

FINANCIAL SECTION

THE BANK OF NEW YORK MELLON CORPORATION
2019 Annual Report
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The Bank of New York Mellon Corporation (and its subsidiaries)

Financial Summary

<i>(dollars in millions, except per share amounts and unless otherwise noted)</i>	2019	2018	2017	2016	2015
Selected income statement information:					
Fee and other revenue	\$ 13,218	\$ 12,794	\$ 12,165	\$ 12,073	\$ 12,082
Income (loss) from consolidated investment management funds	56	(13)	70	26	86
Net interest revenue	3,188	3,611	3,308	3,138	3,026
Total revenue	16,462	16,392	15,543	15,237	15,194
Provision for credit losses	(25)	(11)	(24)	(11)	160
Noninterest expense	10,900	11,211	10,957	10,523	10,799
Income before income taxes	5,587	5,192	4,610	4,725	4,235
Provision for income taxes	1,120	938	496	1,177	1,013
Net income	4,467	4,254	4,114	3,548	3,222
Net (income) loss attributable to noncontrolling interests <i>(a)</i>	(26)	12	(24)	(1)	(64)
Net income applicable to shareholders of The Bank of New York Mellon Corporation	4,441	4,266	4,090	3,547	3,158
Preferred stock dividends	(169)	(169)	(175)	(122)	(105)
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	\$ 4,272	\$ 4,097	\$ 3,915	\$ 3,425	\$ 3,053
Earnings per share applicable to common shareholders of The Bank of New York Mellon Corporation:					
Basic	\$ 4.53	\$ 4.06	\$ 3.74	\$ 3.16	\$ 2.73
Diluted	\$ 4.51	\$ 4.04	\$ 3.72	\$ 3.15	\$ 2.71
Average common shares and equivalents outstanding of The Bank of New York Mellon Corporation <i>(in thousands)</i>:					
Basic	939,623	1,002,922	1,034,281	1,066,286	1,104,719
Diluted	943,109	1,007,141	1,040,290	1,072,013	1,112,511
Selected balance sheet information (at period-end):					
Interest-earning assets	\$ 323,893	\$ 308,749	\$ 316,261	\$ 280,332	\$ 338,955
Total assets	381,508	362,873	371,758	333,469	393,780
Deposits	259,466	238,778	244,322	221,490	279,610
Long-term debt	27,501	29,163	27,979	24,463	21,547
Preferred stock	3,542	3,542	3,542	3,542	2,552
Total The Bank of New York Mellon Corporation common shareholders' equity	37,941	37,096	37,709	35,269	35,485
At Dec. 31					
Assets under custody and/or administration ("AUC/A") <i>(in trillions) (b)</i>	\$ 37.1	\$ 33.1	\$ 33.3	\$ 29.9	\$ 28.9
Assets under management ("AUM") <i>(in billions) (c)</i>	1,910	1,722	1,893	1,648	1,625
Market value of securities on loan <i>(in billions) (d)</i>	378	373	408	296	277
Selected ratios:					
Return on common equity	11.4%	10.8%	10.8%	9.6%	8.6%
Return on tangible common equity – Non-GAAP <i>(e)</i>	23.2	22.5	23.9	21.2	19.7
Return on average assets	1.23	1.19	1.14	0.96	0.82
Pre-tax operating margin	34	32	30	31	28
Fee revenue as a percentage of total revenue	80	78	78	79	79
Non-U.S. revenue as a percentage of total revenue	35	37	36	34	36
Net interest margin	1.10	1.25	1.14	1.03	0.96

(a) Primarily attributable to noncontrolling interests related to consolidated investment management funds.

(b) Consists of AUC/A primarily from the Asset Servicing business and, to a lesser extent, the Clearance and Collateral Management, Issuer Services, Pershing and Wealth Management businesses. Includes the AUC/A of CIBC Mellon Global Securities Services Company ("CIBC Mellon"), a joint venture with the Canadian Imperial Bank of Commerce, of \$1.5 trillion at Dec. 31, 2019, \$1.2 trillion at Dec. 31, 2018, \$1.3 trillion at Dec. 31, 2017, \$1.2 trillion at Dec. 31, 2016 and \$1.0 trillion at Dec. 31, 2015.

(c) Excludes securities lending cash management assets and assets managed in the Investment Services business.

(d) Represents the total amount of securities on loan in our agency securities lending program managed by the Investment Services business. Excludes securities for which BNY Mellon acts as an agent on behalf of CIBC Mellon clients, which totaled \$60 billion at Dec. 31, 2019, \$58 billion at Dec. 31, 2018, \$71 billion at Dec. 31, 2017, \$63 billion at Dec. 31, 2016 and \$55 billion at Dec. 31, 2015.

(e) Return on tangible common equity, a Non-GAAP measure, excludes goodwill and intangible assets, net of deferred tax liabilities. See "Supplemental information – Explanation of GAAP and Non-GAAP financial measures" beginning on page 101 for the reconciliation of the Non-GAAP measure.

The Bank of New York Mellon Corporation (and its subsidiaries)

Financial Summary (continued)

<i>(dollars in millions, except per share amounts and unless otherwise noted)</i>	2019	2018	2017	2016	2015
Cash dividends per common share	\$ 1.18	\$ 1.04	\$ 0.86	\$ 0.72	\$ 0.68
Common dividend payout ratio	26%	26%	23%	23%	25%
Common dividend yield	2.3%	2.2%	1.6%	1.5%	1.6%
Closing stock price per common share	\$ 50.33	\$ 47.07	\$ 53.86	\$ 47.38	\$ 41.22
Market capitalization <i>(in billions)</i>	\$ 45.3	\$ 45.2	\$ 54.6	\$ 49.6	\$ 44.7
Book value per common share	\$ 42.12	\$ 38.63	\$ 37.21	\$ 33.67	\$ 32.69
Tangible book value per common share – Non-GAAP <i>(a)</i>	\$ 21.33	\$ 19.04	\$ 18.24	\$ 16.19	\$ 15.27
Full-time employees at year-end	48,400	51,300	52,500	52,000	51,200
Common shares outstanding at year-end <i>(in thousands)</i>	900,683	960,426	1,013,442	1,047,488	1,085,343
Average total equity to average total assets	11.9%	12.1%	11.7%	10.7%	10.2%
Capital ratios (at year-end):					
Regulatory capital ratios - fully phased-in basis: <i>(b)</i>					
Advanced:					
Common Equity Tier 1 (“CET1”) ratio	11.5%	10.7%	10.3%	9.7%	9.5%
Tier 1 capital ratio	13.7	12.8	12.3	11.8	11.0
Total capital ratio	14.4	13.6	13.0	12.1	11.1
Standardized:					
CET1 ratio	12.5	11.7	11.5	11.3	10.2
Tier 1 capital ratio	14.8	14.1	13.7	13.6	11.8
Total capital ratio	15.8	15.1	14.7	14.2	12.0
Tier 1 leverage ratio	6.6	6.6	6.4	N/A	N/A
Supplementary leverage ratio (“SLR”)	6.1	6.0	5.9	5.6	4.9
BNY Mellon shareholders’ equity to total assets ratio	10.9%	11.2%	11.1%	11.6%	9.7%
BNY Mellon common shareholders’ equity to total assets ratio	9.9	10.2	10.1	10.6	9.0

- (a) Tangible book value per common share – Non-GAAP excludes goodwill and intangible assets, net of deferred tax liabilities. See “Supplemental information – Explanation of GAAP and Non-GAAP financial measures” beginning on page 101 for the reconciliation of the Non-GAAP measure.
- (b) For our CET1, Tier 1 and Total capital ratios, our effective capital ratios under U.S. capital rules are the lower of the ratios as calculated under the Standardized and Advanced Approaches. Beginning Jan. 1, 2018, consolidated regulatory ratios were fully phased-in. The regulatory ratios for all prior periods are presented on an estimated fully phased-in basis. For additional information on our regulatory capital ratios, see “Capital” beginning on page 41.

Results of Operations

General

In this Annual Report, references to “our,” “we,” “us,” “BNY Mellon,” the “Company” and similar terms refer to The Bank of New York Mellon Corporation and its consolidated subsidiaries. The term “Parent” refers to The Bank of New York Mellon Corporation but not its subsidiaries.

BNY Mellon’s actual results of future operations may differ from those estimated or anticipated in certain forward-looking statements contained herein for reasons which are discussed below and under the headings “Forward-looking Statements” and “Risk Factors.”

Certain business terms and acronyms used in this Annual Report are defined in the Glossary and Acronyms sections.

The following should be read in conjunction with the Consolidated Financial Statements included in this report. Investors should also read the section titled “Forward-looking Statements.”

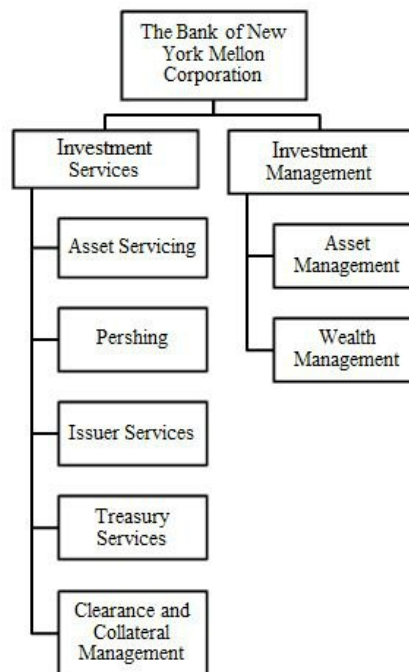
This Annual Report generally discusses 2019 and 2018 items and comparisons between 2019 and 2018. Discussions of 2017 items and comparisons between 2018 and 2017 that are not included in this Annual Report can be found in our 2018 Annual Report, which was filed as an exhibit to our Form 10-K for the year ended Dec. 31, 2018.

Overview

Established in 1784 by Alexander Hamilton, we were the first company listed on the New York Stock Exchange (NYSE: BK). With a 235-year history, BNY Mellon is a global company that manages and services assets for financial institutions, corporations and individual investors in 35 countries.

BNY Mellon has two business segments, Investment Services and Investment Management, which offer a comprehensive set of capabilities and deep expertise across the investment lifecycle, enabling the Company to provide solutions to buy-side and sell-side market participants, as well as leading institutional and wealth management clients globally.

The diagram below presents our two business segments and lines of business, with the remaining operations in the Other segment.



Key 2019 events

Todd Gibbons named interim Chief Executive Officer; Joseph Echevarria named Non-Executive Chairman

In September 2019, Todd Gibbons was appointed interim Chief Executive Officer and a member of the Board of Directors of the Company. During Todd’s career at BNY Mellon, he has held leadership roles across risk, finance, client management and many of our businesses. Most recently, Todd served as Vice Chairman and CEO of Clearing, Markets and Client Management. Todd also served for nine years as BNY Mellon’s Chief Financial Officer.

Joseph Echevarria, a member of BNY Mellon’s Board of Directors since February 2015 and Lead Independent Director, was appointed Non-Executive Chairman of the Board.

Sold interest in Promontory Interfinancial Network, LLC

In November 2019, MCDI (Holdings) LLC, a wholly owned subsidiary of BNY Mellon, along with the other holders of Promontory Interfinancial Network, LLC (“PIN”), sold their interests in PIN. BNY Mellon recorded an after-tax gain of \$622 million.

Summary of financial highlights

We reported net income applicable to common shareholders of BNY Mellon of \$4.3 billion, or \$4.51 per diluted common share, in 2019, including a net benefit of \$467 million, or \$0.49 per diluted common share, primarily reflecting the gain on the sale of an equity investment and a net reduction of reserves for a tax-related exposure of certain investment management funds, partially offset by severance, a lease-related impairment, net securities losses and litigation expense. In 2018, net income applicable to common shareholders of BNY Mellon was \$4.1 billion, or \$4.04 per diluted common share, including a net charge of \$168 million, or \$(0.17) per diluted common share, related to severance, expenses associated with consolidating real estate and litigation expense, partially offset by adjustments to provisional estimates for U.S. tax legislation.

Highlights of 2019 results

- AUC/A totaled \$37.1 trillion at Dec. 31, 2019 compared with \$33.1 trillion at Dec. 31, 2018. The 12% increase primarily reflects higher market values and client inflows. (See “Investment Services business” beginning on page 13.)
- AUM totaled \$1.9 trillion at Dec. 31, 2019 compared with \$1.7 trillion at Dec. 31, 2018. The 11% increase primarily reflects higher market values and the favorable impact of a weaker U.S. dollar (principally versus the British pound), partially offset by net outflows. (See “Investment Management business” beginning on page 15.)
- Investment services fees totaled \$7.9 billion in 2019, a slight increase compared with 2018, primarily reflecting growth in clearance and collateral management and the impact of higher equity markets, partially offset by the unfavorable impact of a stronger U.S. dollar and lower securities lending revenue. (See “Investment Services business” beginning on page 13.)
- Investment management and performance fees totaled \$3.4 billion in 2019, compared with \$3.6 billion in 2018, a decrease of 7%. The decrease primarily reflects the impact of cumulative AUM outflows, lower performance fees and the unfavorable impact of a stronger U.S. dollar (principally versus the British pound), partially offset by higher market values. On a constant currency basis (Non-GAAP), investment management and performance fees decreased 6% compared with 2018. (See “Investment Management business” beginning on page 15.)
- Foreign exchange and other trading revenue totaled \$654 million in 2019, compared with \$732 million in 2018. Foreign exchange revenue totaled \$577 million in 2019, a decrease of 13%, compared with \$663 million in 2018, primarily reflecting lower volatility, partially offset by foreign currency hedging. (See “Fee and other revenue” beginning on page 6.)
- Net interest revenue totaled \$3.2 billion in 2019, compared with \$3.6 billion in 2018, a decrease of 12%. The decrease primarily reflects higher deposit and funding costs, lower noninterest-bearing deposits and loan balances and a lease-related impairment, partially offset by higher yields on interest-earning assets. Net interest margin was 1.10% in 2019, compared with 1.25% in 2018. (See “Net interest revenue” beginning on page 8.)
- The provision for credit losses was a credit of \$25 million in 2019 and a credit of \$11 million in 2018. (See “Asset quality and allowance for credit losses” beginning on page 33.)
- Noninterest expense totaled \$10.9 billion in 2019 compared with \$11.2 billion in 2018. The 3% decrease primarily reflects the favorable impact of a stronger U.S. dollar, lower litigation and staff expenses, a reduction of previously established reserves for a tax-related exposure of certain investment management funds and expenses associated with consolidating real estate recorded in 2018, partially offset by continued investments in technology. See “Noninterest expense” beginning on page 11.)
- The provision for income taxes was \$1.1 billion (20.0% effective tax rate) in 2019. (See “Income taxes” on page 11.)
- The net unrealized pre-tax gain on the securities portfolio, including the impact of related hedges, was \$796 million at Dec. 31, 2019, compared

with a net unrealized pre-tax loss of \$907 million at Dec. 31, 2018. The increase in net unrealized pre-tax gain was primarily driven by lower market interest rates. (See “Securities” beginning on page 26.)

- Our CET1 ratio calculated under the Advanced Approaches was 11.5% at Dec. 31, 2019 and 10.7% at Dec. 31, 2018. The increase primarily reflects capital generated through earnings, unrealized gains on securities available-for-sale,

lower risk-weighted assets (“RWAs”) and the impact of stock awards and option exercises, partially offset by capital deployed through common stock repurchases and dividend payments. (See “Capital” beginning on page 41.)

- Our SLR was 6.1% at Dec. 31, 2019 and 6.0%, at Dec. 31, 2018. (See “Capital” beginning on page 41.)

Fee and other revenue

Fee and other revenue				2019	2018
				vs.	vs.
<i>(dollars in millions, unless otherwise noted)</i>	2019	2018	2017	2018	2017
Investment services fees:					
Asset servicing fees (a)	\$ 4,563	\$ 4,608	\$ 4,383	(1)%	5 %
Clearing services fees (b)(c)	1,648	1,616	1,598	2	1
Issuer services fees	1,130	1,099	977	3	12
Treasury services fees	559	554	557	1	(1)
Total investment services fees (c)	7,900	7,877	7,515	—	5
Investment management and performance fees (c)	3,389	3,647	3,539	(7)	3
Foreign exchange and other trading revenue	654	732	668	(11)	10
Financing-related fees	196	207	216	(5)	(4)
Distribution and servicing	129	139	160	(7)	(13)
Investment and other income	968	240	64	N/M	N/M
Total fee revenue	13,236	12,842	12,162	3	6
Net securities (losses) gains	(18)	(48)	3	N/M	N/M
Total fee and other revenue	\$ 13,218	\$ 12,794	\$ 12,165	3 %	5 %
Fee revenue as a percentage of total revenue	80%	78%	78%		
AUC/A at period end (in trillions) (d)	\$ 37.1	\$ 33.1	\$ 33.3	12 %	(1)%
AUM at period end (in billions) (e)	\$ 1,910	\$ 1,722	\$ 1,893	11 %	(9)%

(a) Asset servicing fees include the fees from the Clearance and Collateral Management business and also include securities lending revenue of \$179 million in 2019, \$220 million in 2018 and \$195 million in 2017.

(b) Clearing services fees are almost entirely earned by our Pershing business.

(c) In 2019, we reclassified certain platform-related fees to clearing services fees from investment management and performance fees. Prior periods have been reclassified.

(d) Consists of AUC/A primarily from the Asset Servicing business and, to a lesser extent, the Clearance and Collateral Management, Issuer Services, Pershing and Wealth Management businesses. Includes the AUC/A of CIBC Mellon of \$1.5 trillion at Dec. 31, 2019, \$1.2 trillion at Dec. 31, 2018 and \$1.3 trillion at Dec. 31, 2017.

(e) Excludes securities lending cash management assets and assets managed in the Investment Services business.

Fee and other revenue increased 3% compared with 2018. The increase primarily reflects higher investment and other income driven by the gain on the sale of an equity investment, clearing services fees and issuer services fees, partially offset by lower investment management and performance fees, foreign exchange and other trading revenue and asset servicing fees.

Investment services fees

Investment services fees increased slightly compared with 2018 reflecting the following:

- Asset servicing fees decreased 1%, primarily reflecting lower client activity, the unfavorable impact of a stronger U.S. dollar and lower security lending revenue, partially offset by growth in clearance volumes and collateral

management and the impact of higher equity markets.

- Clearing services fees increased 2%, primarily driven by growth in client assets and accounts.
- Issuer services fees increased 3%, primarily reflecting higher volumes in Corporate Trust, partially offset by lower Depository Receipts revenue.
- Treasury services fees increased 1%, primarily reflecting higher payment fees.

See the “Investment Services business” in “Review of businesses” for additional details.

Investment management and performance fees

Investment management and performance fees decreased 7% compared with 2018, primarily reflecting the impact of cumulative AUM outflows, lower performance fees and the unfavorable impact of a stronger U.S. dollar (principally versus the British pound), partially offset by higher market values. On a constant currency basis (Non-GAAP), investment management and performance fees decreased 6% compared to 2018. Performance fees were \$83 million in 2019 and \$144 million in 2018.

AUM was \$1.9 trillion at Dec. 31, 2019, an increase of 11% compared with Dec. 31, 2018, primarily reflecting higher market values and the favorable impact of a weaker U.S. dollar (principally versus the British pound), partially offset by net outflows.

See the “Investment Management business” in “Review of businesses” for additional details regarding the drivers of investment management and performance fees, AUM and AUM flows.

Foreign exchange and other trading revenue

Foreign exchange and other trading revenue			
<i>(in millions)</i>	2019	2018	2017
Foreign exchange	\$ 577	\$ 663	\$ 638
Other trading revenue	77	69	30
Total foreign exchange and other trading revenue	\$ 654	\$ 732	\$ 668

Foreign exchange and other trading revenue decreased 11% compared with 2018.

Foreign exchange revenue is primarily driven by the volume of client transactions and the spread realized on these transactions, both of which are impacted by market volatility, and the impact of foreign currency hedging activities. In 2019, foreign exchange revenue totaled \$577 million, a decrease of 13% compared with 2018, primarily reflecting lower volatility, partially offset by foreign currency hedging. Foreign exchange revenue is primarily reported in the Investment Services business and, to a lesser extent, the Investment Management business and the Other segment.

