecticut	**5,432**	5,242
All other	**46,915**	43,899
Total retained loans	**$ 237,561**	$ 224,795

(a) Includes collateral-dependent residential real estate loans that are charged down to the fair value of the underlying collateral less costs to sell. The Firm reports, in accordance with regulatory guidance, residential real estate loans that have been discharged under Chapter 7 bankruptcy and not reaffirmed by the borrower ("Chapter 7 loans") as collateral-dependent nonaccrual TDRs, regardless of their delinquency status. At December 31, 2022, approximately 5% of Chapter 7 residential real estate loans were 30 days or more past due.

(b) Nonaccrual loans exclude mortgage loans insured by U.S. government agencies which were not material at December 31, 2022 and 2021.

(c) Generally, all consumer nonaccrual loans have an allowance. In accordance with regulatory guidance, certain nonaccrual loans that are considered collateral-dependent have been charged down to the lower of amortized cost or the fair value of their underlying collateral less costs to sell. If the value of the underlying collateral improves subsequent to charge down, the related allowance may be negative.

(d) Interest income on nonaccrual loans recognized on a cash basis was $175 million and $172 million for the years ended December 31, 2022 and 2021, respectively.

(e) Generally excludes loans under payment deferral programs offered in response to the COVID-19 pandemic.

(f) Represents the aggregate unpaid principal balance of loans divided by the estimated current property value. Current property values are estimated, at a minimum, quarterly, based on home valuation models using nationally recognized home price index valuation estimates incorporating actual data to the extent available and forecasted data where actual data is not available. Current estimated combined LTV for junior lien home equity loans considers all available lien positions, as well as unused lines, related to the property.

(g) Refreshed FICO scores represent each borrower's most recent credit score, which is obtained by the Firm on at least a quarterly basis.

(h) Includes residential real estate loans, primarily held in LLCs in AWM that did not have a refreshed FICO score. These loans have been included in a FICO band based on management's estimation of the borrower's credit quality.

(i) Excludes loans with no FICO and/or LTV data available.

(j) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2022.

Loan modifications

Modifications of residential real estate loans, where the Firm grants concessions to borrowers who are experiencing financial difficulty are generally accounted for and reported as TDRs. Loans with short-term or other insignificant modifications that are not considered concessions are not TDRs. The carrying value of new TDRs was $362 million, $866 million and $819 million for the years ended December 31, 2022, 2021 and 2020, respectively. There were no additional commitments to lend to borrowers whose residential real estate loans have been modified in TDRs.

Nature and extent of modifications

The Firm's proprietary modification programs as well as government programs, including U.S. GSE programs, generally provide various concessions to financially troubled borrowers including, but not limited to, interest rate reductions, term or payment extensions and delays of principal and/or interest payments that would otherwise have been required under the terms of the original agreement. The following table provides information about how residential real estate loans were modified in TDRs under the Firm's loss mitigation programs described above during the periods presented. This table excludes Chapter 7 loans where the sole concession granted is the discharge of debt and loans with short-term or other insignificant modifications that are not considered concessions.

Year ended December 31,	**2022**	2021	2020
Number of loans approved for a trial modification	**3,902**	6,246	5,522
Number of loans permanently modified	**4,182**	4,588	6,850
Concession granted:[(a)]			
Interest rate reduction	**54 %**	74 %	50 %
Term or payment extension	**67**	53	49
Principal and/or interest deferred	**10**	23	14
Principal forgiveness	**1**	2	2
Other[(b)]	**37**	36	66

(a) Represents concessions granted in permanent modifications as a percentage of the number of loans permanently modified. The sum of the percentages exceeds 100% because predominantly all of the modifications include more than one type of concession. Concessions offered on trial modifications are generally consistent with those granted on permanent modifications.

(b) Includes variable interest rate to fixed interest rate modifications and payment delays that meet the definition of a TDR.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the various concessions granted in modifications of residential real estate loans under the loss mitigation programs described above and about redefaults of certain loans modified in TDRs for the periods presented. The following table presents only the financial effects of permanent modifications and do not include temporary concessions offered through trial modifications. This table also excludes Chapter 7 loans where the sole concession granted is the discharge of debt and loans with short-term or other insignificant modifications that are not considered concessions.

Year ended December 31, (in millions, except weighted - average data)	**2022**	2021	2020
Weighted-average interest rate of loans with interest rate reductions – before TDR	**4.75 %**	4.54 %	5.09 %
Weighted-average interest rate of loans with interest rate reductions – after TDR	**3.35**	2.92	3.28
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – before TDR	**22**	23	22
Weighted-average remaining contractual term (in years) of loans with term or payment extensions – after TDR	**38**	38	39
Charge-offs recognized upon permanent modification	**$ 1**	$ –	$ 5
Principal deferred	**16**	28	16
Principal forgiven	**2**	1	5
Balance of loans that redefaulted within one year of permanent modification[(a)]	**$ 147**	$ 160	$ 199

(a) Represents loans permanently modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The dollar amounts presented represent the balance of such loans at the end of the reporting period in which such loans defaulted. For residential real estate loans modified in TDRs, payment default is deemed to occur when the loan becomes two contractual payments past due. In the event that a modified loan redefaults, it will generally be liquidated through foreclosure or another similar type of liquidation transaction. Redefaults of loans modified within the last twelve months may not be representative of ultimate redefault levels.

At December 31, 2022, the weighted-average estimated remaining lives of residential real estate loans permanently modified in TDRs were six years. The estimated remaining lives of these loans reflect estimated prepayments, both voluntary and involuntary (i.e., foreclosures and other forced liquidations).

Active and suspended foreclosure

At December 31, 2022 and 2021, the Firm had residential real estate loans, excluding those insured by U.S. government agencies, with a carrying value of $565 million and $619 million, respectively, that were not included in REO, but were in the process of active or suspended foreclosure.

Auto and other

The following tables provide information on delinquency, which is the primary credit quality indicator for retained auto and other consumer loans.

	December 31, 2022								
	Term loans by origination year						Revolving loans		
(in millions, except ratios)	2022	2021	2020	2019	2018	Prior to 2018	Within the revolving period	Converted to term loans	Total
Loan delinquency									
Current	**$ 22,187**	**$ 20,212** [b]	**$ 11,401** [b]	**$ 3,991**	**$ 1,467**	**$ 578**	**$ 2,342**	**$ 118**	**$ 62,296**
30–119 days past due	**263**	**308**	**100**	**68**	**33**	**17**	**12**	**10**	**811**
120 or more days past due	**–**	**53**	**24**	**–**	**–**	**1**	**2**	**5**	**85**
Total retained loans	**$ 22,450**	**$ 20,573**	**$ 11,525**	**$ 4,059**	**$ 1,500**	**$ 596**	**$ 2,356**	**$ 133**	**$ 63,192**
% of 30+ days past due to total retained loans[a]	**1.17 %**	**1.15 %**	**0.83 %**	**1.68 %**	**2.20 %**	**3.02 %**	**0.59 %**	**11.28 %**	**1.18 %**

	December 31, 2021								
	Term loans by origination year						Revolving loans		
(in millions, except ratios)	2021	2020	2019	2018	2017	Prior to 2017	Within the revolving period	Converted to term loans	Total
Loan delinquency									
Current	$ 35,323 [c]	$ 18,324 [c]	$ 7,443	$ 3,671	$ 1,800	$ 666	$ 2,242	$ 120	$69,589
30–119 days past due	192	720	88	53	31	21	12	6	1,123
120 or more days past due	–	35	–	–	1	1	5	7	49
Total retained loans	$ 35,515	$ 19,079	$ 7,531	$ 3,724	$ 1,832	$ 688	$ 2,259	$ 133	$70,761
% of 30+ days past due to total retained loans[a]	0.54 %	0.47 %	1.17 %	1.42 %	1.75 %	3.20 %	0.75 %	9.77 %	0.71 % [d]

(a) At December 31, 2022 and 2021, auto and other loans excluded $153 million and $667 million, respectively, of PPP loans guaranteed by the SBA that are 30 or more days past due. These amounts have been excluded based upon the SBA guarantee.

(b) Includes $252 million of loans originated in 2021 and $98 million of loans originated in 2020 in Business Banking under the PPP. PPP loans are guaranteed by the SBA. Other than in certain limited circumstances, the Firm typically does not recognize charge-offs, classify as nonaccrual nor record an allowance for loan losses on these loans.

(c) Includes $4.4 billion of loans originated in 2021 and $1.0 billion of loans originated in 2020 in Business Banking under the PPP.

(d) Prior-period amount has been revised to conform with the current presentation.

Nonaccrual and other credit quality indicators

The following table provides information on nonaccrual and other credit quality indicators for retained auto and other consumer loans.

	Total Auto and other	
(in millions)	**December 31, 2022**	December 31, 2021
Nonaccrual loans[(a)(b)(c)]	**$ 129**	$ 119
Geographic region[(d)]		
California	**$ 9,689**	$ 11,163
Texas	**7,216**	7,859
Florida	**4,847**	4,901
New York	**4,345**	5,848
Illinois	**2,839**	2,930
New Jersey	**2,219**	2,355
Pennsylvania	**1,822**	2,004
Georgia	**1,708**	1,748
Ohio	**1,603**	1,843
Louisiana	**1,576**	1,801
All other	**25,328**	28,309
Total retained loans	**$ 63,192**	$ 70,761

(a) At December 31, 2022 and 2021, nonaccrual loans excluded $101 million and $506 million, respectively, of PPP loans 90 or more days past due and guaranteed by the SBA, of which $76 million and $35 million, respectively, were no longer accruing interest based on the guidelines set by the SBA. Typically the principal balance of the loans is insured and interest is guaranteed at a specified reimbursement rate subject to meeting the guidelines set by the SBA. There were no loans that were not guaranteed by the SBA that are 90 or more days past due and still accruing interest at December 31, 2022 and 2021.

(b) Generally, all consumer nonaccrual loans have an allowance. In accordance with regulatory guidance, certain nonaccrual loans that are considered collateral-dependent have been charged down to the lower of amortized cost or the fair value of their underlying collateral less costs to sell. If the value of the underlying collateral improves subsequent to charge down, the related allowance may be negative.

(c) Interest income on nonaccrual loans recognized on a cash basis was not material for the years ended December 31, 2022 and 2021.

(d) The geographic regions presented in this table are ordered based on the magnitude of the corresponding loan balances at December 31, 2022.

Loan modifications

Certain auto and other loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. Loans with short-term or other insignificant modifications that are not considered concessions are not TDRs.

The impact of these modifications, as well as new TDRs, were not material to the Firm for the years ended December 31, 2022, 2021 and 2020. Additional commitments to lend to borrowers whose loans have been modified in TDRs as of December 31, 2022 and 2021 were not material.

Credit card loan portfolio

The credit card portfolio segment includes credit card loans originated and purchased by the Firm. Delinquency rates are the primary credit quality indicator for credit card loans as they provide an early warning that borrowers may be experiencing difficulties (30 days past due); information on those borrowers that have been delinquent for a longer period of time (90 days past due) is also considered. In addition to delinquency rates, the geographic distribution of the loans provides insight as to the credit quality of the portfolio based on the regional economy.

While the borrower's credit score is another general indicator of credit quality, the Firm does not view credit scores as a primary indicator of credit quality because the borrower's credit score tends to be a lagging indicator. The distribution of such scores provides a general indicator of credit quality trends within the portfolio; however, the score does not capture all factors that would be predictive of future credit performance. Refreshed FICO score information, which is obtained at least quarterly, for a statistically significant random sample of the credit card portfolio is indicated in the following table. FICO is considered to be the industry benchmark for credit scores.

The Firm generally originates new credit card accounts to prime consumer borrowers. However, certain cardholders' FICO scores may decrease over time, depending on the performance of the cardholder and changes in the credit score calculation.

The following tables provide information on delinquency, which is the primary credit quality indicator for retained credit card loans.

	December 31, 2022		
(in millions, except ratios)	Within the revolving period	Converted to term loans[a]	Total
Loan delinquency			
Current and less than 30 days past due and still accruing	**$ 181,793**	**$ 696**	**$ 182,489**
30–89 days past due and still accruing	**1,356**	**64**	**1,420**
90 or more days past due and still accruing	**1,230**	**36**	**1,266**
Total retained loans	**$ 184,379**	**$ 796**	**$ 185,175**
Loan delinquency ratios			
% of 30+ days past due to total retained loans	**1.40 %**	**12.56 %**	**1.45 %**
% of 90+ days past due to total retained loans	**0.67**	**4.52**	**0.68**

	December 31, 2021		
(in millions, except ratios)	Within the revolving period	Converted to term loans[a]	Total
Loan delinquency			
Current and less than 30 days past due and still accruing	$ 151,798	$ 901	$ 152,699
30–89 days past due and still accruing	770	59	829
90 or more days past due and still accruing	741	27	768
Total retained loans	$ 153,309	$ 987	$ 154,296
Loan delinquency ratios			
% of 30+ days past due to total retained loans	0.99 %	8.71 %	1.04 %
% of 90+ days past due to total retained loans	0.48	2.74	0.50

[a] Represents TDRs.

Other credit quality indicators

The following table provides information on other credit quality indicators for retained credit card loans.

(in millions, except ratios)	December 31, 2022	December 31, 2021
Geographic region[(a)]		
California	**$ 28,154**	$ 23,030
Texas	**19,171**	15,879
New York	**15,046**	12,652
Florida	**12,905**	10,412
Illinois	**10,089**	8,530
New Jersey	**7,643**	6,367
Ohio	**5,792**	4,923
Pennsylvania	**5,517**	4,708
Colorado	**5,493**	4,573
Arizona	**4,487**	3,668
All other	**70,878**	59,554
Total retained loans	**$ 185,175**	$ 154,296
Percentage of portfolio based on carrying value with estimated refreshed FICO scores		
Equal to or greater than 660	**86.8 %**	88.5 %
Less than 660	**13.0**	11.3
No FICO available	**0.2**	0.2

(a) The geographic regions presented in the table are ordered based on the magnitude of the corresponding loan balances at December 31, 2022.

Loan modifications

The Firm may offer loan modification programs granting concessions to credit card borrowers who are experiencing financial difficulty. The Firm grants concessions for most of the credit card loans under long-term programs. These modifications involve placing the customer on a fixed payment plan, generally for 60 months, and typically include reducing the interest rate on the credit card. Substantially all modifications under the Firm's long-term programs are considered to be TDRs. Loans with short-term or other insignificant modifications that are not considered concessions are not TDRs.

If the cardholder does not comply with the modified payment terms, then the credit card loan continues to age and will ultimately be charged-off in accordance with the Firm's standard charge-off policy. In most cases, the Firm does not reinstate the borrower's line of credit.

Financial effects of modifications and redefaults

The following table provides information about the financial effects of the concessions granted on credit card loans modified in TDRs and redefaults for the periods presented. For all periods disclosed, new enrollments were less than 1% of total retained credit card loans.

Year ended December 31, (in millions, except weighted-average data)	2022	2021	2020
Balance of new TDRs[(a)]	**$ 418**	$ 393	$ 818
Weighted-average interest rate of loans – before TDR	**19.86 %**	17.75 %	18.04 %
Weighted-average interest rate of loans – after TDR	**4.13**	5.14	4.64
Balance of loans that redefaulted within one year of modification[(b)]	**$ 34**	$ 57	$ 110

(a) Represents the outstanding balance prior to modification.

(b) Represents loans modified in TDRs that experienced a payment default in the periods presented, and for which the payment default occurred within one year of the modification. The amounts presented represent the balance of such loans as of the end of the quarter in which they defaulted.

For credit card loans modified in TDRs, payment default is deemed to have occurred when the borrower misses two consecutive contractual payments. Defaulted modified credit card loans remain in the modification program and continue to be charged off in accordance with the Firm's standard charge-off policy.

Wholesale loan portfolio

Wholesale loans include loans made to a variety of clients, ranging from large corporate and institutional clients to high-net-worth individuals.

The primary credit quality indicator for wholesale loans is the internal risk rating assigned to each loan. Risk ratings are used to identify the credit quality of loans and differentiate risk within the portfolio. Risk ratings on loans consider the PD and the LGD. The PD is the likelihood that a loan will default. The LGD is the estimated loss on the loan that would be realized upon the default of the borrower and takes into consideration collateral and structural support for each credit facility.

Management considers several factors to determine an appropriate internal risk rating, including the obligor's debt capacity and financial flexibility, the level of the obligor's earnings, the amount and sources for repayment, the level and nature of contingencies, management strength, and the industry and geography in which the obligor operates. The Firm's internal risk ratings generally align with the qualitative characteristics (e.g., borrower capacity to meet financial commitments and vulnerability to changes in the economic environment) defined by S&P and Moody's, however the quantitative characteristics (e.g., PD and LGD) may differ as they reflect internal historical experiences and assumptions. The Firm generally considers internal ratings with qualitative characteristics equivalent to BBB-/Baa3 or higher as investment grade, and these ratings have a lower PD and/or lower LGD than non-investment grade ratings.

Noninvestment-grade ratings are further classified as noncriticized and criticized, and the criticized portion is further subdivided into performing and nonaccrual loans, representing management's assessment of the collectibility of principal and interest. Criticized loans have a higher PD than noncriticized loans. The Firm's definition of criticized aligns with the U.S. banking regulatory definition of criticized exposures, which consist of special mention, substandard and doubtful categories.

Risk ratings are reviewed on a regular and ongoing basis by Credit Risk Management and are adjusted as necessary for updated information affecting the obligor's ability to fulfill its obligations.

As noted above, the risk rating of a loan considers the industry in which the obligor conducts its operations. As part of the overall credit risk management framework, the Firm focuses on the management and diversification of its industry and client exposures, with particular attention paid to industries with an actual or potential credit concern. Refer to Note 4 for further detail on industry concentrations.

The following tables provide information on internal risk rating, which is the primary credit quality indicator for retained wholesale loans.

December 31, (in millions, except ratios)	Secured by real estate		Commercial and industrial		Other[b]		Total retained loans	
	2022	2021	2022	2021	2022	2021	2022	2021
Loans by risk ratings								
Investment-grade	$ 99,552	$ 92,369	$ 76,275	$ 75,783	$ 249,585	$ 241,859	$ 425,412	$ 410,011
Noninvestment- grade:								
Noncriticized	23,272	22,495	81,393	62,039	57,888	52,440	162,553	136,974
Criticized performing	3,662	3,645	8,974	6,900	1,106	770	13,742	11,315
Criticized nonaccrual[a]	246	326	1,018	969	699	759	1,963	2,054
Total noninvestment- grade	27,180	26,466	91,385	69,908	59,693	53,969	178,258	150,343
Total retained loans	$ 126,732	$ 118,835	$ 167,660	$ 145,691	$ 309,278	$ 295,828	$ 603,670	$ 560,354
% of investment-grade to total retained loans	78.55 %	77.73 %	45.49 %	52.02 %	80.70 %	81.76 %	70.47 %	73.17 %
% of total criticized to total retained loans	3.08	3.34	5.96	5.40	0.58	0.52	2.60	2.39
% of criticized nonaccrual to total retained loans	0.19	0.27	0.61	0.67	0.23	0.26	0.33	0.37

(a) At December 31, 2021 nonaccrual loans excluded $127 million of PPP loans 90 or more days past due and guaranteed by the SBA, predominantly in commercial and industrial. At December 31, 2022 the amount excluded was not material.

(b) Includes loans to financial institutions, states and political subdivisions, SPEs, nonprofits, personal investment companies and trusts, as well as loans to individuals and individual entities (predominantly Global Private Bank clients within AWM and J.P. Morgan Wealth Management within CCB). Refer to Note 14 for more information on SPEs.

	Secured by real estate								
	December 31, 2022								
	Term loans by origination year						Revolving loans		
(in millions)	2022	2021	2020	2019	2018	Prior to 2018	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	$ 24,134	$ 22,407	$ 14,773	$ 14,666	$ 5,277	$ 17,289	$ 1,006	$ —	$ 99,552
Noninvestment-grade	6,072	5,602	3,032	3,498	2,395	5,659	920	2	27,180
Total retained loans	$ 30,206	$ 28,009	$ 17,805	$ 18,164	$ 7,672	$ 22,948	$ 1,926	$ 2	$ 126,732

	Secured by real estate								
	December 31, 2021								
	Term loans by origination year						Revolving loans		
(in millions)	2021	2020	2019	2018	2017	Prior to 2017	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	$ 23,346	$ 16,030	$ 17,265	$ 8,103	$ 7,325	$ 19,066	$ 1,226	$ 8	$ 92,369
Noninvestment-grade	5,364	3,826	4,564	3,806	2,834	5,613	458	1	26,466
Total retained loans	$ 28,710	$ 19,856	$ 21,829	$ 11,909	$ 10,159	$ 24,679	$ 1,684	$ 9	$ 118,835

	Commercial and industrial								
	December 31, 2022								
	Term loans by origination year						Revolving loans		
(in millions)	2022	2021	2020	2019	2018	Prior to 2018	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	**$ 21,072**	**$ 8,338**	**$ 3,045**	**$ 1,995**	**$ 748**	**$ 989**	**$ 40,087**	**$ 1**	**$ 76,275** [(a)]
Noninvestment-grade	**24,088**	**12,444**	**3,459**	**2,506**	**525**	**1,014**	**47,267**	**82**	**91,385**
Total retained loans	**$ 45,160**	**$ 20,782**	**$ 6,504**	**$ 4,501**	**$ 1,273**	**$ 2,003**	**$ 87,354**	**$ 83**	**$ 167,660**

	Commercial and industrial								
	December 31, 2021								
	Term loans by origination year						Revolving loans		
(in millions)	2021	2020	2019	2018	2017	Prior to 2017	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	$ 21,342	$ 6,268	$ 3,609	$ 1,269	$ 1,108	$ 819	$ 41,367	$ 1	$ 75,783 [(b)]
Noninvestment-grade	19,314	7,112	4,559	2,177	930	430	35,312	74	69,908
Total retained loans	$ 40,656	$ 13,380	$ 8,168	$ 3,446	$ 2,038	$ 1,249	$ 76,679	$ 75	$ 145,691

(a) At December 31, 2022, $139 million of the $140 million total PPP loans in the wholesale portfolio were commercial and industrial. Of the $139 million, $58 million were originated in 2021, and $81 million were originated in 2020. PPP loans are guaranteed by the SBA and considered investment-grade. Other than in certain limited circumstances, the Firm typically does not recognize charge-offs, classify as nonaccrual nor record an allowance for loan losses on these loans.

(b) At December 31, 2021, $1.1 billion of the $1.3 billion total PPP loans in the wholesale portfolio were commercial and industrial. Of the $1.1 billion, $698 million were originated in 2021 and $396 million were originated in 2020.

	Other[(a)]								
	December 31, 2022								
	Term loans by origination year						Revolving loans		
(in millions)	2022	2021	2020	2019	2018	Prior to 2018	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	**$ 32,121**	**$ 15,864**	**$ 13,015**	**$ 4,529**	**$ 2,159**	**$ 7,251**	**$ 171,049**	**$ 3,597**	**$ 249,585**
Noninvestment-grade	**16,829**	**7,096**	**1,821**	**699**	**451**	**475**	**32,240**	**82**	**59,693**
Total retained loans	**$ 48,950**	**$ 22,960**	**$ 14,836**	**$ 5,228**	**$ 2,610**	**$ 7,726**	**$ 203,289**	**$ 3,679**	**$ 309,278**

	Other[(a)]								
	December 31, 2021								
	Term loans by origination year						Revolving loans		
(in millions)	2021	2020	2019	2018	2017	Prior to 2017	Within the revolving period	Converted to term loans	Total
Loans by risk ratings									
Investment-grade	$ 26,782	$ 17,829	$ 6,125	$ 2,885	$ 3,868	$ 7,651	$ 176,118	$ 601	$ 241,859
Noninvestment-grade	16,905	2,399	1,455	935	218	467	31,585	5	53,969
Total retained loans	$ 43,687	$ 20,228	$ 7,580	$ 3,820	$ 4,086	$ 8,118	$ 207,703	$ 606	$ 295,828

(a) Includes loans to financial institutions, states and political subdivisions, SPEs, nonprofits, personal investment companies and trusts, as well as loans to individuals and individual entities (predominantly Global Private Bank clients within AWM and J.P. Morgan Wealth Management within CCB). Refer to Note 14 for more information on SPEs.

The following table presents additional information on retained loans secured by real estate within the Wholesale portfolio, which consists of loans secured wholly or substantially by a lien or liens on real property at origination. Multifamily lending includes financing for acquisition, leasing and construction of apartment buildings. Other commercial lending largely includes financing for acquisition, leasing and construction, largely for office, retail and industrial real estate. Included in secured by real estate loans is $6.4 billion and $5.7 billion as of December 31, 2022 and 2021, respectively, of construction and development loans made to finance land development and on-site construction of commercial, industrial, residential, or farm buildings.

December 31, (in millions, except ratios)	Multifamily		Other Commercial		Total retained loans secured by real estate	
	2022	2021	**2022**	2021	**2022**	2021
Retained loans secured by real estate	**$ 79,139**	$ 73,801	**$ 47,593**	$ 45,034	**$ 126,732**	$ 118,835
Criticized	**1,916**	1,671	**1,992**	2,300	**3,908**	3,971
% of criticized to total retained loans secured by real estate	**2.42 %**	2.26 %	**4.19 %**	5.11 %	**3.08 %**	3.34 %
Criticized nonaccrual	**$ 51**	$ 91	**$ 195**	$ 235	**$ 246**	$ 326
% of criticized nonaccrual loans to total retained loans secured by real estate	**0.06 %**	0.12 %	**0.41 %**	0.52 %	**0.19 %**	0.27 %

Geographic distribution and delinquency

The following table provides information on the geographic distribution and delinquency for retained wholesale loans.

December 31, (in millions)	Secured by real estate		Commercial and industrial		Other		Total retained loans	
	2022	2021	**2022**	2021	**2022**	2021	**2022**	2021
Loans by geographic distribution[(a)]								
Total U.S.	**$ 123,740**	$ 115,732	**$ 125,324**	$ 106,449	**$ 230,525**	$ 215,750	**$ 479,589**	$ 437,931
Total non-U.S.	**2,992**	3,103	**42,336**	39,242	**78,753**	80,078	**124,081**	122,423
Total retained loans	**$ 126,732**	$ 118,835	**$ 167,660**	$ 145,691	**$ 309,278**	$ 295,828	**$ 603,670**	$ 560,354
Loan delinquency								
Current and less than 30 days past due and still accruing	**$ 126,083**	$ 118,163	**$ 165,415**	$ 143,459	**$ 307,511**	$ 293,358	**$ 599,009**	$ 554,980
30–89 days past due and still accruing	**402**	331	**1,127**	1,193	**1,015**	1,590	**2,544**	3,114
90 or more days past due and still accruing[(b)]	**1**	15	**100**	70	**53**	121	**154**	206
Criticized nonaccrual[(c)]	**246**	326	**1,018**	969	**699**	759	**1,963**	2,054
Total retained loans	**$ 126,732**	$ 118,835	**$ 167,660**	$ 145,691	**$ 309,278**	$ 295,828	**$ 603,670**	$ 560,354

(a) The U.S. and non-U.S. distribution is determined based predominantly on the domicile of the borrower.
(b) Represents loans that are considered well-collateralized and therefore still accruing interest.
(c) At December 31, 2021 nonaccrual loans excluded $127 million of PPP loans 90 or more days past due and guaranteed by the SBA, predominantly in commercial and industrial. At December 31, 2022 the amount excluded was not material.

Nonaccrual loans

The following table provides information on retained wholesale nonaccrual loans.

December 31, (in millions)	Secured by real estate		Commercial and industrial		Other		Total retained loans	
	2022	2021	**2022**	2021	**2022**	2021	**2022**	2021
Nonaccrual loans								
With an allowance	**$ 172**	$ 254	**$ 686**	$ 604	**$ 487**	$ 286	**$ 1,345**	$ 1,144
Without an allowance[(a)]	**74**	72	**332**	365	**212**	473	**618**	910
Total nonaccrual loans[(b)]	**$ 246**	$ 326	**$ 1,018**	$ 969	**$ 699**	$ 759	**$ 1,963**	$ 2,054

(a) When the discounted cash flows or collateral value equals or exceeds the amortized cost of the loan, the loan does not require an allowance. This typically occurs when the loans have been partially charged off and/or there have been interest payments received and applied to the loan balance.
(b) Interest income on nonaccrual loans recognized on a cash basis were not material for the years ended December 31, 2022 and 2021.

Loan modifications

Certain loan modifications are considered to be TDRs as they provide various concessions to borrowers who are experiencing financial difficulty. Loans with short-term or other insignificant modifications that are not considered concessions are not TDRs nor are loans for which the Firm has elected to suspend TDR accounting guidance under the option provided by the CARES Act. New TDRs during the years ended December 31, 2022, 2021 and 2020 were $801 million, $881 million and $734 million, respectively. New TDRs during the years ended December 31, 2022, 2021 and 2020 reflected the extension of maturity dates, covenant waivers, receipt of assets in partial satisfaction of the loan and deferral of principal and interest payments, predominantly in the Commercial and Industrial and Other loan classes. The impact of these modifications resulting in new TDRs was not material to the Firm for the years ended December 31, 2022, 2021 and 2020.