Other trading revenue totaled \$77 million in 2019 compared with \$69 million in 2018. The increase primarily reflects fixed income and derivative trading, partially offset by the impact of Investment Management hedging activities. Other trading revenue is reported in all three business segments.

Financing-related fees

Financing-related fees, which are primarily reported in the Investment Services business, include capital market fees, loan commitment fees and credit-related fees. Financing-related fees totaled \$196 million in 2019 compared with \$207 million in 2018, primarily reflecting lower fees on standby letters of credit and commitments.

Distribution and servicing fees

Distribution and servicing fees earned from mutual funds are primarily based on average assets in the funds and the sales of funds that we manage or administer and are primarily reported in the Investment Management business. These fees, which include 12b-1 fees, fluctuate with the overall level of net sales, the relative mix of sales between share classes, the funds’ market values and money market fee waivers.

Distribution and servicing fees were \$129 million in 2019 compared with \$139 million in 2018. The decrease primarily reflects the impact of lower fees from mutual funds driven by AUM outflows.

Investment and other income

The following table provides the components of investment and other income.

Investment and other income <i>(in millions)</i>	2019	2018	2017
Asset-related gains (losses)	\$ 819	\$ 70	\$ (1)
Corporate/bank-owned life insurance	138	145	153
Expense reimbursements from joint venture	79	71	64
Seed capital gains (a)	14	3	32
Lease-related gains	—	1	56
Other (loss)	(82)	(50)	(240)
Total investment and other income	\$ 968	\$ 240	\$ 64

(a) Excludes seed capital gains related to consolidated investment management funds, which are reflected in operations of consolidated investment management funds.

Investment and other income includes gains or losses from asset-related activity, corporate and bank-owned life insurance contracts, expense reimbursements

Net interest revenue

Net interest revenue				2019	2018
<i>(dollars in millions)</i>	2019	2018	2017	vs. 2018	vs. 2017
Net interest revenue	\$ 3,188	\$ 3,611	\$ 3,308	(12)%	9%
Add: Tax equivalent adjustment	13	20	47	N/M	N/M
Net interest revenue on a fully taxable equivalent ("FTE") basis – Non-GAAP (a)	\$ 3,201	\$ 3,631	\$ 3,355	(12)%	8%
Average interest-earning assets	\$ 290,489	\$ 289,916	\$ 290,522	—%	—%
Net interest margin	1.10%	1.25%	1.14%	(15) bps	11 bps
Net interest margin (FTE) – Non-GAAP (a)	1.10%	1.25%	1.15%	(15) bps	10 bps

(a) Net interest revenue (FTE) – Non-GAAP and net interest margin (FTE) – Non-GAAP include the tax equivalent adjustments on tax-exempt income which allows for comparisons of amounts arising from both taxable and tax-exempt sources and is consistent with industry practice. The adjustment to an FTE basis has no impact on net income.

bps - basis points

Net interest revenue decreased 12% and the net interest margin decreased 15 basis points compared with 2018, primarily reflecting higher deposit and funding costs, lower noninterest-bearing deposit balances and a \$70 million lease-related impairment recorded in 2019. This was partially offset by the impact of higher interest-earning asset yields and higher interest-bearing deposit balances.

Average interest-earning assets of \$290 billion were slightly higher than 2018. The slight increase primarily reflects higher federal funds sold and securities purchased under resale agreements, driven by higher average deposits, which was mostly

from our CIBC Mellon joint venture, seed capital, lease-related activity and other (loss) income. Asset-related gains (losses) include real estate, loan and other asset dispositions. Expense reimbursements from our CIBC Mellon joint venture relate to expenses incurred by BNY Mellon on behalf of the CIBC Mellon joint venture. Other (loss) income primarily includes foreign currency remeasurement gain (loss), other investments, including renewable energy, and various miscellaneous revenues. Investments in renewable energy generate losses in other income that are more than offset by benefits and credits recorded to the provision for income taxes.

Investment and other income was \$968 million in 2019 compared with \$240 million in 2018. The increase primarily reflects the gain on the sale of an equity investment. Investment and other income was \$64 million in 2017 reflecting the impact of U.S. tax legislation on our renewable energy investments.

offset by lower interest-bearing deposits with the Federal Reserve and other central banks and loans.

Average non-U.S. dollar deposits comprised approximately 30% of our average total deposits in 2019 and 2018. Approximately 45% of the average non-U.S. dollar deposits in 2019 and 2018 were euro-denominated.

Net interest revenue in future quarters will depend on the level and mix of client deposits, deposit rates, as well as the level and shape of the yield curve, which may result in lower yields on interest-earning assets.

Results of Operations (continued)

Average balances and interest rates <i>(dollars in millions)</i>	2019			2018		
	Average balance	Interest	Average rate	Average balance	Interest	Average rate
Assets						
Interest-earning assets:						
Interest-bearing deposits with the Federal Reserve and other central banks	\$ 61,739	\$ 448	0.73%	\$ 68,408	\$ 531	0.78%
Interest-bearing deposits with banks (primarily foreign banks)	14,666	265	1.81	14,740	219	1.48
Federal funds sold and securities purchased under resale agreements (a)	36,705	2,154	5.87	27,883	1,116	4.00
Margin loans	11,370	454	3.99	14,397	510	3.54
Non-margin loans:						
Domestic offices	29,165	1,005	3.45 (b)	29,642	1,020	3.44
Foreign offices	10,788	330	3.06	11,771	336	2.85
Total non-margin loans (c)	39,953	1,335	3.34 (b)	41,413	1,356	3.27
Securities:						
U.S. government obligations	20,040	431	2.15	23,908	486	2.03
U.S. government agency obligations	66,519	1,671	2.51	63,902	1,518	2.37
State and political subdivisions (d)	1,569	46	2.89	2,565	69	2.69
Other securities:						
Domestic offices (d)	10,504	353	3.36	8,186	341	4.17
Foreign offices	21,616	248	1.15	19,848	179	0.90
Total other securities (d)	32,120	601	1.87	28,034	520	1.85
Trading securities (primarily domestic) (d)	5,808	156	2.69	4,666	127	2.74
Total securities (d)	126,056	2,905	2.30	123,075	2,720	2.21
Total interest-earning assets (d)	\$ 290,489	\$ 7,561	2.60% (b)	\$ 289,916	\$ 6,452	2.23%
Noninterest-earning assets						
Total assets	\$ 345,955			\$ 343,774		
Liabilities						
Interest-bearing liabilities:						
Interest-bearing deposits:						
Domestic offices	\$ 78,698	\$ 958	1.22%	\$ 59,226	\$ 537	0.91%
Foreign offices	93,191	636	0.68	95,475	340	0.36
Total interest-bearing deposits	171,889	1,594	0.93	154,701	877	0.57
Federal funds purchased and securities sold under repurchase agreements (a)	12,463	1,437	11.53	15,546	758	4.88
Trading liabilities	1,479	35	2.33	1,310	29	2.21
Other borrowed funds:						
Domestic offices	1,655	59	3.54	2,122	55	2.57
Foreign offices	240	—	0.20	423	3	0.73
Total other borrowed funds	1,895	59	3.11	2,545	58	2.26
Commercial paper	2,485	55	2.22	2,607	51	1.97
Payables to customers and broker-dealers	15,595	238	1.53	16,353	191	1.17
Long-term debt	28,110	942	3.35	28,257	857	3.03
Total interest-bearing liabilities	\$ 233,916	\$ 4,360	1.86%	\$ 221,319	\$ 2,821	1.27%
Total noninterest-bearing deposits	51,529			63,814		
Other noninterest-bearing liabilities	19,244			16,952		
Total liabilities	304,689			302,085		
Temporary equity						
Redeemable noncontrolling interests	66			187		
Permanent equity						
Total The Bank of New York Mellon Corporation shareholders' equity	41,047			41,360		
Noncontrolling interests	153			142		
Total permanent equity	41,200			41,502		
Total liabilities, temporary equity and permanent equity	\$ 345,955			\$ 343,774		
Net interest revenue (FTE) – Non-GAAP		\$ 3,201		\$ 3,631		
Net interest margin (FTE) – Non-GAAP			1.10% (b)			1.25%
Less: Tax equivalent adjustment (d)		13		20		
Net interest revenue – GAAP		\$ 3,188		\$ 3,611		
Net interest margin – GAAP			1.10% (b)			1.25%
Percentage of assets attributable to foreign offices (e)	31%			31%		
Percentage of liabilities attributable to foreign offices (e)	34			34		

(a) Includes the average impact of offsetting under enforceable netting agreements of approximately \$56 billion in 2019 and \$25 billion in 2018. On a Non-GAAP basis, excluding the impact of offsetting, the yield on federal funds sold and securities purchased under resale agreements would have been 2.33% for 2019 and 2.10% for 2018, and the rate on federal funds purchased and securities sold under repurchase agreements would have been 2.11% for 2019 and 1.86% for 2018. We believe providing the rates excluding the impact of netting is useful to investors as it is more reflective of the actual rates earned and paid.

(b) Includes the impact of the lease-related impairment of \$70 million in 2019. On a Non-GAAP basis, excluding the lease-related impairment, the yield on non-margin loans in domestic offices would have been 3.69%, the yield on total non-margin loans would have been 3.52%, the yield on total interest-earning assets would have been 2.63%, the net interest margin would have been 1.12% and the net interest margin (FTE) – Non-GAAP would have been 1.13% for 2019. We believe providing the rates excluding the lease-related impairment is useful to investors as it is more reflective of the actual rates earned.

(c) Interest income includes fees of \$4 million in 2019 and \$7 million in 2018. Nonaccrual loans are included in average loans; the associated income, which was recognized on a cash basis, is included in interest income.

(d) Average rates were calculated on an FTE basis, at tax rates of approximately 21% for both 2019 and 2018.

(e) Includes the Cayman Islands branch office.

Results of Operations (continued)

Average balances and interest rates (continued)	2017		
	Average balance	Interest	Average rate
<i>(dollars in millions)</i>			
Assets			
Interest-earning assets:			
Interest-bearing deposits with the Federal Reserve and other central banks	\$ 70,213	\$ 319	0.45%
Interest-bearing deposits with banks (primarily foreign banks)	14,879	120	0.80
Federal funds sold and securities purchased under resale agreements (a)	27,192	423	1.55
Margin loans	14,500	343	2.36
Non-margin loans:			
Domestic offices	30,524	819	2.68
Foreign offices	12,915	258	2.00
Total non-margin loans (b)	43,439	1,077	2.48
Securities:			
U.S. government obligations	25,674	425	1.66
U.S. government agency obligations	60,268	1,195	1.98
State and political subdivisions (c)	3,226	100	3.09
Other securities:			
Domestic offices (c)	9,141	215	2.35
Foreign offices	19,541	150	0.77
Total other securities (c)	28,682	365	1.27
Trading securities (primarily domestic) (c)	2,449	62	2.54
Total securities (c)	120,299	2,147	1.79
Total interest-earning assets (c)	\$ 290,522	\$ 4,429	1.52%
Noninterest-earning assets			
Total assets	\$ 343,848		
Liabilities			
Interest-bearing liabilities:			
Interest-bearing deposits:			
Domestic offices	\$ 46,908	\$ 107	0.23%
Foreign offices	96,215	55	0.06
Total interest-bearing deposits	143,123	162	0.11
Federal funds purchased and securities sold under repurchase agreements (a)	19,653	225	1.14
Trading liabilities	1,243	7	0.57
Other borrowed funds:			
Domestic offices	1,113	21	1.86
Foreign offices	803	5	0.67
Total other borrowed funds	1,916	26	1.36
Commercial paper	2,630	29	1.08
Payables to customers and broker-dealers	18,984	64	0.34
Long-term debt	27,424	561	2.05
Total interest-bearing liabilities	\$ 214,973	\$ 1,074	0.50%
Total noninterest-bearing deposits	71,664		
Other noninterest-bearing liabilities	16,932		
Total liabilities	303,569		
Temporary equity			
Redeemable noncontrolling interests	180		
Permanent equity			
Total The Bank of New York Mellon Corporation shareholders' equity	39,687		
Noncontrolling interests	412		
Total permanent equity	40,099		
Total liabilities, temporary equity and permanent equity	\$ 343,848		
Net interest revenue (FTE) – Non-GAAP		\$ 3,355	
Net interest margin (FTE) – Non-GAAP			1.15%
Less: Tax equivalent adjustment (c)		47	
Net interest revenue – GAAP		\$ 3,308	
Net interest margin – GAAP			1.14%
Percentage of assets attributable to foreign offices (d)	30%		
Percentage of liabilities attributable to foreign offices (d)	35		

(a) Includes the average impact of offsetting under enforceable netting agreements of approximately \$6 billion in 2017. On a Non-GAAP basis, excluding the impact of offsetting, the yield on federal funds sold and securities purchased under resale agreements would have been 1.29%, and the rate on federal funds purchased and securities sold under repurchase agreements would have been 0.89% for 2017. We believe providing the rates excluding the impact of netting is useful to investors as it is more reflective of the actual rates earned and paid.

(b) Interest income includes fees of \$9 million in 2017. Nonaccrual loans are included in average loans; the associated income, which was recognized on a cash basis, is included in interest income.

(c) Average rates were calculated on an FTE basis, at tax rates of approximately 35% in 2017.

(d) Includes the Cayman Islands branch office.

Noninterest expense

Noninterest expense				2019	2018
				vs.	vs.
<i>(dollars in millions)</i>	2019	2018	2017	2018	2017
Staff	\$ 6,063	\$ 6,145	\$ 6,033	(1)%	2 %
Professional, legal and other purchased services	1,345	1,334	1,276	1	5
Software and equipment	1,222	1,062	985	15	8
Net occupancy	564	630	570	(10)	11
Sub-custodian and clearing	450	450	414	—	9
Distribution and servicing	374	406	419	(8)	(3)
Business development	213	228	229	(7)	—
Bank assessment charges	125	170	220	(26)	(23)
Amortization of intangible assets	117	180	209	(35)	(14)
Other	427	606	602	(30)	1
Total noninterest expense	\$ 10,900	\$ 11,211	\$ 10,957	(3)%	2 %
Full-time employees at year-end	48,400	51,300	52,500	(6)%	(2)%

Total noninterest expense decreased 3% compared with 2018. The decrease primarily reflects the favorable impact of a stronger U.S. dollar, lower litigation and staff expenses, a reduction of previously established reserves for a tax-related exposure of certain investment management funds that we manage and expenses associated with consolidating real estate recorded in 2018. The decrease was partially offset by continued investments in technology. The investments in technology are included in staff, professional, legal and other purchased services, and software and equipment expenses.

Our investments in technology infrastructure and platforms are expected to continue. As a result, we expect to incur higher technology-related expenses in 2020 than in 2019 which is expected to be mostly offset by decreases in other expenses as we continue to manage overall expenses. In addition, we also expect an increase in pension expense as a result of a lower expected rate of return on plan assets.

Income taxes

BNY Mellon recorded an income tax provision of \$1.1 billion (20.0% effective tax rate) in 2019. The income tax provision was \$938 million (18.1% effective tax rate) in 2018, including the positive impact of adjusting provisional estimates related to U.S. tax legislation. The income tax provision was \$496 million (10.8% effective tax rate) in 2017, including the estimated tax benefit related to U.S. tax legislation. For additional information, see Note 12 of the Notes to Consolidated Financial Statements.

Review of businesses

We have an internal information system that produces performance data along product and service lines for our two principal businesses, Investment Services and Investment Management, and the Other segment.

Business accounting principles

Our business data has been determined on an internal management basis of accounting, rather than the generally accepted accounting principles used for consolidated financial reporting. These measurement principles are designed so that reported results of the businesses will track their economic performance.

For information on the accounting principles of our businesses, the primary products and services in each line of business, the primary types of revenue by business and how our businesses are presented and analyzed, see Note 24 of the Notes to Consolidated Financial Statements.

Business results are subject to reclassification when organizational changes are made. There were no significant organizational changes in 2019. The results are also subject to refinements in revenue and expense allocation methodologies, which are typically reflected on a prospective basis.

The results of our businesses may be influenced by client and other activities that vary by quarter. In the first quarter, staff expense typically increases reflecting the vesting of long-term stock awards for retirement-eligible employees. In the third quarter, volume-related fees may decline due to reduced client activity. In the third quarter, staff expense typically

increases reflecting the annual employee merit increase. In the fourth quarter, we typically incur higher business development and marketing expenses. In our Investment Management business, performance fees are typically higher in the fourth and first quarters, as those quarters represent the end of the measurement period for many of the performance fee-eligible relationships.

The results of our businesses may also be impacted by the translation of financial results denominated in foreign currencies to the U.S. dollar. We are primarily impacted by activities denominated in the British pound and the euro. On a consolidated basis and in our Investment Services business, we typically have more foreign currency-denominated expenses than revenues. However, our Investment Management business typically has more foreign currency-denominated revenues than expenses. Overall, currency fluctuations impact the year-over-year growth rate in the Investment Management business more than the Investment Services business. However, currency fluctuations, in isolation, are not expected to significantly impact net income on a consolidated basis.

Fee revenue in Investment Management, and to a lesser extent in Investment Services, is impacted by the value of market indices. At Dec. 31, 2019, we estimate that a 5% change in global equity markets, spread evenly throughout the year, would impact fee revenue by less than 1% and diluted earnings per common share by \$0.03 to \$0.05.

See Note 24 of the Notes to Consolidated Financial Statements for the consolidating schedules which show the contribution of our businesses to our overall profitability.

Investment Services business

				2019 vs. 2018	2018 vs. 2017
<i>(dollars in millions, unless otherwise noted)</i>					
Revenue:					
Investment services fees:					
Asset servicing fees (a)	\$ 4,479	\$ 4,520	\$ 4,286	(1)%	5%
Clearing services fees (b)(c)	1,649	1,615	1,594	2	1
Issuer services fees	1,130	1,099	975	3	13
Treasury services fees	558	553	555	1	—
Total investment services fees (c)	7,816	7,787	7,410	—	5
Foreign exchange and other trading revenue	621	665	620	(7)	7
Other (c)(d)	457	474	497	(4)	(5)
Total fee and other revenue	8,894	8,926	8,527	—	5
Net interest revenue	3,093	3,372	3,058	(8)	10
Total revenue	11,987	12,298	11,585	(3)	6
Provision for credit losses	(16)	1	(7)	N/M	N/M
Noninterest expense (excluding amortization of intangible assets)	7,969	7,929	7,598	1	4
Amortization of intangible assets	80	129	149	(38)	(13)
Total noninterest expense	8,049	8,058	7,747	—	4
Income before income taxes	\$ 3,954	\$ 4,239	\$ 3,845	(7)%	10%
Pre-tax operating margin	33%	34%	33%		
Securities lending revenue	\$ 163	\$ 198	\$ 168	(18)%	18%
Total revenue by line of business:					
Asset Servicing	\$ 5,600	\$ 5,932	\$ 5,603	(6)%	6%
Pershing	2,256	2,255	2,180	—	3
Issuer Services	1,723	1,743	1,588	(1)	10
Treasury Services	1,275	1,302	1,251	(2)	4
Clearance and Collateral Management	1,133	1,066	963	6	11
Total revenue by line of business	\$ 11,987	\$ 12,298	\$ 11,585	(3)%	6%
Metrics:					
Average loans	\$ 33,115	\$ 36,931	\$ 40,142	(10)%	(8)%
Average deposits	\$ 204,979	\$ 203,279	\$ 200,235	1%	2%
AUC/A at period end (in trillions) (e)	\$ 37.1	\$ 33.1	\$ 33.3	12%	(1)%
Market value of securities on loan at period end (in billions) (f)	\$ 378	\$ 373	\$ 408	1%	(9)%
Pershing:					
Average active clearing accounts (U.S. platform) (in thousands)	6,262	6,097	6,137	3%	(1)%
Average long-term mutual fund assets (U.S. platform)	\$ 540,247	\$ 511,004	\$ 487,845	6%	5%
Average investor margin loans (U.S. platform)	\$ 9,541	\$ 10,829	\$ 9,810	(12)%	10%
Clearance and Collateral Management:					
Average tri-party collateral management balances (in billions)	\$ 3,446	\$ 2,918	\$ 2,502	18%	17%

(a) Asset servicing fees include the fees from the Clearance and Collateral Management business.

(b) Clearing services fees are almost entirely earned by our Pershing business.

(c) In 2019, we reclassified certain platform-related fees to clearing services fees from investment management and performance fees. Prior periods have been reclassified.

(d) Other revenue includes investment management and performance fees, financing-related fees, distribution and servicing revenue, securities gains and losses and investment and other income.

(e) Consists of AUC/A primarily from the Asset Servicing business and, to a lesser extent, the Clearance and Collateral Management, Issuer Services and Pershing businesses. Includes the AUC/A of CIBC Mellon of \$1.5 trillion at Dec. 31, 2019, \$1.2 trillion at Dec. 31, 2018 and \$1.3 trillion at Dec. 31, 2017.

(f) Represents the total amount of securities on loan in our agency securities lending program managed by the Investment Services business. Excludes securities for which BNY Mellon acts as agent on behalf of CIBC Mellon clients, which totaled \$60 billion at Dec. 31, 2019, \$58 billion at Dec. 31, 2018 and \$71 billion at Dec. 31, 2017.

Business description

BNY Mellon Investment Services provides business services and technology solutions to entities including financial institutions, corporations, foundations and endowments, public funds and government agencies. Our lines of business include: Asset Servicing, Pershing, Issuer Services, Treasury Services and Clearance and Collateral Management. For information on the drivers of the Investment Services fee revenue, see Note 10 of the Notes to Consolidated Financial Statements

We are one of the leading global investment services providers with \$37.1 trillion of AUC/A at Dec. 31, 2019.

The Asset Servicing business provides a comprehensive suite of solutions. As one of the largest global custody and fund accounting providers and a trusted partner, we offer services for the safekeeping of assets in capital markets globally as well as alternative investment and structured product strategies. We provide custody and foreign exchange services, support exchange-traded funds and unit investment trusts and provide our clients outsourcing capabilities. We deliver securities lending and financing solutions on both an agency and principal basis. Our agency securities lending program is one of the largest lenders of U.S. and non-U.S. securities, servicing a lendable asset pool of approximately \$4.2 trillion in 34 separate markets. Our market-leading liquidity services portal enables cash investments for institutional clients and includes fund research and analytics.

Pershing provides execution, clearing, custody, business and technology solutions, delivering dependable operational support to broker-dealers, wealth managers and registered investment advisors (RIAs) globally.

The Issuer Services business includes Corporate Trust and Depositary Receipts. Our Corporate Trust business delivers a full range of issuer and related investor services, including trustee, paying agency, fiduciary, escrow and other financial services. We are a leading provider to the debt capital markets, providing customized and market-driven solutions to investors, bondholders and lenders. Our Depositary Receipts business drives global investing by providing servicing and value-added solutions that enable, facilitate and enhance

cross-border trading, clearing, settlement and ownership. We are one of the largest providers of depositary receipts services in the world, partnering with leading companies from more than 50 countries.

Our Treasury Services business provides global payments, liquidity management and trade finance services for financial institutions, corporations and the public sector.

Our Clearance and Collateral Management business clears and settles equity and fixed-income transactions globally and serves as custodian for tri-party repo collateral worldwide. We are the primary provider of U.S. government securities clearance and a provider of non-U.S. government securities clearance. Our collateral services include collateral management, administration and segregation. We offer innovative solutions and industry expertise which help financial institutions and institutional investors with their liquidity, financing, risk and balance sheet challenges. We are a leading provider of tri-party collateral management services with an average of \$3.4 trillion serviced globally including approximately \$2.5 trillion of the U.S. tri-party repo market.

Review of financial results

AUC/A of \$37.1 trillion increased 12% compared with Dec. 31, 2018, primarily reflecting higher market values and client inflows. AUC/A consisted of 35% equity securities and 65% fixed-income securities at Dec. 31, 2019 and 33% equity securities and 67% fixed-income securities at Dec. 31, 2018.

Total revenue of \$12.0 billion decreased 3% compared with 2018. The drivers of total revenue by line of business are indicated below.

Asset Servicing revenue of \$5.6 billion decreased 6% compared with 2018. The decrease primarily reflects lower net interest revenue, foreign exchange revenue, client activity and securities lending revenue and the unfavorable impact of a stronger U.S. dollar, partially offset by the impact of higher equity markets.

Pershing revenue of \$2.3 billion increased slightly compared with 2018. The increase primarily reflects growth in client assets and accounts, client activity and the impact of higher equity markets, partially

Results of Operations (continued)

offset by previously disclosed lost business and lower net interest revenue.

Issuer Services revenue of \$1.7 billion decreased 1% compared with 2018. The decrease primarily reflects lower net interest revenue in Corporate Trust and lower Depository Receipts revenue, partially offset by higher volumes in Corporate Trust.

Treasury Services revenue of \$1.3 billion decreased 2% compared with 2018. The decrease primarily reflects lower net interest revenue, partially offset by higher payment fees.

Clearance and Collateral Management revenue of \$1.1 billion increased 6% compared with 2018. The increase primarily reflects growth in clearance and

collateral management volumes, partially offset by lower net interest revenue.

Market and regulatory trends are driving investable assets toward lower fee asset management products at reduced margins for our clients. These dynamics are also negatively impacting our investment services fees. However, at the same time, these trends are providing additional outsourcing opportunities as clients and other market participants seek to comply with new regulations and reduce their operating costs.

Noninterest expense of \$8.0 billion decreased slightly compared with 2018. The decrease primarily reflects lower litigation and staff expenses and the favorable impact of a stronger U.S. dollar, which were mostly offset by higher investments in technology.

Investment Management business

				2019	2018
				vs.	vs.
(dollars in millions)	2019	2018	2017	2018	2017
Revenue:					
Investment management fees (a)	\$ 3,290	\$ 3,488	\$ 3,428	(6)%	2%
Performance fees	83	144	94	(42)	53
Investment management and performance fees (b)	3,373	3,632	3,522	(7)	3
Distribution and servicing	178	190	207	(6)	(8)
Other (a)	(85)	(41)	(61)	N/M	N/M
Total fee and other revenue (a)	3,466	3,781	3,668	(8)	3
Net interest revenue	255	303	329	(16)	(8)
Total revenue	3,721	4,084	3,997	(9)	2
Provision for credit losses	(1)	3	2	N/M	N/M
Noninterest expense (excluding amortization of intangible assets)	2,606	2,767	2,794	(6)	(1)
Amortization of intangible assets	37	51	60	(27)	(15)
Total noninterest expense	2,643	2,818	2,854	(6)	(1)
Income before income taxes	\$ 1,079	\$ 1,263	\$ 1,141	(15)%	11%
Pre-tax operating margin	29%	31%	29%		
Adjusted pre-tax operating margin – Non-GAAP (c)	32%	34%	32%		
Total revenue by line of business:					
Asset Management	\$ 2,548	\$ 2,836	\$ 2,775	(10)%	2%
Wealth Management	1,173	1,248	1,222	(6)	2
Total revenue by line of business	\$ 3,721	\$ 4,084	\$ 3,997	(9)%	2%
Average balances:					
Average loans	\$ 16,372	\$ 16,774	\$ 16,565	(2)%	1%
Average deposits	\$ 14,923	\$ 14,291	\$ 13,615	4%	5%

- (a) Total fee and other revenue includes the impact of the consolidated investment management funds, net of noncontrolling interests. Additionally, other revenue includes asset servicing fees, treasury services fees, foreign exchange and other trading revenue and investment and other income.
- (b) On a constant currency basis, investment management and performance fees decreased 6% (Non-GAAP) compared with 2018. See "Supplemental information – Explanation of GAAP and Non-GAAP financial measures" beginning on page 101 for the reconciliation of this Non-GAAP measure.
- (c) Net of distribution and servicing expense. See "Supplemental information – Explanation of GAAP and Non-GAAP financial measures" beginning on page 101 for the reconciliation of this Non-GAAP measure.

Results of Operations (continued)

AUM trends			
<i>(dollars in billions)</i>	2019	2018	2017
AUM at period end, by product type: (a)			
Equity	\$ 154	\$ 135	\$ 161
Fixed income	224	200	206
Index	339	301	350
Liability-driven investments	728	659	667
Multi-asset and alternative investments	192	167	214
Cash	273	260	295
Total AUM by product type	\$ 1,910	\$ 1,722	\$ 1,893
Changes in AUM: (a)			
Beginning balance of AUM	\$ 1,722	\$ 1,893	\$ 1,648
Net inflows (outflows):			
Long-term strategies:			
Equity	(16)	(13)	(14)
Fixed income	6	4	6
Liability-driven investments	(1)	45	50
Multi-asset and alternative investments	(1)	(6)	8
Total long-term active strategies (outflows) inflows	(12)	30	50
Index	(32)	(34)	(17)
Total long-term strategies (outflows) inflows	(44)	(4)	33
Short-term strategies:			
Cash	8	(35)	30
Total net (outflows) inflows	(36)	(39)	63
Net market impact	191	(48)	106
Net currency impact	33	(53)	76
Divestiture/other	—	(31)	(b) —
Ending balance of AUM	\$ 1,910	\$ 1,722	\$ 1,893

Wealth Management client assets (c)	2019	2018	2017
	\$ 266	\$ 239	\$ 262

- (a) Excludes securities lending cash management assets and assets managed in the Investment Services business.
- (b) Primarily reflects a change in methodology beginning in 2018 to exclude AUM related to equity method investments as well as the divestiture of CenterSquare Investment Management.
- (c) Includes AUM and AUC/A in the Wealth Management business.

Business description

Our Investment Management business consists of two lines of business, Asset Management and Wealth Management. With AUM of \$1.9 trillion, our Investment Management business is the seventh-largest global asset manager and includes our investment firms and Wealth Management business.

Our investment firms deliver a highly diversified portfolio of investment strategies independently, and through our global distribution network, to institutional and retail clients globally. The investment firms offer a broad range of actively managed equity, fixed income, alternative and liability-driven investments, along with passive products and cash management.

Our Asset Management model provides specialized expertise from eight respected investment firms offering solutions across every major asset class, with backing from the proven stewardship and global presence of BNY Mellon. Each investment firm has its own individual culture, investment philosophy and proprietary investment process. This approach brings our clients clear, independent thinking from highly experienced investment professionals.

In addition to the investment firms, Asset Management has multiple global distribution entities which are responsible for distributing investment products developed and managed by the investment firms, as well as responsibility for management and distribution of our U.S. mutual funds and certain offshore money market funds.

BNY Mellon Wealth Management provides investment management, custody, wealth and estate planning and private banking services. BNY Mellon Wealth Management has \$266 billion in client assets as of Dec. 31, 2019, and an extensive network of offices in the U.S. and internationally.

The results of the Investment Management business are driven by a blend of daily, monthly and quarterly averages of AUM by product type. The overall level of AUM for a given period is determined by:

- the beginning level of AUM;
- the net flows of new assets during the period resulting from new business wins and existing client enrichments, reduced by the loss of clients and withdrawals; and
- the impact of market price appreciation or depreciation, foreign exchange rates and investment firm acquisitions or divestitures.

The mix of AUM is a result of the historical growth rates of equity and fixed income markets and the cumulative net flows of our investment firms as a result of client asset allocation decisions. Actively managed equity, multi-asset and alternative assets

typically generate higher percentage fees than fixed-income and liability-driven investments and cash. Also, actively managed assets typically generate higher management fees than indexed or passively managed assets of the same type. Market and regulatory trends have resulted in increased demand for lower fee asset management products and for performance-based fees.

Investment management fees are dependent on the overall level and mix of AUM and the management fees expressed in basis points (one-hundredth of one percent) charged for managing those assets. Management fees are typically subject to fee schedules based on the overall level of assets managed for a single client or by individual asset class and style. This is most common for institutional clients where we typically manage substantial assets for individual accounts.

Performance fees are generally calculated as a percentage of a portfolio's performance in excess of a benchmark index or a peer group's performance.

A key driver of organic growth in investment management and performance fees is the amount of net new AUM flows. Overall market conditions are also key drivers, with a significant long-term economic driver being growth of global financial assets.

Net interest revenue is determined by loan and deposit volumes and the interest rate spread between customer rates and internal funds transfer rates on loans and deposits. Expenses in the Investment Management business are mainly driven by staff and distribution and servicing expenses.

Review of financial results

AUM increased 11% compared with Dec. 31, 2018 primarily reflecting higher market values and the favorable impact of a weaker U.S. dollar (principally versus the British pound), partially offset by net outflows.

Net long-term strategy outflows were \$44 billion in 2019, primarily resulting from outflows of index and equity funds. Short-term strategy inflows were \$8 billion in 2019.

Total revenue of \$3.7 billion decreased 9% compared with 2018.

Asset Management revenue of \$2.5 billion decreased 10% compared with 2018. The decrease primarily reflects cumulative AUM outflows, the impact of divestitures, the unfavorable impact of a stronger U.S. dollar (principally versus the British pound), lower performance fees and the impact of hedging activities, partially offset by higher market values.

Wealth Management revenue of \$1.2 billion decreased 6% compared with 2018. The decrease reflects lower net interest revenue and fees.

Revenue generated in the Investment Management business included 40% from non-U.S. sources in 2019, compared with 42% in 2018.

Noninterest expense of \$2.6 billion decreased 6% compared with 2018. The decrease primarily reflects the net reduction of the reserves for tax-related exposure of certain investment management funds, the favorable impact of a stronger U.S. dollar, lower staff expense and lower distribution and servicing expenses.

Other segment

<i>(in millions)</i>	2019	2018	2017
Fee revenue	\$ 904	\$ 133	\$ 4
Net securities (losses) gains	(16)	(48)	3
Total fee and other revenue	888	85	7
Net interest (expense)	(160)	(64)	(79)
Total revenue (loss)	728	21	(72)
Provision for credit losses	(8)	(15)	(19)
Noninterest expense	208	334	347
Income (loss) before income taxes	\$ 528	\$ (298)	\$ (400)
Average loans and leases	\$ 1,836	\$ 2,105	\$ 1,232

Description of segment

The Other segment primarily includes:

- the leasing portfolio;
- corporate treasury activities, including our securities portfolio;
- derivatives and other trading activity;
- corporate and bank-owned life insurance;
- renewable energy investments; and
- business exits.

Revenue primarily reflects:

- net interest revenue and lease-related gains (losses) from leasing operations;
- net interest revenue from corporate treasury activity;
- fee and other revenue from corporate and bank-owned life insurance and business exits; and
- gains (losses) associated with investment securities and other assets, including renewable energy.

Expenses include:

- direct expenses supporting leasing, investing, and funding activities; and
- expenses not directly attributable to Investment Services and Investment Management operations.

Review of financial results

Income before taxes was \$528 million in 2019 compared with a loss before taxes of \$298 million in 2018.

Total fee revenue increased \$771 million compared with 2018, primarily reflecting the gain on the sale of an equity investment.

Net securities losses of \$16 million were primarily related to corporate treasury activity.

Net interest expense increased \$96 million compared with 2018, primarily reflecting a lease-related impairment and corporate treasury activity.

Noninterest expense decreased \$126 million compared with 2018, primarily reflecting the expenses associated with relocating our corporate headquarters in 2018 and lower staff expense.

International operations

Our primary international activities consist of asset servicing and global payment services in our Investment Services business and asset management in our Investment Management business.

Our clients include central banks and sovereigns, financial institutions, asset managers, insurance companies, corporations, local authorities and high-net-worth individuals and family offices. Through our global network of offices, we have developed a deep understanding of local requirements and cultural needs, and we pride ourselves on providing dedicated service through our multilingual sales, marketing and client service teams.

At Dec. 31, 2019, we had approximately 9,100 employees in Europe, the Middle East and Africa (“EMEA”), approximately 13,300 employees in the Asia-Pacific region (“APAC”) and approximately 700 employees in other global locations, primarily Brazil.

We are the seventh-largest global asset manager. At both Dec. 31, 2019 and Dec. 31, 2018, our international operations managed 55% of BNY Mellon's AUM.

In Europe, we maintain capabilities to service Undertakings for Collective Investment in Transferable Securities Directives ("UCITS") and alternative investment funds. We offer a full range of tailored solutions for investment companies, financial institutions and institutional investors across Europe.

We are a provider of non-U.S. government securities, fixed income and equities clearance, settling securities transactions directly in European markets, and using a high-quality and established network of local agents in non-European markets.

We have extensive experience providing trade and cash services to financial institutions and central banks outside of the U.S. In addition, we offer a broad range of servicing and fiduciary products to financial institutions, corporations and central banks. In emerging markets, we lead with global payments and issuer services, introducing other products as the markets mature. For more established markets, our focus is on global investment services.

We are also a full-service global provider of foreign exchange services, actively trading in over 100 of the world's currencies. We serve clients from trading desks located in Europe, Asia and North America.

Our financial results, as well as our levels of AUC/A and AUM, are impacted by translation from foreign currencies to the U.S. dollar. We are primarily impacted by activities denominated in the British pound and the euro. If the U.S. dollar depreciates against these currencies, the translation impact is a higher level of fee revenue, net interest revenue, noninterest expense and AUC/A and AUM. Conversely, if the U.S. dollar appreciates, the translated levels of fee revenue, net interest revenue, noninterest expense and AUC/A and AUM will be lower.

Foreign exchange rates vs. U.S. dollar	2019	2018	2017
Spot rate (at Dec. 31):			
British pound	\$ 1.3199	\$ 1.2801	\$ 1.3532
Euro	1.1231	1.1455	1.2009
Yearly average rate:			
British pound	\$ 1.2770	\$ 1.3349	\$ 1.2885
Euro	1.1195	1.1808	1.1390

International clients accounted for 35% of revenues in 2019, compared with 37% in 2018. Net income from international operations was \$1.9 billion in 2019, compared with \$2.2 billion in 2018.

In 2019, revenues from EMEA were \$3.8 billion, compared with \$4.3 billion in 2018. The 10% decrease primarily reflects lower revenue in the Investment Services business, driven by lower foreign exchange revenue, the unfavorable impact of a stronger U.S. dollar, lower net interest revenue and lower depositary receipts fees. The decrease also reflects lower revenue in the Investment Management business, driven by lower performance fees, the unfavorable impact of a stronger U.S. dollar (principally versus the British pound), cumulative AUM outflows and the impact of hedging activities, partially offset by the impact of higher market values. Our Investment Services and Investment Management businesses generated 70% and 30% of EMEA revenues, respectively. Net income from EMEA was \$1.1 billion in 2019, compared with \$1.3 billion in 2018.

Revenues from APAC were \$1.2 billion in 2019, compared with \$1.1 billion in 2018. The 5% increase primarily reflects higher revenue in the Investment Services business. Our Investment Services and Investment Management businesses generated 82% and 18% of APAC revenues, respectively. Net income from APAC was \$423 million in 2019, compared with \$448 million in 2018.

For additional information regarding our international operations, including certain key subjective assumptions used in determining the results, see Note 25 of the Notes to Consolidated Financial Statements.

Country risk exposure

The following table presents BNY Mellon's top 10 exposures by country (excluding the U.S.) as of Dec. 31, 2019, as well as certain countries with higher-risk profiles, and is presented on an internal risk management basis. We monitor our exposure to these and other countries as part of our internal country risk management process.

The country risk exposure below reflects the Company's risk to an immediate default of the counterparty or obligor based on the country of residence of the entity which incurs the liability. If there is credit risk mitigation, the country of residence of the entity providing the risk mitigation is the country of risk. The country of risk for investment securities is generally based on the domicile of the issuer of the security.

Country risk exposure at Dec. 31, 2019 (in billions)	Interest-bearing deposits		Lending (a)	Investment securities (b)	Other (c)	Total exposure
	Central banks	Banks				
Top 10 country exposure:						
Japan	\$ 20.9	\$ 0.6	\$ 0.1	\$ 0.4	\$ 0.2	\$ 22.2
Germany	15.3	0.4	0.8	3.7	0.3	20.5
United Kingdom ("UK")	10.0	0.4	1.8	4.7	2.1	19.0
Belgium	5.9	0.2	0.1	0.1	—	6.3
Canada	—	2.0	0.2	2.4	0.9	5.5
China	—	2.1	1.4	—	0.4	3.9
Netherlands	0.2	0.3	0.2	1.8	0.1	2.6
France	—	0.2	—	1.8	0.2	2.2
Ireland	0.3	0.1	0.2	0.3	1.2	2.1
Italy	0.1	0.6	0.1	1.2	—	2.0
Total Top 10 country exposure	\$ 52.7	\$ 6.9	\$ 4.9	\$ 16.4	\$ 5.4	\$ 86.3 (d)
Select country exposure:						
Brazil	\$ —	\$ —	\$ 1.6	\$ 0.1	\$ 0.1	\$ 1.8
Total select country exposure	\$ —	\$ —	\$ 1.6	\$ 0.1	\$ 0.1	\$ 1.8

(a) Lending includes loans, acceptances, issued letters of credit, net of participations, and lending-related commitments.