The carrying value of TDRs was $936 million and $607 million as of December 31, 2022 and 2021, respectively.

Note 13 – Allowance for credit losses

The Firm's allowance for credit losses represents management's estimate of expected credit losses over the remaining expected life of the Firm's financial assets measured at amortized cost and certain off-balance sheet lending-related commitments. The allowance for credit losses comprises:

- the allowance for loan losses, which covers the Firm's retained loan portfolios (scored and risk-rated) and is presented separately on the Consolidated balance sheets,
- the allowance for lending-related commitments, which is presented on the Consolidated balance sheets in accounts payable and other liabilities, and
- the allowance for credit losses on investment securities, which is reflected in investment securities on the Consolidated balance sheets.

The income statement effect of all changes in the allowance for credit losses is recognized in the provision for credit losses.

Determining the appropriateness of the allowance for credit losses is complex and requires significant judgment by management about the effect of matters that are inherently uncertain. At least quarterly, the allowance for credit losses is reviewed by the CRO, the CFO and the Controller of the Firm. Subsequent evaluations of credit exposures, considering the macroeconomic conditions, forecasts and other factors then prevailing, may result in significant changes in the allowance for credit losses in future periods.

The Firm's policies used to determine its allowance for loan losses and its allowance for lending-related commitments are described in the following paragraphs. Refer to Note 10 for a description of the policies used to determine the allowance for credit losses on investment securities.

Methodology for allowances for loan losses and lending-related commitments

The allowance for loan losses and allowance for lending-related commitments represents expected credit losses over the remaining expected life of retained loans and lending-related commitments that are not unconditionally cancellable. The Firm does not record an allowance for future draws on unconditionally cancellable lending-related commitments (e.g., credit cards). Expected losses related to accrued interest on credit card loans are considered in the Firm's allowance for loan losses. However, the Firm does not record an allowance on other accrued interest receivables, due to its policy to write these receivables off no later than 90 days past due by reversing interest income.

The expected life of each instrument is determined by considering its contractual term, expected prepayments, cancellation features, and certain extension and call options. The expected life of funded credit card loans is generally estimated by considering expected future payments on the credit card account, and determining how much of those amounts should be allocated to repayments of the funded loan balance (as of the balance sheet date) versus other account activity. This allocation is made using an approach that incorporates the payment application requirements of the Credit Card Accountability Responsibility and Disclosure Act of 2009, generally paying down the highest interest rate balances first.

The estimate of expected credit losses includes expected recoveries of amounts previously charged off or expected to be charged off, even if such recoveries result in a negative allowance.

Collective and Individual Assessments

When calculating the allowance for loan losses and the allowance for lending-related commitments, the Firm assesses whether exposures share similar risk characteristics. If similar risk characteristics exist, the Firm estimates expected credit losses collectively, considering the risk associated with a particular pool and the probability that the exposures within the pool will deteriorate or default. The assessment of risk characteristics is subject to significant management judgment. Emphasizing one characteristic over another or considering additional characteristics could affect the allowance.

- Relevant risk characteristics for the consumer portfolio include product type, delinquency status, current FICO scores, geographic distribution, and, for collateralized loans, current LTV ratios.
- Relevant risk characteristics for the wholesale portfolio include risk rating, delinquency status, tenor, level and type of collateral, LOB, geography, industry, credit enhancement, product type, facility purpose, and payment terms.

The majority of the Firm's credit exposures share risk characteristics with other similar exposures, and as a result are collectively assessed for impairment ("portfolio-based component"). The portfolio-based component covers consumer loans, performing risk-rated loans and certain lending-related commitments.

If an exposure does not share risk characteristics with other exposures, the Firm generally estimates expected credit losses on an individual basis, considering expected repayment and conditions impacting that individual exposure ("asset-specific component"). The asset-specific component covers modified PCD loans, loans modified or reasonably expected to be modified in a TDR, collateral-dependent loans, as well as, risk-rated loans that have been placed on nonaccrual status.

Portfolio-based component

The portfolio-based component begins with a quantitative calculation that considers the likelihood of the borrower changing delinquency status or moving from one risk rating to another. The quantitative calculation covers expected credit losses over an instrument's expected life and is estimated by applying credit loss factors to the Firm's estimated exposure at default. The credit loss factors incorporate the probability of borrower default as well as loss severity in the event of default. They are derived using a weighted average of five internally developed macroeconomic scenarios over an eight-quarter forecast period, followed by a single year straight-line interpolation to revert to long run historical information for periods beyond the eight-quarter forecast period. The five macroeconomic scenarios consist of a central, relative adverse, extreme adverse, relative upside and extreme upside scenario, and are updated by the Firm's central forecasting team. The scenarios take into consideration the Firm's macroeconomic outlook, internal perspectives from subject matter experts across the Firm, and market consensus and involve a governed process that incorporates feedback from senior management across LOBs, Corporate Finance and Risk Management.

The quantitative calculation is adjusted to take into consideration model imprecision, emerging risk assessments, trends and other subjective factors that are not yet reflected in the calculation. These adjustments are accomplished in part by analyzing the historical loss experience, including during stressed periods, for each major product or model. Management applies judgment in making this adjustment, including taking into account uncertainties associated with the economic and political conditions, quality of underwriting standards, borrower behavior, credit concentrations or deterioration within an industry, product or portfolio, as well as other relevant internal and external factors affecting the credit quality of the portfolio. In certain instances, the interrelationships between these factors create further uncertainties.

The application of different inputs into the quantitative calculation, and the assumptions used by management to adjust the quantitative calculation, are subject to significant management judgment, and emphasizing one input or assumption over another, or considering other inputs or assumptions, could affect the estimate of the allowance for loan losses and the allowance for lending-related commitments.

Asset-specific component

To determine the asset-specific component of the allowance, collateral-dependent loans (including those loans for which foreclosure is probable) and larger, nonaccrual risk-rated loans in the wholesale portfolio segment are generally evaluated individually, while smaller loans (both scored and risk-rated) are aggregated for evaluation using factors relevant for the respective class of assets.

The Firm generally measures the asset-specific allowance as the difference between the amortized cost of the loan and the present value of the cash flows expected to be collected, discounted at the loan's original effective interest rate. Subsequent changes in impairment are generally recognized as an adjustment to the allowance for loan losses. For collateral-dependent loans, the fair value of collateral less estimated costs to sell is used to determine the charge-off amount for declines in value (to reduce the amortized cost of the loan to the fair value of collateral) or the amount of negative allowance that should be recognized (for recoveries of prior charge-offs associated with improvements in the fair value of collateral).

The asset-specific component of the allowance for loans that have been or are expected to be modified in TDRs incorporates the effect of the modification on the loan's expected cash flows (including forgone interest, principal forgiveness, as well as other concessions), and also the potential for redefault. For residential real estate loans modified in or expected to be modified in TDRs, the Firm develops product-specific probability of default estimates, which are applied at a loan level to compute expected losses. In developing these probabilities of default, the Firm considers the relationship between the credit quality characteristics of the underlying loans and certain assumptions about housing prices and unemployment, based upon industry-wide data. The Firm also considers its own historical loss experience to-date based on actual redefaulted modified loans. For credit card loans modified in or expected to be modified in TDRs, expected losses incorporate projected delinquencies and charge-offs based on the Firm's historical experience by type of modification program. For wholesale loans modified or expected to be modified in TDRs, expected losses incorporate management's expectation of the borrower's ability to repay under the modified terms.

Estimating the timing and amounts of future cash flows is highly judgmental as these cash flow projections rely upon estimates such as loss severities, asset valuations, default rates (including redefault rates on modified loans), the amounts and timing of interest or principal payments (including any expected prepayments) or other factors that are reflective of current and expected market conditions. These estimates are, in turn, dependent on factors such as the duration of current overall economic conditions, industry, portfolio, or borrower-specific factors, the expected outcome of insolvency proceedings as well as, in certain circumstances, other economic factors. All of these estimates and assumptions require significant management judgment and certain assumptions are highly subjective.

Allowance for credit losses and related information

The table below summarizes information about the allowances for credit losses, and includes a breakdown of loans and lending-related commitments by impairment methodology. Refer to Note 10 for further information on the allowance for credit losses on investment securities.

(Table continued on next page)

	2022			
Year ended December 31, (in millions)	Consumer, excluding credit card	Credit card	Wholesale	Total
Allowance for loan losses				
Beginning balance at January 1,	$ 1,765	$ 10,250	$ 4,371	$ 16,386
Cumulative effect of a change in accounting principle[(a)]	NA	NA	NA	NA
Gross charge-offs	812	3,192	322	4,326
Gross recoveries collected	(543)	(789)	(141)	(1,473)
Net charge-offs	269	2,403	181	2,853
Provision for loan losses	543	3,353	2,293	6,189
Other	1	–	3	4
Ending balance at December 31,	$ 2,040	$ 11,200	$ 6,486	$ 19,726
Allowance for lending-related commitments				
Beginning balance at January 1,	$ 113	$ –	$ 2,148	$ 2,261
Cumulative effect of a change in accounting principle[(a)]	NA	NA	NA	NA
Provision for lending-related commitments	(37)	–	157	120
Other	–	–	1	1
Ending balance at December 31,	$ 76	$ –	$ 2,306	$ 2,382
Total allowance for investment securities	NA	NA	NA	$ 96
Total allowance for credit losses[(b)]	$ 2,116	$ 11,200	$ 8,792	$ 22,204
Allowance for loan losses by impairment methodology				
Asset-specific[(c)]	$ (624)	$ 223	$ 467	$ 66
Portfolio-based	2,664	10,977	6,019	19,660
Total allowance for loan losses	$ 2,040	$ 11,200	$ 6,486	$ 19,726
Loans by impairment methodology				
Asset-specific[(c)]	$ 11,978	$ 796	$ 2,189	$ 14,963
Portfolio-based	288,775	184,379	601,481	1,074,635
Total retained loans	$ 300,753	$ 185,175	$ 603,670	$ 1,089,598
Collateral-dependent loans				
Net charge-offs	$ (33)	$ –	$ 16	$ (17)
Loans measured at fair value of collateral less cost to sell	3,585	–	464	4,049
Allowance for lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 90	$ 90
Portfolio-based	76	–	2,216	2,292
Total allowance for lending-related commitments[(d)]	$ 76	$ –	$ 2,306	$ 2,382
Lending-related commitments by impairment methodology				
Asset-specific	$ –	$ –	$ 455	$ 455
Portfolio-based[(e)]	20,423	–	461,688	482,111
Total lending-related commitments	$ 20,423	$ –	$ 462,143	$ 482,566

(a) Represents the impact to allowance for credit losses upon the adoption of CECL on January 1, 2020. Refer to Note 1 for further information.

(b) At December 31, 2022 excludes an allowance for credit losses associated with certain accounts receivable in CIB of $21 million.

(c) Includes collateral dependent loans, including those considered TDRs and those for which foreclosure is deemed probable, modified PCD loans and non-collateral dependent loans that have been modified or are reasonably expected to be modified in a TDR. Also includes risk-rated loans that have been placed on nonaccrual status for the wholesale portfolio segment. The asset-specific credit card allowance for loans modified, or reasonably expected to be modified, in a TDR is calculated based on the loans' original contractual interest rates and does not consider any incremental penalty rates.

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

(e) At December 31, 2022, 2021 and 2020, lending-related commitments excluded $13.1 billion, $15.7 billion and $19.5 billion, respectively, for the consumer, excluding credit card portfolio segment; $821.3 billion, $730.5 billion and $658.5 billion, respectively, for the credit card portfolio segment; and $9.8 billion, $32.1 billion and $25.3 billion, respectively, for the wholesale portfolio segment, which were not subject to the allowance for lending-related commitments. Prior-period amount for wholesale lending-related commitments, including the amount not subject to allowance, has been revised to conform with the current presentation.

(table continued from previous page)

2021				2020			
Consumer, excluding credit card	Credit card	Wholesale	Total	Consumer, excluding credit card	Credit card	Wholesale	Total
$ 3,636	$ 17,800	$ 6,892	$ 28,328	$ 2,538	$ 5,683	$ 4,902	$ 13,123
NA	NA	NA	NA	297	5,517	(1,642)	4,172
630	3,651	283	4,564	805	5,077	954	6,836
(619)	(939)	(141)	(1,699)	(631)	(791)	(155)	(1,577)
11	2,712	142	2,865	174	4,286	799	5,259
(1,858)	(4,838)	(2,375)	(9,071)	974	10,886	4,431	16,291
(2)	–	(4)	(6)	1	–	–	1
$ 1,765	$ 10,250	$ 4,371	$ 16,386	$ 3,636	$ 17,800	$ 6,892	$ 28,328
$ 187	$ –	$ 2,222	$ 2,409	$ 12	$ –	$ 1,179	$ 1,191
NA	NA	NA	NA	133	–	(35)	98
(75)	–	(74)	(149)	42	–	1,079	1,121
1	–	–	1	–	–	(1)	(1)
$ 113	$ –	$ 2,148	$ 2,261	$ 187	$ –	$ 2,222	$ 2,409
NA	NA	NA	$ 42	NA	NA	NA	$ 78
$ 1,878	$ 10,250	$ 6,519	$ 18,689	$ 3,823	$ 17,800	$ 9,114	$ 30,815
$ (665)	$ 313	$ 263	$ (89)	$ (7)	$ 633	$ 682	$ 1,308
2,430	9,937	4,108	16,475	3,643	17,167	6,210	27,020
$ 1,765	$ 10,250	$ 4,371	$ 16,386	$ 3,636	$ 17,800	$ 6,892	$ 28,328
$ 13,919	$ 987	$ 2,255	$ 17,161	$ 16,648	$ 1,375	$ 3,606	$ 21,629
281,637	153,309	558,099	993,045	285,479	142,057	511,341	938,877
$ 295,556	$ 154,296	$ 560,354	$ 1,010,206	$ 302,127	$ 143,432	$ 514,947	$ 960,506
$ 33	$ –	$ 38	$ 71	$ 133	$ –	$ 76	$ 209
4,472	–	617	5,089	4,956	–	188	5,144
$ –	$ –	$ 167	$ 167	$ –	$ –	$ 114	$ 114
113	–	1,981	2,094	187	–	2,108	2,295
$ 113	$ –	$ 2,148	$ 2,261	$ 187	$ –	$ 2,222	$ 2,409
$ –	$ –	$ 764	$ 764	$ –	$ –	$ 577	$ 577
29,588	–	453,571	483,159	37,783	–	423,993	461,776
$ 29,588	$ –	$ 454,335	$ 483,923	$ 37,783	$ –	$ 424,570	$ 462,353

Discussion of changes in the allowance

The allowance for credit losses as of December 31, 2022 was $22.2 billion, reflecting a net addition of $3.5 billion from December 31, 2021, consisting of:

- $2.3 billion in wholesale, driven by deterioration in the Firm’s macroeconomic outlook and loan growth, predominantly in CB and CIB, and
- $1.2 billion in consumer, predominantly driven by Card Services, reflecting higher outstanding balances and deterioration in the Firm’s macroeconomic outlook, partially offset by a reduction in the allowance related to a decrease in uncertainty associated with borrower behavior as the effects of the pandemic gradually recede.

Deterioration in the Firm’s macroeconomic outlook included both updates to the central scenario in the fourth quarter of 2022, which now reflects a mild recession, as well as the impact of the increased weight placed on the adverse scenarios beginning in the first quarter of 2022 due to the effects associated with higher inflation, changes in monetary policy, and geopolitical risks, including the war in Ukraine.

The Firm's allowance for credit losses is estimated using a weighted average of five internally developed macroeconomic scenarios. The adverse scenarios incorporate more punitive macroeconomic factors than the central case assumptions provided in the table below, resulting in a weighted average U.S. unemployment rate peaking at 5.6% in the second quarter of 2024, and a 1.2% lower U.S. real GDP exiting the second quarter of 2024.

The Firm’s central case assumptions reflected U.S. unemployment rates and U.S. real GDP as follows:

	Assumptions at December 31, 2022		
	2Q23	**4Q23**	**2Q24**
U.S. unemployment rate[(a)]	**3.8 %**	**4.3 %**	**5.0 %**
YoY growth in U.S. real GDP[(b)]	**1.5 %**	**0.4 %**	**— %**

	Assumptions at December 31, 2021		
	2Q22	4Q22	2Q23
U.S. unemployment rate[(a)]	4.2 %	4.0 %	3.9 %
YoY growth in U.S. real GDP[(b)]	3.1 %	2.8 %	2.1 %

(a) Reflects quarterly average of forecasted U.S. unemployment rate.
(b) The year over year growth in U.S. real GDP in the forecast horizon of the central scenario is calculated as the percentage change in U.S. real GDP levels from the prior year.

Subsequent changes to this forecast and related estimates will be reflected in the provision for credit losses in future periods.

Refer to Critical Accounting Estimates Used by the Firm on pages 149-152 for further information on the allowance for credit losses and related management judgments.
Refer to Consumer Credit Portfolio on pages 110-115, Wholesale Credit Portfolio on pages 116-126 for additional information on the consumer and wholesale credit portfolios.

Note 14 – Variable interest entities

Refer to Note 1 on page 164 for a further description of JPMorgan Chase's accounting policies regarding consolidation of VIEs.

The following table summarizes the most significant types of Firm-sponsored VIEs by business segment. The Firm considers a "Firm-sponsored" VIE to include any entity where: (1) JPMorgan Chase is the primary beneficiary of the structure; (2) the VIE is used by JPMorgan Chase to securitize Firm assets; (3) the VIE issues financial instruments with the JPMorgan Chase name; or (4) the entity is a JPMorgan Chase–administered asset-backed commercial paper conduit.

Line of Business	*Transaction Type*	*Activity*	*2022 Form 10-K page references*
CCB	Credit card securitization trusts	Securitization of originated credit card receivables	pages 247-248
	Mortgage securitization trusts	Servicing and securitization of both originated and purchased residential mortgages	pages 248-250
CIB	Mortgage and other securitization trusts	Securitization of both originated and purchased residential and commercial mortgages, and other consumer loans	pages 248-250
	Multi-seller conduits	Assisting clients in accessing the financial markets in a cost-efficient manner and structuring transactions to meet investor needs	page 250
	Municipal bond vehicles	Financing of municipal bond investments	pages 250-251

The Firm's other business segments are also involved with VIEs (both third-party and Firm-sponsored), but to a lesser extent, as follows:

- Asset & Wealth Management: AWM sponsors and manages certain funds that are deemed VIEs. As asset manager of the funds, AWM earns a fee based on assets managed; the fee varies with each fund's investment objective and is competitively priced. For fund entities that qualify as VIEs, AWM's interests are, in certain cases, considered to be significant variable interests that result in consolidation of the financial results of these entities.
- Commercial Banking: CB provides financing and lending-related services to a wide spectrum of clients, including certain third-party-sponsored entities that may meet the definition of a VIE. CB does not control the activities of these entities and does not consolidate these entities. CB's maximum loss exposure, regardless of whether the entity is a VIE, is generally limited to loans and lending-related commitments which are reported and disclosed in the same manner as any other third-party transaction.
- Corporate: Corporate is involved with entities that may meet the definition of VIEs; however these entities are generally subject to specialized investment company accounting, which does not require the consolidation of investments, including VIEs. In addition, Treasury and CIO invest in securities generally issued by third parties which may meet the definition of VIEs (e.g., issuers of asset-backed securities). In general, the Firm does not have the power to direct the significant activities of these entities and therefore does not consolidate these entities. Refer to Note 10 for further information on the Firm's investment securities portfolio.

In addition, CIB also invests in and provides financing and other services to VIEs sponsored by third parties. Refer to pages 251-252 of this Note for more information on consolidated VIE assets and liabilities as well as the VIEs sponsored by third parties.

Significant Firm-sponsored variable interest entities

Credit card securitizations

CCB's Card Services business may securitize originated credit card loans, primarily through the Chase Issuance Trust (the "Trust"). The Firm's continuing involvement in credit card securitizations includes servicing the receivables, retaining an undivided seller's interest in the receivables, retaining certain senior and subordinated securities and maintaining escrow accounts.

The Firm consolidates the assets and liabilities of its sponsored credit card trusts as it is considered to be the primary beneficiary of these securitization trusts based on the Firm's ability to direct the activities of these VIEs through its servicing responsibilities and other duties, including making decisions as to the receivables that are transferred into those trusts and as to any related modifications and workouts. Additionally, the nature and extent of the Firm's other continuing involvement with the trusts, as indicated above, obligates the Firm to absorb losses and gives the Firm the right to receive certain benefits from these VIEs that could potentially be significant.

The underlying securitized credit card receivables and other assets of the securitization trusts are available only for payment of the beneficial interests issued by the securitization trusts; they are not available to pay the Firm's other obligations or the claims of the Firm's creditors.

The agreements with the credit card securitization trusts require the Firm to maintain a minimum undivided interest in the credit card trusts (generally 5%). As of December 31, 2022 and 2021, the Firm held undivided interests in Firm-sponsored credit card securitization trusts of $6.1 billion and $7.1 billion, respectively. The Firm maintained an average undivided interest in principal receivables owned by those trusts of approximately 62% and 57% for the years ended December 31, 2022 and 2021, respectively. The Firm did not retain any senior securities and retained $1.5 billion of subordinated securities in certain of its credit card securitization trusts at both December 31, 2022 and 2021. The Firm's undivided interests in the credit card trusts and securities retained are eliminated in consolidation.

Firm-sponsored mortgage and other securitization trusts
The Firm securitizes (or has securitized) originated and purchased residential mortgages, commercial mortgages and other consumer loans primarily in its CCB and CIB businesses. Depending on the particular transaction, as well as the respective business involved, the Firm may act as the servicer of the loans and/or retain certain beneficial interests in the securitization trusts.

The following tables present the total unpaid principal amount of assets held in Firm-sponsored private-label securitization entities, including those in which the Firm has continuing involvement, and those that are consolidated by the Firm. Continuing involvement includes servicing the loans, holding senior interests or subordinated interests (including amounts required to be held pursuant to credit risk retention rules), recourse or guarantee arrangements, and derivative contracts. In certain instances, the Firm's only continuing involvement is servicing the loans. The Firm's maximum loss exposure from retained and purchased interests is the carrying value of these interests.

	Principal amount outstanding			JPMorgan Chase interest in securitized assets in nonconsolidated VIEs[c][d][e]			
December 31, 2022 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by JPMorgan Chase
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	**$ 55,362**	**$ 754**	**$ 37,058**	**$ 744**	**$ 1,918**	**$ –**	**$ 2,662**
Subprime	**9,709**	**–**	**1,743**	**10**	**–**	**–**	**10**
Commercial and other[b]	**164,915**	**–**	**127,037**	**888**	**5,373**	**670**	**6,931**
Total	**$ 229,986**	**$ 754**	**$ 165,838**	**$ 1,642**	**$ 7,291**	**$ 670**	**$ 9,603**

	Principal amount outstanding			JPMorgan Chase interest in securitized assets in nonconsolidated VIEs[c][d][e]			
December 31, 2021 (in millions)	Total assets held by securitization VIEs	Assets held in consolidated securitization VIEs	Assets held in nonconsolidated securitization VIEs with continuing involvement	Trading assets	Investment securities	Other financial assets	Total interests held by JPMorgan Chase
Securitization-related[a]							
Residential mortgage:							
Prime/Alt-A and option ARMs	$ 55,085	$ 942	$ 42,522 [f]	$ 974	$ 684	$ 95	$ 1,753
Subprime	10,966	27	10,115	2	–	–	2
Commercial and other[b]	150,694	–	93,698	671	3,274	506	4,451
Total	$ 216,745	$ 969	$ 146,335	$ 1,647	$ 3,958	$ 601	$ 6,206

(a) Excludes U.S. GSEs and government agency securitizations and re-securitizations, which are not Firm-sponsored.
(b) Consists of securities backed by commercial real estate loans and non-mortgage-related consumer receivables.
(c) Excludes the following: retained servicing; securities retained from loan sales and securitization activity related to U.S. GSEs and government agencies; interest rate and foreign exchange derivatives primarily used to manage interest rate and foreign exchange risks of securitization entities; senior securities of $134 million and $145 million at December 31, 2022 and 2021,respectively, and subordinated securities which were not material at both December 31, 2022 and 2021, which the Firm purchased in connection with CIB's secondary market-making activities.
(d) Includes interests held in re-securitization transactions.
(e) As of December 31, 2022 and 2021, 84% and 79%, respectively, of the Firm's retained securitization interests, which are predominantly carried at fair value and include amounts required to be held pursuant to credit risk retention rules, were risk-rated "A" or better, on an S&P-equivalent basis. The retained interests in prime residential mortgages consisted of $2.6 billion and $1.6 billion of investment-grade retained interests at December 31, 2022 and 2021, respectively, and $131 million of noninvestment-grade retained interests at December 31, 2021; noninvestment-grade retained interests were not material at December 31, 2022. The retained interests in commercial and other securitization trusts consisted of $5.8 billion and $3.5 billion of investment-grade retained interests, and $1.1 billion and $929 million of noninvestment-grade retained interests at December 31, 2022 and 2021, respectively.
(f) Prior-period amount has been revised to conform with the current presentation.

Residential mortgage
The Firm securitizes residential mortgage loans originated by CCB, as well as residential mortgage loans purchased from third parties by either CCB or CIB. CCB generally retains servicing for all residential mortgage loans it originated or purchased, and for certain mortgage loans purchased by CIB. For securitizations of loans serviced by CCB, the Firm has the power to direct the significant activities of the VIE because it is responsible for decisions related to loan modifications and workouts. CCB may also retain an interest upon securitization.

In addition, CIB engages in underwriting and trading activities involving securities issued by Firm-sponsored securitization trusts. As a result, CIB at times retains senior and/or subordinated interests (including residual interests and amounts required to be held pursuant to credit risk retention rules) in residential mortgage securitizations at the time of securitization, and/or reacquires positions in the secondary market in the normal course of business. In certain instances, as a result of the positions retained or reacquired by CIB or held by Treasury and CIO or CCB, when considered together with the servicing arrangements entered into by CCB, the Firm is deemed to be the primary beneficiary of certain securitization trusts.

The Firm does not consolidate residential mortgage securitizations (Firm-sponsored or third-party-sponsored) when it is not the servicer (and therefore does not have the power to direct the most significant activities of the trust) or does not hold a beneficial interest in the trust that could potentially be significant to the trust.

Commercial mortgages and other consumer securitizations
CIB originates and securitizes commercial mortgage loans, and engages in underwriting and trading activities involving the securities issued by securitization trusts. CIB may retain unsold senior and/or subordinated interests (including amounts required to be held pursuant to credit risk retention rules) in commercial mortgage securitizations at the time of securitization but, generally, the Firm does not service commercial loan securitizations. Treasury and CIO may choose to invest in these securitizations as well. For commercial mortgage securitizations the power to direct the significant activities of the VIE generally is held by the servicer or investors in a specified class of securities ("controlling class"). The Firm generally does not retain an interest in the controlling class in its sponsored commercial mortgage securitization transactions.

Re-securitizations
The Firm engages in certain re-securitization transactions in which debt securities are transferred to a VIE in exchange for new beneficial interests. These transfers occur in connection with both U.S. GSEs and government agency sponsored VIEs, which are backed by residential mortgages. The Firm's consolidation analysis is largely dependent on the Firm's role and interest in the re-securitization trusts.

The following table presents the principal amount of securities transferred to re-securitization VIEs.

Year ended December 31, (in millions)	**2022**	2021	2020
Transfers of securities to VIEs			
U.S. GSEs and government agencies	**$ 16,128**	$ 53,923	$ 46,123

Most re-securitizations with which the Firm is involved are client-driven transactions in which a specific client or group of clients is seeking a specific return or risk profile. For these transactions, the Firm has concluded that the decision-making power of the entity is shared between the Firm and its clients, considering the joint effort and decisions in establishing the re-securitization trust and its assets, as well as the significant economic interest the client holds in the re-securitization trust; therefore the Firm does not consolidate the re-securitization VIE.

The Firm did not transfer any private label securities to re-securitization VIEs during 2022, 2021 and 2020, and retained interests in any such Firm-sponsored VIEs as of December 31, 2022 and 2021 were not material.

Additionally, the Firm may invest in beneficial interests of third-party-sponsored re-securitizations and generally purchases these interests in the secondary market. In these circumstances, the Firm does not have the unilateral ability to direct the most significant activities of the re-securitization trust, either because it was not involved in the initial design of the trust, or the Firm was involved with an independent third-party sponsor and demonstrated shared power over the creation of the trust; therefore, the Firm does not consolidate the re-securitization VIE.

The following table presents information on the Firm's interests in nonconsolidated re-securitization VIEs.

December 31, (in millions)	Nonconsolidated re-securitization VIEs **2022**	 2021
U.S. GSEs and government agencies		
Interest in VIEs	**$ 2,580**	$ 1,947

As of December 31, 2022 and 2021, the Firm did not consolidate any U.S. GSE and government agency re-securitization VIEs or any Firm-sponsored private-label re-securitization VIEs.