(b) Investment securities include both the available-for-sale and held-to-maturity portfolios.

(c) Other exposures include over-the-counter ("OTC") derivative and securities financing transactions, net of collateral.

(d) The top 10 country exposures comprise approximately 80% of our total non-U.S. exposure.

Based on our internal country risk management process at Dec. 31, 2019, we have significant exposure to the UK, which withdrew from the European Union ("EU") on Jan. 31, 2020. For additional information, see "Other Matters - UK's Withdrawal from the EU ("Brexit")" and "Risk Factors - The UK's withdrawal from the EU may have negative effects on global economic conditions, global financial markets, and our business and results of operations."

Events in recent years have resulted in increased focus on Italy and Brazil. The country risk exposure to Italy primarily consists of investment grade sovereign debt. The country risk exposure to Brazil is primarily short-term trade finance loans extended to large financial institutions. We also have operations in Brazil providing investment services and investment management services.

Cross-border outstandings

Cross-border outstandings are based on the Federal Financial Institutions Examination Council's ("FFIEC") regulatory guidelines for reporting cross-border risk and provide information on the distribution, by country and sector, of claims on foreign residents held by U.S. banks. Under the FFIEC guidelines, cross-border outstandings are reported based on the domicile of the counterparty, issuer of collateral or guarantor. Cross-border outstandings in the table below include claims of U.S. domiciled offices on foreign counterparties as well as claims of foreign offices on counterparties located outside those foreign jurisdictions. The guidelines to determine the cross-border outstandings in the table below are different from how we determine and manage our country risk exposure. For example, unfunded loan commitments as well as central bank deposits made by our foreign bank subsidiaries in their local jurisdiction are not considered cross-border outstandings. As a result, the cross-border

outstandings in the table below are not comparable to the country risk exposure in the previous section.

Foreign assets are subject to the general risks attendant on the conduct of business in each foreign country, including economic uncertainties and each foreign government's regulations. In addition, our foreign assets may be affected by changes in demand

or pricing resulting from fluctuations in currency exchange rates or other factors.

The table below shows our cross-border outstandings at Dec. 31 of each of the last three years where cross-border exposure exceeds 1.00% of total assets (denoted with “*”) or exceeds 0.75% but is less than or equal to 1.00% of total assets (denoted with “**”).

Cross-border outstandings <i>(in millions)</i>	Banks and other financial institutions <i>(a)</i>	Public sector	Commercial, industrial and other	Total cross-border outstandings <i>(b)</i>
2019:				
Germany*	\$ 2,547	\$ 1,571	\$ 1,187	\$ 5,305
Canada**	2,667	121	819	3,607
China**	3,376	—	72	3,448
2018:				
Canada*	\$ 1,888	\$ 381	\$ 2,263	\$ 4,532
Germany**	1,655	736	1,079	3,470
China**	3,030	—	5	3,035
2017:				
Germany**	\$ 1,530	\$ 1,344	\$ 600	\$ 3,474
Canada**	2,256	1	1,170	3,427
France**	295	2,519	130	2,944

(a) Primarily short-term interest-bearing deposits with banks. Also includes global trade finance loans.

(b) Excludes assets of consolidated investment management funds.

Emerging markets exposure

We determine our emerging markets exposures using the MSCI Emerging Markets Index. Our emerging markets exposures totaled \$13 billion at Dec. 31, 2019 and \$11 billion at Dec. 31, 2018. The increase primarily reflects increased exposure to banks in South Korea, Malaysia, Qatar and Brazil.

Critical accounting estimates

Our significant accounting policies are described in Note 1 of the Notes to Consolidated Financial Statements. Certain of these policies include critical accounting estimates which require management to make subjective or complex judgments about the effect of matters that are inherently uncertain and may change in subsequent periods. Our critical accounting estimates are those related to the allowance for loan losses and allowance for lending-related commitments, fair value of financial instruments and derivatives, goodwill and other intangibles and litigation and regulatory contingencies. Management has discussed the development and selection of the critical accounting estimates with the Company's Audit Committee.

Allowance for loan losses and allowance for lending-related commitments

The allowance for loan losses and allowance for lending-related commitments represent management's estimate of losses inherent in our credit portfolio. This evaluation process is subject to numerous estimates and judgments.

We utilize a quantitative methodology and qualitative framework for determining the allowance for loan losses and the allowance for lending-related commitments. Within this qualitative framework, management applies judgment when assessing internal risk factors and environmental factors to compute an additional allowance for each component of the loan portfolio.

The components of the allowance for loan losses and the allowance for lending-related commitments are inclusive of the qualitative allowance framework and consist of the following three elements:

- an allowance for impaired credits of \$1 million or greater;
- an allowance for higher risk-rated credits and pass-rated credits; and
- an allowance for residential mortgage loans.

Our lending is primarily to institutional customers. As a result, our loans are generally larger than \$1 million. Therefore, the first element, impaired credits, is based on individual analysis of all impaired loans of \$1 million or greater. The allowance is measured by the difference between the recorded value of impaired loans and their impaired value. Impaired value is either the present value of the expected future cash flows from the borrower, the market value of the loan, or the fair value of the collateral, if the loan is collateral dependent.

The second element, higher risk-rated credits and pass-rated credits, is based on our incurred loss model. Individual credit analyses are performed on such loans before being assigned a credit rating. All borrowers are collectively evaluated based on their credit rating. The loss inherent in each loan incorporates the borrower's credit rating, facility rating and maturity. The loss given default, derived from the facility rating, incorporates a recovery expectation and an estimate of the use of the facility at default (usage given default). The borrower's probability of default is derived from the associated credit rating. Borrower ratings are reviewed at least annually and are periodically mapped to third-party databases, including rating agency and default and recovery databases, for ongoing consistency and validity. Higher risk-rated credits are reviewed quarterly.

The third element, the allowance for residential mortgage loans, is determined by segregating mortgage pools into delinquency periods, ranging from current through foreclosure. Each of these delinquency periods is assigned a probability of default. A specific loss given default is assigned for each mortgage pool. We assign all residential mortgage pools, except home equity lines of credit, a probability of default and loss given default based on default and loss data derived from internal historical data related to our residential mortgage portfolio. The resulting incurred loss factor (the probability of default multiplied by the loss given default) is applied against the loan balance to determine the allowance held for each pool. This approach is applied to the other residential mortgage portfolio (a relatively small sub-segment of our mortgage loans). The allowance for wealth management loans and mortgages originated by our Wealth Management business (the majority of mortgage loans held) is assessed using the second element described above. For home equity lines of credit, probability of default

and loss given default are based on external data from third-party databases due to the small size of the portfolio and insufficient internal data.

The qualitative framework is used to determine an additional allowance for each portfolio based on the factors below:

Internal risk factors:

- Ratio of nonperforming loans to total non-margin loans;
- Ratio of criticized assets to total loans and lending-related commitments;
- Borrower concentration; and
- Significant concentrations in high-risk industries and countries.

Environmental risk factors:

- U.S. non-investment grade default rate;
- Unemployment rate; and
- Change in real gross domestic product.

The objective of the qualitative framework is to capture incurred losses that may not have been fully captured in the quantitative reserve, which is based primarily on historical data. Management determines the qualitative allowance each period based on judgment informed by consideration of internal and external risk factors and other considerations that may be deemed relevant during the period. Once determined in the aggregate, our qualitative allowance is then allocated to each of our loan classes based on the respective classes' quantitative allowance balances with the allocations adjusted, when necessary, for class specific risk factors.

For each risk factor, we calculate the minimum and maximum values, and percentiles in-between, to evaluate the distribution of our historical experience. The distribution of historical experience is compared to the risk factor's current quarter observed experience to assess the current risk inherent in the portfolio and overall direction/trend of a risk factor relative to our historical experience.

Based on this analysis, we assign a risk level—no impact, low, moderate, high and elevated—to each risk factor for the current quarter. Management assesses the impact of each risk factor to determine an aggregate risk level. We do not quantify the impact of any particular risk factor. Management's assessment of the risk factors, as well as the trend in

the quantitative allowance, supports management's judgment for the overall required qualitative allowance. A smaller qualitative allowance may be required when our quantitative allowance has reflected incurred losses associated with the aggregate risk level. A greater qualitative allowance may be required if our quantitative allowance does not yet reflect the incurred losses associated with the aggregate risk level.

To the extent actual results differ from forecasts or management's judgment, the allowance for credit losses may be greater or less than future charge-offs.

The credit rating assigned to each credit is a significant variable in determining the allowance. If each credit were rated one grade better, the allowance would have decreased by \$55 million, while if each credit were rated one grade worse, the allowance would have increased by \$91 million. Similarly, if the loss given default were one rating worse, the allowance would have increased by \$52 million, while if the loss given default were one rating better, the allowance would have decreased by \$55 million. For impaired credits, if the net carrying value of the loans was 10% higher or lower, the allowance would have decreased or increased by less than \$1 million, respectively.

Our accounting for credit losses related to financial assets measured at amortized cost, including loans and lending-related commitments will change beginning in the first quarter 2020 as a result of the adoption of Accounting Standards Update ("ASU") 2016-13, *Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments*. For additional information, see Recent Accounting Developments.

Fair value of financial instruments and derivatives

The guidance included in Accounting Standards Codification ("ASC") 820, *Fair Value Measurement*, defines fair value, establishes a framework for measuring fair value, and expands disclosures about assets and liabilities measured at fair value. The standard also established a three-level hierarchy for fair value measurements based upon the transparency of inputs to the valuation of an asset or liability as of the measurement date.

Fair value - Securities

Level 1 - Securities: Securities where valuations are based on recent quoted prices for identical securities in actively traded markets.

Level 2 - Securities: For securities where quotes from recent transactions are not available for identical securities, we determine fair value primarily based on pricing sources with reasonable levels of price transparency. The pricing sources employ financial models or obtain comparisons to similar instruments to arrive at "consensus" prices.

Specifically, the pricing sources obtain recent transactions for similar types of securities (e.g., vintage or position in the securitization structure) and ascertain variables such as discount rate and speed of prepayment for the type of transaction and apply such variables to similar types of bonds. We view these as observable transactions in the current market place and classify such securities as Level 2.

In addition, we have significant investments in more actively traded agency residential mortgage-backed securities ("RMBS") and other types of securities such as sovereign debt. The pricing sources derive the prices for these securities largely from quotes they obtain from major inter-dealer brokers. The pricing sources receive their daily-observed trade price and other information feeds from the inter-dealer brokers.

We obtain prices for our Level 1 and Level 2 securities from multiple pricing sources. We have designed controls to develop an understanding of the pricing sources' securities pricing methodology and have implemented specific internal controls over the valuation of securities.

As appropriate, we review the quality control procedures and pricing methodologies used by the pricing sources, including the process for obtaining prices provided by the pricing sources, their valuation methodology and controls for each class of security.

Prices received from pricing sources are subject to validation checks that help determine the completeness and accuracy of the prices. These validation checks are reviewed by management and, based on the results, may be subject to additional review and investigation. We also review securities with no price changes (stale prices) and securities with zero values.

We have a surveillance process in place to monitor the reasonableness of prices provided by the pricing sources. We utilize a hierarchy that compares security prices obtained from multiple pricing sources against established thresholds. Discrepancies that fall outside of these thresholds are challenged with the pricing services and adjusted if necessary.

If further research is required, we review and validate these prices with the pricing sources. We also validate prices from pricing sources by comparing prices received to actual observed prices from actions such as purchases and sales, when possible.

At Dec. 31, 2019, approximately 99% of our securities were valued by pricing sources with reasonable levels of price transparency. The remaining securities were generally valued using observable inputs.

Level 3 - Securities: Where we use our own cash flow models, which includes a significant input into the model that is deemed unobservable, to estimate the value of securities, we classify them as Level 3. At both Dec. 31, 2019 and Dec. 31, 2018, we have no securities included in Level 3 of the fair value hierarchy.

For details of our securities by level of the valuation hierarchy, see Note 20 of the Notes to Consolidated Financial Statements.

Fair value - Derivative financial instruments

Level 1 - Derivative financial instruments: Includes derivative financial instruments that are actively traded on exchanges, principally listed equity options.

Level 2 - Derivative financial instruments: Includes OTC derivative financial instruments. Derivatives classified as Level 2 are valued utilizing discounted cash flow analysis and financial models for which the valuation inputs are observable or can be corroborated, directly or indirectly, for substantially the full term of the instrument. Valuation inputs include interest rate yield curves, foreign exchange rates, equity prices, credit curves, option volatilities and other factors.

Where appropriate, valuation adjustments are made to account for various factors such as creditworthiness of the counterparty, creditworthiness of the Company and model and liquidity risks.

Level 3 - Derivative financial instruments: Level 3 derivatives include derivatives for which valuations are based on inputs that are unobservable and significant to the overall fair value measurement, and may include certain long-dated or highly structured contracts. At both Dec. 31, 2019 and Dec. 31, 2018, we have no derivatives included in Level 3 of the fair value hierarchy.

For details of our derivative financial instruments by level of the valuation hierarchy, see Note 20 of the Notes to Consolidated Financial Statements.

Fair value option

ASC 825, *Financial Instruments*, provides the option to elect fair value as an alternative measurement basis for selected financial assets and financial liabilities which are not subject to fair value under other accounting standards. The changes in fair value are recognized in income. See Note 21 of the Notes to Consolidated Financial Statements for additional disclosure regarding the fair value option.

Fair value - Judgments

In times of illiquid markets and financial stress, actual prices and valuations may significantly diverge from results predicted by models. In addition, other factors can affect our estimate of fair value, including market dislocations and unexpected correlations. The use of different methodologies or different assumptions to value certain financial instruments could result in a different estimate of fair value. See Note 1 of the Notes to Consolidated Financial Statements.

Goodwill and other intangibles

We initially record all assets and liabilities acquired in purchase acquisitions, including goodwill, indefinite-lived intangibles and other intangibles, in accordance with ASC 805, *Business Combinations*. Goodwill, indefinite-lived intangibles and other intangibles are subsequently accounted for in accordance with ASC 350, *Intangibles - Goodwill and Other*. The initial measurement of goodwill and intangibles requires judgment concerning estimates of the fair value of the acquired assets and liabilities. Goodwill (\$17.4 billion at Dec. 31, 2019) and indefinite-lived intangible assets (\$2.6 billion at Dec. 31, 2019) are not amortized but are subject to tests for impairment annually or more often if events or

circumstances indicate it is more likely than not they may be impaired. Other intangible assets are amortized over their estimated useful lives and are subject to impairment if events or circumstances indicate a possible inability to realize the carrying value.

BNY Mellon's three business segments include seven reporting units for which annual goodwill impairment testing is performed in accordance with ASC 350, *Intangibles - Goodwill and Other*. The Investment Management segment is comprised of two reporting units; the Investment Services segment is comprised of four reporting units and one reporting unit is included in the Other segment.

The goodwill impairment test compares the estimated fair value of the reporting unit with its carrying amount, including goodwill. If the estimated fair value of the reporting unit exceeds its carrying amount, goodwill of the reporting unit is considered not impaired. However, if the carrying amount of the reporting unit were to exceed its estimated fair value, an impairment loss would be recorded. A substantial goodwill impairment charge would not have a significant impact on our financial condition or our regulatory capital ratios, but could have an adverse impact on our results of operations. In addition, due to regulatory restrictions, the Company's subsidiary banks could be restricted from distributing available cash to the Parent, resulting in the Parent needing to issue additional long-term debt.

In the second quarter of 2019, we performed our annual goodwill test on all seven reporting units using an income approach to estimate the fair values of each reporting unit. Estimated cash flows used in the income approach were based on management's projections as of March 31, 2019. We applied a 10% discount rate to these cash flows and incorporated a 6.0% market equity risk premium. Estimated cash flows extend many years into the future, and, by their nature, are difficult to estimate over such an extended time frame.

As a result of the annual goodwill impairment test of the seven reporting units, no goodwill impairment was recognized. The fair values of six of the Company's reporting units were substantially in excess of the respective reporting units' carrying value. The Asset Management reporting unit, with \$7.2 billion of allocated goodwill, and one of the two reporting units in the Investment Management

segment, exceeded its carrying value by approximately 18%. For the Asset Management reporting unit, in the future, small changes in the assumptions, such as changes in the level of AUM and operating margin, could produce a non-cash goodwill impairment.

Key judgments in accounting for intangibles include useful life and classification between goodwill and indefinite-lived intangibles or other intangibles requiring amortization.

Indefinite-lived intangible assets are evaluated for impairment at least annually by comparing their fair values, estimated using discounted cash flow analyses, to their carrying values. Other amortizing intangible assets (\$522 million at Dec. 31, 2019) are evaluated for impairment if events and circumstances indicate a possible impairment. Such evaluation of other intangible assets would be initially based on undiscounted cash flow projections.

See Notes 1 and 7 of the Notes to Consolidated Financial Statements for additional information regarding goodwill, intangible assets and the annual and interim impairment testing.

Litigation and regulatory contingencies

Significant estimates and judgments are required in establishing an accrued liability for litigation and regulatory contingencies. For additional information on our policy, see "Legal proceedings" in Note 22 of the Notes to Consolidated Financial Statements.

Consolidated balance sheet review

One of our key risk management objectives is to maintain a balance sheet that remains strong throughout market cycles to meet the expectations of our major stakeholders, including our shareholders, clients, creditors and regulators.

We also seek to undertake overall liquidity risk, including intraday liquidity risk, that stays within our risk appetite. The objective of our balance sheet management strategy is to maintain a balance sheet that is characterized by strong liquidity and asset quality, ready access to external funding sources at competitive rates and a strong capital structure that supports our risk-taking activities and is adequate to absorb potential losses. In managing the balance sheet, appropriate consideration is given to balancing

the competing needs of maintaining sufficient levels of liquidity and complying with applicable regulations and supervisory expectations while optimizing profitability.

At Dec. 31, 2019, total assets were \$382 billion, compared with \$363 billion at Dec. 31, 2018. The increase in total assets was primarily driven by higher interest-bearing deposits with the Federal Reserve and other central banks and trading assets, partially offset by lower federal funds sold and securities purchased under resale agreements. Deposits totaled \$259 billion at Dec. 31, 2019, compared with \$239 billion at Dec. 31, 2018. The increase reflects higher interest-bearing deposits in both U.S. and non-U.S. offices, partially offset by lower noninterest-bearing deposits principally in U.S. offices. Total interest-bearing deposits as a percentage of total interest-earning assets were 62% at Dec. 31, 2019 and 54% at Dec. 31, 2018.

At Dec. 31, 2019, available funds totaled \$145 billion which include cash and due from banks, interest-bearing deposits with the Federal Reserve and other central banks, interest-bearing deposits with banks and federal funds sold and securities purchased under resale agreements. This compares with available funds of \$135 billion at Dec. 31, 2018. Total available funds as a percentage of total assets were 38% at Dec. 31, 2019 and 37% at Dec. 31, 2018. For additional information on our liquid funds and available funds, see “Liquidity and dividends.”

Securities were \$123 billion, or 32% of total assets, at Dec. 31, 2019, compared with \$120 billion, or 33% of total assets, at Dec. 31, 2018. The increase primarily reflects additional investments in agency RMBS, sovereign debt/sovereign guaranteed, an increase in the net unrealized pre-tax gain, and additional investments in foreign government agencies, partially offset by net maturities and sales of U.S. Treasury securities. For additional

information on our securities portfolio, see “Securities” and Note 4 of the Notes to Consolidated Financial Statements.

Loans were \$55 billion, or 14% of total assets, at Dec. 31, 2019, compared with \$57 billion, or 16% of total assets, at Dec. 31, 2018. The decrease was primarily driven by lower overdrafts, partially offset by higher loans to financial institutions and commercial real estate loans. For additional information on our loan portfolio, see “Loans” and Note 5 of the Notes to Consolidated Financial Statements.