Multi-seller conduits

Multi-seller conduit entities are separate bankruptcy remote entities that provide secured financing, collateralized by pools of receivables and other financial assets, to customers of the Firm. The conduits fund their financing facilities through the issuance of highly rated commercial paper. The primary source of repayment of the commercial paper is the cash flows from the pools of assets. In most instances, the assets are structured with deal-specific credit enhancements provided to the conduits by the customers (i.e., sellers) or other third parties. Deal-specific credit enhancements are generally structured to cover a multiple of historical losses expected on the pool of assets, and are typically in the form of overcollateralization provided by the seller. The deal-specific credit enhancements mitigate the Firm’s potential losses on its agreements with the conduits.

To ensure timely repayment of the commercial paper, and to provide the conduits with funding to provide financing to customers in the event that the conduits do not obtain funding in the commercial paper market, each asset pool financed by the conduits has a minimum 100% deal-specific liquidity facility associated with it provided by JPMorgan Chase Bank, N.A. JPMorgan Chase Bank, N.A. also provides the multi-seller conduit vehicles with uncommitted program-wide liquidity facilities and program-wide credit enhancement in the form of standby letters of credit. The amount of program-wide credit enhancement required is based upon commercial paper issuance and approximates 10% of the outstanding balance of commercial paper.

The Firm consolidates its Firm-administered multi-seller conduits, as the Firm has both the power to direct the significant activities of the conduits and a potentially significant economic interest in the conduits. As administrative agent and in its role in structuring transactions, the Firm makes decisions regarding asset types and credit quality, and manages the commercial paper funding needs of the conduits. The Firm’s interests that could potentially be significant to the VIEs include the fees received as administrative agent and liquidity and program-wide credit enhancement provider, as well as the potential exposure created by the liquidity and credit enhancement facilities provided to the conduits.

In the normal course of business, JPMorgan Chase makes markets in and invests in commercial paper issued by the Firm-administered multi-seller conduits. The Firm held $13.8 billion and $13.7 billion of the commercial paper issued by the Firm-administered multi-seller conduits at December 31, 2022 and 2021, respectively, which have been eliminated in consolidation. The Firm’s investments reflect the Firm’s funding needs and capacity and were not driven by market illiquidity. Other than the amounts required to be held pursuant to credit risk retention rules, the Firm is not obligated under any agreement to purchase the commercial paper issued by the Firm-administered multi-seller conduits.

Deal-specific liquidity facilities, program-wide liquidity and credit enhancement provided by the Firm have been eliminated in consolidation. The Firm or the Firm-administered multi-seller conduits provide lending-related commitments to certain clients of the Firm-administered multi-seller conduits. The unfunded commitments were $10.6 billion and $13.4 billion at December 31, 2022 and 2021, respectively, and are reported as off-balance sheet lending-related commitments in other unfunded commitments to extend credit. Refer to Note 28 for more information on off-balance sheet lending-related commitments.

Municipal bond vehicles

Municipal bond vehicles or tender option bond (“TOB”) trusts allow institutions to finance their municipal bond investments at short-term rates. In a typical TOB transaction, the trust purchases highly rated municipal bond(s) of a single issuer and funds the purchase by issuing two types of securities: (1) puttable floating-rate certificates (“floaters”) and (2) inverse floating-rate residual interests (“residuals”). The floaters are typically purchased by money market funds or other short-term investors and may be tendered, with requisite notice, to the TOB trust. The residuals are retained by the investor seeking to finance its municipal bond investment. TOB transactions where the residual is held by a third-party investor are typically known as customer TOB trusts, and non-customer TOB trusts are transactions where the Residual is retained by the Firm. Customer TOB trusts are sponsored by a third party. The Firm serves as sponsor for all non-customer TOB transactions. The Firm may provide various services to a TOB trust, including remarketing agent, liquidity or tender option provider, and/or sponsor.

J.P. Morgan Securities LLC may serve as a remarketing agent on the floaters for TOB trusts. The remarketing agent is responsible for establishing the periodic variable rate on the floaters, conducting the initial placement and remarketing tendered floaters. The remarketing agent may, but is not obligated to, make markets in floaters. Floaters held by the Firm were not material during 2022 and 2021.

JPMorgan Chase Bank, N.A. or J.P. Morgan Securities LLC often serves as the sole liquidity or tender option provider for the TOB trusts. The liquidity provider’s obligation to perform is conditional and is limited by certain events

(“Termination Events”), which include bankruptcy or failure to pay by the municipal bond issuer or credit enhancement provider, an event of taxability on the municipal bonds or the immediate downgrade of the municipal bond to below investment grade. In addition, the liquidity provider’s exposure is typically further limited by the high credit quality of the underlying municipal bonds, the excess collateralization in the vehicle, or, in certain transactions, the reimbursement agreements with the Residual holders.

Holders of the floaters may “put,” or tender, their floaters to the TOB trust. If the remarketing agent cannot successfully remarket the floaters to another investor, the liquidity provider either provides a loan to the TOB trust for the TOB trust’s purchase of the floaters, or it directly purchases the tendered floaters.

TOB trusts are considered to be variable interest entities. The Firm consolidates non-customer TOB trusts because as the Residual holder, the Firm has the right to make decisions that significantly impact the economic performance of the municipal bond vehicle, and it has the right to receive benefits and bear losses that could potentially be significant to the municipal bond vehicle.

Consolidated VIE assets and liabilities

The following table presents information on assets and liabilities related to VIEs consolidated by the Firm as of December 31, 2022 and 2021.

	Assets				Liabilities		
December 31, 2022 (in millions)	Trading assets	Loans	Other[c]	Total assets[d]	Beneficial interests in VIE assets[e]	Other[f]	Total liabilities
VIE program type							
Firm-sponsored credit card trusts	**$ –**	**$ 9,699**	**$ 100**	**$ 9,799**	**$ 1,999**	**$ 2**	**$ 2,001**
Firm-administered multi-seller conduits	**–**	**22,819**	**170**	**22,989**	**9,236**	**39**	**9,275**
Municipal bond vehicles	**2,089**	**–**	**7**	**2,096**	**1,232**	**10**	**1,242**
Mortgage securitization entities[a]	**–**	**781**	**10**	**791**	**143**	**67**	**210**
Other	**62**	**1,112** [b]	**263**	**1,437**	**–**	**161**	**161**
Total	**$ 2,151**	**$ 34,411**	**$ 550**	**$ 37,112**	**$ 12,610**	**$ 279**	**$ 12,889**

	Assets				Liabilities		
December 31, 2021 (in millions)	Trading assets	Loans	Other[c]	Total assets[d]	Beneficial interests in VIE assets[e]	Other[f]	Total liabilities
VIE program type							
Firm-sponsored credit card trusts	$ –	$ 11,108	$ 102	$ 11,210	$ 2,397	$ 1	$ 2,398
Firm-administered multi-seller conduits	1	19,883	71	19,955	6,198	41	6,239
Municipal bond vehicles	2,009	–	2	2,011	1,976	–	1,976
Mortgage securitization entities[a]	–	955	32	987	179	85	264
Other	–	1,078 [b]	283	1,361	–	118	118
Total	$ 2,010	$ 33,024	$ 490	$ 35,524	$ 10,750	$ 245	$ 10,995

(a) Includes residential mortgage securitizations.

(b) Primarily includes purchased supply chain finance receivables and purchased auto loan securitizations in CIB.

(c) Includes assets classified as cash and other assets on the Consolidated balance sheets.

(d) The assets of the consolidated VIEs included in the program types above are used to settle the liabilities of those entities. The assets and liabilities include third-party assets and liabilities of consolidated VIEs and exclude intercompany balances that eliminate in consolidation.

(e) The interest-bearing beneficial interest liabilities issued by consolidated VIEs are classified in the line item on the Consolidated balance sheets titled, “Beneficial interests issued by consolidated VIEs”. The holders of these beneficial interests generally do not have recourse to the general credit of JPMorgan Chase. Included in beneficial interests in VIE assets are long-term beneficial interests of $2.1 billion and $2.6 billion at December 31, 2022 and 2021, respectively.

(f) Includes liabilities classified as accounts payable and other liabilities on the Consolidated balance sheets.

VIEs sponsored by third parties

The Firm enters into transactions with VIEs structured by other parties. These include, for example, acting as a derivative counterparty, liquidity provider, investor, underwriter, placement agent, remarketing agent, trustee or custodian. These transactions are conducted at arm's-length, and individual credit decisions are based on the analysis of the specific VIE, taking into consideration the quality of the underlying assets. Where the Firm does not have the power to direct the activities of the VIE that most significantly impact the VIE's economic performance, or a variable interest that could potentially be significant, the Firm generally does not consolidate the VIE, but it records and reports these positions on its Consolidated balance sheets in the same manner it would record and report positions in respect of any other third-party transaction.

Tax credit vehicles

The Firm holds investments in unconsolidated tax credit vehicles, which are limited partnerships and similar entities that own and operate affordable housing, energy, and other projects. These entities are primarily considered VIEs. A third party is typically the general partner or managing member and has control over the significant activities of the tax credit vehicles, and accordingly the Firm does not consolidate tax credit vehicles. The Firm generally invests in these partnerships as a limited partner and earns a return primarily through the receipt of tax credits allocated to the projects. The maximum loss exposure, represented by equity investments and funding commitments, was $30.2 billion and $26.8 billion, of which $10.6 billion and $9.4 billion was unfunded at December 31, 2022 and 2021, respectively. The Firm assesses each project and to reduce the risk of loss, may withhold varying amounts of its capital investment until the project qualifies for tax credits. Refer to Note 25 for further information on affordable housing tax credits and Note 28 for more information on off-balance sheet lending-related commitments.

Customer municipal bond vehicles (TOB trusts)

The Firm may provide various services to customer TOB trusts, including remarketing agent, liquidity or tender option provider. In certain customer TOB transactions, the Firm, as liquidity provider, has entered into a reimbursement agreement with the Residual holder. In those transactions, upon the termination of the vehicle, the Firm has recourse to the third-party Residual holders for any shortfall. The Firm does not have any intent to protect Residual holders from potential losses on any of the underlying municipal bonds. The Firm does not consolidate customer TOB trusts, since the Firm does not have the power to make decisions that significantly impact the economic performance of the municipal bond vehicle.

The Firm's maximum exposure as a liquidity provider to customer TOB trusts at December 31, 2022 and 2021, was $5.8 billion and $6.8 billion, respectively. The fair value of assets held by such VIEs at December 31, 2022 and 2021 was $8.2 billion and $10.5 billion respectively.

Loan securitizations

The Firm has securitized and sold a variety of loans, including residential mortgages, credit card receivables, commercial mortgages and other consumer loans. The purposes of these securitization transactions were to satisfy investor demand and to generate liquidity for the Firm.

For loan securitizations in which the Firm is not required to consolidate the trust, the Firm records the transfer of the loan receivable to the trust as a sale when all of the following accounting criteria for a sale are met: (1) the transferred financial assets are legally isolated from the Firm's creditors; (2) the transferee or beneficial interest holder can pledge or exchange the transferred financial assets; and (3) the Firm does not maintain effective control over the transferred financial assets (e.g., the Firm cannot repurchase the transferred assets before their maturity and it does not have the ability to unilaterally cause the holder to return the transferred assets).

For loan securitizations accounted for as a sale, the Firm recognizes a gain or loss based on the difference between the value of proceeds received (including cash, beneficial interests, or servicing assets received) and the carrying value of the assets sold. Gains and losses on securitizations are reported in noninterest revenue.

Securitization activity

The following table provides information related to the Firm's securitization activities for the years ended December 31, 2022, 2021 and 2020, related to assets held in Firm-sponsored securitization entities that were not consolidated by the Firm, and where sale accounting was achieved at the time of the securitization.

	2022		2021		2020	
Year ended December 31, (in millions)	Residential mortgage[d]	Commercial and other[e]	Residential mortgage[d]	Commercial and other[e]	Residential mortgage[d]	Commercial and other[e]
Principal securitized	**$ 10,218**	**$ 9,036**	$ 23,876	$ 14,917	$ 7,103	$ 6,624
All cash flows during the period:[a]						
Proceeds received from loan sales as financial instruments[b][c]	**$ 9,783**	**$ 8,921**	$ 24,450	$ 15,044	$ 7,321	$ 6,865
Servicing fees collected	**62**	**2**	153	1	211	1
Cash flows received on interests	**489**	**285**	578	273	801	239

(a) Excludes re-securitization transactions.
(b) Predominantly includes Level 2 assets.
(c) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale.
(d) Represents prime mortgages. Excludes loan securitization activity related to U.S. GSEs and government agencies.
(e) Includes commercial mortgage and other consumer loans.

Key assumptions used to value retained interests originated during the year are shown in the table below.

Year ended December 31,	2022	2021	2020
Residential mortgage retained interest:			
Weighted-average life (in years)	**10.8**	3.9	4.7
Weighted-average discount rate	**4.0 %**	3.3 %	8.2 %
Commercial mortgage retained interest:			
Weighted-average life (in years)	**5.9**	6.0	6.9
Weighted-average discount rate	**2.9 %**	1.2 %	3.0 %

Loans and excess MSRs sold to U.S. government-sponsored enterprises and loans in securitization transactions pursuant to Ginnie Mae guidelines

In addition to the amounts reported in the securitization activity tables above, the Firm, in the normal course of business, sells originated and purchased mortgage loans and certain originated excess MSRs on a nonrecourse basis, predominantly to U.S. GSEs. These loans and excess MSRs are sold primarily for the purpose of securitization by the U.S. GSEs, who provide certain guarantee provisions (e.g., credit enhancement of the loans). The Firm also sells loans into securitization transactions pursuant to Ginnie Mae guidelines; these loans are typically insured or guaranteed by another U.S. government agency. The Firm does not consolidate the securitization vehicles underlying these transactions as it is not the primary beneficiary. For a limited number of loan sales, the Firm is obligated to share a portion of the credit risk associated with the sold loans with the purchaser. Refer to Note 28 for additional information about the Firm's loan sales- and securitization-related indemnifications and Note 15 for additional information about the impact of the Firm's sale of certain excess MSRs.

The following table summarizes the activities related to loans sold to the U.S. GSEs, and loans in securitization transactions pursuant to Ginnie Mae guidelines.

Year ended December 31, (in millions)	**2022**	2021	2020
Carrying value of loans sold	**$ 48,891**	$ 105,035	$ 81,153
Proceeds received from loan sales as cash	**$ 22**	$ 161	$ 45
Proceeds from loan sales as securities[a][b]	**48,096**	103,286	80,186
Total proceeds received from loan sales[c]	**$ 48,118**	$ 103,447	$ 80,231
Gains/(losses) on loan sales[d][e]	**$ (25)**	$ 9	$ 6

(a) Includes securities from U.S. GSEs and Ginnie Mae that are generally sold shortly after receipt or retained as part of the Firm's investment securities portfolio.
(b) Included in level 2 assets.
(c) Excludes the value of MSRs retained upon the sale of loans.
(d) Gains/(losses) on loan sales include the value of MSRs.
(e) The carrying value of the loans accounted for at fair value approximated the proceeds received upon loan sale.

Options to repurchase delinquent loans

In addition to the Firm's obligation to repurchase certain loans due to material breaches of representations and warranties as discussed in Note 28, the Firm also has the option to repurchase delinquent loans that it services for Ginnie Mae loan pools, as well as for other U.S. government agencies under certain arrangements. The Firm typically elects to repurchase delinquent loans from Ginnie Mae loan pools as it continues to service them and/or manage the foreclosure process in accordance with the applicable requirements, and such loans continue to be insured or guaranteed. When the Firm's repurchase option becomes exercisable, such loans must be reported on the Consolidated balance sheets as a loan with a corresponding liability. Refer to Note 12 for additional information.

The following table presents loans the Firm repurchased or had an option to repurchase, real estate owned, and foreclosed government-guaranteed residential mortgage loans recognized on the Firm's Consolidated balance sheets as of December 31, 2022 and 2021. Substantially all of these loans and real estate are insured or guaranteed by U.S. government agencies.

December 31, (in millions)	**2022**	2021
Loans repurchased or option to repurchase[a]	**$ 839**	$ 1,022
Real estate owned	**10**	5
Foreclosed government-guaranteed residential mortgage loans[b]	**27**	36

(a) Predominantly all of these amounts relate to loans that have been repurchased from Ginnie Mae loan pools.
(b) Relates to voluntary repurchases of loans, which are included in accrued interest and accounts receivable.

Loan delinquencies and liquidation losses

The table below includes information about components of and delinquencies related to nonconsolidated securitized financial assets held in Firm-sponsored private-label securitization entities, in which the Firm has continuing involvement as of December 31, 2022 and 2021.

As of or for the year ended December 31, (in millions)	Securitized assets		90 days past due		Net liquidation losses / (recoveries)	
	2022	2021	**2022**	2021	**2022**	2021
Securitized loans						
Residential mortgage:						
Prime/ Alt-A & option ARMs	**$ 37,058**	$ 42,522 [a]	**$ 511**	$ 1,937 [a]	**$ (29)**	$ 16 [a]
Subprime	**1,743**	10,115	**212**	1,609	**(1)**	16
Commercial and other	**127,037**	93,698	**948**	1,456	**50**	288
Total loans securitized	**$ 165,838**	$ 146,335	**$ 1,671**	$ 5,002	**$ 20**	$ 320

(a) Prior-period amounts have been revised to conform with the current presentation.

Note 15 – Goodwill and Mortgage servicing rights

Goodwill

Goodwill is recorded upon completion of a business combination as the difference between the purchase price and the fair value of the net assets acquired, and can be adjusted up to one year from the acquisition date as more information is obtained about the fair value of assets acquired and liabilities assumed. Subsequent to initial recognition, goodwill is not amortized but is tested for impairment during the fourth quarter of each fiscal year, or more often if events or circumstances, such as adverse changes in the business climate, indicate that there may be an impairment.

The goodwill associated with each business combination is allocated to the related reporting units, which are generally determined based on how the Firm's businesses are managed and how they are reviewed. The following table presents goodwill attributed to the reportable business segments and Corporate.

December 31, (in millions)	**2022**	2021	2020
Consumer & Community Banking	**$ 32,121**	$ 31,474	$ 31,311
Corporate & Investment Bank	**8,008**	7,906	7,913
Commercial Banking	**2,985**	2,986	2,985
Asset & Wealth Management	**7,902**	7,222	7,039
Corporate[(a)]	**646**	727	–
Total goodwill	**$ 51,662**	$ 50,315	$ 49,248

(a) For goodwill in Corporate acquired in the third quarter of 2021, the Firm elected to perform a qualitative impairment assessment, as permitted under U.S. GAAP.

The following table presents changes in the carrying amount of goodwill.

Year ended December 31, (in millions)	**2022**	2021	2020
Balance at beginning of period	**$ 50,315**	$ 49,248	$ 47,823
Changes during the period from:			
Business combinations[(a)]	**1,426**	1,073 [(c)]	1,412
Other[(b)]	**(79)**	(6) [(c)]	13
Balance at December 31,	**$ 51,662**	$ 50,315	$ 49,248

(a) For 2022, represents estimated goodwill associated with the acquisitions of Global Shares PLC in AWM, Frosch Travel Group, LLC and Figg, Inc. in CCB, and Renovite Technologies, Inc. and Volkswagen Payments S.A. in CIB. For 2021, represents goodwill associated with the acquisitions of Nutmeg in Corporate, OpenInvest and Campbell Global in AWM, and Frank and The Infatuation in CCB. For 2020, represents goodwill associated with the acquisitions of cxLoyalty in CCB and 55ip in AWM.

(b) Predominantly foreign currency adjustments.

(c) Prior-period amounts have been revised to conform with the current presentation.

Goodwill impairment testing

The Firm's goodwill was not impaired at December 31, 2022, 2021 and 2020.

The goodwill impairment test is generally performed by comparing the current fair value of each reporting unit with its carrying value. If the fair value is in excess of the carrying value, then the reporting unit's goodwill is considered not to be impaired. If the fair value is less than the carrying value, then an impairment charge is recognized for the amount by which the reporting unit's carrying value exceeds its fair value, up to the amount of goodwill allocated to that reporting unit.

The Firm uses the reporting units' allocated capital plus goodwill and other intangible assets as a proxy for the carrying values of equity for the reporting units in the goodwill impairment testing. Reporting unit equity is determined on a similar basis as the allocation of capital to the LOBs which takes into consideration a variety of factors including capital levels of similarly rated peers and applicable regulatory capital requirements. Proposed LOB capital levels are incorporated into the Firm's annual budget process, which is reviewed by the Firm's Board of Directors and Operating Committee. Allocated capital is further reviewed at least annually and updated as needed.

The primary method the Firm uses to estimate the fair value of its reporting units is the income approach. This approach projects cash flows for the forecast period and uses the perpetuity growth method to calculate terminal values. These cash flows and terminal values, which are based on the reporting units' annual budgets and forecasts are then discounted using an appropriate discount rate. The discount rate used for each reporting unit represents an estimate of the cost of equity for that reporting unit and is determined considering the Firm's overall estimated cost of equity (estimated using the Capital Asset Pricing Model), as adjusted for the risk characteristics specific to each reporting unit (for example, for higher levels of risk or uncertainty associated with the business or management's forecasts and assumptions). To assess the reasonableness of the discount rates used for each reporting unit, management compares the discount rate to the estimated cost of equity for publicly traded institutions with similar businesses and risk characteristics. In addition, the weighted average cost of equity (aggregating the various reporting units) is compared with the Firm's overall estimated cost of equity to ensure reasonableness. The valuations derived from the discounted cash flow analysis are then compared with market-based trading and transaction multiples for relevant competitors. Trading and transaction comparables are used as general indicators to assess the overall reasonableness of the estimated fair values, although precise conclusions generally cannot be drawn due to the differences that naturally exist between the Firm's businesses and competitor institutions.

The Firm also takes into consideration a comparison between the aggregate fair values of the Firm's reporting units and JPMorgan Chase's market capitalization. In evaluating this comparison, the Firm considers several factors, including (i) a control premium that would exist in a market transaction, (ii) factors related to the level of execution risk that would exist at the Firmwide level that do not exist at the reporting unit level and (iii) short-term market volatility and other factors that do not directly affect the value of individual reporting units.

Unanticipated declines in business performance, increases in credit losses, increases in capital requirements, as well as deterioration in economic or market conditions, adverse regulatory or legislative changes or increases in the estimated market cost of equity, could cause the estimated fair values of the Firm’s reporting units to decline in the future, which could result in a material impairment charge to earnings in a future period related to some portion of the associated goodwill.

Mortgage servicing rights

MSRs represent the fair value of expected future cash flows for performing servicing activities for others. The fair value considers estimated future servicing fees and ancillary revenue, offset by estimated costs to service the loans, and generally declines over time as net servicing cash flows are received, effectively amortizing the MSR asset against contractual servicing and ancillary fee income. MSRs are either purchased from third parties or recognized upon sale or securitization of mortgage loans if servicing is retained.

As permitted by U.S. GAAP, the Firm has elected to account for its MSRs at fair value. The Firm treats its MSRs as a single class of servicing assets based on the availability of market inputs used to measure the fair value of its MSR asset and its treatment of MSRs as one aggregate pool for risk management purposes. The Firm estimates the fair value of MSRs using an option-adjusted spread (“OAS”) model, which projects MSR cash flows over multiple interest rate scenarios in conjunction with the Firm’s prepayment model, and then discounts these cash flows at risk-adjusted rates. The model considers portfolio characteristics, contractually specified servicing fees, prepayment assumptions, delinquency rates, costs to service, late charges and other ancillary revenue, and other economic factors. The Firm compares fair value estimates and assumptions to observable market data where available, and also considers recent market activity and actual portfolio experience.

The fair value of MSRs is sensitive to changes in interest rates, including their effect on prepayment speeds. MSRs typically decrease in value when interest rates decline because declining interest rates tend to increase prepayments and therefore reduce the expected life of the net servicing cash flows that comprise the MSR asset. Conversely, securities (e.g., mortgage-backed securities), and certain derivatives (e.g., those for which the Firm receives fixed-rate interest payments) increase in value when interest rates decline. JPMorgan Chase uses combinations of derivatives and securities to manage the risk of changes in the fair value of MSRs. The intent is to offset any interest-rate related changes in the fair value of MSRs with changes in the fair value of the related risk management instruments.

The following table summarizes MSR activity for the years ended December 31, 2022, 2021 and 2020.

As of or for the year ended December 31, (in millions, except where otherwise noted)	**2022**	2021	2020
Fair value at beginning of period	**$ 5,494**	$ 3,276	$ 4,699
MSR activity:			
Originations of MSRs	**798**	1,659	944
Purchase of MSRs	**1,400**	1,363	248
Disposition of MSRs[a]	**(822)**	(114)	(176)
Net additions/(dispositions)	**1,376**	2,908	1,016
Changes due to collection/realization of expected cash flows	**(936)**	(788)	(899)
Changes in valuation due to inputs and assumptions:			
Changes due to market interest rates and other[b]	**2,022**	404	(1,568)
Changes in valuation due to other inputs and assumptions:			
Projected cash flows (e.g., cost to service)	**14**	109	(54)
Discount rates	**–**	–	199
Prepayment model changes and other[c]	**3**	(415)	(117)
Total changes in valuation due to other inputs and assumptions	**17**	(306)	28
Total changes in valuation due to inputs and assumptions	**2,039**	98	(1,540)
Fair value at December 31,	**$ 7,973**	$ 5,494	$ 3,276
Change in unrealized gains/(losses) included in income related to MSRs held at December 31,	**$ 2,039**	$ 98	$ (1,540)
Contractual service fees, late fees and other ancillary fees included in income	**1,535**	1,298	1,325
Third-party mortgage loans serviced at December 31, (in billions)	**584**	520	448
Servicer advances, net of an allowance for uncollectible amounts, at December 31, (in billions)[d]	**0.8**	1.6	1.8

(a) Includes excess MSRs transferred to agency-sponsored trusts in exchange for stripped mortgage backed securities ("SMBS") for the years ended December 31, 2022 and 2020. In each transaction, a portion of the SMBS was acquired by third parties at the transaction date; the Firm acquired the remaining balance of those SMBS as trading securities.

(b) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.

(c) Represents changes in prepayments other than those attributable to changes in market interest rates.

(d) Represents amounts the Firm pays as the servicer (e.g., scheduled principal and interest, taxes and insurance), which will generally be reimbursed within a short period of time after the advance from future cash flows from the trust or the underlying loans. The Firm's credit risk associated with these servicer advances is minimal because reimbursement of the advances is typically senior to all cash payments to investors. In addition, the Firm maintains the right to stop payment to investors if the collateral is insufficient to cover the advance. However, certain of these servicer advances may not be recoverable if they were not made in accordance with applicable rules and agreements.

The following table presents the components of mortgage fees and related income (including the impact of MSR risk management activities) for the years ended December 31, 2022, 2021 and 2020.

Year ended December 31, (in millions)	2022	2021	2020
CCB mortgage fees and related income			
Production revenue	**$ 497**	$ 2,215	$ 2,629
Net mortgage servicing revenue:			
Operating revenue:			
Loan servicing revenue	**1,582**	1,257	1,367
Changes in MSR asset fair value due to collection/realization of expected cash flows	**(936)**	(788)	(899)
Total operating revenue	**646**	469	468
Risk management:			
Changes in MSR asset fair value due to market interest rates and other[(a)]	**2,022**	404	(1,568)
Other changes in MSR asset fair value due to other inputs and assumptions in model[(b)]	**17**	(306)	28
Change in derivative fair value and other	**(1,946)**	(623)	1,522
Total risk management	**93**	(525)	(18)
Total net mortgage servicing revenue	**739**	(56)	450
Total CCB mortgage fees and related income	**1,236**	2,159	3,079
All other	**14**	11	12
Mortgage fees and related income	**$ 1,250**	$ 2,170	$ 3,091

(a) Represents both the impact of changes in estimated future prepayments due to changes in market interest rates, and the difference between actual and expected prepayments.

(b) Represents the aggregate impact of changes in model inputs and assumptions such as projected cash flows (e.g., cost to service), discount rates and changes in prepayments other than those attributable to changes in market interest rates (e.g., changes in prepayments due to changes in home prices).

Changes in fair value based on variations in assumptions generally cannot be easily extrapolated, because the relationship of the change in the assumptions to the change in fair value are often highly interrelated and may not be linear. In the following table, the effect that a change in a particular assumption may have on the fair value is calculated without changing any other assumption. In reality, changes in one factor may result in changes in another, which would either magnify or counteract the impact of the initial change.

The table below outlines the key economic assumptions used to determine the fair value of the Firm's MSRs at December 31, 2022 and 2021, and outlines the sensitivities of those fair values to immediate adverse changes in those assumptions, as defined below.

December 31, (in millions, except rates)	2022	2021
Weighted-average prepayment speed assumption (constant prepayment rate)	**6.12 %**	9.90 %
Impact on fair value of 10% adverse change	**$ (183)**	$ (210)
Impact on fair value of 20% adverse change	**(356)**	(404)
Weighted-average option adjusted spread[(a)]	**5.77 %**	6.44 %
Impact on fair value of 100 basis points adverse change	**$ (341)**	$ (225)
Impact on fair value of 200 basis points adverse change	**(655)**	(433)

(a) Includes the impact of operational risk and regulatory capital.