Long-term debt totaled \$28 billion at Dec. 31, 2019 and \$29 billion at Dec. 31, 2018. The decrease reflects maturities and a redemption, partially offset by issuances and an increase in the fair value of hedged long-term debt. For additional information on long-term debt, see “Liquidity and dividends” and Note 13 of the Notes to Consolidated Financial Statements.

The Bank of New York Mellon Corporation total shareholders’ equity increased to \$41.5 billion at Dec. 31, 2019 from \$40.6 billion at Dec. 31, 2018. For additional information on our capital, see “Capital” and Note 15 of the Notes to Consolidated Financial Statements.

Securities

In the discussion of our securities portfolio, we have included certain credit ratings information because the information can indicate the degree of credit risk to which we are exposed. Significant changes in ratings classifications for our securities portfolio could indicate increased credit risk for us and could be accompanied by a reduction in the fair value of our securities portfolio.

Results of Operations (continued)

The following table shows the distribution of our total securities portfolio.

Securities portfolio <i>(dollars in millions)</i>	Dec. 31, 2018	2019 change in unrealized gain (loss)	Dec. 31, 2019		Fair value as a % of amortized cost <i>(a)</i>	Unrealized gain (loss)	Ratings <i>(b)</i>				
	Fair value		Amortized cost	Fair value			AAA/ AA-	A+/ A-	BBB+/ BBB-	BB+ and lower	Not rated
Agency RMBS	\$ 50,214	\$ 1,154	\$ 54,379	\$ 54,646	100%	\$ 267	100%	—%	—%	—%	—%
U.S. Treasury	24,792	193	18,797	18,865	100	68	100	—	—	—	—
Sovereign debt/sovereign guaranteed <i>(c)</i>	11,577	19	13,304	13,404	101	100	74	5	20	1	—
Agency commercial mortgage-backed securities (“MBS”)	10,947	140	10,557	10,613	101	56	100	—	—	—	—
Foreign covered bonds <i>(d)</i>	2,959	19	4,268	4,276	100	8	100	—	—	—	—
Collateralized loan obligations (“CLOs”)	3,364	31	4,078	4,063	100	(15)	99	—	—	1	—
Supranational	3,006	15	3,724	3,734	100	10	100	—	—	—	—
U.S. government agencies	3,157	36	2,913	2,933	101	20	100	—	—	—	—
Foreign government agencies <i>(e)</i>	1,161	6	2,638	2,641	100	3	95	5	—	—	—
Non-agency commercial MBS	1,470	52	2,134	2,165	101	31	98	2	—	—	—
Other asset-backed securities (“ABS”)	1,773	5	2,141	2,143	100	2	100	—	—	—	—
Non-agency RMBS <i>(f)</i>	1,427	(34)	1,118	1,316	118	198	26	11	3	37	23
State and political subdivisions	2,264	31	1,034	1,061	103	27	77	22	—	—	1
Corporate bonds	1,054	41	832	853	103	21	17	68	15	—	—
Other	77	(5)	1	1	100	—	—	—	—	—	100
Total securities	\$ 119,242 <i>(g)</i>	\$ 1,703	\$ 121,918	\$ 122,714 <i>(g)</i>	101%	\$ 796 <i>(g)(h)</i>	95%	2%	2%	1%	—%

(a) Amortized cost reflects historical impairments.

(b) Represents ratings by Standard & Poor’s (“S&P”) or the equivalent.

(c) Primarily consists of exposure to UK, France, Germany, Spain, Italy and the Netherlands.

(d) Primarily consists of exposure to Canada, UK, Australia and Germany.

(e) Primarily consists of exposure to Germany, the Netherlands and Finland.

(f) Includes RMBS that were included in the former Grantor Trust of \$832 million at Dec. 31, 2018 and \$640 million at Dec. 31, 2019.

(g) Includes net unrealized gains on derivatives hedging securities available-for-sale of \$131 million at Dec. 31, 2018 and net unrealized losses of \$641 million at Dec. 31, 2019.

(h) Includes unrealized gains of \$474 million at Dec. 31, 2019 related to available-for-sale securities, net of hedges.

The fair value of our securities portfolio, including related hedges, was \$122.7 billion at Dec. 31, 2019, compared with \$119.2 billion at Dec. 31, 2018. The increase primarily reflects additional investments in agency RMBS, sovereign debt/sovereign guaranteed, an increase in the net unrealized pre-tax gain, and additional investments in foreign government agencies, partially offset by net maturities and sales of U.S. Treasury securities.

At Dec. 31, 2019, the securities portfolio had a net unrealized gain, including the impact of related hedges, of \$796 million, compared with a net unrealized loss of \$907 million at Dec. 31, 2018. The increase in the net unrealized pre-tax gain was primarily driven by lower market interest rates.

The unrealized gain (after-tax) on our available-for-sale securities portfolio, net of hedges, included in accumulated other comprehensive income (“OCI”) was \$361 million at Dec. 31, 2019, compared with an unrealized loss (after-tax) of \$167 million at Dec. 31, 2018. The increase in the unrealized gain, net of tax, was primarily driven by lower market interest rates.

At Dec. 31, 2019, 95% of the securities in our portfolio were rated AAA/AA-, unchanged when compared with Dec. 31, 2018.

See Note 4 of the Notes to Consolidated Financial Statements for the pre-tax net securities losses by security type. See Note 20 of the Notes to Consolidated Financial Statements for details of securities by level in the fair value hierarchy.

Results of Operations (continued)

The following table presents the amortizable purchase premium (net of discount) related to the securities portfolio and accretible discount related to the 2009 restructuring of the securities portfolio.

Net premium amortization and discount accretion of securities <i>(a)</i>			
<i>(dollars in millions)</i>	2019	2018	2017
Amortizable purchase premium (net of discount) relating to securities:			
Balance at period end	\$ 1,319	\$ 1,429	\$ 1,987
Estimated average life remaining at period end <i>(in years)</i>	4.3	5.0	5.0
Amortization	\$ 364	\$ 437	\$ 547
Accretible discount related to the prior restructuring of the securities portfolio:			
Balance at period end	\$ 163	\$ 207	\$ 274
Estimated average life remaining at period end <i>(in years)</i>	6.3	6.3	6.3
Accretion	\$ 54	\$ 86	\$ 100

(a) Amortization of purchase premium decreases net interest revenue while accretion of discount increases net interest revenue. Both were recorded on a level yield basis.

Securities

The following table presents the total securities portfolio at fair value. The fair values do not include the impact of related hedges.

Securities at fair value <i>(in millions)</i>	Dec. 31,		
	2019	2018	2017
Agency RMBS	\$ 54,646	\$ 50,215	\$ 49,746
U.S. Treasury	19,274	24,729	25,005
Sovereign debt/sovereign guaranteed	13,433	11,609	14,180
Agency commercial MBS	10,761	10,860	10,079
Foreign covered bonds	4,276	2,959	2,615
CLOs	4,063	3,364	2,909
Supranational	3,736	3,011	2,107
U.S. government agencies	2,971	3,144	2,549
Foreign government agencies	2,643	1,161	630
Non-agency commercial MBS	2,178	1,464	1,366
Other ABS	2,143	1,773	1,043
Non-agency RMBS <i>(a)</i>	1,316	1,427	1,853
State and political subdivisions	1,061	2,264	2,973
Corporate bonds	853	1,054	1,255
Money market funds	—	—	963
Other	1	77	782
Total securities	\$ 123,355	\$ 119,111	\$ 120,055

(a) Includes other RMBS.

Equity investments

We have several equity investments recorded in other assets. These include equity method investments, including renewable energy, and investments in qualified affordable housing projects, Federal Reserve Bank stock, seed capital, private equity and other investments. The following table presents the carrying values at Dec. 31, 2019 and Dec. 31, 2018.

Equity investments <i>(in millions)</i>	Dec. 31,	
	2019	2018
Renewable energy investments	\$ 1,144	\$ 1,264
Equity in a joint venture and other investments:		
CIBC Mellon	626	548
Siguler Guff	233	244
Other equity investments	243	272
Total equity in a joint venture and other investments	\$ 1,102	\$ 1,064
Qualified affordable housing project investments	1,024	999
Federal Reserve Bank stock	466	484
Seed capital	184	224
Federal Home Loan Bank stock	22	111
Private equity investments <i>(a)</i>	89	74
Total equity investments	\$ 4,031	\$ 4,220

(a) Represents investments in small business investment companies ("SBICs"), which are compliant with the Volcker Rule.

Renewable energy investments

We invest in renewable energy projects to receive an expected after-tax return, which consists of allocated renewable energy tax credits, tax deductions and cash distributions based on the operations of the project. The pre-tax losses on these investments are recorded in investment and other income on the consolidated income statement. The corresponding tax benefits and credits are recorded to the provision for income taxes on the consolidated income statement.

For additional information on the fair value of certain seed capital investments and our private equity investments, see Note 8 of the Notes to Consolidated Financial Statements.

Loans

Total exposure – consolidated <i>(in billions)</i>	Dec. 31, 2019			Dec. 31, 2018		
	Loans	Unfunded commitments	Total exposure	Loans	Unfunded commitments	Total exposure
Non-margin loans:						
Financial institutions	\$ 12.5	\$ 34.4	\$ 46.9	\$ 11.6	\$ 34.0	\$ 45.6
Commercial	1.8	12.6	14.4	2.1	15.2	17.3
Subtotal institutional	14.3	47.0	61.3	13.7	49.2	62.9
Wealth management loans and mortgages	16.2	0.8	17.0	16.0	0.8	16.8
Commercial real estate	5.6	3.6	9.2	4.8	3.5	8.3
Lease financings	1.1	—	1.1	1.3	—	1.3
Other residential mortgages	0.5	—	0.5	0.6	—	0.6
Overdrafts	2.7	—	2.7	5.5	—	5.5
Other	1.2	—	1.2	1.2	—	1.2
Subtotal non-margin loans	41.6	51.4	93.0	43.1	53.5	96.6
Margin loans	13.4	0.1	13.5	13.5	0.1	13.6
Total	\$ 55.0	\$ 51.5	\$ 106.5	\$ 56.6	\$ 53.6	\$ 110.2

At Dec. 31, 2019, total exposures of \$106.5 billion decreased 3% compared with Dec. 31, 2018, primarily reflecting lower exposure in the commercial portfolio and lower overdrafts, partially offset by increased exposure in the financial institutions and commercial real estate portfolios.

Our financial institutions and commercial portfolios comprise our largest concentrated risk. These portfolios comprised 58% of our total exposure at Dec. 31, 2019 and 57% at Dec. 31, 2018. Additionally, most of our overdrafts relate to financial institutions.

Financial institutions

The financial institutions portfolio is shown below.

Financial institutions portfolio exposure <i>(dollars in billions)</i>	Dec. 31, 2019					Dec. 31, 2018		
	Loans	Unfunded commitments	Total exposure	% Inv. grade	% due <1 yr.	Loans	Unfunded commitments	Total exposure
Securities industry	\$ 2.9	\$ 23.4	\$ 26.3	100%	99%	\$ 3.1	\$ 22.5	\$ 25.6
Banks	7.4	1.1	8.5	77	95	6.3	1.6	7.9
Asset managers	1.3	6.4	7.7	98	82	1.3	6.1	7.4
Insurance	—	2.7	2.7	100	13	0.1	2.5	2.6
Government	0.1	0.3	0.4	100	54	0.1	0.5	0.6
Other	0.8	0.5	1.3	85	54	0.7	0.8	1.5
Total	\$ 12.5	\$ 34.4	\$ 46.9	95%	89%	\$ 11.6	\$ 34.0	\$ 45.6

The financial institutions portfolio exposure was \$46.9 billion at Dec. 31, 2019, an increase of 3% from Dec. 31, 2018, primarily reflecting increased exposure in the securities industry and banks portfolios.

Financial institution exposures are high-quality, with 95% of the exposures meeting the investment grade equivalent criteria of our internal credit rating classification at Dec. 31, 2019. Each customer is assigned an internal credit rating, which is mapped to an equivalent external rating agency grade based upon a number of dimensions, which are continually

evaluated and may change over time. For ratings of non-U.S. counterparties, our internal credit rating is generally capped at a rating equivalent to the sovereign rating of the country where the counterparty resides, regardless of the internal credit rating assigned to the counterparty or the underlying collateral.

In addition, 80% of the financial institutions exposure is secured. For example, securities industry clients and asset managers often borrow against marketable securities held in custody.

The exposure to financial institutions is generally short-term with 89% of the exposures expiring within one year. At Dec. 31, 2019, 18% of the exposure to financial institutions expires within 90 days, compared with 20% at Dec. 31, 2018.

At Dec. 31, 2019, the secured intraday credit provided to dealers in connection with their tri-party repo activity totaled \$20.6 billion and was included in the securities industry portfolio. Dealers secure the outstanding intraday credit with high-quality liquid collateral having a market value in excess of the amount of the outstanding credit. Secured intraday credit facilities represent nearly half of the exposure in the financial institutions portfolio and are reviewed and reapproved annually.

Commercial

The commercial portfolio is presented below.

Commercial portfolio exposure <i>(dollars in billions)</i>	Dec. 31, 2019						Dec. 31, 2018		
	Loans	Unfunded commitments	Total exposure	% Inv. grade	% due <1 yr.	Loans	Unfunded commitments	Total exposure	
Manufacturing	\$ 0.9	\$ 4.2	\$ 5.1	95%	10%	\$ 0.8	\$ 5.1	\$ 5.9	
Services and other	0.6	3.7	4.3	97	19	0.7	4.8	5.5	
Energy and utilities	0.3	3.7	4.0	98	5	0.5	4.1	4.6	
Media and telecom	—	1.0	1.0	92	—	0.1	1.2	1.3	
Total	\$ 1.8	\$ 12.6	\$ 14.4	96%	11%	\$ 2.1	\$ 15.2	\$ 17.3	

The commercial portfolio exposure was \$14.4 billion at Dec. 31, 2019, a decrease of 17% from Dec. 31, 2018, reflecting lower exposure in all the portfolios.

Utilities-related exposure represents approximately 75% of the energy and utilities portfolio at Dec. 31, 2019. The exposure in the energy and utilities portfolio, which includes exposure to refining, exploration and production companies and integrated companies, was 98% investment grade at Dec. 31, 2019, and 88% at Dec. 31, 2018. In 2019, we sold our exposure related to a California utility company that had filed for bankruptcy.

Our credit strategy is to focus on investment grade clients that are active users of our non-credit services. The following table summarizes the percentage of the financial institutions and commercial portfolio exposures that are investment grade.

Our bank exposure primarily relates to our global trade finance. These exposures are short-term in nature, with 95% due in less than one year. The investment grade percentage of our bank exposure was 77% at Dec. 31, 2019 and Dec. 31, 2018. Our non-investment grade exposures are primarily in Brazil. These loans are primarily trade finance loans.

The asset manager portfolio exposure was high-quality, with 98% of the exposures meeting our investment grade equivalent ratings criteria as of Dec. 31, 2019. These exposures are generally short-term liquidity facilities, with the majority to regulated mutual funds.

Percentage of the portfolios that are investment grade	Dec. 31,		
	2019	2018	2017
Financial institutions	95%	95%	93%
Commercial	96%	95%	95%

Wealth management loans and mortgages

Our wealth management exposure was \$17.0 billion at Dec. 31, 2019, compared with \$16.8 billion at Dec. 31, 2018. Wealth management loans and mortgages primarily consist of loans to high-net-worth individuals, which are secured by marketable securities and/or residential property. Wealth management mortgages are primarily interest-only, adjustable-rate mortgages with a weighted-average loan-to-value ratio of 62% at origination. Less than 1% of the mortgages were past due at Dec. 31, 2019.

At Dec. 31, 2019, the wealth management mortgage portfolio consisted of the following geographic concentrations: California - 23%; New York - 17%; Massachusetts - 10%; Florida - 8%; and other - 42%.

Commercial real estate

Our commercial real estate exposure totaled \$9.2 billion at Dec. 31, 2019, compared with \$8.3 billion at Dec. 31, 2018. Our income-producing commercial real estate facilities are focused on experienced owners and are structured with moderate leverage based on existing cash flows. Our commercial real estate lending activities also include construction and renovation facilities. Our client base consists of experienced developers and long-term holders of real estate assets. Loans are approved on the basis of existing or projected cash flows and supported by appraisals and knowledge of local market conditions. Development loans are structured with moderate leverage, and in many instances, involve some level of recourse to the developer.

At Dec. 31, 2019, 65% of our commercial real estate portfolio was secured. The secured portfolio is diverse by project type, with 44% secured by residential buildings, 40% secured by office buildings, 8% secured by retail properties and 8% secured by other categories. Approximately 95% of the unsecured portfolio consists of real estate investment trusts (“REITs”) and real estate operating companies, which are both predominantly investment grade.

At Dec. 31, 2019, our commercial real estate portfolio consisted of the following concentrations: New York metro - 45%; REITs and real estate operating companies - 33%; and other - 22%.

Lease financings

The lease financings portfolio exposure totaled \$1.1 billion at Dec. 31, 2019 and \$1.3 billion at Dec. 31, 2018. At Dec. 31, 2019, approximately 98% of leasing exposure was investment grade, or investment grade equivalent.

At Dec. 31, 2019, the lease financings portfolio consisted of exposures backed by well-diversified assets, primarily large-ticket transportation equipment. The largest component is rail, consisting of both passenger and freight train cars. Assets are

both domestic and foreign-based, with primary concentrations in the United States and Germany. Approximately 57% of the portfolio is additionally secured by highly rated securities and/or secured by letters of credit from investment grade issuers. Counterparty rating equivalents at Dec. 31, 2019 were as follows:

- 60% of the counterparties were A or better;
- 38% were BBB; and
- 2% were non-investment grade.

Other residential mortgages

The other residential mortgages portfolio primarily consists of 1-4 family residential mortgage loans and totaled \$494 million at Dec. 31, 2019 and \$594 million at Dec. 31, 2018. Included in this portfolio at Dec. 31, 2019 were \$91 million of mortgage loans purchased in 2005, 2006 and the first quarter of 2007, of which 10% of the serviced loan balance was at least 60 days delinquent.

Overdrafts

Overdrafts primarily relate to custody and securities clearance clients and are generally repaid within two business days.

Other loans

Other loans primarily include loans to consumers that are fully collateralized with equities, mutual funds and fixed-income securities.

Margin loans

Margin loan exposure of \$13.5 billion at Dec. 31, 2019 and \$13.6 billion at Dec. 31, 2018 was collateralized with marketable securities. Borrowers are required to maintain a daily collateral margin in excess of 100% of the value of the loan. Margin loans included \$3.6 billion at Dec. 31, 2019 and \$2.6 billion at Dec. 31, 2018 related to a term loan program that offers fully collateralized loans to broker-dealers.

Loans by category

The following table shows loans outstanding at year-end over the last five years.

Loans by category <i>(in millions)</i>	Dec. 31,				
	2019	2018	2017	2016	2015
Domestic:					
Commercial	\$ 1,442	\$ 1,949	\$ 2,744	\$ 2,286	\$ 2,115
Commercial real estate	5,575	4,787	4,900	4,639	3,899
Financial institutions	4,852	5,091	5,568	6,342	6,640
Lease financings	537	706	772	989	1,007
Wealth management loans and mortgages	16,050	15,843	16,420	15,555	13,247
Other residential mortgages	494	594	708	854	1,055
Overdrafts	524	1,550	963	1,055	911
Other	1,167	1,181	1,131	1,202	1,137
Margin loans	11,907	13,343	15,689	17,503	19,340
Total domestic	42,548	45,044	48,895	50,425	49,351
Foreign:					
Commercial	347	183	167	331	227
Commercial real estate	7	—	—	15	46
Financial institutions	7,626	6,492	7,483	8,347	9,259
Lease financings	576	551	527	736	850
Wealth management loans and mortgages	140	122	108	99	100
Other (primarily overdrafts)	2,230	4,031	4,264	4,418	3,637
Margin loans	1,479	141	96	87	233
Total foreign	12,405	11,520	12,645	14,033	14,352
Total loans (a)	\$ 54,953	\$ 56,564	\$ 61,540	\$ 64,458	\$ 63,703

(a) Net of unearned income of \$313 million at Dec. 31, 2019, \$358 million at Dec. 31, 2018, \$394 million at Dec. 31, 2017, \$527 million at Dec. 31, 2016 and \$674 million at Dec. 31, 2015, primarily on domestic and foreign lease financings.

Foreign loans

We have credit relationships in foreign markets, particularly in areas associated with our securities servicing and trade finance activities. Excluding lease financings, these activities resulted in outstanding foreign loans of \$11.8 billion at Dec. 31, 2019 and \$11.0 billion at Dec. 31, 2018. The increase primarily resulted from higher margin and financial institutions loans.

Maturity of loan portfolio

The following table shows the maturity structure of our loan portfolio at Dec. 31, 2019.

Maturity of loan portfolio at Dec. 31, 2019 (a)				
<i>(in millions)</i>	Within 1 year	Between 1 and 5 years	After 5 years	Total
Domestic:				
Commercial	\$ 329	\$ 1,113	\$ —	\$ 1,442
Commercial real estate	701	2,937	1,937	5,575
Financial institutions	4,042	810	—	4,852
Overdrafts	524	—	—	524
Other	1,167	—	—	1,167
Margin loans	11,888	19	—	11,907
Subtotal	18,651	4,879	1,937	25,467
Foreign	10,933	756	—	11,689
Total	\$ 29,584	\$ 5,635	(b) \$ 1,937	(b) \$37,156

(a) Excludes loans collateralized by residential properties, lease financings and wealth management loans and mortgages.

(b) Variable rate loans due after one year totaled \$7.1 billion and fixed rate loans totaled \$279 million.

Asset quality and allowance for credit losses

Our credit strategy is to focus on investment grade clients who are active users of our non-credit services. Our primary exposure to the credit risk of a

customer consists of funded loans, unfunded contractual commitments to lend, standby letters of credit (“SBLC”) and overdrafts associated with our custody and securities clearance businesses.

The following table details changes in our allowance for credit losses.

Allowance for credit losses activity <i>(dollars in millions)</i>	2019	2018	2017	2016	2015
Non-margin loans	\$ 41,567	\$ 43,080	\$ 45,755	\$ 46,868	\$ 43,708
Margin loans	13,386	13,484	15,785	17,590	19,573
Total loans	\$ 54,953	\$ 56,564	\$ 61,540	\$ 64,458	\$ 63,281
Average loans outstanding	51,323	55,810	57,939	61,681	60,672
Balance, Jan. 1					
Domestic	\$ 220	\$ 226	\$ 245	\$ 240	\$ 236
Foreign	32	35	36	35	44
Total allowance at Jan. 1	252	261	281	275	280
Charge-offs:					
Commercial	(12)	—	—	—	—
Financial institutions	—	—	—	—	(170)
Wealth management loans and mortgages	(1)	—	—	—	—
Other residential mortgages	(1)	(1)	(1)	(2)	(2)
Total charge-offs	(14)	(1)	(1)	(2)	(172)
Recoveries:					
Financial institutions	—	—	—	13	1
Other residential mortgages	3	2	5	5	6
Foreign	—	1	—	1	—
Total recoveries	3	3	5	19	7
Net (charge-offs) recoveries	(11)	2	4	17	(165)
Provision for credit losses	(25)	(11)	(24)	(11)	160
Balance, Dec. 31,					
Domestic	192	220	226	245	240
Foreign	24	32	35	36	35
Total allowance, Dec. 31,	\$ 216	\$ 252	\$ 261	\$ 281	\$ 275
Allowance for loan losses	\$ 122	\$ 146	\$ 159	\$ 169	\$ 157
Allowance for lending-related commitments	94	106	102	112	118
Net charge-offs (recoveries) to average loans outstanding	0.02%	—%	(0.01)%	(0.03)%	0.27%
Net charge-offs (recoveries) to total allowance for credit losses	5.09	(0.79)	(1.53)	(6.05)	60.00
Allowance for loan losses as a percentage of total loans	0.22	0.26	0.26	0.26	0.25
Allowance for loan losses as a percentage of non-margin loans	0.29	0.34	0.35	0.36	0.36
Total allowance for credit losses as a percentage of total loans	0.39	0.45	0.42	0.44	0.43
Total allowance for credit losses as a percentage of non-margin loans	0.52	0.58	0.57	0.60	0.63

The allowance for credit losses decreased \$36 million compared with Dec. 31, 2018, primarily reflecting lower credit exposure, an improved credit environment and the sale of the remaining exposure related to a California utility company that had filed for bankruptcy.

We had \$13.4 billion of secured margin loans on our balance sheet at Dec. 31, 2019, compared with \$13.5 billion at Dec. 31, 2018 and \$15.8 billion at Dec. 31, 2017. We have rarely suffered a loss on these types of loans and do not allocate any of our allowance for credit losses to them. As a result, we believe that the ratio of total allowance for credit losses as a percentage of non-margin loans is a more appropriate metric to measure the adequacy of the reserve.

Results of Operations (continued)

The allowance for loan losses and allowance for lending-related commitments represent management's estimate of losses inherent in our credit portfolio. This evaluation process is subject to numerous estimates and judgments. To the extent actual results differ from forecasts or management's judgment, the allowance for credit losses may be greater or less than future charge-offs.

Based on an evaluation of the allowance for credit losses as discussed in "Critical accounting estimates" and Note 1 of the Notes to Consolidated Financial Statements, we have allocated our allowance for credit losses as presented below.

Allocation of allowance	Dec. 31,				
	2019	2018	2017	2016	2015
Commercial real estate	35%	30%	29%	26%	22%
Commercial	28	32	30	29	30
Foreign	11	13	13	13	13
Financial institutions	9	9	9	9	11
Wealth management (a)	9	8	8	8	7
Other residential mortgages	6	6	8	10	12
Lease financings	2	2	3	5	5
Total	100%	100%	100%	100%	100%

(a) Includes the allowance for wealth management mortgages.

The allocation of the allowance for credit losses is inherently judgmental, and the entire allowance for credit losses is available to absorb credit losses regardless of the nature of the losses.

Nonperforming assets

The table below presents our nonperforming assets.

Nonperforming assets (dollars in millions)	Dec. 31,				
	2019	2018	2017	2016	2015
Nonperforming loans:					
Other residential mortgages	\$ 62	\$ 67	\$ 78	\$ 91	\$ 102
Wealth management loans and mortgages	24	9	7	8	11
Commercial real estate	—	—	1	—	2
Lease financings	—	—	—	4	—
Financial institutions	—	—	—	—	171
Total nonperforming loans	86	76	86	103	286
Other assets owned	3	3	4	4	6
Total nonperforming assets	\$ 89	\$ 79	\$ 90	\$ 107	\$ 292
Nonperforming assets ratio	0.16%	0.14%	0.15%	0.17%	0.46%
Nonperforming assets ratio, excluding margin loans	0.21	0.18	0.20	0.23	0.67
Allowance for loan losses/nonperforming loans	141.9	192.1	184.9	164.1	54.9
Allowance for loan losses/nonperforming assets	137.1	184.8	176.7	157.9	53.8
Total allowance for credit losses/nonperforming loans	251.2	331.6	303.5	272.8	96.2
Total allowance for credit losses/nonperforming assets	242.7	319.0	290.0	262.6	94.2

Nonperforming assets increased \$10 million compared with Dec. 31, 2018, primarily reflecting the 2019 refinement of the application of our nonperforming assets policy for first lien residential mortgage loans greater than 90 days delinquent.

The following table presents loans that are past due 90 days or more and still accruing interest.

Past due loans ≥ 90 days still accruing interest at year-end (in millions)	2019	2018	2017	2016	2015
Domestic:					
Consumer	\$ —	\$ 12	\$ 5	\$ 7	\$ 5
Commercial	—	—	—	—	—
Total domestic	—	12	5	7	5
Foreign	—	—	—	—	—
Total past due loans	\$ —	\$ 12	\$ 5	\$ 7	\$ 5

See Note 5 of the Notes to Consolidated Financial Statements for additional information on our past due loans. See “Nonperforming assets” in Note 1 of the Notes to Consolidated Financial Statements for our policy for placing loans on nonaccrual status.

Deposits

We receive client deposits through a variety of Investment Services and Investment Management businesses and we rely on those deposits as a low-cost and stable source of funding.

Total deposits were \$259.5 billion at Dec. 31, 2019, an increase of 9%, compared with \$238.8 billion at Dec. 31, 2018. The increase reflects higher interest-bearing deposits in both U.S. and non-U.S. offices, partially offset by lower noninterest-bearing deposits principally in U.S. offices.

Noninterest-bearing deposits were \$57.6 billion at Dec. 31, 2019 compared with \$70.8 billion at Dec. 31, 2018. Interest-bearing deposits were \$201.9 billion at Dec. 31, 2019 compared with \$168.0 billion at Dec. 31, 2018.

The aggregate amount of deposits by foreign customers in domestic offices was \$47.5 billion and \$36.4 billion at Dec. 31, 2019 and Dec. 31, 2018, respectively.

Deposits in foreign offices totaled \$105.1 billion at Dec. 31, 2019 and \$99.2 billion at Dec. 31, 2018. The majority of these deposits were in amounts in excess of \$100,000 and were primarily overnight foreign deposits.

The following table shows the maturity breakdown of domestic time deposits of \$100,000 or more at Dec. 31, 2019.

Domestic time deposits \geq \$100,000 at Dec. 31, 2019			
<i>(in millions)</i>	Certificates of deposit	Other time deposits	Total
3 months or less	\$ 358	\$ 43,970	\$ 44,328
Between 3 and 6 months	217	—	217
Between 6 and 12 months	45	—	45
Over 12 months	2	—	2
Total	\$ 622	\$ 43,970	\$ 44,592

Short-term borrowings

We fund ourselves primarily through deposits and, to a lesser extent, other short-term borrowings and long-term debt. Short-term borrowings consist of federal funds purchased and securities sold under repurchase agreements, payables to customers and broker-dealers, commercial paper and other borrowed funds. Certain short-term borrowings, for example, securities sold under repurchase agreements, require the delivery of securities as collateral.

Information related to federal funds purchased and securities sold under repurchase agreements is presented below.

Federal funds purchased and securities sold under repurchase agreements			
<i>(dollars in millions)</i>	2019	2018	2017
Maximum month-end balance during the year	\$ 16,967	\$ 21,600	\$ 21,850
Average daily balance (a)	\$ 12,463	\$ 15,546	\$ 19,653
Weighted-average rate during the year (a)	11.53%	4.88%	1.14%
Ending balance (b)	\$ 11,401	\$ 14,243	\$ 15,163
Weighted-average rate at Dec. 31 (b)	9.47%	12.99%	2.33%

- (a) Includes the average impact of offsetting under enforceable netting agreements of \$55,595 million in 2019, \$25,203 million in 2018 and \$5,657 million in 2017. On a Non-GAAP basis, excluding the impact of offsetting, the weighted-average rates would have been 2.11% for 2019, 1.86% for 2018 and 0.89% for 2017. We believe providing the rates excluding the impact of netting is useful to investors as it is more reflective of the actual rates paid.
- (b) Includes the impact of offsetting under enforceable netting agreements of \$93,794 million at Dec. 31, 2019, \$76,040 million at Dec. 31, 2018 and \$25,848 million at Dec. 31, 2017.

Fluctuations of federal funds purchased and securities sold under repurchase agreements reflect changes in overnight borrowing opportunities. The fluctuations in the weighted-average rates compared with Dec. 31, 2018 and Dec. 31, 2017 primarily reflect repurchase agreement activity with the Fixed Income Clearing Corporation (“FICC”), where we record interest expense gross, but the ending and average balances reflect the impact of offsetting under enforceable netting agreements. This activity primarily relates to government securities collateralized resale and repurchase agreements executed with clients that are novated to and settle with the FICC.

Information related to payables to customers and broker-dealers is presented below.

Payables to customers and broker-dealers			
<i>(dollars in millions)</i>	2019	2018	2017
Maximum month-end balance during the year	\$ 20,343	\$ 20,905	\$ 21,621
Average daily balance (a)	\$ 18,778	\$ 19,450	\$ 21,142
Weighted-average rate during the year (a)	1.53%	1.17%	0.34%
Ending balance at Dec. 31	\$ 18,758	\$ 19,731	\$ 20,184
Weighted-average rate at Dec. 31	1.01%	1.62%	0.56%

(a) The weighted-average rate is calculated based on, and is applied to, the average interest-bearing payables to customers and broker-dealers, which were \$15,595 million in 2019, \$16,353 million in 2018 and \$18,984 million in 2017.

Payables to customers and broker-dealers represent funds awaiting re-investment and short sale proceeds payable on demand. Payables to customers and broker-dealers are driven by customer trading activity and market volatility.

Information related to commercial paper is presented below.

Commercial paper			
<i>(dollars in millions)</i>	2019	2018	2017
Maximum month-end balance during the year	\$ 8,894	\$ 4,470	\$ 4,714
Average daily balance	\$ 2,485	\$ 2,607	\$ 2,630
Weighted-average rate during the year	2.22%	1.97%	1.08%
Ending balance at Dec. 31	\$ 3,959	\$ 1,939	\$ 3,075
Weighted-average rate at Dec. 31	1.60%	2.34%	1.27%

The Bank of New York Mellon issues commercial paper that matures within 397 days from date of issue and is not redeemable prior to maturity or subject to voluntary prepayment. The fluctuations in the commercial paper balances primarily reflect funding of investments in short-term assets.

Information related to other borrowed funds is presented below.

Other borrowed funds			
<i>(dollars in millions)</i>	2019	2018	2017
Maximum month-end balance during the year	\$ 3,969	\$ 3,269	\$ 3,955
Average daily balance	\$ 1,895	\$ 2,545	\$ 1,916
Weighted-average rate during the year	3.11%	2.26%	1.36%
Ending balance at Dec. 31	\$ 599	\$ 3,227	\$ 3,028
Weighted-average rate at Dec. 31	2.65%	2.64%	1.48%

Other borrowed funds primarily include borrowings from the Federal Home Loan Bank, overdrafts of sub-custodian account balances in our Investment Services businesses, finance lease liabilities and borrowings under lines of credit by our Pershing subsidiaries. Overdrafts typically relate to timing differences for settlements. The decrease in other borrowed funds, compared with prior periods, primarily reflects a decrease in borrowings from the Federal Home Loan Bank and overdrafts of sub-custodian account balances in our Investment Services businesses.

Liquidity and dividends

BNY Mellon defines liquidity as the ability of the Parent and its subsidiaries to access funding or convert assets to cash quickly and efficiently, or to roll over or issue new debt, especially during periods of market stress, at a reasonable cost, and in order to meet its short-term (up to one year) obligations. Funding liquidity risk is the risk that BNY Mellon cannot meet its cash and collateral obligations at a reasonable cost for both expected and unexpected cash flow and collateral needs without adversely affecting daily operations or our financial condition. Funding liquidity risk can arise from funding mismatches, market constraints from the inability to convert assets into cash, the inability to hold or raise cash, low overnight deposits, deposit run-off or contingent liquidity events.

Changes in economic conditions or exposure to credit, market, operational, legal and reputational risks also can affect BNY Mellon's liquidity risk profile and are considered in our liquidity risk framework.

The Parent’s policy is to have access to sufficient unencumbered cash and cash equivalents at each quarter-end to cover maturities and other forecasted debt redemptions, net interest payments and net tax payments for the following 18-month period, and to provide sufficient collateral to satisfy transactions subject to Section 23A of the Federal Reserve Act. As of Dec. 31, 2019, the Parent was in compliance with this policy.

For additional information on our liquidity policy, see “Risk Management - Liquidity Risk.”

We monitor and control liquidity exposures and funding needs within and across significant legal entities, branches, currencies and business lines, taking into account, among other factors, any applicable restrictions on the transfer of liquidity among entities.

BNY Mellon also manages potential intraday liquidity risks. We monitor and manage intraday liquidity against existing and expected intraday liquid resources (such as cash balances, remaining intraday credit capacity, intraday contingency funding and available collateral) to enable BNY Mellon to meet its intraday obligations under normal and reasonably severe stressed conditions.

We define available funds for internal liquidity management purposes as cash and due from banks, interest-bearing deposits with the Federal Reserve and other central banks, interest-bearing deposits with banks and federal funds sold and securities purchased under resale agreements. The following table presents our total available funds at period end and on an average basis.

Available funds (dollars in millions)	Dec. 31,	Dec. 31,	Average		
	2019	2018	2019	2018	2017
Cash and due from banks	\$ 4,830	\$ 5,864	\$ 5,084	\$ 5,014	\$ 5,039
Interest-bearing deposits with the Federal Reserve and other central banks	95,042	67,988	61,739	68,408	70,213
Interest-bearing deposits with banks	14,811	14,148	14,666	14,740	14,879
Federal funds sold and securities purchased under resale agreements	30,182	46,795	36,705	27,883	27,192
Total available funds	\$ 144,865	\$ 134,795	\$ 118,194	\$ 116,045	\$ 117,323
Total available funds as a percentage of total assets	38%	37%	34%	34%	34%

Total available funds were \$144.9 billion at Dec. 31, 2019, compared with \$134.8 billion at Dec. 31, 2018. The increase was primarily due to higher interest-bearing deposits with the Federal Reserve and other central banks, partially offset by lower federal funds sold and securities purchased under resale agreements.

Average non-core sources of funds, such as federal funds purchased and securities sold under repurchase agreements, trading liabilities, commercial paper and other borrowed funds, were \$18.3 billion for 2019 and \$22.0 billion for 2018. The decrease primarily reflects a decrease in federal funds purchased and securities sold under repurchase agreements.

Average foreign deposits, primarily from our European-based Investment Services businesses, were \$93.2 billion for 2019, compared with \$95.5 billion for 2018. The decrease primarily reflects reduced client activity. Average interest-bearing domestic deposits were \$78.7 billion for 2019 and \$59.2 billion for 2018. The increase primarily reflects an increase in demand and time deposits.

Average payables to customers and broker-dealers were \$15.6 billion for 2019 and \$16.4 billion for 2018. Payables to customers and broker-dealers are driven by customer trading activity and market volatility.

Average long-term debt was \$28.1 billion for 2019 and \$28.3 billion for 2018. The slight decrease primarily reflects maturities and a redemption of long-term debt, offset by issuances.

Average noninterest-bearing deposits decreased to \$51.5 billion for 2019 from \$63.8 billion for 2018, primarily reflecting client activity.

A significant reduction in our Investment Services business would reduce our access to deposits. See “Asset/liability management” for additional factors that could impact our deposit balances.

Sources of liquidity

The Parent’s three major sources of liquidity are access to the debt and equity markets, dividends from

Results of Operations (continued)

its subsidiaries, and cash on hand and cash otherwise made available in business-as-usual circumstances to

the Parent through a committed credit facility with our intermediate holding company (“IHC”).

Our ability to access the capital markets on favorable terms, or at all, is partially dependent on our credit ratings, which are as follows:

Credit ratings at Dec. 31, 2019	Moody's	S&P	Fitch	DBRS
Parent:				
Long-term senior debt	A1	A	AA-	AA
Subordinated debt	A2	A-	A+	AA (low)
Preferred stock	Baa1	BBB	BBB	A
Outlook - Parent	Stable	Stable	Stable	Stable
The Bank of New York Mellon:				
Long-term senior debt	Aa2	AA-	AA	AA (high)
Subordinated debt	NR	A	NR	NR
Long-term deposits	Aa1	AA-	AA+	AA (high)
Short-term deposits	P1	A-1+	F1+	R-1 (high)
Commercial paper	P1	A-1+	F1+	R-1 (high)
BNY Mellon, N.A.:				
Long-term senior debt	Aa2 (a)	AA-	AA (a)	AA (high)
Long-term deposits	Aa1	AA-	AA+	AA (high)
Short-term deposits	P1	A-1+	F1+	R-1 (high)
Outlook - Banks	Stable	Stable	Stable	Stable

(a) Represents senior debt issuer default rating.

NR - Not rated.

Long-term debt totaled \$27.5 billion at Dec. 31, 2019 and \$29.2 billion at Dec. 31, 2018. The decrease reflects maturities and a redemption totaling \$5.3 billion, partially offset by issuances of \$3.0 billion and an increase in the fair value of hedged long-term debt. The Parent has \$4.0 billion of long-term debt that will mature in 2020.