Note 16 – Premises and equipment

Premises and equipment, including leasehold improvements, are carried at cost less accumulated depreciation and amortization. JPMorgan Chase computes depreciation using the straight-line method over the estimated useful life of an asset. For leasehold improvements, the Firm uses the straight-line method computed over the lesser of the remainder of the lease term, or estimated useful life of the improvements.

JPMorgan Chase capitalizes certain costs associated with the acquisition or development of internal-use software. Once the software is ready for its intended use, these costs are amortized on a straight-line basis over the software's expected useful life.

Impairment is assessed periodically when events or changes in circumstances indicate that the carrying value of an asset may not be fully recoverable.

Note 17 – Deposits

At December 31, 2022 and 2021, noninterest-bearing and interest-bearing deposits were as follows.

December 31, (in millions)	**2022**	2021
U.S. offices		
Noninterest-bearing (included **$26,363** and $8,115 at fair value)[a]	**$ 644,902**	$ 711,525 [b]
Interest-bearing (included **$586** and $629 at fair value)[a]	**1,276,346**	1,359,932 [b]
Total deposits in U.S. offices	**1,921,248**	2,071,457
Non-U.S. offices		
Noninterest-bearing (included **$1,398** and $2,420 at fair value)[a]	**27,005**	26,229
Interest-bearing (included **$273** and $169 at fair value)[a]	**391,926**	364,617
Total deposits in non-U.S. offices	**418,931**	390,846
Total deposits	**$2,340,179**	$2,462,303

(a) Includes structured notes classified as deposits for which the fair value option has been elected. Refer to Note 3 for further discussion.

(b) Prior-period amounts have been revised to conform with the current presentation.

At December 31, 2022 and 2021, time deposits in denominations that met or exceeded the insured limit were as follows.

December 31, (in millions)	**2022**	2021
U.S. offices	**$ 64,622**	$ 38,970
Non-U.S. offices[a]	**77,907**	54,535
Total	**$142,529**	$ 93,505

(a) Represents all time deposits in non-U.S. offices as these deposits typically exceed the insured limit.

At December 31, 2022, the remaining maturities of interest-bearing time deposits were as follows.

December 31, 2022 (in millions)	U.S.	Non-U.S.	Total
2023	$ 75,606	$ 75,088	$ 150,694
2024	1,335	358	1,693
2025	300	17	317
2026	178	30	208
2027	131	897	1,028
After 5 years	572	109	681
Total	$ 78,122	$ 76,499	$ 154,621

Note 18 - Leases

Firm as lessee

At December 31, 2022, JPMorgan Chase and its subsidiaries were obligated under a number of noncancellable leases, predominantly operating leases for premises and equipment used primarily for business purposes. These leases generally have terms of 20 years or less, determined based on the contractual maturity of the lease, and include periods covered by options to extend or terminate the lease when the Firm is reasonably certain that it will exercise those options. All leases with lease terms greater than twelve months are reported as a lease liability with a corresponding right-of-use ("ROU") asset. None of these lease agreements impose restrictions on the Firm's ability to pay dividends, engage in debt or equity financing transactions or enter into further lease agreements. Certain of these leases contain escalation clauses that will increase rental payments based on maintenance, utility and tax increases, which are non-lease components. The Firm elected not to separate lease and non-lease components of a contract for its real estate leases. As such, real estate lease payments represent payments on both lease and non-lease components.

Operating lease liabilities and ROU assets are recognized at the lease commencement date based on the present value of the future minimum lease payments over the lease term. The future lease payments are discounted at a rate that estimates the Firm's collateralized borrowing rate for financing instruments of a similar term and are included in accounts payable and other liabilities. The operating lease ROU asset, included in premises and equipment, also includes any lease prepayments made, plus initial direct costs incurred, less any lease incentives received. Rental expense associated with operating leases is recognized on a straight-line basis over the lease term, and generally included in occupancy expense in the Consolidated statements of income.

The following tables provide information related to the Firm's operating leases:

December 31, (in millions, except where otherwise noted)	2022	2021
Right-of-use assets	**$ 7,782**	$ 7,888
Lease liabilities	**8,183**	8,328
Weighted average remaining lease term (in years)	**8.4**	8.5
Weighted average discount rate	**3.55 %**	3.40 %
Supplemental cash flow information		
Cash paid for amounts included in the measurement of lease liabilities - operating cash flows	**$ 1,613**	$ 1,656
Supplemental non-cash information		
Right-of-use assets obtained in exchange for operating lease obligations	**$ 1,435**	$ 1,167

Year ended December 31, (in millions)	2022	2021
Rental expense		
Gross rental expense	**$ 2,079**	$ 2,086
Sublease rental income	**(119)**	(129)
Net rental expense	**$ 1,960**	$ 1,957

The following table presents future payments under operating leases as of December 31, 2022:

Year ended December 31, (in millions)	
2023	$ 1,572
2024	1,433
2025	1,273
2026	1,034
2027	887
After 2027	3,382
Total future minimum lease payments	9,581
Less: Imputed interest	(1,398)
Total	$ 8,183

In addition to the table above, as of December 31, 2022, the Firm had additional future operating lease commitments of $588 million that were signed but had not yet commenced. These operating leases will commence between 2023 and 2026 with lease terms up to 21 years.

Firm as lessor

The Firm provides auto and equipment lease financing to its customers through lease arrangements with lease terms that may contain renewal, termination and/or purchase options. The Firm's lease financings are predominantly auto operating leases. These assets subject to operating leases are recognized in other assets on the Firm's Consolidated balance sheets and are depreciated on a straight-line basis over the lease term to reduce the asset to its estimated residual value. Depreciation expense is included in technology, communications and equipment expense in the Consolidated statements of income. The Firm's lease income is generally recognized on a straight-line basis over the lease term and is included in other income in the Consolidated statements of income.

On a periodic basis, the Firm assesses leased assets for impairment, and if the carrying amount of the leased asset exceeds the undiscounted cash flows from the lease payments and the estimated residual value upon disposition of the leased asset, an impairment loss is recognized.

The risk of loss on auto and equipment leased assets relating to the residual value of the leased assets is monitored through projections of the asset residual values at lease origination and periodic review of residual values, and is mitigated through arrangements with certain manufacturers or lessees.

The following table presents the carrying value of assets subject to leases reported on the Consolidated balance sheets:

December 31, (in millions)	**2022**	2021
Carrying value of assets subject to operating leases, net of accumulated depreciation	**$ 12,302**	$ 17,553
Accumulated depreciation	**4,282**	5,737

The following table presents the Firm's operating lease income and the related depreciation expense on the Consolidated statements of income:

Year ended December 31, (in millions)	**2022**	2021	2020
Operating lease income	**$ 3,654**	$ 4,914	$ 5,539
Depreciation expense	**2,475**	3,380	4,257

The following table presents future receipts under operating leases as of December 31, 2022:

Year ended December 31, (in millions)	
2023	$ 2,172
2024	1,181
2025	389
2026	39
2027	10
After 2027	15
Total future minimum lease receipts	$ 3,806

Note 19 – Accounts payable and other liabilities

Accounts payable and other liabilities consist of brokerage payables, which include payables to customers and payables related to security purchases that did not settle, as well as other accrued expenses, such as compensation accruals, credit card rewards liability, operating lease liabilities, income tax payables, and litigation reserves.

The following table details the components of accounts payable and other liabilities.

December 31, (in millions)	**2022**	2021
Brokerage payables	**$ 188,692**	$ 169,172
Other payables and liabilities[(a)]	**111,449**	93,583
Total accounts payable and other liabilities	**$ 300,141**	$ 262,755

(a) Includes credit card rewards liability of $11.3 billion and $9.8 billion at December 31, 2022 and 2021, respectively.

Note 20 – Long-term debt

JPMorgan Chase issues long-term debt denominated in various currencies, predominantly U.S. dollars, with both fixed and variable interest rates. Included in senior and subordinated debt below are various equity-linked or other indexed instruments, which the Firm has elected to measure at fair value. Changes in fair value are recorded in principal transactions revenue in the Consolidated statements of income, except for unrealized gains/(losses) due to DVA which are recorded in OCI. The following table is a summary of long-term debt carrying values (including unamortized premiums and discounts, issuance costs, valuation adjustments and fair value adjustments, where applicable) by remaining contractual maturity as of December 31, 2022.

By remaining maturity at December 31, (in millions, except rates)		2022				2021
		Under 1 year	1-5 years	After 5 years	**Total**	Total
Parent company						
Senior debt:	Fixed rate	**$ 6,770**	**$ 78,821**	**$ 108,924**	**$ 194,515**	$ 202,370
	Variable rate	**604**	**8,053**	**2,908**	**11,565**	13,343
	Interest rates[e]	**2.64 %**	**2.67 %**	**3.41 %**	**3.06 %**	2.67 %
Subordinated debt:	Fixed rate	**$ 1,982**	**$ 8,809**	**$ 8,902**	**$ 19,693**	$ 18,269
	Variable rate	**–**	**–**	**–**	**–**	–
	Interest rates[e]	**3.38 %**	**4.54 %**	**4.69 %**	**4.50 %**	4.24 %
	Subtotal	**$ 9,356**	**$ 95,683**	**$ 120,734**	**$ 225,773**	$ 233,982
Subsidiaries						
Federal Home Loan Banks advances:	Fixed rate	**$ 4**	**$ 43**	**$ 46**	**$ 93**	$ 110
	Variable rate	**7,000**	**4,000**	**–**	**11,000**	11,000
	Interest rates[e]	**4.36 %**	**4.22 %**	**6.08 %**	**4.32 %**	0.23 %
Senior debt:	Fixed rate	**$ 2,358**	**$ 6,743**	**$ 6,282**	**$ 15,383**	$ 15,504
	Variable rate	**13,445**	**22,562**	**5,499**	**41,506**	38,147
	Interest rates[e]	**4.12 %**	**4.85%**	**1.63 %**	**2.02 %**	2.09 %
Subordinated debt:	Fixed rate	**$ –**	**$ 262**	**$ –**	**$ 262**	$ 287
	Variable rate	**–**	**–**	**–**	**–**	–
	Interest rates[e]	**– %**	**8.25 %**	**– %**	**8.25 %**	8.25 %
	Subtotal	**$ 22,807**	**$ 33,610**	**$ 11,827**	**$ 68,244**	$ 65,048
Junior subordinated debt:	Fixed rate	**$ –**	**$ –**	**$ 550**	**$ 550**	$ 678
	Variable rate	**–**	**373**	**925**	**1,298**	1,297
	Interest rates[e]	**– %**	**5.03 %**	**6.67 %**	**6.33 %**	3.20 %
	Subtotal	**$ –**	**$ 373**	**$ 1,475**	**$ 1,848**	$ 1,975
Total long-term debt[a][b][c]		**$ 32,163**	**$ 129,666**	**$ 134,036**	**$ 295,865** [f][g]	$ 301,005
Long-term beneficial interests:	Fixed rate	**$ 1,000**	**$ 999**	**$ –**	**$ 1,999**	$ 1,747
	Variable rate	**–**	**–**	**143**	**143**	829
	Interest rates[e]	**1.53 %**	**3.97 %**	**3.60 %**	**2.81 %**	1.57 %
Total long-term beneficial interests[d]		**$ 1,000**	**$ 999**	**$ 143**	**$ 2,142**	$ 2,576

(a) Included long-term debt of $13.8 billion and $14.1 billion secured by assets totaling $208.3 billion and $170.6 billion at December 31, 2022 and 2021, respectively. The amount of long-term debt secured by assets does not include amounts related to hybrid instruments.

(b) Included $72.3 billion and $74.9 billion of long-term debt accounted for at fair value at December 31, 2022 and 2021, respectively.

(c) Included $10.3 billion and $15.8 billion of outstanding zero-coupon notes at December 31, 2022 and 2021, respectively. The aggregate principal amount of these notes at their respective maturities is $45.3 billion and $46.4 billion, respectively. The aggregate principal amount reflects the contractual principal payment at maturity, which may exceed the contractual principal payment at the Firm's next call date, if applicable.

(d) Included on the Consolidated balance sheets in beneficial interests issued by consolidated VIEs. Also included $5 million and $12 million accounted for at fair value at December 31, 2022 and 2021, respectively. Excluded short-term commercial paper and other short-term beneficial interests of $10.5 billion and $8.2 billion at December 31, 2022 and 2021, respectively.

(e) The interest rates shown are the weighted average of contractual rates in effect at December 31, 2022 and 2021, respectively, including non-U.S. dollar fixed- and variable-rate issuances, which excludes the effects of the associated derivative instruments used in hedge accounting relationships, if applicable. The interest rates shown exclude structured notes accounted for at fair value.

(f) At December 31, 2022, long-term debt in the aggregate of $194.9 billion was redeemable at the option of JPMorgan Chase, in whole or in part, prior to maturity, based on the terms specified in the respective instruments.

(g) The aggregate carrying values of debt that matures in each of the five years subsequent to 2022 is $32.2 billion in 2023, $40.1 billion in 2024, $34.3 billion in 2025, $32.5 billion in 2026 and $22.8 billion in 2027.

The weighted-average contractual interest rates for total long-term debt excluding structured notes accounted for at fair value were 3.26% and 2.67% as of December 31, 2022 and 2021, respectively. In order to modify exposure to interest rate and currency exchange rate movements, JPMorgan Chase utilizes derivative instruments, primarily interest rate and cross-currency interest rate swaps, in conjunction with some of its debt issuances. The use of these instruments modifies the Firm’s interest expense on the associated debt. The modified weighted-average interest rates for total long-term debt, including the effects of related derivative instruments, were 4.89% and 1.43% as of December 31, 2022 and 2021, respectively.

JPMorgan Chase & Co. has guaranteed certain long-term debt of its subsidiaries, including structured notes. These guarantees rank on parity with the Firm’s other unsecured and unsubordinated indebtedness. The amount of such guaranteed long-term debt and structured notes was $28.2 billion and $16.4 billion at December 31, 2022 and 2021, respectively.

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

Note 21 – Preferred stock

At December 31, 2022 and 2021, JPMorgan Chase was authorized to issue 200 million shares of preferred stock, in one or more series, with a par value of $1 per share. In the event of a liquidation or dissolution of the Firm, JPMorgan Chase's preferred stock then outstanding takes precedence over the Firm's common stock with respect to the payment of dividends and the distribution of assets.

The following is a summary of JPMorgan Chase's non-cumulative preferred stock outstanding as of December 31, 2022 and 2021, and the quarterly dividend declarations for the years ended December 31, 2022, 2021 and 2020.

	Shares[a]		Carrying value (in millions)						Dividend declared per share[d]		
	December 31,		December 31,			Contractual rate in effect at December 31, 2022	Earliest redemption date[b]	Floating annualized rate[c]	Year ended December 31,		
	2022	2021	2022	2021	Issue date				2022	2021	2020
Fixed-rate:											
Series Y	–	–	$ –	$ –	2/12/2015	– %	3/1/2020	NA	$ –	$ –	$ 153.13
Series AA	–	–	–	–	6/4/2015	–	9/1/2020	NA	–	305.00	610.00
Series BB	–	–	–	–	7/29/2015	–	9/1/2020	NA	–	307.50	615.00
Series DD	**169,625**	169,625	**1,696**	1,696	9/21/2018	**5.750**	12/1/2023	NA	**575.00**	575.00	575.00
Series EE	**185,000**	185,000	**1,850**	1,850	1/24/2019	**6.000**	3/1/2024	NA	**600.00**	600.00	600.00
Series GG	**90,000**	90,000	**900**	900	11/7/2019	**4.750**	12/1/2024	NA	**475.00**	475.00	506.67 [e]
Series JJ	**150,000**	150,000	**1,500**	1,500	3/17/2021	**4.550**	6/1/2026	NA	**455.00**	321.03	NA [e]
Series LL	**185,000**	185,000	**1,850**	1,850	5/20/2021	**4.625**	6/1/2026	NA	**462.52**	245.39	NA [e]
Series MM	**200,000**	200,000	**2,000**	2,000	7/29/2021	**4.200**	9/1/2026	NA	**420.00**	142.33	NA [e]
Fixed-to-floating-rate:											
Series I	–	293,375	$ –	$ 2,934	4/23/2008	–	4/30/2018	LIBOR + 3.47%	$ **375.03**	$ 370.38	$ 428.03
Series Q	**150,000**	150,000	**1,500**	1,500	4/23/2013	**5.150**	5/1/2023	LIBOR + 3.25	**515.00**	515.00	515.00
Series R	**150,000**	150,000	**1,500**	1,500	7/29/2013	**6.000**	8/1/2023	LIBOR + 3.30	**600.00**	600.00	600.00
Series S	**200,000**	200,000	**2,000**	2,000	1/22/2014	**6.750**	2/1/2024	LIBOR + 3.78	**675.00**	675.00	675.00
Series U	**100,000**	100,000	**1,000**	1,000	3/10/2014	**6.125**	4/30/2024	LIBOR + 3.33	**612.50**	612.50	612.50
Series V	–	250,000	–	2,500	6/9/2014	–	7/1/2019	LIBOR + 3.32	**340.91**	353.65	436.85
Series X	**160,000**	160,000	**1,600**	1,600	9/23/2014	**6.100**	10/1/2024	LIBOR + 3.33	**610.00**	610.00	610.00
Series Z	–	200,000	–	2,000	4/21/2015	–	5/1/2020	LIBOR + 3.80	–	401.44	453.52
Series CC	**125,750**	125,750	**1,258**	1,258	10/20/2017	**LIBOR + 2.58**	11/1/2022	LIBOR + 2.58	**526.27**	462.50	462.50 [f]
Series FF	**225,000**	225,000	**2,250**	2,250	7/31/2019	**5.000**	8/1/2024	SOFR + 3.38	**500.00**	500.00	500.00
Series HH	**300,000**	300,000	**3,000**	3,000	1/23/2020	**4.600**	2/1/2025	SOFR + 3.125	**460.00**	460.00	470.22 [e]
Series II	**150,000**	150,000	**1,500**	1,500	2/24/2020	**4.000**	4/1/2025	SOFR + 2.745	**400.00**	400.00	341.11 [e]
Series KK	**200,000**	200,000	**2,000**	2,000	5/12/2021	**3.650**	6/1/2026	CMT + 2.85	**365.00**	201.76	NA [e]
Total preferred stock	**2,740,375**	3,483,750	**$ 27,404**	$ 34,838							

(a) Represented by depositary shares.

(b) Fixed-to-floating rate notes convert to a floating rate at the earliest redemption date.

(c) Floating annualized rate includes three-month LIBOR, three-month term SOFR or five-year Constant Maturity Treasury ("CMT") rate, as applicable, plus the spreads noted above.

(d) Dividends on preferred stock are discretionary and non-cumulative. When declared, dividends are declared quarterly. Dividends are payable quarterly on fixed-rate preferred stock. Dividends are payable semiannually on fixed-to-floating-rate preferred stock while at a fixed rate, and payable quarterly after converting to a floating rate.

(e) The initial dividend declared is prorated based on the number of days outstanding for the period. Dividends were declared quarterly thereafter at the contractual rate.

(f) The dividend rate for Series CC preferred stock became floating and payable quarterly starting on November 1, 2022; prior to which the dividend rate was fixed at 4.625% or $231.25 per share payable semiannually.

Each series of preferred stock has a liquidation value and redemption price per share of $10,000, plus accrued but unpaid dividends. The aggregate liquidation value was $27.7 billion at December 31, 2022.

Redemptions

On October 31, 2022, the Firm redeemed all $2.93 billion of its fixed to floating rate non-cumulative perpetual preferred stock, Series I.

On October 3, 2022, the Firm redeemed all $2.5 billion of its fixed-to-floating rate non-cumulative preferred stock, Series V.

On February 1, 2022, the Firm redeemed all $2.0 billion of its fixed-to-floating rate non-cumulative preferred stock, Series Z.

On June 1, 2021, the Firm redeemed all $1.43 billion of its 6.10% non-cumulative preferred stock, Series AA and all $1.15 billion of its 6.15% non-cumulative preferred stock, Series BB.

Redemption rights

Each series of the Firm's preferred stock may be redeemed on any dividend payment date on or after the earliest redemption date for that series. All outstanding preferred stock series may also be redeemed following a "capital treatment event," as described in the terms of each series. Any redemption of the Firm's preferred stock is subject to non-objection from the Board of Governors of the Federal Reserve System (the "Federal Reserve").

Note 22 – Common stock

At December 31, 2022 and 2021, JPMorgan Chase was authorized to issue 9.0 billion shares of common stock with a par value of $1 per share.

Common shares issued (reissuances from treasury) by JPMorgan Chase during the years ended December 31, 2022, 2021 and 2020 were as follows.

Year ended December 31, (in millions)	**2022**	2021	2020
Total issued – balance at January 1	**4,104.9**	4,104.9	4,104.9
Treasury – balance at January 1	**(1,160.8)**	(1,055.5)	(1,020.9)
Repurchase	**(23.1)**	(119.7)	(50.0)
Reissuance:			
Employee benefits and compensation plans	**12.0**	13.5	14.2
Employee stock purchase plans	**1.2**	0.9	1.2
Total reissuance	**13.2**	14.4	15.4
Total treasury – balance at December 31	**(1,170.7)**	(1,160.8)	(1,055.5)
Outstanding at December 31	**2,934.2**	2,944.1	3,049.4

Effective May 1, 2022, the Firm is authorized to purchase up to $30 billion of common shares under its common share repurchase program, which superseded the previously approved repurchase program under which the Firm was authorized to purchase up to $30 billion of common shares. In the second half of 2022, as a result of the expected increases in regulatory capital requirements, the Firm temporarily suspended share repurchases. In the first quarter of 2023, the Firm resumed repurchasing shares under its common share repurchase program.

The following table sets forth the Firm's repurchases of common stock for the years ended December 31, 2022, 2021 and 2020.

Year ended December 31, (in millions)	**2022**	2021[(a)]	2020[(b)]
Total number of shares of common stock repurchased	**23.1**	119.7	50.0
Aggregate purchase price of common stock repurchases	**$3,122**	$18,448	$6,397

(a) As directed by the Federal Reserve, total net repurchases and common stock dividends in the first and second quarter of 2021 were restricted and could not exceed the average of the Firm's net income for the four preceding calendar quarters. Effective July 1, 2021, the Firm became subject to the normal capital distribution restrictions provided under the regulatory capital framework.

(b) On March 15, 2020, in response to the economic disruptions caused by the COVID-19 pandemic, the Firm temporarily suspended repurchases of its common stock. Subsequently, the Federal Reserve directed all large banks, including the Firm, to discontinue net share repurchases through the end of 2020.

The Board of Directors' authorization to repurchase common shares is utilized at management's discretion, and the timing of purchases and the exact amount of common shares that may be repurchased is subject to various factors, including market conditions; legal and regulatory considerations affecting the amount and timing of repurchase activity; the Firm's capital position (taking into account goodwill and intangibles); internal capital generation; and alternative investment opportunities. The $30 billion common share repurchase program approved by the Board does not establish specific price targets or timetables. The repurchase program may be suspended by management at any time; and may be executed through open market purchases or privately negotiated transactions, or utilizing Rule 10b5-1 plans, which are written trading plans that the Firm may enter into from time to time under Rule 10b5-1 of the Securities Exchange Act of 1934 and which allow the Firm to repurchase its common shares during periods when it may otherwise not be repurchasing common shares — for example, during internal trading blackout periods.

As of December 31, 2022, approximately 58.9 million shares of common stock were reserved for issuance under various employee incentive, compensation, option and stock purchase plans, and directors' compensation plans.

Note 23 – Earnings per share

Basic earnings per share ("EPS") is calculated using the two-class method. Under the two-class method, all earnings (distributed and undistributed) are allocated to common stock and participating securities. JPMorgan Chase grants RSUs under its share-based compensation programs, predominantly all of which entitle recipients to receive nonforfeitable dividends during the vesting period on a basis equivalent to dividends paid to holders of the Firm's common stock. These unvested RSUs meet the definition of participating securities based on their respective rights to receive nonforfeitable dividends, and they are treated as a separate class of securities in computing basic EPS. Participating securities are not included as incremental shares in computing diluted EPS; refer to Note 9 for additional information.

Diluted EPS incorporates the potential impact of contingently issuable shares, including awards which require future service as a condition of delivery of the underlying common stock. Diluted EPS is calculated under both the two-class and treasury stock methods, and the more dilutive amount is reported. For each of the periods presented in the table below, diluted EPS calculated under the two-class method was more dilutive.

The following table presents the calculation of net income applicable to common stockholders and basic and diluted EPS for the years ended December 31, 2022, 2021 and 2020.

Year ended December 31, (in millions, except per share amounts)	**2022**	2021	2020
Basic earnings per share			
Net income	**$ 37,676**	$ 48,334	$ 29,131
Less: Preferred stock dividends	**1,595**	1,600	1,583
Net income applicable to common equity	**36,081**	46,734	27,548
Less: Dividends and undistributed earnings allocated to participating securities	**189**	231	138
Net income applicable to common stockholders	**$ 35,892**	$ 46,503	$ 27,410
Total weighted-average basic shares outstanding	**2,965.8**	3,021.5	3,082.4
Net income per share	**$ 12.10**	$ 15.39	$ 8.89
Diluted earnings per share			
Net income applicable to common stockholders	**$ 35,892**	$ 46,503	$ 27,410
Total weighted-average basic shares outstanding	**2,965.8**	3,021.5	3,082.4
Add: Dilutive impact of SARs and employee stock options, unvested PSUs and nondividend-earning RSUs	**4.2**	5.1	5.0
Total weighted-average diluted shares outstanding	**2,970.0**	3,026.6	3,087.4
Net income per share	**$ 12.09**	$ 15.36	$ 8.88

Note 24 – Accumulated other comprehensive income/(loss)

AOCI includes the after-tax change in unrealized gains and losses on investment securities, foreign currency translation adjustments (including the impact of related derivatives), fair value changes of excluded components on fair value hedges, cash flow hedging activities, net gain/(loss) related to the Firm's defined benefit pension and OPEB plans, and fair value option-elected liabilities arising from changes in the Firm's own credit risk (DVA).

Year ended December 31, (in millions)	Unrealized gains/(losses) on investment securities	Translation adjustments, net of hedges	Fair value hedges	Cash flow hedges	Defined benefit pension and OPEB plans	DVA on fair value option elected liabilities	Accumulated other comprehensive income/(loss)
Balance at December 31, 2019	$ 4,057	$ (707)	$ (131)	$ 63	$ (1,344)	$ (369)	$ 1,569
Net change	4,123	234	19	2,320	212	(491)	6,417
Balance at December 31, 2020	$ 8,180 [(a)]	$ (473)	$ (112)	$ 2,383	$ (1,132)	$ (860)	$ 7,986
Net change	(5,540)	(461)	(19)	(2,679)	922	(293)	(8,070)
Balance at December 31, 2021	$ 2,640 [(a)]	$ (934)	$ (131)	$ (296)	$ (210)	$ (1,153)	$ (84)
Net change	(11,764)	(611)	98	(5,360)	(1,241)	1,621	(17,257)
Balance at December 31, 2022	**$ (9,124)** [(a)]	**$ (1,545)**	**$ (33)**	**$ (5,656)**	**$ (1,451)**	**$ 468**	**$ (17,341)**

(a) Includes after-tax net unamortized unrealized gains/(losses) of $(1.3) billion, $2.4 billion, and $3.3 billion related to AFS securities that have been transferred to HTM for the years ended 2022, 2021 and 2020, respectively. Refer to Note 10 for further information.

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

	2022			2021			2020		
Year ended December 31, (in millions)	Pre-tax	Tax effect	After-tax	Pre-tax	Tax effect	After-tax	Pre-tax	Tax effect	After-tax
Unrealized gains/(losses) on investment securities									
Net unrealized gains/(losses) arising during the period	**$(17,862)**	**$ 4,290**	**$(13,572)**	$ (7,634)	$ 1,832	$ (5,802)	$ 6,228	$ (1,495)	$ 4,733
Reclassification adjustment for realized (gains)/losses included in net income[(a)]	**2,380**	**(572)**	**1,808**	345	(83)	262	(802)	192	(610)
Net change	**(15,482)**	**3,718**	**(11,764)**	(7,289)	1,749	(5,540)	5,426	(1,303)	4,123
Translation adjustments[(b)]									
Translation	**(3,574)**	**265**	**(3,309)**	(2,447)	125	(2,322)	1,407	(103)	1,304
Hedges	**3,553**	**(855)**	**2,698**	2,452	(591)	1,861	(1,411)	341	(1,070)
Net change	**(21)**	**(590)**	**(611)**	5	(466)	(461)	(4)	238	234
Fair value hedges, net change[(c)]	**130**	**(32)**	**98**	(26)	7	(19)	25	(6)	19
Cash flow hedges									
Net unrealized gains/(losses) arising during the period	**(7,473)**	**1,794**	**(5,679)**	(2,303)	553	(1,750)	3,623	(870)	2,753
Reclassification adjustment for realized (gains)/losses included in net income[(d)]	**420**	**(101)**	**319**	(1,222)	293	(929)	(570)	137	(433)
Net change	**(7,053)**	**1,693**	**(5,360)**	(3,525)	846	(2,679)	3,053	(733)	2,320
Defined benefit pension and OPEB plans, net change[(e)]	**(1,459)**	**218**	**(1,241)**	1,129	(207)	922	214	(2)	212
DVA on fair value option elected liabilities, net change	**2,141**	**(520)**	**1,621**	(393)	100	(293)	(648)	157	(491)
Total other comprehensive income/(loss)	**$(21,744)**	**$ 4,487**	**$(17,257)**	$(10,099)	$ 2,029	$ (8,070)	$ 8,066	$ (1,649)	$ 6,417

(a) The pre-tax amount is reported in Investment securities gains/(losses) in the Consolidated statements of income.