The following table presents the long-term debt issued in 2019.

Debt issuances (in millions)	2019
Senior notes:	
3-month LIBOR + 28bps senior notes due in 2021	\$ 1,250
1.95% senior notes due 2022	1,000
2.10% senior notes due 2024	750
Total debt issuances	\$ 3,000

In January 2020, the Parent issued \$750 million of fixed rate senior notes maturing in 2023 at an annual rate of 1.85% and \$250 million of fixed rate senior notes maturing in 2024 at an annual rate of 2.1%.

In February 2020, the Parent redeemed \$1.25 billion of the outstanding 2.150% senior notes due 2020 at par plus accrued and unpaid interest.

The Bank of New York Mellon may issue notes and certificates of deposit (“CDs”). At Dec. 31, 2019 and Dec. 31, 2018, \$1.1 billion and \$2.8 billion, respectively, of CDs were outstanding. At Dec. 31, 2019 and Dec. 31, 2018, \$1.3 billion and \$1.0 billion, respectively, of notes were outstanding.

The Bank of New York Mellon also issues commercial paper that matures within 397 days from date of issue and is not redeemable prior to maturity or subject to voluntary prepayment. The average commercial paper outstanding was \$2.5 billion for 2019 and \$2.6 billion for 2018. Commercial paper outstanding was \$4.0 billion at Dec. 31, 2019 and \$1.9 billion at Dec. 31, 2018.

Subsequent to Dec. 31, 2019, our U.S. bank subsidiaries could declare dividends to the Parent of approximately \$1.1 billion, without the need for a regulatory waiver. In addition, at Dec. 31, 2019, non-bank subsidiaries of the Parent had liquid assets of approximately \$1.8 billion. Restrictions on our

ability to obtain funds from our subsidiaries are discussed in more detail in “Supervision and Regulation - Capital Planning and Stress Testing - Payment of Dividends, Stock Repurchases and Other Capital Distributions” and in Note 19 of the Notes to Consolidated Financial Statements.

Pershing LLC has uncommitted lines of credit in place for liquidity purposes which are guaranteed by the Parent. Pershing LLC has three separate uncommitted lines of credit amounting to \$750 million in aggregate. There were no borrowings under these lines in 2019. Pershing Limited, an indirect UK-based subsidiary of BNY Mellon, has three separate uncommitted lines of credit amounting to \$350 million in aggregate. Average borrowings under these lines were \$2 million, in aggregate, in 2019.

BNY Mellon Capital Markets, LLC also has an uncommitted line of credit in place for \$100 million for liquidity purposes. There were no borrowings under this line in 2019.

The double leverage ratio is the ratio of our equity investment in subsidiaries divided by our consolidated Parent company equity, which includes our noncumulative perpetual preferred stock. In short, the double leverage ratio measures the extent to which equity in subsidiaries is financed by Parent company debt. As the double leverage ratio increases, this can reflect greater demands on a company’s cash flows in order to service interest payments and debt maturities. BNY Mellon’s double leverage ratio is managed in a range considering the high level of unencumbered available liquid assets held in its principal subsidiaries (such as central bank deposit placements and government securities), the Company’s cash generating fee-based business model, with fee revenue representing 80% of total revenue in 2019, and the dividend capacity of our banking subsidiaries. Our double leverage ratio was 116.9% at Dec. 31, 2019 and 117.7% at Dec. 31, 2018, and within the range targeted by management.

Uses of funds

The Parent’s major uses of funds are repurchases of common stock, payment of dividends, principal and interest payments on its borrowings, acquisitions and additional investments in its subsidiaries.

In 2019, we paid \$1.3 billion in dividends on our common and preferred stock. Our common stock dividend payout ratio was 26% for 2019.

In 2019, we repurchased 69.3 million common shares at an average price of \$48.01 per common share for a total cost of \$3.3 billion.

Liquidity coverage ratio (“LCR”)

U.S. regulators have established an LCR that requires certain banking organizations, including BNY Mellon, to maintain a minimum amount of unencumbered high-quality liquid assets (“HQLA”) sufficient to withstand the net cash outflow under a hypothetical standardized acute liquidity stress scenario for a 30-day time horizon.

The following table presents BNY Mellon’s consolidated HQLA at Dec. 31, 2019, and the average HQLA and average LCR for the fourth quarter of 2019.

Consolidated HQLA and LCR <i>(dollars in billions)</i>	Dec. 31, 2019
Securities (a)	\$ 106
Cash (b)	87
Total consolidated HQLA (c)	\$ 193
Total consolidated HQLA – average (c)	\$ 168
Average LCR	120%

(a) *Primarily includes securities of U.S. government-sponsored enterprises, sovereign securities, U.S. Treasury, U.S. agency and investment-grade corporate debt.*

(b) *Primarily includes cash on deposit with central banks.*

(c) *Consolidated HQLA presented before adjustments. After haircuts and the impact of trapped liquidity, consolidated HQLA totaled \$149 billion at Dec. 31, 2019 and averaged \$125 billion for the fourth quarter of 2019.*

BNY Mellon and each of our affected domestic bank subsidiaries were compliant with the U.S. LCR requirements of at least 100% throughout 2019.

Statement of cash flows

The following summarizes the activity reflected on the consolidated statement of cash flows. While this information may be helpful to highlight certain macro trends and business strategies, the cash flow analysis may not be as relevant when analyzing changes in our net earnings and net assets. We believe that in addition to the traditional cash flow analysis, the discussion related to liquidity and dividends and

asset/liability management herein may provide more useful context in evaluating our liquidity position and related activity.

Net cash provided by operating activities was \$96 million in 2019, compared with \$6.0 billion in 2018. In 2019 and 2018, cash flows provided by operations were principally the result of earnings, partially offset by changes in trading assets and liabilities. In 2018, cash flows provided by operations were also the result of changes in accruals and other balances.

Net cash used for investing activities was \$10.5 billion in 2019, compared with net cash provided by investing activities of \$3.3 billion in 2018. In 2019 and 2018, net cash used for and provided by investing activities, respectively, primarily reflects changes in interest-bearing deposits with the Federal Reserve and other central banks and changes in federal funds sold and securities purchased under resale agreements.

Net cash provided by financing activities was \$9.5 billion in 2019, compared with net cash used for financing activities of \$8.1 billion in 2018. In 2019, net cash provided by financing activities primarily

reflects changes in deposits, partially offset by repayments of long-term debt, common stock repurchases and changes in federal funds purchased and securities sold under repurchase agreements. In 2018, net cash used for financing activities primarily reflects repayments of long-term debt, common stock repurchases and changes in deposits, partially offset by proceeds from the issuance of long-term debt.

Commitments and obligations

We have contractual obligations to make fixed and determinable payments to third parties as indicated in the table below. The table excludes certain obligations such as trade payables and trading liabilities, where the obligation is short-term or subject to valuation based on market factors. In addition to the amounts shown in the table below, at Dec. 31, 2019, \$173 million of unrecognized tax benefits have been recorded as liabilities in accordance with ASC 740, *Income Taxes*. Related to these unrecognized tax benefits, we have also recorded a liability for potential interest of \$31 million. At this point, it is not possible to determine when these amounts will be settled or resolved.

Contractual obligations at Dec. 31, 2019	Total	Payments due by period			
		Less than 1 year	1-3 years	3-5 years	Over 5 years
<i>(in millions)</i>					
Deposits without a stated maturity	\$ 154,130	\$ 154,130	\$ —	\$ —	\$ —
Term deposits	48,281	48,278	2	—	1
Federal funds purchased and securities sold under repurchase agreements	11,401	11,401	—	—	—
Payables to customers and broker-dealers	18,758	18,758	—	—	—
Other borrowed funds (a)	599	599	—	—	—
Operating leases	2,066	284	423	302	1,057
Long-term debt (b)	30,667	4,702	9,268	8,721	7,976
Unfunded pension and post-retirement benefits	244	28	55	50	111
Investment commitments (c)	422	152	243	7	20
Total contractual obligations	\$ 266,568	\$ 238,332	\$ 9,991	\$ 9,080	\$ 9,165

(a) Includes finance leases.

(b) Includes interest.

(c) Includes Community Reinvestment Act commitments.

We have entered into fixed and determinable commitments as indicated in the table below:

<i>(in millions)</i>	Total	Amount of commitment expiration per period			
		Less than 1 year	1-3 years	3-5 years	Over 5 years
Securities lending indemnifications <i>(a)</i>	\$ 408,378	\$ 408,378	\$ —	\$ —	\$ —
Lending commitments	49,119	31,042	7,017	10,772	288
Standby letters of credit	2,298	1,572	628	95	3
Purchase obligations <i>(b)</i>	1,862	971	666	210	15
Commercial letters of credit	74	74	—	—	—
Private equity commitments <i>(c)</i>	55	23	4	28	—
Total commitments	\$ 461,786	\$ 442,060	\$ 8,315	\$ 11,105	\$ 306

(a) Excludes the indemnification for securities for which BNY Mellon acts as an agent on behalf of CIBC Mellon clients, which totaled \$57 billion at Dec. 31, 2019.

(b) Purchase obligations are defined as agreements to purchase goods or services that are enforceable and legally binding and specify all significant terms.

(c) Relates to SBIC investments, which are compliant with the Volcker Rule.

See “Liquidity and dividends” and Note 22 of the Notes to Consolidated Financial Statements for a further discussion of the source of funds for our commitments and obligations.

Off-balance sheet arrangements

Off-balance sheet arrangements discussed in this section are limited to certain guarantees, retained or

contingent interests and obligations arising out of unconsolidated variable interest entities (“VIEs”). Guarantees include SBLCs issued as part of our corporate banking business and securities lending indemnifications issued as part of our Investment Services business. See Note 22 of the Notes to Consolidated Financial Statements for a further discussion of our off-balance sheet arrangements.

Capital

Capital data <i>(dollars in millions, except per share amounts; common shares in thousands)</i>	2019	2018
At period end:		
BNY Mellon shareholders’ equity to total assets ratio	10.9%	11.2%
BNY Mellon common shareholders’ equity to total assets ratio	9.9%	10.2%
Total BNY Mellon shareholders’ equity	\$ 41,483	\$ 40,638
Total BNY Mellon common shareholders’ equity <i>(a)</i>	\$ 37,941	\$ 37,096
BNY Mellon tangible common shareholders’ equity – Non-GAAP <i>(a)</i>	\$ 19,216	\$ 18,290
Book value per common share <i>(a)</i>	\$ 42.12	\$ 38.63
Tangible book value per common share – Non-GAAP <i>(a)</i>	\$ 21.33	\$ 19.04
Closing stock price per common share	\$ 50.33	\$ 47.07
Market capitalization	\$ 45,331	\$ 45,207
Common shares outstanding	900,683	960,426
Full-year:		
Average common equity to average assets	10.8%	11.0%
Cash dividends per common share	\$ 1.18	\$ 1.04
Common dividend payout ratio	26%	26%
Common dividend yield	2.3%	2.2%

(a) See “Supplemental information – Explanation of GAAP and Non-GAAP financial measures” beginning on page 101 for a reconciliation of GAAP to Non-GAAP.

The Bank of New York Mellon Corporation total shareholders’ equity increased to \$41.5 billion at Dec. 31, 2019 from \$40.6 billion at Dec. 31, 2018. The increase primarily reflects earnings, unrealized gains

on securities available-for-sale and the impact of stock awards and option exercises, partially offset by common stock repurchases and dividend payments.

We repurchased 69.3 million common shares at an average price of \$48.01 per common share for a total of \$3.3 billion in 2019. We expect to continue to repurchase shares in the first half of 2020 under the 2019 capital plan.

The unrealized gain (after-tax) on our available-for-sale securities portfolio, net of hedges, included in accumulated OCI was \$361 million at Dec. 31, 2019, compared with an unrealized loss (after-tax) of \$167 million at Dec. 31, 2018. The increase in the unrealized gain, net of tax, was primarily driven by lower market interest rates.

Capital adequacy

Regulators establish certain levels of capital for bank holding companies (“BHCs”) and banks, including BNY Mellon and our bank subsidiaries, in accordance with established quantitative measurements. For the Parent to maintain its status as a financial holding company (“FHC”), our U.S. bank subsidiaries and BNY Mellon must, among other things, qualify as “well capitalized.” As of Dec. 31, 2019 and Dec. 31,

2018, BNY Mellon and our U.S. bank subsidiaries were “well capitalized.”

Failure to satisfy regulatory standards, including “well capitalized” status or capital adequacy rules more generally, could result in limitations on our activities and adversely affect our financial condition. See the discussion of these matters in “Supervision and Regulation - Regulated Entities of BNY Mellon and Ancillary Regulatory Requirements” and “Risk Factors - Operational Risk - Failure to satisfy regulatory standards, including “well capitalized” and “well managed” status or capital adequacy and liquidity rules more generally, could result in limitations on our activities and adversely affect our business and financial condition.”

The U.S. banking agencies’ capital rules are based on the framework adopted by the Basel Committee on Banking Supervision (“BCBS”), as amended from time to time. For additional information on these capital requirements, see “Supervision and Regulation.”

The table below presents our consolidated and largest bank subsidiary regulatory capital ratios.

Consolidated and largest bank subsidiary regulatory capital ratios	Dec. 31, 2019			Dec. 31, 2018
	Well capitalized	Minimum required (a)	Capital ratios	Capital ratios
Consolidated regulatory capital ratios: (b)				
Advanced Approaches:				
CET1 ratio	N/A (c)	8.5%	11.5%	10.7%
Tier 1 capital ratio	6%	10	13.7	12.8
Total capital ratio	10%	12	14.4	13.6
Standardized Approach:				
CET1 ratio	N/A (c)	8.5%	12.5%	11.7%
Tier 1 capital ratio	6%	10	14.8	14.1
Total capital ratio	10%	12	15.8	15.1
Tier 1 leverage ratio	N/A (c)	4	6.6	6.6
SLR (d)	N/A (c)	5	6.1	6.0
The Bank of New York Mellon regulatory capital ratios: (b)				
Advanced Approaches:				
CET1 ratio	6.5%	7%	15.1%	14.0%
Tier 1 capital ratio	8	8.5	15.1	14.3
Total capital ratio	10	10.5	15.2	14.7
Tier 1 leverage ratio	5	4	6.9	7.6
SLR (d)	6	3	6.4	6.8

(a) Minimum requirements for Dec. 31, 2019 include minimum thresholds plus currently applicable buffers.

(b) For our CET1, Tier 1 capital and Total capital ratios, our effective capital ratios under U.S. capital rules are the lower of the ratios as calculated under the Standardized and Advanced Approaches. The Tier 1 leverage ratio is based on Tier 1 capital and quarterly average total assets. The U.S. global systemically important banks (“G-SIB”) surcharge of 1.5% is subject to change. The countercyclical capital buffer is currently set to 0%.

(c) The Federal Reserve’s regulations do not establish well capitalized thresholds for these measures for BHCs.

(d) The SLR is based on Tier 1 capital and total leverage exposure, which includes certain off-balance sheet exposures.

Our CET1 ratio determined under the Advanced Approaches was 11.5% at Dec. 31, 2019 and 10.7% at Dec. 31, 2018. The increase compared with Dec. 31, 2018 primarily reflects capital generated through earnings, unrealized gains on securities available-for-sale, lower RWAs and the impact of stock awards and option exercises, partially offset by capital deployed through common stock repurchases and dividend payments. RWAs decreased compared with Dec. 31, 2018, as an increase in credit risk RWAs was more than offset by a decrease in operational risk RWAs primarily due to the external loss data used in our model.

Our operational loss risk model is informed by external losses, including fines and penalties levied against institutions in the financial services industry, particularly those that relate to businesses in which we operate, and as a result external losses have impacted and could in the future impact the amount of capital that we are required to hold.

Our capital ratios are necessarily subject to, among other things, anticipated compliance with all necessary enhancements to model calibration, approval by regulators of certain models used as part of RWA calculations, other refinements, further implementation guidance from regulators, market practices and standards and any changes BNY Mellon may make to its businesses. As a consequence of these factors, our capital ratios may materially change, and may be volatile over time and from period to period.

The following table presents our capital components and RWAs.

Capital components and risk-weighted assets (in millions)	Dec. 31,	
	2019	2018
CET1:		
Common shareholders' equity	\$ 37,941	\$ 37,096
Adjustments for:		
Goodwill and intangible assets (a)	(18,725)	(18,806)
Net pension fund assets	(272)	(320)
Equity method investments	(311)	(361)
Deferred tax assets	(46)	(42)
Other	(47)	—
Total CET1	18,540	17,567
Other Tier 1 capital:		
Preferred stock	3,542	3,542
Other	(86)	(65)
Total Tier 1 capital	\$ 21,996	\$ 21,044
Tier 2 capital:		
Subordinated debt	\$ 1,248	\$ 1,250
Allowance for credit losses	216	252
Other	(11)	(10)
Total Tier 2 capital – Standardized Approach	1,453	1,492
Excess of expected credit losses	—	65
Less: Allowance for credit losses	216	252
Total Tier 2 capital – Advanced Approaches	\$ 1,237	\$ 1,305
Total capital:		
Standardized Approach	\$ 23,449	\$ 22,536
Advanced Approaches	\$ 23,233	\$ 22,349
Risk-weighted assets:		
Standardized Approach	\$ 148,695	\$ 149,618
Advanced Approaches:		
Credit Risk	\$ 95,490	\$ 92,917
Market Risk	4,020	3,454
Operational Risk	61,388	68,300
Total Advanced Approaches	\$ 160,898	\$ 164,671
Average assets for Tier 1 leverage ratio	\$ 334,869	\$ 319,007
Total leverage exposure for SLR	\$ 362,452	\$ 347,943

(a) Reduced by deferred tax liabilities associated with intangible assets and tax deductible goodwill.

The table below presents the factors that impacted CET1 capital.

CET1 generation	2019
<i>(in millions)</i>	
CET1 – Beginning of year	\$ 17,567
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	4,272
Goodwill and intangible assets, net of related deferred tax liabilities	81
Gross CET1 generated	4,353
Capital deployed:	
Common stock repurchases	(3,327)
Common stock dividend payments	(1,120)
Total capital deployed	(4,447)
Other comprehensive income:	
Foreign currency translation	148
Unrealized gain on assets available-for-sale	526
Defined benefit plans	(54)
Unrealized gain on cash flow hedges	3
Other	(90)
Total other comprehensive income	533
Additional paid-in capital (a)	397
Other additions (deductions):	
Embedded goodwill	50
Net pension fund assets	48
Deferred tax assets	(4)
Other	43
Total other additions	137
Net CET1 generated	973
CET1 – End of year	\$ 18,540

(a) Primarily related to stock awards, the exercise of stock options and stock issued for employee benefit plans.

The following table shows the impact on the consolidated capital ratios at Dec. 31, 2019 of a \$100 million increase or decrease in common equity, or a \$1 billion increase or decrease in RWAs, quarterly average assets or total leverage exposure.

	Sensitivity of consolidated capital ratios at Dec. 31, 2019	
	Increase or decrease of	
<i>(in basis points)</i>	\$100 million in common equity	\$1 billion in RWA, quarterly average assets or total leverage exposure
CET1:		
Standardized Approach	7 bps	8 bps
Advanced Approaches	6	7
Tier 1 capital:		
Standardized Approach	7	10
Advanced Approaches	6	9
Total capital:		
Standardized Approach	7	11
Advanced Approaches	6	9
Tier 1 leverage	3	2
SLR	3	2

Capital ratios vary depending on the size of the balance sheet at period end and the levels and types of investments in assets. The balance sheet size fluctuates from period to period based on levels of customer and market activity. In general, when servicing clients are more actively trading securities, deposit balances and the balance sheet as a whole are higher. In addition, when markets experience significant volatility or stress, our balance sheet size may increase considerably as client deposit levels increase.

Total Loss-Absorbing Capacity (“TLAC”)

The final TLAC rule establishing external TLAC, external long-term debt (“LTD”) and related requirements for U.S. G-SIBs, including BNY Mellon, at the top-tier holding company level became effective on Jan. 1, 2019. The following summarizes the minimum requirements for BNY Mellon’s external TLAC and external LTD ratios, plus currently applicable buffers.