(b) Reclassifications of pre-tax realized gains/(losses) on translation adjustments and related hedges are reported in other income/expense in the Consolidated statements of income. During the year ended December 31, 2022, the Firm reclassified a net pre-tax loss of $8 million to other expense and other revenue related to the liquidation of certain legal entities, $38 million related to the net investment hedge gains and $46 million loss related to cumulative translation adjustment. During the year ended December 31, 2021, the Firm reclassified a net pre-tax loss of $7 million. During the year ended December 31, 2020, the Firm reclassified net pre-tax gain of $6 million.

(c) Represents changes in fair value of cross-currency swaps attributable to changes in cross-currency basis spreads, which are excluded from the assessment of hedge effectiveness and recorded in other comprehensive income. The initial cost of cross-currency basis spreads is recognized in earnings as part of the accrual of interest on the cross-currency swap.

(d) The pre-tax amounts are primarily recorded in noninterest revenue, net interest income and compensation expense in the Consolidated statements of income.

(e) During the year ended December 31, 2022, a remeasurement of the Firm's U.S. principal defined benefit plan in the third quarter, was required as a result of a pension settlement. The remeasurement resulted in a net decrease of $1.4 billion in pre-tax AOCI. Refer to Note 8 for further information.

Note 25 – Income taxes

JPMorgan Chase and its eligible subsidiaries file a consolidated U.S. federal income tax return. JPMorgan Chase uses the asset and liability method to provide for income taxes on all transactions recorded in the Consolidated Financial Statements. This method requires that income taxes reflect the expected future tax consequences of temporary differences between the carrying amounts of assets or liabilities for book and tax purposes. Accordingly, a deferred tax asset or liability for each temporary difference is determined based on the tax rates that the Firm expects to be in effect when the underlying items of income and expense are realized. JPMorgan Chase's expense for income taxes includes the current and deferred portions of that expense. A valuation allowance is established to reduce deferred tax assets to the amount the Firm expects to realize.

Due to the inherent complexities arising from the nature of the Firm's businesses, and from conducting business and being taxed in a substantial number of jurisdictions, significant judgments and estimates are required to be made. Agreement of tax liabilities between JPMorgan Chase and the many tax jurisdictions in which the Firm files tax returns may not be finalized for several years. Thus, the Firm's final tax-related assets and liabilities may ultimately be different from those currently reported.

Effective tax rate and expense

The following table presents a reconciliation of the applicable statutory U.S. federal income tax rate to the effective tax rate.

Effective tax rate

Year ended December 31,	**2022**	2021	2020
Statutory U.S. federal tax rate	**21.0 %**	21.0 %	21.0 %
Increase/(decrease) in tax rate resulting from:			
U.S. state and local income taxes, net of U.S. federal income tax benefit	**3.5**	3.0	2.5
Tax-exempt income	**(0.9)**	(0.9)	(1.6)
Non-U.S. earnings	**0.4**	0.1	1.4
Business tax credits	**(5.4)**	(4.2)	(5.4)
Other, net	**(0.2)**	(0.1)	0.8
Effective tax rate	**18.4 %**	18.9 %	18.7 %

The following table reflects the components of income tax expense/(benefit) included in the Consolidated statements of income.

Income tax expense/(benefit)

Year ended December 31, (in millions)	**2022**	2021	2020
Current income tax expense/ (benefit)			
U.S. federal	**$ 5,606**	$ 2,865	$ 5,759
Non-U.S.	**2,992**	2,718	2,705
U.S. state and local	**2,630**	1,897	1,793
Total current income tax expense/ (benefit)	**11,228**	7,480	10,257
Deferred income tax expense/ (benefit)			
U.S. federal	**(2,004)**	3,460	(2,776)
Non-U.S.	**(154)**	(101)	(126)
U.S. state and local	**(580)**	389	(671)
Total deferred income tax expense/(benefit)	**(2,738)**	3,748	(3,573)
Total income tax expense	**$ 8,490**	$ 11,228	$ 6,684

Total income tax expense includes $331 million of tax benefits in 2022, $69 million of tax expenses in 2021, and $72 million of tax benefits in 2020, resulting from the resolution of tax audits.

Tax effect of items recorded in stockholders' equity

The preceding table does not reflect the tax effect of certain items that are recorded each period directly in stockholders' equity. The tax effect of all items recorded directly to stockholders' equity resulted in a decrease of $4.5 billion in 2022, an increase of $2.0 billion in 2021, and a decrease of $827 million in 2020.

Results from U.S. and non-U.S. earnings

The following table presents the U.S. and non-U.S. components of income before income tax expense.

Year ended December 31, (in millions)	**2022**	2021	2020
U.S.	**$ 34,626**	$ 50,126	$ 27,312
Non-U.S.[(a)]	**11,540**	9,436	8,503
Income before income tax expense	**$ 46,166**	$ 59,562	$ 35,815

(a) For purposes of this table, non-U.S. income is defined as income generated from operations located outside the U.S.

The Firm will recognize any U.S. income tax expense it may incur on global intangible low tax income as income tax expense in the period in which the tax is incurred. At December 31, 2022 the income tax expense incurred was not material.

Affordable housing tax credits

The Firm recognized $1.8 billion of tax credits and other tax benefits associated with investments in affordable housing projects within income tax expense for the year ended 2022, and $1.7 billion and $1.5 billion for the years ended 2021 and 2020, respectively. The amount of amortization of such investments reported in income tax expense was $1.4 billion, $1.3 billion and $1.2 billion, respectively. The carrying value of these investments, which are reported in other assets on the Firm's Consolidated balance sheets, was $12.1 billion and $10.8 billion at December 31, 2022 and 2021, respectively. The amount of commitments related to these investments, which are reported in accounts payable and other liabilities on the Firm's Consolidated balance sheets, was $5.4 billion and $4.6 billion at December 31, 2022 and 2021, respectively.

Deferred taxes

Deferred income tax expense/(benefit) results from differences between assets and liabilities measured for financial reporting purposes versus income tax return purposes. Deferred tax assets are recognized if, in management's judgment, their realizability is determined to be more likely than not. If a deferred tax asset is determined to be unrealizable, a valuation allowance is established. The significant components of deferred tax assets and liabilities are reflected in the following table.

December 31, (in millions)	2022	2021
Deferred tax assets		
Allowance for loan losses	**$ 5,193**	$ 4,345
Employee benefits	**1,342**	987
Accrued expenses and other	**8,577**	3,955
Non-U.S. operations	**1,148**	900
Tax attribute carryforwards	**365**	615
Gross deferred tax assets	**16,625**	10,802
Valuation allowance	**(198)**	(378)
Deferred tax assets, net of valuation allowance	**$ 16,427**	$ 10,424
Deferred tax liabilities		
Depreciation and amortization	**$ 2,044**	$ 3,289
Mortgage servicing rights, net of hedges	**1,864**	2,049
Leasing transactions	**2,843**	4,227
Other, net	**3,801**	4,459
Gross deferred tax liabilities	**10,552**	14,024
Net deferred tax (liabilities)/assets	**$ 5,875**	$ (3,600)

JPMorgan Chase has recorded deferred tax assets of $365 million at December 31, 2022, in connection with U.S. federal and non-U.S. NOL carryforwards and other tax attributes, FTC carryforwards, and state and local capital loss carryforwards. At December 31, 2022, total U.S. federal NOL carryforwards were $648 million, non-U.S. NOL carryforwards were $308 million, FTC carryforwards were $81 million, state and local capital loss carryforwards were $1.0 billion, and other U.S. federal tax attributes were $256 million. If not utilized, a portion of the U.S. federal NOL carryforwards and other U.S. federal tax attributes will expire between 2026 and 2037 whereas others have an unlimited carryforward period. Similarly, certain non-U.S. NOL carryforwards will expire between 2026 and 2039 whereas others have an unlimited carryforward period. The FTC carryforwards will expire between 2029 and 2030, and the state and local capital loss carryforwards will expire in 2026.

The valuation allowance at December 31, 2022, was due to the state and local capital loss carryforwards, FTC carryforwards, and certain non-U.S. deferred tax assets, including NOL carryforwards.

Unrecognized tax benefits

At December 31, 2022, 2021 and 2020, JPMorgan Chase's unrecognized tax benefits, excluding related interest expense and penalties, were $5.0 billion, $4.6 billion and $4.3 billion, respectively, of which $3.8 billion, $3.4 billion and $3.1 billion, respectively, if recognized, would reduce the annual effective tax rate. Included in the amount of unrecognized tax benefits are certain items that would not affect the effective tax rate if they were recognized in the Consolidated statements of income. These unrecognized items include the tax effect of certain temporary differences, the portion of gross state and local unrecognized tax benefits that would be offset by the benefit from associated U.S. federal income tax deductions, and the portion of gross non-U.S. unrecognized tax benefits that would have offsets in other jurisdictions. JPMorgan Chase evaluates the need for changes in unrecognized tax benefits based on its anticipated tax return filing positions as part of its U.S. federal and state and local tax returns. In addition, the Firm is presently under audit by a number of taxing authorities, most notably by the Internal Revenue Service, as summarized in the Tax examination status table below. The evaluation of unrecognized tax benefits as well as the potential for audit settlements make it reasonably possible that over the next 12 months the gross balance of unrecognized tax benefits may increase or decrease by as much as approximately $1.0 billion. The change in the unrecognized tax benefit would result in a payment or income statement recognition.

The following table presents a reconciliation of the beginning and ending amount of unrecognized tax benefits.

Year ended December 31, (in millions)	**2022**	2021	2020
Balance at January 1,	**$ 4,636**	$ 4,250	$ 4,024
Increases based on tax positions related to the current period	**1,234**	798	685
Increases based on tax positions related to prior periods	**123**	393	362
Decreases based on tax positions related to prior periods	**(824)**	(657)	(705)
Decreases related to cash settlements with taxing authorities	**(126)**	(148)	(116)
Balance at December 31,	**$ 5,043**	$ 4,636	$ 4,250

After-tax interest expense/(benefit) and penalties related to income tax liabilities recognized in income tax expense were $141 million, $174 million and $147 million in 2022, 2021 and 2020, respectively.

At December 31, 2022 and 2021, in addition to the liability for unrecognized tax benefits, the Firm had accrued $1.3 billion and $1.1 billion, respectively, for income tax-related interest and penalties.

Tax examination status

JPMorgan Chase is continually under examination by the Internal Revenue Service, by taxing authorities throughout the world, and by many state and local jurisdictions throughout the U.S. The following table summarizes the status of significant income tax examinations of JPMorgan Chase and its consolidated subsidiaries as of December 31, 2022.

	Periods under examination	Status
JPMorgan Chase – U.S.	2011 - 2013	Field examination of amended returns
JPMorgan Chase – U.S.	2014 - 2018	Field examination of original and amended returns
JPMorgan Chase – New York State	2012 - 2014	Field Examination
JPMorgan Chase – New York City	2015 - 2017	Field Examination
JPMorgan Chase – U.K.	2011 - 2020	Field examination of certain select entities

Note 26 – Restricted cash, other restricted assets and intercompany funds transfers

Restricted cash and other restricted assets

Certain of the Firm's cash and other assets are restricted as to withdrawal or usage. These restrictions are imposed by various regulatory authorities based on the particular activities of the Firm's subsidiaries.

The business of JPMorgan Chase Bank, N.A. is subject to examination and regulation by the OCC. The Bank is a member of the U.S. Federal Reserve System, and its deposits in the U.S. are insured by the FDIC, subject to applicable limits.

The Firm is required to maintain cash reserves at certain non-US central banks.

The Firm is also subject to rules and regulations established by other U.S. and non U.S. regulators. As part of its compliance with the respective regulatory requirements, the Firm's broker-dealer activities are subject to certain restrictions on cash and other assets.

The following table presents the components of the Firm's restricted cash:

December 31, (in billions)	2022	2021
Segregated for the benefit of securities and cleared derivative customers	**18.7**	14.6
Cash reserves at non-U.S. central banks and held for other general purposes	**8.1**	5.1
Total restricted cash[(a)]	**$ 26.8**	$ 19.7

(a) Comprises $25.4 billion and $18.4 billion in deposits with banks, and $1.4 billion and $1.3 billion in cash and due from banks on the Consolidated balance sheets as of December 31, 2022 and 2021, respectively.

Also, as of December 31, 2022 and 2021, the Firm had the following other restricted assets:

- Cash and securities pledged with clearing organizations for the benefit of customers of $42.4 billion and $47.5 billion, respectively.
- Securities with a fair value of $31.7 billion and $30.0 billion, respectively, were also restricted in relation to customer activity.

Intercompany funds transfers

Restrictions imposed by U.S. federal law prohibit JPMorgan Chase Bank, N.A., and its subsidiaries, from lending to JPMorgan Chase & Co. ("Parent Company") and certain of its affiliates unless the loans are secured in specified amounts. Such secured loans provided by any banking subsidiary to the Parent Company or to any particular affiliate, together with certain other transactions with such affiliate (collectively referred to as "covered transactions"), must be made on terms and conditions that are consistent with safe and sound banking practices. In addition, unless collateralized with cash or US Government debt obligations, covered transactions are generally limited to 10% of the banking subsidiary's total capital, as determined by the risk-based capital guidelines; the aggregate amount of covered transactions between any banking subsidiary and all of its affiliates is limited to 20% of the banking subsidiary's total capital.

The Parent Company's two principal subsidiaries are JPMorgan Chase Bank, N.A. and JPMorgan Chase Holdings LLC, an intermediate holding company (the "IHC"). The IHC generally holds the stock of JPMorgan Chase's subsidiaries other than JPMorgan Chase Bank, N.A. and its subsidiaries. The IHC also owns other assets and provides intercompany loans to the Parent Company. The Parent Company is obligated to contribute to the IHC substantially all the net proceeds received from securities issuances (including issuances of senior and subordinated debt securities and of preferred and common stock).

The principal sources of income and funding for the Parent Company are dividends from JPMorgan Chase Bank, N.A. and dividends and extensions of credit from the IHC. In addition to dividend restrictions set forth in statutes and regulations, the Federal Reserve, the OCC and the FDIC have authority under the Financial Institutions Supervisory Act to prohibit or to limit the payment of dividends by the banking organizations they supervise, including the Parent Company and its subsidiaries that are banks or bank holding companies, if, in the banking regulator's opinion, payment of a dividend would constitute an unsafe or unsound practice in light of the financial condition of the banking organization. The IHC is prohibited from paying dividends or extending credit to the Parent Company if certain capital or liquidity "thresholds" are breached or if limits are otherwise imposed by the Parent Company's management or Board of Directors.

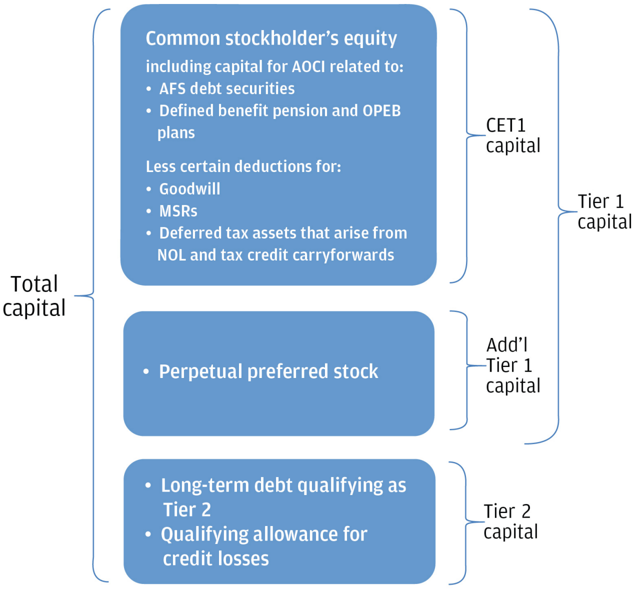
At January 1, 2023, the Parent Company's banking subsidiaries could pay, in the aggregate, approximately $34 billion in dividends to their respective bank holding companies without the prior approval of their relevant banking regulators. The capacity to pay dividends in 2023 will be supplemented by the banking subsidiaries' earnings during the year.

Note 27 – Regulatory capital

The Federal Reserve establishes capital requirements, including well-capitalized requirements, for the consolidated financial holding company. The Office of the Comptroller of the Currency ("OCC") establishes similar minimum capital requirements and standards for the Firm's principal IDI subsidiary, JPMorgan Chase Bank, N.A.

The capital rules under Basel III establish minimum capital ratios and overall capital adequacy standards for large and internationally active U.S. bank holding companies and banks, including the Firm and its IDI subsidiaries, including JPMorgan Chase Bank, N.A. Two comprehensive approaches are prescribed for calculating RWA: a standardized approach ("Basel III Standardized"), and an advanced approach ("Basel III Advanced"). For each of the risk-based capital ratios, the capital adequacy of the Firm and JPMorgan Chase Bank, N.A. is evaluated against the lower of the Standardized or Advanced approaches compared to their respective regulatory capital ratio requirements.

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


Common stockholder's equity
including capital for AOCI related to:
• AFS debt securities
• Defined benefit pension and OPEB plans
Less certain deductions for:
• Goodwill
• MSRs
• Deferred tax assets that arise from NOL and tax credit carryforwards
• Perpetual preferred stock
• Long-term debt qualifying as Tier 2
• Qualifying allowance for credit losses
CET1 capital
Add'l Tier 1 capital
Tier 1 capital
Tier 2 capital
Total capital

Under the risk-based capital and leverage-based guidelines of the Federal Reserve, JPMorgan Chase is required to maintain minimum ratios for CET1 capital, Tier 1 capital, Total capital, 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 established by their respective primary regulators.

The following table presents the risk-based regulatory capital ratio requirements and well-capitalized ratios to which the Firm and its IDI subsidiaries were subject as of December 31, 2022 and 2021.

	Standardized capital ratio requirements		Advanced capital ratio requirements		Well-capitalized ratios	
	BHC(a)(b)	IDI(c)	BHC(a)	IDI(c)	BHC(d)	IDI(e)
Risk-based capital ratios						
CET1 capital	12.0 %	7.0 %	10.5 %	7.0 %	NA	6.5 %
Tier 1 capital	13.5	8.5	12.0	8.5	6.0 %	8.0
Total capital	15.5	10.5	14.0	10.5	10.0	10.0

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 regulatory capital ratio requirements applicable to the Firm. The CET1, Tier 1 and Total capital ratio requirements each include a respective minimum requirement plus a GSIB surcharge of 3.5% as calculated under Method 2; plus a 4.0% SCB for Basel III Standardized ratios and a fixed 2.5% capital conservation buffer for Basel III Advanced ratios. The countercyclical buffer is currently set to 0% by the federal banking agencies.

(b) For the period ended December 31, 2021, the CET1, Tier 1, and Total capital ratio requirements under Basel III Standardized applicable to the Firm were 11.2%, 12.7% and 14.7%, respectively. SCB for Basel III Standardized ratio for 2021 was 3.2%.

(c) Represents requirements for JPMorgan Chase's IDI subsidiaries. The CET1, Tier 1 and Total capital ratio requirements include a fixed capital conservation buffer requirement of 2.5% that is applicable to the IDI subsidiaries. The IDI subsidiaries are not subject to the GSIB surcharge.

(d) Represents requirements for bank holding companies pursuant to regulations issued by the Federal Reserve.

(e) Represents requirements for IDI subsidiaries pursuant to regulations issued under the FDIC Improvement Act.

The following table presents the leverage-based regulatory capital ratio requirements and well-capitalized ratios to which the Firm and its IDI subsidiaries were subject as of December 31, 2022 and 2021.

	Capital ratio requirements(a)		Well-capitalized ratios	
	BHC	IDI	BHC(b)	IDI
Leverage-based capital ratios				
Tier 1 leverage	4.0 %	4.0 %	NA	5.0 %
SLR	5.0	6.0	NA	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 minimum SLR requirement of 3.0%, as well as supplementary leverage buffer requirements of 2.0% and 3.0% for BHC and IDI subsidiaries, respectively.

(b) The Federal Reserve's regulations do not establish well-capitalized thresholds for these measures for BHCs.

CECL regulatory capital transition

Until December 31, 2021, the Firm's capital reflected a two year delay of the effects of CECL provided by the Federal Reserve Board in response to the COVID-19 pandemic.

Beginning January 1, 2022, the $2.9 billion CECL capital benefit is being phased out at 25% per year over a three-year period. As of December 31, 2022, the Firm's CET1 capital reflected the remaining $2.2 billion benefit associated with the CECL capital transition provisions.

Additionally, effective January 1, 2022, the Firm phased out 25% of the other CECL capital transition provisions which impacted Tier 2 capital, adjusted average assets, total leverage exposure and RWA, as applicable.

Refer to Note 1 for further information on the CECL accounting guidance.

The following tables present risk-based capital metrics under both the Basel III Standardized and Basel III Advanced approaches and leverage-based capital metrics for JPMorgan Chase and JPMorgan Chase Bank, N.A. As of December 31, 2022 and 2021, JPMorgan Chase and JPMorgan Chase Bank, N.A. were well-capitalized and met all capital requirements to which each was subject.

	Basel III Standardized		**Basel III Advanced**	
December 31, 2022 (in millions, except ratios)	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.
Risk-based capital metrics:[a]				
CET1 capital	**$ 218,934**	**$ 269,668**	**$ 218,934**	**$ 269,668**
Tier 1 capital	**245,631**	**269,672**	**245,631**	**269,672**
Total capital	**277,769**	**288,433**	**264,583**	**275,255**
Risk-weighted assets	**1,653,538**	**1,597,072**	**1,609,773**	**1,475,602**
CET1 capital ratio	**13.2 %**	**16.9 %**	**13.6 %**	**18.3 %**
Tier 1 capital ratio	**14.9**	**16.9**	**15.3**	**18.3**
Total capital ratio	**16.8**	**18.1**	**16.4**	**18.7**

	Basel III Standardized		Basel III Advanced	
December 31, 2021 (in millions, except ratios)	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.
Risk-based capital metrics:[a]				
CET1 capital	$ 213,942	$ 266,907	$ 213,942	$ 266,907
Tier 1 capital	246,162	266,910	246,162	266,910
Total capital	274,900	281,826	265,796	272,299
Risk-weighted assets	1,638,900	1,582,280	1,547,920	1,392,847
CET1 capital ratio	13.1 %	16.9 %	13.8 %	19.2 %
Tier 1 capital ratio	15.0	16.9	15.9	19.2
Total capital ratio	16.8	17.8	17.2	19.5

(a) The capital metrics reflect the CECL capital transition provisions.

	December 31, 2022		December 31, 2021	
Three months ended (in millions, except ratios)	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.	JPMorgan Chase & Co.	JPMorgan Chase Bank, N.A.
Leverage-based capital metrics:[a]				
Adjusted average assets[b]	**$ 3,703,873**	**$ 3,249,912**	$ 3,782,035	$ 3,334,925
Tier 1 leverage ratio	**6.6 %**	**8.3 %**	6.5 %	8.0 %
Total leverage exposure	**$ 4,367,092**	**$ 3,925,502**	$ 4,571,789	$ 4,119,286
SLR	**5.6 %**	**6.9 %**	5.4 %	6.5 %

(a) The capital metrics reflect the CECL capital transition provisions.

(b) Adjusted average assets, for purposes of calculating the leverage ratios, includes quarterly average assets adjusted for on-balance sheet assets that are subject to deduction from Tier 1 capital, predominantly goodwill, inclusive of estimated equity method goodwill, and other intangible assets.

Note 28 – Off-balance sheet lending-related financial instruments, guarantees, and other commitments

JPMorgan Chase provides lending-related financial instruments (e.g., commitments and guarantees) to address the financing needs of its customers and clients. The contractual amount of these financial instruments represents the maximum possible credit risk to the Firm should the customer or client draw upon the commitment or the Firm be required to fulfill its obligation under the guarantee, and should the customer or client subsequently fail to perform according to the terms of the contract. Most of these commitments and guarantees have historically been refinanced, extended, cancelled, or expired without being drawn or a default occurring. As a result, the total contractual amount of these instruments is not, in the Firm's view, representative of its expected future credit exposure or funding requirements.

To provide for expected credit losses in wholesale and certain consumer lending-related commitments, an allowance for credit losses on lending-related commitments is maintained. Refer to Note 13 for further information regarding the allowance for credit losses on lending-related commitments. The following table summarizes the contractual amounts and carrying values of off-balance sheet lending-related financial instruments, guarantees and other commitments at December 31, 2022 and 2021. The amounts in the table below for credit card and home equity lending-related commitments represent the total available credit for these products. The Firm has not experienced, and does not anticipate, that all available lines of credit for these products will be utilized at the same time. The Firm can reduce or cancel credit card lines of credit by providing the borrower notice or, in some cases as permitted by law, without notice. In addition, the Firm typically closes credit card lines when the borrower is 60 days or more past due. The Firm may reduce or close HELOCs when there are significant decreases in the value of the underlying property, or when there has been a demonstrable decline in the creditworthiness of the borrower.

Off–balance sheet lending-related financial instruments, guarantees and other commitments

	Contractual amount						Carrying value[i]	
	2022					2021	**2022**	2021
By remaining maturity at December 31, (in millions)	Expires in 1 year or less	Expires after 1 year through 3 years	Expires after 3 years through 5 years	Expires after 5 years	Total	Total		
Lending-related								
Consumer, excluding credit card:								
Residential Real Estate[a]	**$ 5,156**	**$ 3,500**	**$ 6,542**	**$ 6,089**	**$ 21,287**	$ 32,996	**75**	100
Auto and other	**10,642**	**1**	**—**	**1,588**	**12,231**	12,338	**—**	2
Total consumer, excluding credit card	**15,798**	**3,501**	**6,542**	**7,677**	**33,518**	45,334	**75**	102
Credit card[b]	**821,284**	**—**	**—**	**—**	**821,284**	730,534	**—**	—
Total consumer[c]	**837,082**	**3,501**	**6,542**	**7,677**	**854,802**	775,868	**75**	102
Wholesale:								
Other unfunded commitments to extend credit[d]	**83,832**	**132,237**	**201,921**	**22,417**	**440,407**	453,467	**2,328** [h]	2,037
Standby letters of credit and other financial guarantees[d]	**13,559**	**8,272**	**4,585**	**1,023**	**27,439**	28,530	**408**	476
Other letters of credit[d]	**3,692**	**343**	**98**	**1**	**4,134**	4,448	**6**	9
Total wholesale[c]	**101,083**	**140,852**	**206,604**	**23,441**	**471,980**	486,445	**2,742**	2,522
Total lending-related	**$ 938,165**	**$ 144,353**	**$ 213,146**	**$ 31,118**	**$1,326,782**	$1,262,313	**$ 2,817**	$ 2,624
Other guarantees and commitments								
Securities lending indemnification agreements and guarantees[e]	**$ 283,386**	**$ —**	**$ —**	**$ —**	**$ 283,386**	$ 337,770	**$ —**	$ —
Derivatives qualifying as guarantees	**5,082**	**466**	**12,632**	**41,000**	**59,180**	55,730	**649**	475
Unsettled resale and securities borrowed agreements	**116,260**	**715**	**—**	**—**	**116,975**	103,681	**(2)**	1
Unsettled repurchase and securities loaned agreements	**65,873**	**534**	—	—	**66,407**	74,263	**(7)**	—
Loan sale and securitization-related indemnifications:								
Mortgage repurchase liability	**NA**	**NA**	**NA**	**NA**	**NA**	NA	**76**	61
Loans sold with recourse	**NA**	**NA**	**NA**	**NA**	**820**	827	**28**	19
Exchange & clearing house guarantees and commitments[f]	**191,068**	**—**	**—**	**—**	**191,068**	182,701	**—**	—
Other guarantees and commitments [g]	**4,856**	**723**	**209**	**2,846**	**8,634**	10,490	**53**	69

(a) Includes certain commitments to purchase loans from correspondents.

(b) Also includes commercial card lending-related commitments primarily in CB and CIB.

(c) Predominantly all consumer and wholesale lending-related commitments are in the U.S.

(d) At December 31, 2022 and 2021, reflected the contractual amount net of risk participations totaling $71 million and $44 million, respectively, for other unfunded commitments to extend credit; $8.2 billion and $7.9 billion, respectively, for standby letters of credit and other financial guarantees; and $512 million and $451 million, respectively, for other letters of credit. In regulatory filings with the Federal Reserve these commitments are shown gross of risk participations.

(e) At December 31, 2022 and 2021, collateral held by the Firm in support of securities lending indemnification agreements was $298.5 billion and $357.4 billion, respectively. Securities lending collateral primarily consists of cash, G7 government securities, and securities issued by U.S. GSEs and government agencies.

(f) At December 31, 2022 and 2021, includes guarantees to the Fixed Income Clearing Corporation under the sponsored member repo program and commitments and guarantees associated with the Firm's membership in certain clearing houses.

(g) At December 31, 2022 and 2021, primarily includes unfunded commitments related to certain tax-oriented equity investments, unfunded commitments to purchase secondary market loans, and other equity investment commitments.

(h) At December 31, 2022, includes net markdowns on held-for-sale positions related to unfunded commitments in the bridge financing portfolio.

(i) For lending-related products, the carrying value represents the allowance for lending-related commitments and the guarantee liability; for derivative-related products, and lending-related commitments for which the fair value option was elected, the carrying value represents the fair value.

Other unfunded commitments to extend credit

Other unfunded commitments to extend credit generally consist of commitments for working capital and general corporate purposes, extensions of credit to support commercial paper facilities and bond financings in the event that those obligations cannot be remarketed to new investors, as well as committed liquidity facilities to clearing organizations. The Firm also issues commitments under multipurpose facilities which could be drawn upon in several forms, including the issuance of a standby letter of credit.

Guarantees

U.S. GAAP requires that a guarantor recognize, at the inception of a guarantee, a liability in an amount equal to the fair value of the obligation undertaken in issuing the guarantee. U.S. GAAP defines a guarantee as a contract that contingently requires the guarantor to pay a guaranteed party based upon: (a) changes in an underlying asset, liability or equity security of the guaranteed party; or (b) a third party's failure to perform under a specified agreement. The Firm considers the following off–balance sheet arrangements to be guarantees under U.S. GAAP: standby letters of credit and other financial guarantees, securities lending indemnifications, certain indemnification agreements included within third-party contractual arrangements, certain derivative contracts and the guarantees under the sponsored member repo program.

As required by U.S. GAAP, the Firm initially records guarantees at the inception date fair value of the non-contingent obligation assumed (e.g., the amount of consideration received or the net present value of the premium receivable). For these obligations, the Firm records this fair value amount in other liabilities with an offsetting entry recorded in cash (for premiums received), or other assets (for premiums receivable). Any premium receivable recorded in other assets is reduced as cash is received under the contract, and the fair value of the liability recorded at inception is amortized into income as lending and deposit-related fees over the life of the guarantee contract. The lending-related contingent obligation is recognized based on expected credit losses in addition to, and separate from, any non-contingent obligation.

Non-lending-related contingent obligations are recognized when the liability becomes probable and reasonably estimable. These obligations are not recognized if the estimated amount is less than the carrying amount of any non-contingent liability recognized at inception (adjusted for any amortization). Examples of non-lending-related contingent obligations include indemnifications provided in sales agreements, where a portion of the sale proceeds is allocated to the guarantee, which adjusts the gain or loss that would otherwise result from the transaction. For these indemnifications, the initial liability is amortized to income as the Firm's risk is reduced (i.e., over time or when the indemnification expires).

The contractual amount and carrying value of guarantees and indemnifications are included in the table on page 277.

For additional information on the guarantees, see below.

Standby letters of credit and other financial guarantees
Standby letters of credit and other financial guarantees are conditional lending commitments issued by the Firm to guarantee the performance of a client or customer to a third party under certain arrangements, such as commercial paper facilities, bond financings, acquisition financings, trade financings and similar transactions.

The following table summarizes the contractual amount and carrying value of standby letters of credit and other financial guarantees and other letters of credit arrangements as of December 31, 2022 and 2021.

Standby letters of credit, other financial guarantees and other letters of credit

	2022		2021	
December 31, (in millions)	Standby letters of credit and other financial guarantees	Other letters of credit	Standby letters of credit and other financial guarantees	Other letters of credit
Investment-grade[(a)]	**$ 19,205**	**$ 3,040**	$ 19,998	$ 3,087
Noninvestment-grade[(a)]	**8,234**	**1,094**	8,532	1,361
Total contractual amount	**$ 27,439**	**$ 4,134**	$ 28,530	$ 4,448
Allowance for lending-related commitments	**$ 82**	**$ 6**	$ 123	$ 9
Guarantee liability	**326**	**—**	353	—
Total carrying value	**$ 408**	**$ 6**	$ 476	$ 9
Commitments with collateral	**$ 15,296**	**$ 795**	$ 14,511	$ 999

(a) The ratings scale is based on the Firm's internal risk ratings. Refer to Note 12 for further information on internal risk ratings.

Securities lending indemnifications
Through the Firm's securities lending program, counterparties' securities, via custodial and non-custodial arrangements, may be lent to third parties. As part of this program, the Firm provides an indemnification in the lending agreements which protects the lender against the failure of the borrower to return the lent securities. To minimize its liability under these indemnification agreements, the Firm obtains cash or other highly liquid collateral with a market value exceeding 100% of the value of the securities on loan from the borrower. Collateral is marked to market daily to help assure that collateralization is adequate. Additional collateral is called from the borrower if a shortfall exists, or collateral may be released to the borrower in the event of overcollateralization. If a borrower defaults, the Firm would use the collateral held to purchase replacement securities in the market or to credit the lending client or counterparty with the cash equivalent thereof.

The cash collateral held by the Firm may be invested on behalf of the client in indemnified resale agreements, whereby the Firm indemnifies the client against the loss of principal invested. To minimize its liability under these agreements, the Firm obtains collateral with a market value exceeding 100% of the principal invested.

Derivatives qualifying as guarantees
The Firm transacts in certain derivative contracts that have the characteristics of a guarantee under U.S. GAAP. These contracts include written put options that require the Firm to purchase assets upon exercise by the option holder at a specified price by a specified date in the future. The Firm may enter into written put option contracts in order to meet client needs, or for other trading purposes. The terms of written put options are typically five years or less.

Derivatives deemed to be guarantees also includes stable value contracts, commonly referred to as "stable value products", that require the Firm to make a payment of the difference between the market value and the book value of a counterparty's reference portfolio of assets in the event that market value is less than book value and certain other conditions have been met. Stable value products are transacted in order to allow investors to realize investment returns with less volatility than an unprotected portfolio. These contracts are typically longer-term or may have no stated maturity, but allow the Firm to elect to terminate the contract under certain conditions.

The notional value of derivative guarantees generally represents the Firm's maximum exposure. However, exposure to certain stable value products is contractually limited to a substantially lower percentage of the notional amount.

The fair value of derivative guarantees reflects the probability, in the Firm's view, of whether the Firm will be required to perform under the contract. The Firm reduces exposures to these contracts by entering into offsetting transactions, or by entering into contracts that hedge the market risk related to the derivative guarantees.

The following table summarizes the derivatives qualifying as guarantees as of December 31, 2022 and 2021.

(in millions)	**December 31, 2022**	December 31, 2021
Notional amounts		
Derivative guarantees	**$ 59,180**	$ 55,730
Stable value contracts with contractually limited exposure	**31,820**	29,778
Maximum exposure of stable value contracts with contractually limited exposure	**2,063**	2,882
Fair value		
Derivative payables	**649**	475

In addition to derivative contracts that meet the characteristics of a guarantee, the Firm is both a purchaser and seller of credit protection in the credit derivatives market. Refer to Note 5 for a further discussion of credit derivatives.

Unsettled securities financing agreements

In the normal course of business, the Firm enters into resale and securities borrowed agreements. At settlement, these commitments result in the Firm advancing cash to and receiving securities collateral from the counterparty. The Firm also enters into repurchase and securities loaned agreements. At settlement, these commitments result in the Firm receiving cash from and providing securities collateral to the counterparty. Such agreements settle at a future date. These agreements generally do not meet the definition of a derivative, and therefore, are not recorded on the Consolidated balance sheets until settlement date. These agreements predominantly have regular-way settlement terms. Refer to Note 11 for a further discussion of securities financing agreements.

Loan sales- and securitization-related indemnifications

Mortgage repurchase liability
In connection with the Firm's mortgage loan sale and securitization activities with U.S. GSEs the Firm has made representations and warranties that the loans sold meet certain requirements, and that may require the Firm to repurchase mortgage loans and/or indemnify the loan purchaser if such representations and warranties are breached by the Firm.

Private label securitizations
The liability related to repurchase demands associated with private label securitizations is separately evaluated by the Firm in establishing its litigation reserves.

Refer to Note 30 for additional information regarding litigation.

Loans sold with recourse
The Firm provides servicing for mortgages and certain commercial lending products on both a recourse and nonrecourse basis. In nonrecourse servicing, the principal credit risk to the Firm is the cost of temporary servicing advances of funds (i.e., normal servicing advances). In recourse servicing, the servicer agrees to share credit risk with the owner of the mortgage loans, such as Fannie Mae

or Freddie Mac or a private investor, insurer or guarantor. Losses on recourse servicing predominantly occur when foreclosure sales proceeds of the property underlying a defaulted loan are less than the sum of the outstanding principal balance, plus accrued interest on the loan and the cost of holding and disposing of the underlying property. The Firm's securitizations are predominantly nonrecourse, thereby effectively transferring the risk of future credit losses to the purchaser of the mortgage-backed securities issued by the trust. The unpaid principal balance of loans sold with recourse as well as the carrying value of the related liability that the Firm has recorded in accounts payable and other liabilities on the Consolidated balance sheets, which is representative of the Firm's view of the likelihood it will have to perform under its recourse obligations, are disclosed in the table on page 277.

Other off-balance sheet arrangements

Indemnification agreements – general

In connection with issuing securities to investors outside the U.S., the Firm may agree to pay additional amounts to the holders of the securities in the event that, due to a change in tax law, certain types of withholding taxes are imposed on payments on the securities. The terms of the securities may also give the Firm the right to redeem the securities if such additional amounts are payable. The Firm may also enter into indemnification clauses in connection with the licensing of software to clients ("software licensees") or when it sells a business or assets to a third party ("third-party purchasers"), pursuant to which it indemnifies software licensees for claims of liability or damages that may occur subsequent to the licensing of the software, or third-party purchasers for losses they may incur due to actions taken by the Firm prior to the sale of the business or assets. It is difficult to estimate the Firm's maximum exposure under these indemnification arrangements, since this would require an assessment of future changes in tax law and future claims that may be made against the Firm that have not yet occurred. However, based on historical experience, management expects the risk of loss to be remote.

Merchant charge-backs

Under the rules of payment networks, in its role as a merchant acquirer, the Firm's Merchant Services business in CIB Payments, retains a contingent liability for disputed processed credit and debit card transactions that result in a charge-back to the merchant. If a dispute is resolved in the cardholder's favor, the Firm will (through the cardholder's issuing bank) credit or refund the amount to the cardholder and will charge back the transaction to the merchant. If the Firm is unable to collect the amount from the merchant, the Firm will bear the loss for the amount credited or refunded to the cardholder. The Firm mitigates this risk by withholding future settlements, retaining cash reserve accounts or obtaining other collateral. In addition, the Firm recognizes a valuation allowance that covers the payment or performance risk related to charge-backs.

For the years ended December 31, 2022, 2021 and 2020, the Firm processed an aggregate volume of $2,158.4 billion, $1,886.7 billion, and $1,597.3 billion, respectively.

Clearing Services – Client Credit Risk

The Firm provides clearing services for clients by entering into securities purchases and sales and derivative contracts with CCPs, including ETDs such as futures and options, as well as OTC-cleared derivative contracts. As a clearing member, the Firm stands behind the performance of its clients, collects cash and securities collateral (margin) as well as any settlement amounts due from or to clients, and remits them to the relevant CCP or client in whole or part. There are two types of margin: variation margin is posted on a daily basis based on the value of clients' derivative contracts and initial margin is posted at inception of a derivative contract, generally on the basis of the potential changes in the variation margin requirement for the contract.

As a clearing member, the Firm is exposed to the risk of nonperformance by its clients, but is not liable to clients for the performance of the CCPs. Where possible, the Firm seeks to mitigate its risk to the client through the collection of appropriate amounts of margin at inception and throughout the life of the transactions. The Firm can also cease providing clearing services if clients do not adhere to their obligations under the clearing agreement. In the event of nonperformance by a client, the Firm would close out the client's positions and access available margin. The CCP would utilize any margin it holds to make itself whole, with any remaining shortfalls required to be paid by the Firm as a clearing member.

The Firm reflects its exposure to nonperformance risk of the client through the recognition of margin receivables from clients and margin payables to CCPs; the clients' underlying securities or derivative contracts are not reflected in the Firm's Consolidated Financial Statements.

It is difficult to estimate the Firm's maximum possible exposure through its role as a clearing member, as this would require an assessment of transactions that clients may execute in the future. However, based upon historical experience, and the credit risk mitigants available to the Firm, management believes it is unlikely that the Firm will have to make any material payments under these arrangements and the risk of loss is expected to be remote.

Refer to Note 5 for information on the derivatives that the Firm executes for its own account and records in its Consolidated Financial Statements.

Exchange & Clearing House Memberships
The Firm is a member of several securities and derivative exchanges and clearing houses, both in the U.S. and other countries, and it provides clearing services to its clients. Membership in some of these organizations requires the Firm to pay a pro rata share of the losses incurred by the organization as a result of the default of another member. Such obligations vary with different organizations. These obligations may be limited to the amount (or a multiple of the amount) of the Firm's contribution to the guarantee fund maintained by a clearing house or exchange as part of the resources available to cover any losses in the event of a member default. Alternatively, these obligations may also include a pro rata share of the residual losses after applying the guarantee fund. Additionally, certain clearing houses require the Firm as a member to pay a pro rata share of losses that may result from the clearing house's investment of guarantee fund contributions and initial margin, unrelated to and independent of the default of another member. Generally a payment would only be required should such losses exceed the resources of the clearing house or exchange that are contractually required to absorb the losses in the first instance. In certain cases, it is difficult to estimate the Firm's maximum possible exposure under these membership agreements, since this would require an assessment of future claims that may be made against the Firm that have not yet occurred. However, based on historical experience, management expects the risk of loss to the Firm to be remote. Where the Firm's maximum possible exposure can be estimated, the amount is disclosed in the table on page 277, in the Exchange & clearing house guarantees and commitments line.

Sponsored member repo program
The Firm acts as a sponsoring member to clear eligible overnight and term resale and repurchase agreements through the Government Securities Division of the Fixed Income Clearing Corporation ("FICC") on behalf of clients that become sponsored members under the FICC's rules. The Firm also guarantees to the FICC the prompt and full payment and performance of its sponsored member clients' respective obligations under the FICC's rules. The Firm minimizes its liability under these guarantees by obtaining a security interest in the cash or high-quality securities collateral that the clients place with the clearing house; therefore, the Firm expects the risk of loss to be remote. The Firm's maximum possible exposure, without taking into consideration the associated collateral, is included in the Exchange & clearing house guarantees and commitments line on page 277. Refer to Note 11 for additional information on credit risk mitigation practices on resale agreements and the types of collateral pledged under repurchase agreements.

Guarantees of subsidiaries
In the normal course of business, the Parent Company may provide counterparties with guarantees of certain of the trading and other obligations of its subsidiaries on a contract-by-contract basis, as negotiated with the Firm's counterparties. The obligations of the subsidiaries are included on the Firm's Consolidated balance sheets or are reflected as off-balance sheet commitments; therefore, the Parent Company has not recognized a separate liability for these guarantees. The Firm believes that the occurrence of any event that would trigger payments by the Parent Company under these guarantees is remote.

The Parent Company has guaranteed certain long-term debt and structured notes of its subsidiaries, including JPMorgan Chase Financial Company LLC ("JPMFC"), a 100%-owned finance subsidiary. All securities issued by JPMFC are fully and unconditionally guaranteed by the Parent Company and no other subsidiary of the parent company guarantees these securities. These guarantees, which rank on a parity with the Firm's unsecured and unsubordinated indebtedness, are not included in the table on page 277 of this Note. Refer to Note 20 for additional information.

Note 29 – Pledged assets and collateral

Pledged assets

The Firm pledges financial assets that it owns to maintain potential borrowing capacity at discount windows with Federal Reserve banks, various other central banks and FHLBs. Additionally, the Firm pledges assets for other purposes, including to collateralize repurchase and other securities financing agreements, to cover short sales and to collateralize derivative contracts and deposits. Certain of these pledged assets may be sold or repledged or otherwise used by the secured parties and are parenthetically identified on the Consolidated balance sheets as assets pledged.

The following table presents the Firm's pledged assets.

December 31, (in billions)	2022	2021
Assets that may be sold or repledged or otherwise used by secured parties	**$ 110.8**	$ 126.3
Assets that may not be sold or repledged or otherwise used by secured parties	**114.8**	112.0
Assets pledged at Federal Reserve banks and FHLBs	**567.6**	476.4
Total pledged assets	**$ 793.2**	$ 714.7

Total pledged assets do not include assets of consolidated VIEs; these assets are used to settle the liabilities of those entities. Refer to Note 14 for additional information on assets and liabilities of consolidated VIEs. Refer to Note 11 for additional information on the Firm's securities financing activities. Refer to Note 20 for additional information on the Firm's long-term debt. The significant components of the Firm's pledged assets were as follows.

December 31, (in billions)	2022	2021
Investment securities	**$ 104.4**	$ 80.1
Loans	**485.9**	428.5
Trading assets and other	**202.9**	206.1
Total pledged assets	**$ 793.2**	$ 714.7

Collateral

The Firm accepts financial assets as collateral that it is permitted to sell or repledge, deliver or otherwise use. This collateral is generally obtained under resale and other securities financing agreements, prime brokerage-related held-for-investment customer receivables and derivative contracts. Collateral is generally used under repurchase and other securities financing agreements, to cover short sales, and to collateralize derivative contracts and deposits.

The following table presents the fair value of collateral accepted.

December 31, (in billions)	2022	2021
Collateral permitted to be sold or repledged, delivered, or otherwise used	**$ 1,346.9**	$ 1,471.3
Collateral sold, repledged, delivered or otherwise used	**1,019.4**	1,111.0

Note 30 – Litigation

Contingencies

As of December 31, 2022, the Firm and its subsidiaries and affiliates are defendants or respondents in numerous legal proceedings, including private, civil litigations, government investigations or regulatory enforcement matters. The litigations range from individual actions involving a single plaintiff to class action lawsuits with potentially millions of class members. Investigations and regulatory enforcement matters involve both formal and informal proceedings, by both governmental agencies and self-regulatory organizations. These legal proceedings are at varying stages of adjudication, arbitration or investigation, and involve each of the Firm's lines of business and several geographies and a wide variety of claims (including common law tort and contract claims and statutory antitrust, securities and consumer protection claims), some of which present novel legal theories.

The Firm believes the estimate of the aggregate range of reasonably possible losses, in excess of reserves established, for its legal proceedings is from $0 to approximately $1.2 billion at December 31, 2022. This estimated aggregate range of reasonably possible losses was based upon information available as of that date for those proceedings in which the Firm believes that an estimate of reasonably possible loss can be made. For certain matters, the Firm does not believe that such an estimate can be made, as of that date. The Firm's estimate of the aggregate range of reasonably possible losses involves significant judgment, given:

- the number, variety and varying stages of the proceedings, including the fact that many are in preliminary stages,
- the existence in many such proceedings of multiple defendants, including the Firm, whose share of liability (if any) has yet to be determined,
- the numerous yet-unresolved issues in many of the proceedings, including issues regarding class certification and the scope of many of the claims, and
- the uncertainty of the various potential outcomes of such proceedings, including where the Firm has made assumptions concerning future rulings by the court or other adjudicator, or about the behavior or incentives of adverse parties or regulatory authorities, and those assumptions prove to be incorrect.

In addition, the outcome of a particular proceeding may be a result which the Firm did not take into account in its estimate because the Firm had deemed the likelihood of that outcome to be remote. Accordingly, the Firm's estimate of the aggregate range of reasonably possible losses will change from time to time, and actual losses may vary significantly.

Set forth below are descriptions of the Firm's material legal proceedings.

1MDB Litigation. J.P. Morgan (Suisse) SA was named as a defendant in a civil litigation filed in May 2021 in Malaysia by 1Malaysia Development Berhad ("1MDB"), a Malaysian state-owned and controlled investment fund. J.P. Morgan (Suisse) SA was served in August 2022. The claim alleges "dishonest assistance" against J.P. Morgan (Suisse) SA in relation to payments of $300 million and $500 million, from 2009 and 2010, respectively, received from 1MDB and paid into an account at J.P. Morgan Suisse (SA) held by 1MDB PetroSaudi Limited, a joint venture company between 1MDB and PetroSaudi Holdings (Cayman) Limited. In September 2022, the Firm filed an application challenging the validity of service and the Malaysian court's jurisdiction to hear the claim.

Amrapali. India's Enforcement Directorate ("ED") is investigating J.P. Morgan India Private Limited in connection with investments made in 2010 and 2012 by two offshore funds formerly managed by JPMorgan Chase entities into residential housing projects developed by the Amrapali Group ("Amrapali"). In 2017, numerous creditors filed civil claims against Amrapali, including petitions brought by home buyers relating to delays in delivering or failure to deliver residential units. The home buyers' petitions have been overseen by the Supreme Court of India and are ongoing. In August 2021, the ED issued an order fining J.P. Morgan India Private Limited approximately $31.5 million. The Firm is appealing the order and the fine. Relatedly, in July 2019, the Supreme Court of India issued an order making preliminary findings that Amrapali and other parties, including unspecified JPMorgan Chase entities and the offshore funds that had invested in the projects, violated certain currency control and money laundering provisions, and ordering the ED to conduct a further inquiry under India's Prevention of Money Laundering Act ("PMLA") and Foreign Exchange Management Act ("FEMA"). In May 2020, the ED attached approximately $25 million from J.P. Morgan India Private Limited in connection with the criminal PMLA investigation. The Firm is responding to and cooperating with the PMLA investigation.

Federal Republic of Nigeria Litigation. JPMorgan Chase Bank, N.A. operated an escrow and depository account for the Federal Government of Nigeria ("FGN") and two major international oil companies. The account held approximately $1.1 billion in connection with a dispute among the clients over rights to an oil field. Following the settlement of the dispute, JPMorgan Chase Bank, N.A. paid out the monies in the account in 2011 and 2013 in accordance with directions received from its clients. In November 2017, the Federal Republic of Nigeria ("FRN") commenced a claim in the English High Court for approximately $875 million in payments made out of the accounts. The FRN alleged that the payments were instructed as part of a complex fraud not involving JPMorgan Chase Bank, N.A., but that JPMorgan Chase Bank, N.A. was or should have been on notice that the payments may be fraudulent. A trial was held between February and April 2022. In June 2022, the Court decided the case in favor of JPMorgan Chase Bank, N.A. and dismissed it in full. In November 2022, the Court refused permission to the FRN to appeal the dismissal, and the matter was concluded.

Foreign Exchange Investigations and Litigation. The Firm previously reported settlements with certain government authorities relating to its foreign exchange (“FX”) sales and trading activities and controls related to those activities. Among those resolutions, in May 2015, the Firm pleaded guilty to a single violation of federal antitrust law. The Department of Labor ("DOL") granted the Firm exemptions that permit the Firm and its affiliates to continue to rely on the Qualified Professional Asset Manager exemption under the Employee Retirement Income Security Act (“ERISA”) through the ten-year disqualification period following the antitrust plea. The only remaining FX-related governmental inquiry is a South Africa Competition Commission matter which is currently pending before the South Africa Competition Tribunal.

With respect to civil litigation matters, in August 2018, the United States District Court for the Southern District of New York granted final approval to the Firm’s settlement of a consolidated class action brought by U.S.-based plaintiffs, which principally alleged violations of federal antitrust laws based on an alleged conspiracy to manipulate foreign exchange rates and also sought damages on behalf of persons who transacted in FX futures and options on futures. Although certain members of the settlement class filed requests to the Court to be excluded from the class, an agreement to resolve their claims was reached in December 2022. A putative class action remains pending against the Firm and other foreign exchange dealers on behalf of certain consumers who purchased foreign currencies at allegedly inflated rates. In addition, some FX-related individual and putative class actions based on similar alleged underlying conduct have been filed outside the U.S., including in the U.K., Israel, the Netherlands, Brazil and Australia. An agreement to resolve one of the UK actions was reached in December 2022. In a putative class action pending before the U.K. Competition Appeal Tribunal, proposed class representatives have appealed the tribunal's denial of a request for class certification on an opt-out basis. In Israel, a settlement in principle has been reached in the putative class action, which remains subject to court approval.

Interchange Litigation. Groups of merchants and retail associations filed a series of class action complaints alleging that Visa and Mastercard, as well as certain banks, conspired to set the price of credit and debit card interchange fees and enacted related rules in violation of antitrust laws. In 2012, the parties initially settled the cases for a cash payment, but that settlement was reversed on appeal and remanded to the United States District Court for the Eastern District of New York.

The original class action was divided into two separate actions, one seeking primarily monetary relief and the other seeking primarily injunctive relief. In September 2018, the parties to the monetary class action finalized an agreement which amends and supersedes the prior settlement agreement. Pursuant to this settlement, the defendants collectively contributed an additional $900 million to the approximately $5.3 billion previously held in escrow from the original settlement. In December 2019, the amended settlement agreement was approved by the District Court. Certain merchants appealed the District Court’s approval order, and those appeals are pending. Based on the percentage of merchants that opted out of the amended class settlement, $700 million has been returned to the defendants from the settlement escrow in accordance with the settlement agreement. The injunctive class action continues separately, and in September 2021, the District Court granted plaintiffs’ motion for class certification in part, and denied the motion in part.

Of the merchants who opted out of the amended damages class settlement, certain merchants filed individual actions raising similar allegations against Visa and Mastercard, as well as against the Firm and other banks. While some of those actions remain pending, the defendants have reached settlements with the merchants who opted out representing over half of the combined Mastercard-branded and Visa-branded payment card sales volume.

Jeffrey Epstein Litigation. JPMorgan Chase Bank, N.A. is named as a defendant in two lawsuits filed in the United States District Court for the Southern District of New York which allege that JPMorgan Chase Bank, N.A. knowingly facilitated Jeffrey Epstein’s sex trafficking and other unlawful conduct by providing banking services to Epstein until 2013. One case, which was filed in November 2022, is a putative class action filed by an alleged sex-trafficking victim of Epstein, and the other case, which was filed in December 2022, was brought on behalf of the government of the United States Virgin Islands and also alleges certain Virgin Islands statutory claims. JPMorgan Chase Bank, N.A. has moved to dismiss both complaints.

LIBOR and Other Benchmark Rate Investigations and Litigation. JPMorgan Chase has responded to inquiries from various governmental agencies and entities around the world relating primarily to the British Bankers Association’s (“BBA”) London Interbank Offered Rate (“LIBOR”) for various currencies and the European Banking Federation’s Euro Interbank Offered Rate (“EURIBOR”). The Swiss Competition Commission’s investigation relating to EURIBOR, to which the Firm and one other bank remain subject, continues. In December 2016, the European Commission issued a decision against the Firm and other banks finding an infringement of European antitrust rules relating to EURIBOR. The Firm has filed an appeal of that decision with the European General Court, and that appeal is pending.

In addition, the Firm has been named as a defendant along with other banks in various individual and putative class actions related to benchmark rates, including U.S. dollar LIBOR. In actions related to U.S. dollar LIBOR during the period that it was administered by the BBA, the Firm has obtained dismissal of certain actions and resolved certain other actions, and others are in various stages of litigation. The United States District Court for the Southern District of New York has granted class certification of antitrust claims related to bonds and interest rate swaps sold directly by the defendants, including the Firm. A consolidated putative class action related to the period that U.S. dollar LIBOR was administered by ICE Benchmark Administration has been dismissed. In addition, a group of individual plaintiffs filed a lawsuit asserting antitrust claims, alleging that the Firm and other defendants were engaged in an unlawful agreement to set U.S. dollar LIBOR and conspired to monopolize the market for LIBOR-based consumer loans and credit cards. In September 2022, the Court dismissed plaintiffs' complaint in its entirety, and plaintiffs filed an amended complaint asserting similar antitrust claims, which defendants have moved to dismiss. The Firm's settlements of putative class actions related to the Singapore Interbank Offered Rate and the Singapore Swap Offer Rate, and the Australian Bank Bill Swap Reference Rate received final court approval in November 2022, while the settlement related to Swiss franc LIBOR remains subject to court approval.

Securities Lending Antitrust Litigation. JPMorgan Chase Bank, N.A., J.P. Morgan Securities LLC, J.P. Morgan Prime, Inc., and J.P. Morgan Strategic Securities Lending Corp. are named as defendants in a putative class action filed in the United States District Court for the Southern District of New York. The complaint asserts violations of federal antitrust law and New York State common law in connection with an alleged conspiracy to prevent the emergence of anonymous exchange trading for securities lending transactions. Defendants' motion to dismiss the complaint was denied. Plaintiffs have moved to certify a class in this action, which defendants are opposing.

Shareholder Litigation. Several shareholder putative class actions, as well as shareholder derivative actions purporting to act on behalf of the Firm, have been filed against the Firm, its Board of Directors and certain of its current and former officers.

Certain of these shareholder suits relate to historical trading practices by former employees in the precious metals and U.S. treasuries markets and related conduct which were the subject of the Firm's resolutions with the DOJ, CFTC and SEC in September 2020, and fiduciary activities that were separately the subject of a resolution between JPMorgan Chase Bank, N.A. and the OCC in November 2020. One of these shareholder derivative suits was filed in the Supreme Court of the State of New York in May 2022, asserting breach of fiduciary duty and unjust enrichment claims relating to the historical trading practices and related conduct and fiduciary activities which were the subject of the resolutions described above. In December 2022, the court granted defendants' motion to dismiss this action in full. A second shareholder derivative action was filed in the United States District Court for the Eastern District of New York in December 2022 relating to the historical trading practices and related conduct, which asserts breach of fiduciary duty and contribution claims and alleges that the shareholder is excused from making a demand to commence litigation because such a demand would have been futile. In addition, a consolidated putative class action is pending in the United States District Court for the Eastern District of New York on behalf of shareholders who acquired shares of JPMorgan Chase common stock during the putative class period, alleging that certain SEC filings of the Firm were materially false or misleading because they did not disclose certain information relating to the historical trading practices and conduct. Defendants have moved to dismiss the amended complaint in this action.

A separate shareholder derivative suit was filed in March 2022 in the United States District Court for the Eastern District of New York asserting breaches of fiduciary duty and violations of federal securities laws based on the alleged failure of the Board of Directors to exercise adequate oversight over the Firm's compliance with records preservation requirements which were the subject of resolutions between certain of the Firm's subsidiaries and the SEC and the CFTC. Defendants' motion to dismiss the amended complaint is pending.

* * *

In addition to the various legal proceedings discussed above, JPMorgan Chase and its subsidiaries are named as defendants or are otherwise involved in a substantial number of other legal proceedings. The Firm believes it has meritorious defenses to the claims asserted against it in its currently outstanding legal proceedings and it intends to defend itself vigorously. Additional legal proceedings may be initiated from time to time in the future.

The Firm has established reserves for several hundred of its currently outstanding legal proceedings. In accordance with the provisions of U.S. GAAP for contingencies, the Firm accrues for a litigation-related liability when it is probable that such a liability has been incurred and the amount of the loss can be reasonably estimated. The Firm evaluates its outstanding legal proceedings each quarter to assess its litigation reserves, and makes adjustments in such reserves, upward or downward, as appropriate, based on management's best judgment after consultation with counsel. The Firm's legal expense was $266 million, $426 million and $1.1 billion for the years ended December 31, 2022, 2021 and 2020, respectively. There is no assurance that the Firm's litigation reserves will not need to be adjusted in the future.

In view of the inherent difficulty of predicting the outcome of legal proceedings, particularly where the claimants seek very large or indeterminate damages, or where the matters present novel legal theories, involve a large number of parties or are in early stages of discovery, the Firm cannot state with confidence what will be the eventual outcomes of the currently pending matters, the timing of their ultimate resolution or the eventual losses, fines, penalties or consequences related to those matters. JPMorgan Chase believes, based upon its current knowledge and after consultation with counsel, consideration of the material legal proceedings described above and after taking into account its current litigation reserves and its estimated aggregate range of possible losses, that the other legal proceedings currently pending against it should not have a material adverse effect on the Firm's consolidated financial condition. The Firm notes, however, that in light of the uncertainties involved in such proceedings, there is no assurance that the ultimate resolution of these matters will not significantly exceed the reserves it has currently accrued or that a matter will not have material reputational consequences. As a result, the outcome of a particular matter may be material to JPMorgan Chase's operating results for a particular period, depending on, among other factors, the size of the loss or liability imposed and the level of JPMorgan Chase's income for that period.

Note 31 – International operations

The following table presents income statement and balance sheet-related information for JPMorgan Chase by major international geographic area. The Firm defines international activities for purposes of this footnote presentation as business transactions that involve clients residing outside of the U.S., and the information presented below is based predominantly on the domicile of the client, the location from which the client relationship is managed, booking location or the location of the trading desk. However, many of the Firm's U.S. operations serve international businesses.

As the Firm's operations are highly integrated, estimates and subjective assumptions have been made to apportion revenue and expense between U.S. and international operations. These estimates and assumptions are consistent with the allocations used for the Firm's segment reporting as set forth in Note 32.

The Firm's long-lived assets for the periods presented are not considered by management to be significant in relation to total assets. The majority of the Firm's long-lived assets are located in the U.S.

As of or for the year ended December 31, (in millions)	Revenue[b]	Expense[c]	Income before income tax expense	Net income	Total assets	
2022						
Europe/Middle East/Africa	**$ 18,765**	**$ 11,754**	**$ 7,011**	**$ 5,158**	**$ 558,430**	[d]
Asia-Pacific	**10,025**	**6,763**	**3,262**	**2,119**	**281,479**	
Latin America/Caribbean	**3,178**	**1,697**	**1,481**	**1,156**	**78,673**	
Total international	**31,968**	**20,214**	**11,754**	**8,433**	**918,582**	
North America[a]	**96,727**	**62,315**	**34,412**	**29,243**	**2,747,161**	
Total	**$ 128,695**	**$ 82,529**	**$ 46,166**	**$ 37,676**	**$ 3,665,743**	
2021						
Europe/Middle East/Africa	$ 16,561	$ 10,833	$ 5,728	$ 4,202	$ 517,904	[d]
Asia-Pacific	9,654	6,372	3,282	2,300	277,897	
Latin America/Caribbean	2,756	1,589	1,167	878	65,040	[e]
Total international	28,971	18,794	10,177	7,380	860,841	
North America[a]	92,678	43,293	49,385	40,954	2,882,726	[e]
Total	$ 121,649	$ 62,087	$ 59,562	$ 48,334	$ 3,743,567	
2020						
Europe/Middle East/Africa	$ 16,566	$ 10,987	$ 5,579	$ 3,868	$ 530,687	[d]
Asia-Pacific	9,289	5,558	3,731	2,630	252,553	
Latin America/Caribbean	2,740	1,590	1,150	837	63,853	[e]
Total international	28,595	18,135	10,460	7,335	847,093	
North America[a]	91,356	66,001	25,355	21,796	2,537,664	[e]
Total	$ 119,951	$ 84,136	$ 35,815	$ 29,131	$ 3,384,757	

(a) Substantially reflects the U.S.
(b) Revenue is composed of net interest income and noninterest revenue.
(c) Expense is composed of noninterest expense and the provision for credit losses.
(d) Total assets for the U.K. were approximately $357 billion, $365 billion and $353 billion at December 31, 2022, 2021 and 2020, respectively.
(e) Prior-period amounts have been revised to conform with the current presentation.

Note 32 – Business segments

The Firm is managed on an LOB basis. There are four major reportable business segments – Consumer & Community Banking, Corporate & Investment Bank, Commercial Banking and Asset & Wealth Management. In addition, there is a Corporate segment. The business segments are determined based on the products and services provided, or the type of customer served, and they reflect the manner in which financial information is evaluated by the Firm's Operating Committee. Segment results are presented on a managed basis. Refer to Segment results of this footnote for a further discussion of JPMorgan Chase's business segments.

The following is a description of each of the Firm's business segments, and the products and services they provide to their respective client bases.

Consumer & Community Banking

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

Corporate & Investment Bank

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

Commercial Banking

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

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

Corporate Client Banking covers large corporations.

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

Asset & Wealth Management

Asset & Wealth Management, with client assets of $4.0 trillion, is a global leader in investment and wealth management.

Asset Management
Offers multi-asset investment management solutions across equities, fixed income, alternatives and money market funds to institutional and retail investors providing for a broad range of clients' investment needs.

Global Private Bank
Provides retirement products and services, brokerage, custody, estate planning, lending, deposits and investment management to high net worth clients.

The majority of AWM's client assets are in actively managed portfolios.

Corporate

The Corporate segment consists of Treasury and Chief Investment Office ("CIO") and Other Corporate. Treasury and CIO is predominantly responsible for measuring, monitoring, reporting and managing the Firm's liquidity, funding, capital, structural interest rate and foreign exchange risks.

Other Corporate includes staff functions and expense that is centrally managed as well as certain Firm initiatives and activities not aligned to a specific LOB. The major Other Corporate functions include Real Estate, Technology, Legal, Corporate Finance, Human Resources, Internal Audit, Risk Management, Compliance, Control Management, Corporate Responsibility and various Other Corporate groups.

Segment results

The following table provides a summary of the Firm's segment results as of or for the years ended December 31, 2022, 2021 and 2020, on a managed basis. The Firm's definition of managed basis starts with the reported U.S. GAAP results and includes certain reclassifications to present total net revenue for the Firm (and each of the reportable business segments) on an FTE basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in the managed results on a basis comparable to taxable investments and securities. This allows management to assess the comparability of revenue from year-to-year arising from both taxable and tax-exempt sources. The corresponding income tax impact related to tax-exempt items is recorded within income tax expense/(benefit). These adjustments have no impact on net income as reported by the Firm as a whole or by the LOBs.

Capital allocation

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

The Firm's allocation methodology incorporates Basel III Standardized RWA, Basel III Advanced RWA, the GSIB surcharge, and a simulation of capital in a severe stress environment. At least annually, the assumptions, judgments and methodologies used to allocate capital are reassessed and, as a result, the capital allocated to the LOBs may change.

Segment results and reconciliation[(a)]

(Table continued on next page)

As of or for the year ended December 31, (in millions, except ratios)	Consumer & Community Banking			Corporate & Investment Bank			Commercial Banking			Asset & Wealth Management		
	2022	2021	2020	**2022**	2021	2020	**2022**	2021	2020	**2022**	2021	2020
Noninterest revenue	**$ 15,089**	$17,286	$17,740	**$35,999**	$ 38,209	$35,120	**$ 3,336**	$ 3,929	$ 3,067	**$12,507**	$13,071	$10,822
Net interest income	**39,928**	32,787	33,528	**11,900**	13,540	14,164	**8,197**	6,079	6,246	**5,241**	3,886	3,418
Total net revenue	**55,017**	50,073	51,268	**47,899**	51,749	49,284	**11,533**	10,008	9,313	**17,748**	16,957	14,240
Provision for credit losses	**3,813**	(6,989)	12,312	**1,158**	(1,174)	2,726	**1,268**	(947)	2,113	**128**	(227)	263
Noninterest expense	**31,471**	29,256	27,990	**27,087**	25,325	23,538	**4,719**	4,041	3,798	**11,829**	10,919	9,957
Income/(loss) before income tax expense/ (benefit)	**19,733**	27,806	10,966	**19,654**	27,598	23,020	**5,546**	6,914	3,402	**5,791**	6,265	4,020
Income tax expense/ (benefit)	**4,862**	6,876	2,749	**4,684**	6,464	5,926	**1,333**	1,668	824	**1,426**	1,528	1,028
Net income/(loss)	**$ 14,871**	$20,930	$ 8,217	**$14,970**	$ 21,134	$ 17,094	**$ 4,213**	$ 5,246	$ 2,578	**$ 4,365**	$ 4,737	$ 2,992
Average equity	**$ 50,000**	$50,000	$52,000	**$103,000**	$ 83,000	$ 80,000	**$25,000**	$24,000	$22,000	**$17,000**	$14,000	$10,500
Total assets	**514,085**	500,370	496,705	**1,334,296**	1,259,896	1,095,926	**257,106**	230,776	228,911	**232,037**	234,425	203,384
Return on equity	**29 %**	41 %	15 %	**14 %**	25 %	20 %	**16 %**	21 %	11 %	**25 %**	33 %	28 %
Overhead ratio	**57**	58	55	**57**	49	48	**41**	40	41	**67**	64	70

(Table continued from previous page)

As of or for the year ended December 31, (in millions, except ratios)	Corporate			Reconciling Items[(a)]			Total		
	2022	2021	2020	**2022**	2021	2020	**2022**	2021	2020
Noninterest revenue	**$ (1,798)**	$ 68	$ 1,199	**$ (3,148)**	$ (3,225)	$ (2,560)	**$ 61,985**	$ 69,338	$ 65,388
Net interest income	**1,878**	(3,551)	(2,375)	**(434)**	(430)	(418)	**66,710**	52,311	54,563
Total net revenue	**80**	(3,483)	(1,176)	**(3,582)**	(3,655)	(2,978)	**128,695**	121,649	119,951
Provision for credit losses	**22**	81	66	**–**	–	–	**6,389**	(9,256)	17,480
Noninterest expense	**1,034**	1,802	1,373	**–**	–	–	**76,140**	71,343	66,656
Income/(loss) before income tax expense/(benefit)	**(976)**	(5,366)	(2,615)	**(3,582)**	(3,655)	(2,978)	**46,166**	59,562	35,815
Income tax expense/(benefit)	**(233)**	(1,653)	(865)	**(3,582)**	(3,655)	(2,978)	**8,490**	11,228	6,684
Net income/(loss)	**$ (743)**	$ (3,713)	$ (1,750)	**$ –**	$ –	$ –	**$ 37,676**	$ 48,334	$ 29,131
Average equity	**$ 58,068**	$ 79,968	$ 72,365	**$ –**	$ –	$ –	**$ 253,068**	$ 250,968	$ 236,865
Total assets	**1,328,219**	1,518,100	1,359,831	**NA**	NA	NA	**3,665,743**	3,743,567	3,384,757
Return on equity	**NM**	NM	NM	**NM**	NM	NM	**14 %**	19 %	12 %
Overhead ratio	**NM**	NM	NM	**NM**	NM	NM	**59**	59	56

(a) Segment results on a managed basis reflect revenue on a FTE basis with the corresponding income tax impact recorded within income tax expense/(benefit). These adjustments are eliminated in reconciling items to arrive at the Firm's reported U.S. GAAP results.

Note 33 – Parent Company

The following tables present Parent Company-only financial statements.

Statements of income and comprehensive income

Year ended December 31, (in millions)	2022	2021	2020
Income			
Dividends from subsidiaries and affiliates:			
Bank and bank holding company	**$ 40,500**	$ 10,000	$ 6,000
Non-bank	**–**	–	–
Interest income from subsidiaries	**498**	32	63
Other income/(expense) from subsidiaries:			
Bank and bank holding company	**(3,497)**	859	2,019
Non-bank	**335**	366	(569)
Other income/(expense)	**5,271**	1,137	205
Total income	**43,107**	12,394	7,718
Expense			
Interest expense/(income) to subsidiaries and affiliates[a]	**22,731**	5,353	(8,830)
Other interest expense/(income)[a]	**(14,658)**	(1,349)	14,150
Noninterest expense	**2,817**	2,637	2,222
Total expense	**10,890**	6,641	7,542
Income before income tax benefit and undistributed net income of subsidiaries	**32,217**	5,753	176
Income tax benefit	**1,260**	1,329	1,324
Equity in undistributed net income of subsidiaries	**4,199**	41,252	27,631
Net income	**$ 37,676**	$ 48,334	$ 29,131
Other comprehensive income/(loss), net	**(17,257)**	(8,070)	6,417
Comprehensive income	**$ 20,419**	$ 40,264	$ 35,548

Balance sheets

December 31, (in millions)	2022	2021
Assets		
Cash and due from banks	**$ 41**	$ 36
Deposits with banking subsidiaries	**9,806**	6,809
Trading assets	**2,727**	2,293
Advances to, and receivables from, subsidiaries:		
Bank and bank holding company	**136**	431
Non-bank	**46**	50
Investments (at equity) in subsidiaries and affiliates:		
Bank and bank holding company	**532,759**	545,635
Non-bank	**1,064**	1,007
Other assets	**9,108**	12,220
Total assets	**$ 555,687**	$ 568,481
Liabilities and stockholders' equity		
Borrowings from, and payables to, subsidiaries and affiliates	**$ 24,164**	$ 28,039
Short-term borrowings	**1,130**	1,018
Other liabilities	**10,440**	9,340
Long-term debt[b][c]	**227,621**	235,957
Total liabilities[c]	**263,355**	274,354
Total stockholders' equity	**292,332**	294,127
Total liabilities and stockholders' equity	**$ 555,687**	$ 568,481

Statements of cash flows

Year ended December 31, (in millions)	2022	2021	2020
Operating activities			
Net income	**$ 37,676**	$ 48,334	$ 29,131
Less: Net income of subsidiaries and affiliates	**44,699**	51,252	33,631
Parent company net loss	**(7,023)**	(2,918)	(4,500)
Cash dividends from subsidiaries and affiliates	**40,500**	10,000	6,000
Other operating adjustments	**(23,747)**	(12,677)	15,357
Net cash provided by/(used in) operating activities	**9,730**	(5,595)	16,857
Investing activities			
Net change in:			
Advances to and investments in subsidiaries and affiliates, net	**–**	(3,000)	(2,663)
All other investing activities, net	**31**	31	24
Net cash provided by/(used in) investing activities	**31**	(2,969)	(2,639)
Financing activities			
Net change in:			
Borrowings from subsidiaries and affiliates	**(4,491)**	2,647	1,425
Short-term borrowings	**–**	–	(20)
Proceeds from long-term borrowings	**41,389**	49,169	37,312
Payments of long-term borrowings	**(18,294)**	(15,543)	(34,194)
Proceeds from issuance of preferred stock	**–**	7,350	4,500
Redemption of preferred stock	**(7,434)**	(2,575)	(1,430)
Treasury stock repurchased	**(3,162)**	(18,408)	(6,517)
Dividends paid	**(13,562)**	(12,858)	(12,690)
All other financing activities, net	**(1,205)**	(1,238)	(1,080)
Net cash provided by/(used in) financing activities	**(6,759)**	8,544	(12,694)
Net increase/(decrease) in cash and due from banks and deposits with banking subsidiaries	**3,002**	(20)	1,524
Cash and due from banks and deposits with banking subsidiaries at the beginning of the year	**6,845**	6,865	5,341
Cash and due from banks and deposits with banking subsidiaries at the end of the year	**$ 9,847**	$ 6,845	$ 6,865
Cash interest paid	**$ 7,462**	$ 4,065	$ 5,445
Cash income taxes paid, net[d]	**6,941**	15,259	5,366

(a) Includes interest expense for intercompany derivative hedges on the Firm's LTD and related fair value adjustments, which is predominantly offset by related amounts in Other interest expense/(income).

(b) At December 31, 2022, long-term debt that contractually matures in 2023 through 2027 totaled $9.4 billion, $23.5 billion, $26.8 billion, $28.2 billion, and $17.5 billion, respectively.

(c) Refer to Notes 20 and 28 for information regarding the Parent Company's guarantees of its subsidiaries' obligations.

(d) Represents payments, net of refunds, made by the Parent Company to various taxing authorities and includes taxes paid on behalf of certain of its subsidiaries that are subsequently reimbursed. The reimbursements were $11.3 billion, $13.9 billion, and $8.3 billion for the years ended December 31, 2022, 2021 and 2020, respectively.

Supplementary Information: Distribution of assets, liabilities and stockholders' equity; interest rates and interest differentials

Consolidated average balance sheets, interest and rates

Provided below is a summary of JPMorgan Chase's consolidated average balances, interest and rates on a taxable-equivalent basis for the years 2020 through 2022. Income computed on a taxable-equivalent basis is the income reported in the Consolidated statements of income, adjusted to present interest income and rates earned on assets exempt from income taxes (i.e., federal taxes) on a basis comparable with other taxable investments. The incremental tax rate used for calculating the taxable-equivalent adjustment was approximately 24% in 2022, 2021 and 2020.

(Table continued on next page)

(Unaudited)		**2022**	
Year ended December 31, (Taxable-equivalent interest and rates; in millions, except rates)	Average balance	Interest[g]	Rate
Assets			
Deposits with banks	**$ 670,773**	**$ 9,039**	**1.35 %**
Federal funds sold and securities purchased under resale agreements	**307,150**	**4,632**	**1.51**
Securities borrowed	**205,516**	**2,237**	**1.09**
Trading assets – debt instruments	**283,108**	**9,097**	**3.21**
Taxable securities	**626,122**	**10,372**	**1.66**
Non-taxable securities[a]	**27,863**	**1,224**	**4.39**
Total investment securities	**653,985**	**11,596**	**1.77** [i]
Loans	**1,100,318**	**52,877** [h]	**4.81**
All other interest-earning assets[b]	**128,229**	**3,763**	**2.93**
Total interest-earning assets	**3,349,079**	**93,241**	**2.78**
Allowance for loan losses	**(17,399)**		
Cash and due from banks	**27,601**		
Trading assets – equity and other instruments	**140,778**		
Trading assets – derivative receivables	**78,606**		
Goodwill, MSRs and other intangible assets	**59,467**		
All other noninterest-earning assets	**215,408**		
Total assets	**$ 3,853,540**		
Liabilities			
Interest-bearing deposits	**$ 1,748,666**	**$ 10,082**	**0.58 %**
Federal funds purchased and securities loaned or sold under repurchase agreements	**242,762**	**3,721**	**1.53**
Short-term borrowings[c]	**46,063**	**747**	**1.62**
Trading liabilities – debt and all other interest-bearing liabilities[d][e]	**268,019**	**3,246**	**1.21**
Beneficial interests issued by consolidated VIEs	**11,208**	**226**	**2.02**
Long-term debt	**250,080**	**8,075**	**3.23**
Total interest-bearing liabilities	**2,566,798**	**26,097**	**1.02**
Noninterest-bearing deposits	**719,249**		
Trading liabilities – equity and other instruments[e]	**39,155**		
Trading liabilities – derivative payables	**57,388**		
All other liabilities, including the allowance for lending-related commitments	**185,989**		
Total liabilities	**3,568,579**		
Stockholders' equity			
Preferred stock	**31,893**		
Common stockholders' equity	**253,068**		
Total stockholders' equity	**284,961** [f]		
Total liabilities and stockholders' equity	**$ 3,853,540**		
Interest rate spread			**1.76 %**
Net interest income and net yield on interest-earning assets		**$ 67,144**	**2.00**

[a] Represents securities that are tax-exempt for U.S. federal income tax purposes.

[b] Includes brokerage-related held-for-investment customer receivables, which are classified in accrued interest and accounts receivable, and all other interest-earning assets, which are classified in other assets on the Consolidated Balance Sheets.

[c] Includes commercial paper.

[d] All other interest-bearing liabilities include brokerage-related customer payables.

Within the Consolidated average balance sheets, interest and rates summary, the principal amounts of nonaccrual loans have been included in the average loan balances used to determine the average interest rate earned on loans. Refer to Note 12 for additional information on nonaccrual loans, including interest accrued.

(Table continued from previous page)

2021			2020		
Average balance	Interest[g]	Rate	Average balance	Interest[g]	Rate
$ 719,772	$ 512	0.07 %	$ 444,058	$ 749	0.17 %
269,231	958	0.36	275,926	2,436	0.88
190,655	(385)	(0.20) [j]	143,472	(302)	(0.21) [j]
283,829	6,856	2.42	322,936	7,869	2.44
563,147	6,460	1.15	476,650	7,843	1.65
30,830	1,336	4.33	33,287	1,437	4.32
593,977	7,796	1.31 [i]	509,937	9,280	1.82 [i]
1,035,399	41,663 [h]	4.02	1,004,597	43,886 [h]	4.37
123,079	894	0.73	78,784	1,023	1.30
3,215,942	58,294	1.81	2,779,710	64,941	2.34
(22,179)			(25,775)		
26,776			22,241		
172,822			120,878 [k]		
69,101			73,749 [k]		
55,003			51,934		
207,737			179,413		
$ 3,725,202			$ 3,202,150		
$ 1,672,669 [k]	$ 531	0.03 %	$ 1,389,224	$ 2,357	0.17 %
259,302	274	0.11	255,421	1,058	0.41
44,618	126	0.28	38,853	372	0.96
241,431	257	0.11	205,255	195	0.10
14,595	83	0.57	19,216	214	1.12
250,378	4,282	1.71	254,400	5,764	2.27
2,482,993	5,553	0.22	2,162,369	9,960	0.46
674,485 [k]			517,527		
36,656			32,628		
60,318			61,593		
186,755			161,269		
3,441,207			2,935,386		
33,027			29,899		
250,968			236,865		
283,995 [f]			266,764 [f]		
$ 3,725,202			$ 3,202,150		
		1.59 %			1.88 %
	$ 52,741	1.64		$ 54,981	1.98

[e] The combined balance of trading liabilities – debt and equity instruments was $138.1 billion, $128.2 billion and $106.5 billion for the years ended December 31, 2022, 2021 and 2020, respectively.

[f] The ratio of average stockholders' equity to average assets was 7.4%, 7.6% and 8.3% for the years ended December 31, 2022, 2021 and 2020, respectively. The return on average stockholders' equity, based on net income, was 13.2%, 17.0% and 10.9% for the years ended December 31, 2022, 2021 and 2020, respectively.

[g] Interest includes the effect of related hedging derivatives. Taxable-equivalent amounts are used where applicable.

[h] Fees and commissions on loans included in loan interest amounted to $1.8 billion, $1.9 billion and $1.0 billion for the years ended December 31, 2022, 2021 and 2020.

[i] The annualized rate for securities based on amortized cost was 1.75%, 1.33% and 1.85% for the years ended December 31, 2022, 2021 and 2020, respectively, and does not give effect to changes in fair value that are reflected in AOCI.

[j] Negative interest and rates reflect the net impact of interest earned offset by fees paid on client-driven prime brokerage securities borrowed transactions.

[k] Prior-period amounts have been revised to conform with the current presentation.

Interest rates and interest differential analysis of net interest income – U.S. and non-U.S.

Presented below is a summary of interest and rates segregated between U.S. and non-U.S. operations for the years 2020 through 2022. The segregation of U.S. and non-U.S. components is based on the location of the office recording the transaction.

(Table continued on next page)

	2022		
(Unaudited) Year ended December 31, (Taxable-equivalent interest and rates; in millions, except rates)	Average balance	Interest	Rate
Interest-earning assets			
Deposits with banks:			
U.S.	$ 456,366	$ 7,418	1.63 %
Non-U.S.	214,407	1,621	0.76
Federal funds sold and securities purchased under resale agreements:			
U.S.	130,213	2,191	1.68
Non-U.S.	176,937	2,441	1.38
Securities borrowed:[a]			
U.S.	142,736	1,811	1.27
Non-U.S.	62,780	426	0.68
Trading assets – debt instruments:			
U.S.	170,975	5,414	3.17
Non-U.S.	112,133	3,683	3.28
Investment securities:			
U.S.	623,285	10,994	1.76
Non-U.S.	30,700	602	1.96
Loans:			
U.S.	985,187	48,953	4.97
Non-U.S.	115,131	3,924	3.41
All other interest-earning assets, predominantly U.S.	128,229	3,763	2.93
Total interest-earning assets	3,349,079	93,241	2.78
Interest-bearing liabilities			
Interest-bearing deposits:			
U.S.	1,358,322	7,026	0.52
Non-U.S.	390,344	3,056	0.78
Federal funds purchased and securities loaned or sold under repurchase agreements:			
U.S.	173,016	3,083	1.78
Non-U.S.	69,746	638	0.91
Trading liabilities – debt, short-term and all other interest-bearing liabilities:[b]			
U.S.	194,570	2,384	1.23
Non-U.S.	119,512	1,609	1.35
Beneficial interests issued by consolidated VIEs, predominantly U.S.	11,208	226	2.02
Long-term debt:			
U.S.	246,670	8,026	3.25
Non-U.S.	3,410	49	1.44
Total interest-bearing liabilities	2,566,798	26,097	1.02
Noninterest-bearing liabilities[c]	782,281		
Total investable funds	$ 3,349,079	$ 26,097	0.78 %
Net interest income and net yield:		$ 67,144	2.00 %
U.S.		58,950	2.27
Non-U.S.		8,194	1.09
Percentage of total assets and liabilities attributable to non-U.S. operations:			
Assets			24.9
Liabilities			20.6

[a] Negative interest and rates reflect the net impact of interest earned offset by fees paid on client-driven prime brokerage securities borrowed transactions.
[b] Includes commercial paper.
[c] Represents the amount of noninterest-bearing liabilities funding interest-earning assets.

Refer to the "Net interest income" discussion in Consolidated Results of Operations on pages 51-54 for further information.

(Table continued from previous page)

2021			2020		
Average balance	Interest	Rate	Average balance	Interest	Rate
$ 527,340	$ 693	0.13 %	$ 294,669	$ 768	0.26 %
192,432	(181)	(0.09)	149,389	(19)	(0.01)
114,406	299	0.26	141,409	1,341	0.95
154,825	659	0.43	134,517	1,095	0.81
137,752	(319)	(0.23)	100,026	(305)	(0.30)
52,903	(66)	(0.12)	43,446	3	0.01
158,793	3,530	2.22	216,025	5,056	2.34
125,036	3,326	2.66	106,911	2,813	2.63
563,109	7,399	1.31	475,832	8,703	1.83
30,868	397	1.29	34,105	577	1.69
924,713	39,215	4.24	909,850	41,708	4.58
110,686	2,448	2.21	94,747	2,178	2.30
123,079	894	0.73	78,784	1,023	1.30
3,215,942	58,294	1.81	2,779,710	64,941	2.34
1,301,616	901	0.07	1,068,857	2,288	0.21
371,053	(370)	(0.10)	320,367	69	0.02
199,220	222	0.11	204,958	863	0.42
60,082	52	0.09	50,463	195	0.39
176,466	(345)	(0.20)	151,120	(30)	(0.02)
109,583	728	0.66	92,988	597	0.64
14,595	83	0.57	19,216	214	1.12
244,850	4,229	1.73	247,623	5,704	2.30
5,528	53	0.96	6,777	60	0.89
2,482,993	5,553	0.22	2,162,369	9,960	0.46
732,949			617,341		
$ 3,215,942	$ 5,553	0.17 %	$ 2,779,710	$ 9,960	0.36 %
	$ 52,741	1.64 %		$ 54,981	1.98 %
	46,622	1.86		49,242	2.25
	6,119	0.87		5,739	0.97
		24.6			23.5
		20.4			20.9

Changes in net interest income, volume and rate analysis

The table below presents an attribution of net interest income between volume and rate. The attribution between volume and rate is calculated using annual average balances for each category of assets and liabilities shown in the table and the corresponding annual rates (refer to pages 292-296 for more information on average balances and rates). In this analysis, when the change cannot be isolated to either volume or rate, it has been allocated to volume. The annual rates include the impact of changes in market rates, as well as the impact of any change in composition of the various products within each category of asset or liability. This analysis is calculated separately for each category without consideration of the relationship between categories (for example, the net spread between the rates earned on assets and the rates paid on liabilities that fund those assets). As a result, changes in the granularity or groupings considered in this analysis would produce a different attribution result, and due to the complexities involved, precise allocation of changes in interest rates between volume and rates is inherently complex and judgmental.

	2022 versus 2021			2021 versus 2020		
(Unaudited)	Increase/(decrease) due to change in:			Increase/(decrease) due to change in:		
Year ended December 31, (On a taxable-equivalent basis; in millions)	Volume	Rate	Net change	Volume	Rate	Net change
Interest-earning assets						
Deposits with banks:						
U.S.	**$ (1,185)**	**$ 7,910**	**$ 6,725**	$ 308	$ (383)	$ (75)
Non-U.S.	**166**	**1,636**	**1,802**	(42)	(120)	(162)
Federal funds sold and securities purchased under resale agreements:						
U.S.	**267**	**1,625**	**1,892**	(66)	(976)	(1,042)
Non-U.S.	**311**	**1,471**	**1,782**	75	(511)	(436)
Securities borrowed:[(a)]						
U.S.	**64**	**2,066**	**2,130**	(84)	70	(14)
Non-U.S.	**69**	**423**	**492**	(13)	(56)	(69)
Trading assets – debt instruments:						
U.S.	**375**	**1,509**	**1,884**	(1,267)	(259)	(1,526)
Non-U.S.	**(418)**	**775**	**357**	481	32	513
Investment securities:						
U.S.	**1,061**	**2,534**	**3,595**	1,170	(2,474)	(1,304)
Non-U.S.	**(2)**	**207**	**205**	(44)	(136)	(180)
Loans:						
U.S.	**2,988**	**6,750**	**9,738**	600	(3,093)	(2,493)
Non-U.S.	**148**	**1,328**	**1,476**	355	(85)	270
All other interest-earning assets, predominantly U.S.	**161**	**2,708**	**2,869**	320	(449)	(129)
Change in interest income	**4,005**	**30,942**	**34,947**	1,793	(8,440)	(6,647)
Interest-bearing liabilities						
Interest-bearing deposits:						
U.S.	**268**	**5,857**	**6,125**	109	(1,496)	(1,387)
Non-U.S.	**161**	**3,265**	**3,426**	(55)	(384)	(439)
Federal funds purchased and securities loaned or sold under repurchase agreements:						
U.S.	**(466)**	**3,327**	**2,861**	(6)	(635)	(641)
Non-U.S.	**93**	**493**	**586**	8	(151)	(143)
Trading liabilities – debt, short-term and all other interest-bearing liabilities:[(b)]						
U.S.	**206**	**2,523**	**2,729**	(43)	(272)	(315)
Non-U.S.	**125**	**756**	**881**	112	19	131
Beneficial interests issued by consolidated VIEs, predominantly U.S.	**(69)**	**212**	**143**	(27)	(104)	(131)
Long-term debt:						
U.S.	**75**	**3,722**	**3,797**	(64)	(1,411)	(1,475)
Non-U.S.	**(31)**	**27**	**(4)**	(12)	5	(7)
Change in interest expense	**362**	**20,182**	**20,544**	22	(4,429)	(4,407)
Change in net interest income	**$ 3,643**	**$ 10,760**	**$ 14,403**	$ 1,771	$ (4,011)	$ (2,240)

(a) Negative interest and rates reflect the net impact of interest earned offset by fees paid on client-driven prime brokerage securities borrowed transactions.
(b) Includes commercial paper.

2022 Form 10-K: Annual report on Form 10-K for the year ended December 31, 2022, filed with the U.S. Securities and Exchange Commission.

ABS: Asset-backed securities

AFS: Available-for-sale

ALCO: Asset Liability Committee

Amortized cost: Amount at which a financing receivable or investment is originated or acquired, adjusted for accretion or amortization of premium, discount, and net deferred fees or costs, collection of cash, charge-offs, foreign exchange, and fair value hedge accounting adjustments. For AFS securities, amortized cost is also reduced by any impairment losses recognized in earnings. Amortized cost is not reduced by the allowance for credit losses, except where explicitly presented net.

AOCI: Accumulated other comprehensive income/(loss)

ARM: Adjustable rate mortgage(s)

AUC: Assets under custody

AUM: "Assets under management": Represent assets managed by AWM on behalf of its Private Banking, Institutional and Retail clients. Includes "Committed capital not Called."

Auto loan and lease origination volume: Dollar amount of auto loans and leases originated.

AWM: Asset & Wealth Management

Beneficial interests issued by consolidated VIEs: Represents the interest of third-party holders of debt, equity securities, or other obligations, issued by VIEs that JPMorgan Chase consolidates.

Benefit obligation: Refers to the projected benefit obligation for pension plans and the accumulated postretirement benefit obligation for OPEB plans.

BHC: Bank holding company

BWM: Banking & Wealth Management

CB: Commercial Banking

CCAR: Comprehensive Capital Analysis and Review

CCB: Consumer & Community Banking

CCO: Chief Compliance Officer

CCP: "Central counterparty" is a clearing house that interposes itself between counterparties to contracts traded in one or more financial markets, becoming the buyer to every seller and the seller to every buyer and thereby ensuring the future performance of open contracts. A CCP becomes a counterparty to trades with market participants through novation, an open offer system, or another legally binding arrangement.

CDS: Credit default swaps

CECL: Current Expected Credit Losses

CEO: Chief Executive Officer

CET1 Capital: Common equity Tier 1 capital

CFO: Chief Financial Officer

CFP: Contingency funding plan

CFTC: Commodity Futures Trading Commission

Chase Bank USA, N.A.: Chase Bank USA, National Association

CIB: Corporate & Investment Bank

CIO: Chief Investment Office

Client assets: Represent assets under management as well as custody, brokerage, administration and deposit accounts.

Client deposits and other third-party liabilities: Deposits, as well as deposits that are swept to on-balance sheet liabilities (e.g., commercial paper, federal funds purchased and securities loaned or sold under repurchase agreements) as part of client cash management programs.

Client investment assets: Represent assets under management as well as custody, brokerage and annuity accounts, and deposits held in investment accounts.

CLO: Collateralized loan obligations

CLTV: Combined loan-to-value

CMT: Constant Maturity Treasury

Collateral-dependent: A loan is considered to be collateral-dependent when repayment of the loan is expected to be provided substantially through the operation or sale of the collateral when the borrower is experiencing financial difficulty, including when foreclosure is deemed probable based on borrower delinquency.

Commercial Card: provides a wide range of payment services to corporate and public sector clients worldwide through the commercial card products. Services include procurement, corporate travel and entertainment, expense management services, and business-to-business payment solutions.

Credit derivatives: Financial instruments whose value is derived from the credit risk associated with the debt of a third-party issuer (the reference entity) which allow one party (the protection purchaser) to transfer that risk to another party (the protection seller). Upon the occurrence of a credit event by the reference entity, which may include, among other events, the bankruptcy or failure to pay its obligations, or certain restructurings of the debt of the reference entity, neither party has recourse to the reference entity. The protection purchaser has recourse to the protection seller for the difference between the face value of the CDS contract and the fair value at the time of settling the credit derivative contract. The determination as to whether a credit event has occurred is generally made by the relevant International Swaps and Derivatives Association ("ISDA") Determinations Committee.

Criticized: Criticized loans, lending-related commitments and derivative receivables that are classified as special mention, substandard and doubtful categories for regulatory purposes.

CRO: Chief Risk Officer

CRR: Capital Requirements Regulation

CTC: CIO, Treasury and Corporate

Custom lending: Loans to AWM's Global Private Bank clients, including loans to private investment funds and loans that are collateralized by nontraditional asset types, such as art work, aircraft, etc.

CVA: Credit valuation adjustment

Debit and credit card sales volume: Dollar amount of card member purchases, net of returns.

Deposit margin/deposit spread: Represents net interest income expressed as a percentage of average deposits.

Distributed denial-of-service attack: The use of a large number of remote computer systems to electronically send a high volume of traffic to a target website to create a service outage at the target. This is a form of cyberattack.

Dodd-Frank Act: Wall Street Reform and Consumer Protection Act

DVA: Debit valuation adjustment

EC: European Commission

Eligible HQLA: Eligible high-quality liquid assets, for purposes of calculating the LCR, is the amount of unencumbered HQLA that satisfy certain operational considerations as defined in the LCR rule.

Eligible LTD: Long-term debt satisfying certain eligibility criteria

Embedded derivatives: are implicit or explicit terms or features of a financial instrument that affect some or all of the cash flows or the value of the instrument in a manner similar to a derivative. An instrument containing such terms or features is referred to as a "hybrid." The component of the hybrid that is the non-derivative instrument is referred to as the "host." For example, callable debt is a hybrid instrument that contains a plain vanilla debt instrument (i.e., the host) and an embedded option that allows the issuer to redeem the debt issue at a specified date for a specified amount (i.e., the embedded derivative). However, a floating rate instrument is not a hybrid composed of a fixed-rate instrument and an interest rate swap.

EPS: Earnings per share

ERISA: Employee Retirement Income Security Act of 1974

ETD: "Exchange-traded derivatives": Derivative contracts that are executed on an exchange and settled via a central clearing house.

EU: European Union

Expense categories:

- Volume- and/or revenue-related expenses generally correlate with changes in the related business/ transaction volume or revenue. Examples include commissions and incentive compensation within the LOBs, depreciation expense related to operating lease assets, and brokerage expense related to trading transaction volume.
- Investments in the business include expenses associated with supporting medium- to longer-term strategic plans of the Firm. Examples include front office growth, market expansion, initiatives in technology (including related compensation), marketing, and acquisitions.
- Structural expenses are those associated with the day-to-day cost of running the Firm and are expenses not included in the above two categories. Examples include employee salaries and benefits, certain other incentive compensation, and costs related to real estate.

Fannie Mae: Federal National Mortgage Association

FASB: Financial Accounting Standards Board

FCA: Financial Conduct Authority

FCC: Firmwide Control Committee

FDIC: Federal Deposit Insurance Corporation

Federal Reserve: The Board of the Governors of the Federal Reserve System

FFIEC: Federal Financial Institutions Examination Council

FHA: Federal Housing Administration

FHLB: Federal Home Loan Bank

FICC: The Fixed Income Clearing Corporation

FICO score: A measure of consumer credit risk provided by credit bureaus, typically produced from statistical models by Fair Isaac Corporation utilizing data collected by the credit bureaus.

FINRA: Financial Industry Regulatory Authority

Firm: JPMorgan Chase & Co.

Forward points: Represents the interest rate differential between two currencies, which is either added to or subtracted from the current exchange rate (i.e., "spot rate") to determine the forward exchange rate.

FRC: Firmwide Risk Committee

Freddie Mac: Federal Home Loan Mortgage Corporation

Free standing derivatives: a derivative contract entered into either separate and apart from any of the Firm's other financial instruments or equity transactions. Or, in conjunction with some other transaction and is legally detachable and separately exercisable.

FSB: Financial Stability Board

FTE: Fully taxable equivalent

FVA: Funding valuation adjustment

FX: Foreign exchange

G7: Group of Seven nations: Countries in the G7 are Canada, France, Germany, Italy, Japan, the U.K. and the U.S.

G7 government bonds: Bonds issued by the government of one of the G7 nations.

Ginnie Mae: Government National Mortgage Association

GSIB: Global systemically important banks

HELOC: Home equity line of credit

Home equity – senior lien: Represents loans and commitments where JPMorgan Chase holds the first security interest on the property.

Home equity – junior lien: Represents loans and commitments where JPMorgan Chase holds a security interest that is subordinate in rank to other liens.

Households: A household is a collection of individuals or entities aggregated together by name, address, tax identifier and phone number.

HQLA: "High-quality liquid assets" consist of cash and certain high-quality liquid securities as defined in the LCR rule.

HTM: Held-to-maturity

IBOR: Interbank Offered Rate

ICAAP: Internal capital adequacy assessment process

IDI: Insured depository institutions

IHC: JPMorgan Chase Holdings LLC, an intermediate holding company

Investment-grade: An indication of credit quality based on JPMorgan Chase's internal risk assessment. The Firm considers ratings of BBB-/Baa3 or higher as investment-grade.

IPO: Initial public offering

ISDA: International Swaps and Derivatives Association

JPMorgan Chase: JPMorgan Chase & Co.

JPMorgan Chase Bank, N.A.: JPMorgan Chase Bank, National Association

JPMorgan Chase Foundation or the Firm's Foundation: A not-for-profit organization that makes contributions for charitable and educational purposes.

JPMorgan Securities: J.P. Morgan Securities LLC

JPMSE: J.P. Morgan SE

LCR: Liquidity coverage ratio

LDA: Loss Distribution Approach

LGD: Loss given default

LIBOR: London Interbank Offered Rate

LLC: Limited Liability Company

LOB: Line of business

LOB CROs: Line of Business and CTC Chief Risk Officers

LTIP: Long-term incentive plan

LTV: "Loan-to-value": For residential real estate loans, the relationship, expressed as a percentage, between the principal amount of a loan and the appraised value of the collateral (i.e., residential real estate) securing the loan.

Origination date LTV ratio
The LTV ratio at the origination date of the loan. Origination date LTV ratios are calculated based on the actual appraised values of collateral (i.e., loan-level data) at the origination date.

Current estimated LTV ratio
An estimate of the LTV as of a certain date. The current estimated LTV ratios are calculated using estimated collateral values derived from a nationally recognized home price index measured at the metropolitan statistical area ("MSA") level. These MSA-level home price indices consist of actual data to the extent available and forecasted data where actual data is not available. As a result, the estimated collateral values used to calculate these ratios do not represent actual appraised loan-level collateral values; as such, the resulting LTV ratios are necessarily imprecise and should therefore be viewed as estimates.

Combined LTV ratio
The LTV ratio considering all available lien positions, as well as unused lines, related to the property. Combined LTV ratios are used for junior lien home equity products.

Macro businesses: the macro businesses include Rates, Currencies and Emerging Markets, Fixed Income Financing and Commodities in CIB's Fixed Income Markets.

Managed basis: A non-GAAP presentation of Firmwide financial results that includes reclassifications to present revenue on a fully taxable-equivalent basis. Management also uses this financial measure at the segment level, because it believes this provides information to enable investors to understand the underlying operational performance and trends of the particular business segment and facilitates a comparison of the business segment with the performance of competitors.

Markets: consists of CIB's Fixed Income Markets and Equity Markets businesses.

Master netting agreement: A single agreement with a counterparty that permits multiple transactions governed by that agreement to be terminated or accelerated and settled through a single payment in a single currency in the event of a default (e.g., bankruptcy, failure to make a required payment or securities transfer or deliver collateral or margin when due).

MBS: Mortgage-backed securities

MD&A: Management's discussion and analysis

Measurement alternative: Measures equity securities without readily determinable fair values at cost less impairment (if any), plus or minus observable price changes from an identical or similar investment of the same issuer.

Merchant Services: offers merchants payment processing capabilities, fraud and risk management, data and analytics, and other payments services. Through Merchant Services, merchants of all sizes can accept payments via credit and debit cards and payments in multiple currencies.

MEV: Macroeconomic variable

Moody's: Moody's Investor Services

Mortgage origination channels:

Retail – Borrowers who buy or refinance a home through direct contact with a mortgage banker employed by the Firm using a branch office, the Internet or by phone. Borrowers are frequently referred to a mortgage banker by a banker in a Chase branch, real estate brokers, home builders or other third parties.

Correspondent – Banks, thrifts, other mortgage banks and other financial institutions that sell closed loans to the Firm.

Mortgage product types:

Alt-A

Alt-A loans are generally higher in credit quality than subprime loans but have characteristics that would disqualify the borrower from a traditional prime loan. Alt-A lending characteristics may include one or more of the following: (i) limited documentation; (ii) a high CLTV ratio; (iii) loans secured by non-owner occupied properties; or (iv) a debt-to-income ratio above normal limits. A substantial proportion of the Firm's Alt-A loans are those where a borrower does not provide complete documentation of his or her assets or the amount or source of his or her income.

Option ARMs

The option ARM real estate loan product is an adjustable-rate mortgage loan that provides the borrower with the option each month to make a fully amortizing, interest-only or minimum payment. The minimum payment on an option ARM loan is based on the interest rate charged during the introductory period. This introductory rate is usually significantly below the fully indexed rate. The fully indexed rate is calculated using an index rate plus a margin. Once the introductory period ends, the contractual interest rate charged on the loan increases to the fully indexed rate and adjusts monthly to reflect movements in the index. The minimum payment is typically insufficient to cover interest accrued in the prior month, and any unpaid interest is deferred and added to the principal balance of the loan. Option ARM loans are subject to payment recast, which converts the loan to a variable-rate fully amortizing loan upon meeting specified loan balance and anniversary date triggers.

Prime

Prime mortgage loans are made to borrowers with good credit records who meet specific underwriting requirements, including prescriptive requirements related to income and overall debt levels. New prime mortgage borrowers provide full documentation and generally have reliable payment histories.

Subprime

Subprime loans are loans that, prior to mid-2008, were offered to certain customers with one or more high risk characteristics, including but not limited to: (i) unreliable or poor payment histories; (ii) a high LTV ratio of greater than 80% (without borrower-paid mortgage insurance); (iii) a high debt-to-income ratio; (iv) an occupancy type for the loan is other than the borrower's primary residence; or (v) a history of delinquencies or late payments on the loan.

MREL: Minimum requirements for own funds and eligible liabilities

MSA: Metropolitan statistical areas

MSR: Mortgage servicing rights

Multi-asset: Any fund or account that allocates assets under management to more than one asset class.

NA: Data is not applicable or available for the period presented.

NAV: Net Asset Value

Net Capital Rule: Rule 15c3-1 under the Securities Exchange Act of 1934.

Net charge-off/(recovery) rate: Represents net charge-offs/(recoveries) (annualized) divided by average retained loans for the reporting period.

Net interchange income includes the following components:

- **Interchange income**: Fees earned by credit and debit card issuers on sales transactions.
- **Reward costs**: The cost to the Firm for points earned by cardholders enrolled in credit card rewards programs generally tied to sales transactions.
- **Partner payments**: Payments to co-brand credit card partners based on the cost of loyalty program rewards earned by cardholders on credit card transactions.

Net mortgage servicing revenue: Includes operating revenue earned from servicing third-party mortgage loans, which is recognized over the period in which the service is provided; changes in the fair value of MSRs; the impact of risk management activities associated with MSRs; and gains and losses on securitization of excess mortgage servicing. Net mortgage servicing revenue also includes gains and losses on sales and lower of cost or fair value adjustments of certain repurchased loans insured by U.S. government agencies.

Net revenue rate: Represents Card Services net revenue (annualized) expressed as a percentage of average loans for the period.

Net yield on interest-earning assets: The average rate for interest-earning assets less the average rate paid for all sources of funds.

NFA: National Futures Association

NM: Not meaningful

NOL: Net operating loss

Nonaccrual loans: Loans for which interest income is not recognized on an accrual basis. Loans (other than credit card loans and certain consumer loans insured by U.S. government agencies) are placed on nonaccrual status when full payment of principal and interest is not expected, regardless of delinquency status, or when principal and interest have been in default for a period of 90 days or more unless the loan is both well-secured and in the process of collection. Collateral-dependent loans are typically maintained on nonaccrual status.

Nonperforming assets: Nonperforming assets include nonaccrual loans, nonperforming derivatives and certain assets acquired in loan satisfaction, predominantly real estate owned and other commercial and personal property.

NOW: Negotiable Order of Withdrawal

NSFR: Net Stable Funding Ratio

OAS: Option-adjusted spread

OCC: Office of the Comptroller of the Currency

OCI: Other comprehensive income/(loss)

OPEB: Other postretirement employee benefit

Over-the-counter ("OTC") derivatives: Derivative contracts that are negotiated, executed and settled bilaterally between two derivative counterparties, where one or both counterparties is a derivatives dealer.

Over-the-counter cleared ("OTC-cleared") derivatives: Derivative contracts that are negotiated and executed bilaterally, but subsequently settled via a central clearing house, such that each derivative counterparty is only exposed to the default of that clearing house.

Overhead ratio: Noninterest expense as a percentage of total net revenue.

Parent Company: JPMorgan Chase & Co.

Participating securities: Represents unvested share-based compensation awards containing nonforfeitable rights to dividends or dividend equivalents (collectively, "dividends"), which are included in the earnings per share calculation using the two-class method. JPMorgan Chase grants RSUs to certain employees under its share-based compensation programs, which entitle the recipients to receive nonforfeitable dividends during the vesting period on a basis equivalent to the dividends paid to holders of common stock. These unvested awards meet the definition of participating securities. Under the two-class method, all earnings (distributed and undistributed) are allocated to each class of common stock and participating securities, based on their respective rights to receive dividends.

PCA: Prompt corrective action

PCAOB: Public Company Accounting Oversight Board

PCD: **"Purchased credit deteriorated"** assets represent acquired financial assets that as of the date of acquisition have experienced a more-than-insignificant deterioration in credit quality since origination, as determined by the Firm.

PD: Probability of default

Pillar 1: 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 3: The Basel framework consists of a three "Pillar" approach. Pillar 3 encourages market discipline through disclosure requirements which allow market participants to assess the risk and capital profiles of banks.

PPP: Paycheck Protection Program under the Small Business Association ("SBA")

PRA: Prudential Regulation Authority

Pre-provision profit/(loss): Represents total net revenue less noninterest expense. The Firm believes that this financial measure is useful in assessing the ability of a lending institution to generate income in excess of its provision for credit losses.

Pre-tax margin: Represents income before income tax expense divided by total net revenue, which is, in management's view, a comprehensive measure of pretax performance derived by measuring earnings after all costs are taken into consideration. It is one basis upon which management evaluates the performance of AWM against the performance of their respective competitors.

Principal transactions revenue: Principal transactions revenue is driven by many factors, including:

- the bid-offer spread, which is the difference between the price at which a market participant is willing and able to sell an instrument to the Firm and the price at which another market participant is willing and able to buy it from the Firm, and vice versa; and
- realized and unrealized gains and losses on financial instruments and commodities transactions, including those accounted for under the fair value option, primarily used in client-driven market-making activities, and on private equity investments.
  - Realized gains and losses result from the sale of instruments, closing out or termination of transactions, or interim cash payments.
  - Unrealized gains and losses result from changes in valuation.

In connection with its client-driven market-making activities, the Firm transacts in debt and equity instruments, derivatives and commodities, including physical commodities inventories and financial instruments that reference commodities.

Principal transactions revenue also includes realized and unrealized gains and losses related to:

- derivatives designated in qualifying hedge accounting relationships, primarily fair value hedges of commodity and foreign exchange risk;
- derivatives used for specific risk management purposes, primarily to mitigate credit, foreign exchange and interest rate risks.

Production revenue: Includes fees and income recognized as earned on mortgage loans originated with the intent to sell, and the impact of risk management activities associated with the mortgage pipeline and warehouse loans. Production revenue also includes gains and losses on sales and lower of cost or fair value adjustments on mortgage loans held-for-sale (excluding certain repurchased loans insured by U.S. government agencies), and changes in the fair value of financial instruments measured under the fair value option.

PSUs: Performance share units

Regulatory VaR: Daily aggregated VaR calculated in accordance with regulatory rules.

REO: Real estate owned

Reported basis: Financial statements prepared under U.S. GAAP, which excludes the impact of taxable-equivalent adjustments.

Retained loans: Loans that are held-for-investment (i.e., excludes loans held-for-sale and loans at fair value).

Revenue wallet: Proportion of fee revenue based on estimates of investment banking fees generated across the industry (i.e., the revenue wallet) from investment banking transactions in M&A, equity and debt underwriting, and loan syndications. Source: Dealogic, a third-party provider of investment banking competitive analysis and volume-based league tables for the above noted industry products.

RHS: Rural Housing Service of the U.S. Department of Agriculture

ROA: Return on assets

ROE: Return on equity

ROTCE: Return on tangible common equity

ROU assets: Right-of-use assets

RSU(s): Restricted stock units

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

S&P: Standard and Poor's 500 Index

SA-CCR: Standardized Approach for Counterparty Credit Risk

SAR as it pertains to Hong Kong: Special Administrative Region

SAR(s) as it pertains to employee stock awards: Stock appreciation rights

SCB: Stress Capital Buffer

Scored portfolios: Consumer loan portfolios that predominantly include residential real estate loans, credit card loans, auto loans to individuals and certain small business loans.

SEC: Securities and Exchange Commission

Securities financing agreements: Include resale, repurchase, securities borrowed and securities loaned agreements

Seed capital: Initial JPMorgan capital invested in products, such as mutual funds, with the intention of ensuring the fund is of sufficient size to represent a viable offering to clients, enabling pricing of its shares, and allowing the manager to develop a track record. After these goals are achieved, the intent is to remove the Firm's capital from the investment.

Shelf securities: Securities registered with the SEC under a shelf registration statement that have not been issued, offered or sold. These securities are not included in league tables until they have actually been issued.

Single-name: Single reference-entities

SLR: Supplementary leverage ratio

SMBS: Stripped mortgage-backed securities

SOFR: Secured Overnight Financing Rate

SPEs: Special purpose entities

Structural interest rate risk: Represents interest rate risk of the non-trading assets and liabilities of the Firm.

Structured notes: Structured notes are financial instruments whose cash flows are linked to the movement in one or more indexes, interest rates, foreign exchange rates, commodities prices, prepayment rates, underlying reference pool of loans or other market variables. The notes typically contain embedded (but not separable or detachable) derivatives. Contractual cash flows for principal, interest, or both can vary in amount and timing throughout the life of the note based on non-traditional indexes or non-traditional uses of traditional interest rates or indexes.

Taxable-equivalent basis: In presenting results on a managed basis, the total net revenue for each of the business segments and the Firm is presented on a tax-equivalent basis. Accordingly, revenue from investments that receive tax credits and tax-exempt securities is presented in managed basis results on a level comparable to taxable investments and securities; the corresponding income tax impact related to tax-exempt items is recorded within income tax expense.

TBVPS: Tangible book value per share

TCE: Tangible common equity

TDR: "Troubled debt restructuring" is deemed to occur when the Firm modifies the original terms of a loan agreement by granting a concession to a borrower that is experiencing financial difficulty. Loans with short-term and other insignificant modifications that are not considered concessions are not TDRs.

TLAC: Total loss-absorbing capacity

U.K.: United Kingdom

Unaudited: Financial statements and/or information that have not been subject to auditing procedures by an independent registered public accounting firm.

U.S.: United States of America

U.S. GAAP: Accounting principles generally accepted in the U.S.

U.S. government agencies: U.S. government agencies include, but are not limited to, agencies such as Ginnie Mae and FHA, and do not include Fannie Mae and Freddie Mac which are U.S. government-sponsored enterprises ("U.S. GSEs"). In general, obligations of U.S. government agencies are fully and explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government in the event of a default.

U.S. GSE(s): "U.S. government-sponsored enterprises" are quasi-governmental, privately-held entities established or chartered by the U.S. government to serve public purposes as specified by the U.S. Congress to improve the flow of credit to specific sectors of the economy and provide certain essential services to the public. U.S. GSEs include Fannie Mae and Freddie Mac, but do not include Ginnie Mae or FHA. U.S. GSE obligations are not explicitly guaranteed as to the timely payment of principal and interest by the full faith and credit of the U.S. government.

U.S. Treasury: U.S. Department of the Treasury

VA: U.S. Department of Veterans Affairs

VaR: "Value-at-risk" is a measure of the dollar amount of potential loss from adverse market moves in an ordinary market environment.

VCG: Valuation Control Group

VGF: Valuation Governance Forum

VIEs: Variable interest entities

Warehouse loans: Consist of prime mortgages originated with the intent to sell that are accounted for at fair value and classified as loans.