	As a % of RWAs (a)	As a % of total leverage exposure
Eligible external TLAC ratios	Regulatory minimum of 18% plus a buffer (b) equal to the sum of 2.5%, the method 1 G-SIB surcharge (currently 1%), and the countercyclical capital buffer, if any	Regulatory minimum of 7.5% plus a buffer (c) equal to 2%
Eligible external LTD ratios	Regulatory minimum of 6% plus the greater of the method 1 or method 2 G-SIB surcharge (currently 1.5%)	4.5%

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

(b) Buffer to be met using only CET1.

(c) Buffer to be met using only Tier 1 capital.

External TLAC consists of the Parent’s Tier 1 capital and eligible unsecured LTD issued by it that has a remaining term to maturity of at least one year and satisfies certain other conditions. Eligible LTD consists of the unpaid principal balance of eligible unsecured debt securities, subject to haircuts for amounts due to be paid within two years, that satisfy certain other conditions. Debt issued prior to Dec. 31, 2016 has been permanently grandfathered to the extent these instruments otherwise would be ineligible only due to containing impermissible acceleration rights or being governed by foreign law.

The following table presents our external TLAC and external LTD ratios.

TLAC and LTD ratios	Dec. 31, 2019		
	Minimum required	Minimum ratios with buffers	Ratios
Eligible external TLAC:			
As a percentage of RWA	18.0%	21.5%	27.2%
As a percentage of total leverage exposure	7.5%	9.5%	12.1%
Eligible external LTD:			
As a percentage of RWA	7.5%	N/A	12.2%
As a percentage of total leverage exposure	4.5%	N/A	5.4%

If BNY Mellon maintains risk-based ratio or leverage TLAC measures above the minimum required level, but with a risk-based ratio or leverage below the minimum level with buffers, we will face constraints on dividends, equity repurchases and discretionary executive compensation based on the amount of the shortfall and eligible retained income (that is, four quarters trailing net income, net of distributions and tax effects not reflected in net income).

Issuer purchases of equity securities

Share repurchases – fourth quarter of 2019

<i>(dollars in millions, except per share amounts; common shares in thousands)</i>	Total shares repurchased	Average price per share	Total shares repurchased as part of a publicly announced plan or program	Maximum approximate dollar value of shares that may yet be purchased under the publicly announced plans or programs at Dec. 31, 2019
October 2019	16,548	\$ 46.41	16,548	\$ 2,191
November 2019	5,500	48.39	5,500	1,925
December 2019	129	50.15	129	1,918
Fourth quarter of 2019 (a)	22,177	\$ 46.92	22,177	1,918 (b)

(a) Includes 21 thousand shares repurchased at a purchase price of \$1 million from employees, primarily in connection with the employees' payment of taxes upon the vesting of restricted stock. The average price per share of open market purchases was \$46.92.

(b) Represents the maximum value of the shares authorized to be repurchased through the second quarter of 2020, including employee benefit plan repurchases.

In June 2019, in connection with the Federal Reserve's non-objection to our 2019 capital plan, BNY Mellon announced a share repurchase plan providing for the repurchase of up to \$3.94 billion of common stock starting in the third quarter of 2019 and continuing through the second quarter of 2020. This new share repurchase plan replaces all previously authorized share repurchase plans.

Share repurchases may be executed through open market repurchases, in privately negotiated transactions or by other means, including through repurchase plans designed to comply with Rule 10b5-1 and other derivative, accelerated share repurchase and other structured transactions. The timing and exact amount of any common stock repurchases will depend on various factors, including market conditions and the common stock trading price; the Company's capital position, liquidity and financial performance; alternative uses of capital; and legal and regulatory considerations.

Trading activities and risk management

Our trading activities are focused on acting as a market-maker for our customers, facilitating customer trades and risk mitigating hedging in compliance with the Volcker Rule. The risk from market-making activities for customers is managed by our traders and limited in total exposure through a system of position limits, value-at-risk ("VaR") methodology and other market sensitivity measures. VaR is the potential loss in value due to adverse market movements over a defined time horizon with a specified confidence level. The calculation of our VaR used by management and presented below assumes a one-day holding period, utilizes a 99% confidence level and incorporates non-linear product characteristics. VaR facilitates comparisons across portfolios of different risk characteristics. VaR also captures the diversification of aggregated risk at the firm-wide level.

VaR represents a key risk management measure and it is important to note the inherent limitations to VaR, which include:

- VaR does not estimate potential losses over longer time horizons where moves may be extreme;
- VaR does not take account of potential variability of market liquidity; and
- Previous moves in market risk factors may not produce accurate predictions of all future market moves.

See Note 23 of the Notes to Consolidated Financial Statements for additional information on the VaR methodology.

The following tables indicate the calculated VaR amounts for the trading portfolio for the designated periods using the historical simulation VaR model.

VaR (a) (in millions)	2019			Dec. 31, 2019
	Average	Minimum	Maximum	
Interest rate	\$ 4.3	\$ 3.2	\$ 7.3	\$ 4.8
Foreign exchange	3.1	1.5	6.4	2.7
Equity	0.8	0.3	1.2	1.0
Credit	0.9	0.4	2.0	1.3
Diversification	(3.3)	N/M	N/M	(4.0)
Overall portfolio	5.8	3.9	9.5	5.8

VaR (a) (in millions)	2018			Dec. 31, 2018
	Average	Minimum	Maximum	
Interest rate	\$ 4.1	\$ 3.0	\$ 5.5	\$ 4.3
Foreign exchange	4.3	2.9	8.3	4.1
Equity	0.7	—	1.2	0.8
Credit	0.9	0.6	2.6	0.6
Diversification	(4.2)	N/M	N/M	(3.2)
Overall portfolio	5.8	3.6	10.4	6.6

(a) VaR exposure does not include the impact of the Company's consolidated investment management funds and seed capital investments.

N/M - Because the minimum and maximum may occur on different days for different risk components, it is not meaningful to compute a minimum and maximum portfolio diversification effect.

The interest rate component of VaR represents instruments whose values are predominantly driven

by U.S. Treasury securities interest rate levels. These instruments include, but are not limited to, U.S. Treasury securities, swaps, swaptions, forward rate agreements, exchange-traded futures and options, and other interest rate derivative products.

The foreign exchange component of VaR represents instruments whose values predominantly vary with the level or volatility of currency exchange rates or interest rates. These instruments include, but are not limited to, currency balances, spot and forward transactions, currency options and other currency derivative products.

The equity component of VaR consists of instruments that represent an ownership interest in the form of domestic and foreign common stock or other equity-linked instruments. These instruments include, but are not limited to, common stock, exchange-traded funds, preferred stock, listed equity options (puts and calls), OTC equity options, equity total return swaps, equity index futures and other equity derivative products.

The credit component of VaR represents instruments whose values are predominantly driven by credit spread levels, i.e., idiosyncratic default risk. These instruments include, but are not limited to, securities with exposures from corporate and municipal credit spreads.

The diversification component of VaR is the risk reduction benefit that occurs when combining portfolios and offsetting positions, and from the correlated behavior of risk factor movements.

During 2019, interest rate risk generated 47% of average gross VaR, foreign exchange risk generated 34% of average gross VaR, equity risk generated 9% of average gross VaR and credit risk generated 10% of average gross VaR. During 2019, our daily trading loss did not exceed our calculated VaR amount of the overall portfolio.

The following table of total daily trading revenue or loss illustrates the number of trading days in which our trading revenue or loss fell within particular ranges during the past five quarters.

Distribution of trading revenue (loss) (a) <i>(dollars in millions)</i>	Quarter ended				
	Dec. 31, 2019	Sept. 30, 2019	June 30, 2019	March 31, 2019	Dec. 31, 2018
Revenue range:	Number of days				
Less than \$(2.5)	3	2	—	1	1
\$(2.5) – \$0	5	7	4	5	7
\$0 – \$2.5	23	26	30	22	17
\$2.5 – \$5.0	24	22	23	23	24
More than \$5.0	7	7	7	10	13

(a) Trading revenue (loss) includes realized and unrealized gains and losses primarily related to spot and forward foreign exchange transactions, derivatives and securities trades for our customers and excludes any associated commissions, underwriting fees and net interest revenue.

Trading assets include debt and equity instruments and derivative assets, primarily interest rate and foreign exchange contracts, not designated as hedging instruments. Trading assets were \$13.6 billion at Dec. 31, 2019 and \$7.0 billion at Dec. 31, 2018.

Trading liabilities include debt and equity instruments and derivative liabilities, primarily interest rate and foreign exchange contracts, not designated as hedging instruments. Trading liabilities were \$4.8 billion at Dec. 31, 2019 and \$3.5 billion at Dec. 31, 2018.

Under our fair value methodology for derivative contracts, an initial “risk-neutral” valuation is performed on each position assuming time-discounting based on a AA credit curve. In addition, we consider credit risk in arriving at the fair value of our derivatives.

We reflect external credit ratings as well as observable credit default swap spreads for both ourselves and our counterparties when measuring the fair value of our derivative positions. Accordingly, the valuation of our derivative positions is sensitive to the current changes in our own credit spreads, as well as those of our counterparties.

At Dec. 31, 2019, our OTC derivative assets, including those in hedging relationships, of \$3.2 billion included a credit valuation adjustment (“CVA”) deduction of \$24 million. Our OTC

derivative liabilities, including those in hedging relationships, of \$3.8 billion included a debit valuation adjustment (“DVA”) of \$1 million related to our own credit spread. Net of hedges, the CVA decreased by \$4 million and the DVA was unchanged in 2019. The net impact of these adjustments increased foreign exchange and other trading revenue by \$4 million in 2019. During 2019, no realized loss was charged off against CVA reserves.

At Dec. 31, 2018, our OTC derivative assets, including those in hedging relationships, of \$2.8 billion included a CVA deduction of \$22 million. Our OTC derivative liabilities, including those in hedging relationships, of \$2.4 billion included a DVA of \$1 million related to our own credit spread. Net of hedges, the CVA decreased by \$4 million and the DVA increased by less than \$1 million in 2018. The net impact of these adjustments increased foreign exchange and other trading revenue by \$5 million in 2018. During 2018, no realized loss was charged off against CVA reserves.

The table below summarizes the distribution of credit ratings for our foreign exchange and interest rate derivative counterparties over the past five quarters, which indicates the level of counterparty credit associated with these trading activities. Significant changes in counterparty credit ratings could alter the level of credit risk faced by BNY Mellon.

Foreign exchange and other trading counterparty risk rating profile (a)	Quarter ended				
	Dec. 31, 2019	Sept. 30, 2019	June 30, 2019	March 31, 2019	Dec. 31, 2018
Rating:					
AAA to AA-	54%	55%	54%	49%	50%
A+ to A-	24	24	26	28	28
BBB+ to BBB-	17	16	17	20	18
BB+ and lower (b)	5	5	3	3	4
Total	100%	100%	100%	100%	100%

(a) Represents credit rating agency equivalent of internal credit ratings.

(b) Non-investment grade.

Asset/liability management

Our diversified business activities include processing securities, accepting deposits, investing in securities, lending, raising money as needed to fund assets and other transactions. The market risks from these activities include interest rate risk and foreign exchange risk. Our primary market risk is exposure to movements in U.S. dollar interest rates and certain foreign currency interest rates. We actively manage interest rate sensitivity and use earnings simulation and discounted cash flow models to identify interest rate exposures.

An earnings simulation model is the primary tool used to assess changes in pre-tax net interest revenue. The model incorporates management's assumptions regarding interest rates, market spreads, changes in the prepayment behavior of loans and securities and the impact of derivative financial instruments used for interest rate risk management purposes. These assumptions have been developed through a combination of historical analysis and future expected pricing behavior and are inherently uncertain. Actual results may differ materially from projected results due to timing, magnitude and frequency of interest rate changes, and changes in market conditions and management's strategies, among other factors.

In the table below, we use the earnings simulation model to run various interest rate ramp scenarios from a baseline scenario. The interest rate ramp scenarios examine the impact of large interest rate movements. In each scenario, all currencies' interest rates are shifted higher or lower. The baseline scenario is based on our quarter-end balance sheet and the spot yield curve. The 100 basis point ramp scenario assumes rates change 25 basis points above or below the yield curve in each of the next four quarters and the 200 basis point ramp scenario assumes a 50 basis point per quarter change. Interest rate sensitivity is quantified by calculating the change

in pre-tax net interest revenue between the scenarios over a 12-month measurement period. The net interest revenue sensitivity methodology assumes static deposit levels and also assumes that no management actions will be taken to mitigate the effects of interest rate changes.

The following table shows net interest revenue sensitivity for BNY Mellon.

Estimated changes in net interest revenue (in millions)	Dec. 31, 2019	Sept. 30, 2019	Dec. 31, 2018
Up 200 bps parallel rate ramp vs. baseline (a)	\$ 195	\$ 187	\$ 411
Up 100 bps parallel rate ramp vs. baseline (a)	79	74	198
Down 100 bps parallel rate ramp vs. baseline (a)	(40)	(45)	(163)
Long-term up 50 bps, short-term unchanged (b)	110	115	82
Long-term down 50 bps, short-term unchanged (b)	(105)	(119)	(98)

(a) In the parallel rate ramp, both short-term and long-term rates move in four equal quarterly increments.

(b) Long-term is equal to or greater than one year.

To illustrate the net interest revenue sensitivity to deposit runoff, we note that a \$5 billion instantaneous reduction of U.S. dollar denominated noninterest-bearing deposits would reduce the net interest revenue sensitivity results in the ramp up 100 basis point and 200 basis point scenarios in the table above by approximately \$110 million and approximately \$140 million, respectively. The impact would be smaller if the runoff was assumed to be a mixture of interest-bearing and noninterest-bearing deposits.

For a discussion of factors impacting the growth or contraction of deposits, see "Risk Factors - Our business, financial condition and results of operations could be adversely affected if we do not effectively manage our liquidity."

We also project future cash flows from our assets and liabilities over a long-term horizon and then discount these cash flows using instantaneous parallel shocks to prevailing interest rates. This measure reflects the structural balance sheet interest rate sensitivity by discounting all future cash flows. The aggregation of these discounted cash flows is the economic value of equity (“EVE”). The following table shows how the EVE would change in response to changes in interest rates.

Estimated changes in EVE	Dec. 31, 2019
Rate change:	
Up 200 bps vs. baseline	(4.6)%
Up 100 bps vs. baseline	(1.7)%

The asymmetrical accounting treatment of the impact of a change in interest rates on our balance sheet may create a situation in which an increase in interest rates can adversely affect reported equity and regulatory capital, even though economically there may be no impact on our economic capital position. For example, an increase in rates will result in a decline in the value of our available-for-sale securities portfolio. In this example, there is no corresponding change on our fixed liabilities, even though economically these liabilities are more valuable as rates rise.

These results do not reflect strategies that management could employ to limit the impact as interest rate expectations change.

To manage foreign exchange risk, we fund foreign currency-denominated assets with liability instruments denominated in the same currency. We utilize various foreign exchange contracts if a liability denominated in the same currency is not available or desired, and to minimize the earnings impact of translation gains or losses created by investments in foreign markets. We use forward foreign exchange contracts to protect the value of our net investment in foreign operations. At Dec. 31, 2019, net investments in foreign operations totaled \$14 billion and were spread across 16 foreign currencies.

Overview

BNY Mellon plays a vital role in the global financial markets, and effective risk management is critical to our success. Risk management begins with a strong risk culture, and we reinforce our culture through policies and the Code of Conduct, which are grounded in four principles:

- **Leading by Example:** BNY Mellon's senior management and leaders set the tone and expectations regarding risk culture, maintaining consistent executive sponsorship and senior governance for risk, conduct and ethics issues. They hold themselves and others to the highest ethical standards and create a culture of transparency and accountability where learning from mistakes is valued.
- **Demonstrating Integrity:** We promptly identify and appropriately address potential client conflicts and ensure our business practices support market integrity. Further, BNY Mellon fosters open and honest relationships with supervisors and stakeholders.
- **Ensuring Risk Ownership:** We clearly articulate risk management responsibilities of the first and second line, and articulate our risk culture in the BNY Mellon risk appetite statement. We consistently evaluate risk issues when considering business decisions.
- **Embedding Ethical Behavior:** BNY Mellon integrates risk, conduct and ethics expectations throughout the employee lifecycle, reinforced through training and communications. We continually encourage the reporting and escalation of risk, conduct and ethics issues.

BNY Mellon's business model requires taking on intelligent risk in a responsible and measured manner; balancing risk relative to reward to achieve our strategic objectives and business plans. BNY Mellon's Risk Identification process is the foundation for understanding and managing risk across our five primary risk categories: Operational Risk, Market Risk, Credit Risk, Liquidity Risk and Strategic Risk. Each quarter, the firm's risks are aggregated, reviewed and evaluated to determine the set of risks most material to BNY Mellon. Outputs from the Risk Identification process inform elements of our risk framework such as Risk Appetite, Enterprise-wide Stress Testing and Capital Plans.

BNY Mellon's Risk Appetite expresses the aggregate level of risk we are willing to assume to meet our objectives in a manner that balances risk and reward while considering our risk capacity and maintaining a balance sheet that remains resilient throughout market cycles. This guides BNY Mellon's risk-taking activities and informs key decision-making processes, including the manner by which we pursue our business strategy and the method by which we manage risk. The Risk Appetite Statement and associated key risk metrics to monitor appetite are updated and approved by the Risk Committee of the Board at least annually.

BNY Mellon conducts Enterprise-wide Stress Testing at least annually as part of its Internal Capital Adequacy Assessment Process in accordance with the Comprehensive Capital Analysis and Review ("CCAR"), and as required by the enhanced prudential standards issued pursuant to the Dodd-Frank Act. Enterprise-wide Stress Testing performs analyses across the Company's lines of business, products, geographic areas, and risk types incorporating the results from the different underlying models and projections given alternative stress test scenarios. It is an important component of assessing the adequacy of capital as well as identifying any high risk touch points in business activities. Furthermore, by integrating Enterprise-wide Stress Testing into the Company's capital planning process, the results provide a forward-looking evaluation of the ability to complete planned capital actions in a more-adverse-than-anticipated economic environment. Additional details on Capital Planning and Stress Testing are included in "Supervision and Regulation."

Organizational Model

BNY Mellon's Three Lines of Defense model is a critical component of our risk management framework to clarify roles and responsibilities across the organization.

BNY Mellon's first line includes senior management and business and corporate staff, excluding management and employees in Risk Management, Compliance and Internal Audit. Senior management in the first line is responsible for maintaining and implementing an effective risk management framework and ensuring BNY Mellon appropriately manages risk consistent with its strategy and risk tolerance, including establishing clear responsibilities

and accountability for the identification, measurement, management and control of risk.

Risk & Compliance is the independent second line function. They are responsible for the framework, policies and tools for managing risk and compliance and provide review and challenge to the first line’s management of risk. The organizational model facilitates the management of risk and compliance across three views – businesses, regions and enterprise-wide disciplines applying consistent standards across the firm – with ultimate accountability to BNY Mellon’s Chief Risk Officer. The Chief Risk Officer has reporting lines to both the BNY Mellon Chief Executive Officer and the Risk Committee of the Board of Directors.

Internal Audit is BNY Mellon’s third line of defense and serves as an independent, objective assurance function that reports directly to the Audit Committee of the Company’s Board of Directors. It assists the Company in accomplishing its objectives by bringing

a systematic, disciplined, risk-based approach to evaluate and improve the effectiveness of the Company’s risk management, control and governance processes. The scope of Internal Audit’s work includes the review and evaluation of the adequacy, effectiveness and sustainability of risk management procedures, internal control systems, information systems and governance processes.

Governance

BNY Mellon’s management is responsible for execution of the Company’s risk management and compliance framework and the governance structure that supports it, with oversight provided by BNY Mellon’s Board of Directors and two key Board committees: the Risk Committee and the Audit Committee.

A summary of the governance structure is provided below.



The Risk Committee is comprised entirely of independent directors and meets on a regular basis to review and assess the control processes with respect to the Company’s inherent risks. It also reviews and assesses the risk management activities of the Company and the Company’s risk policies and activities. The roles and responsibilities of the Risk Committee are described in more detail in its charter, a copy of which is available on our website, www.bnymellon.com.

The Audit Committee is also comprised entirely of independent directors. The Audit Committee meets on a regular basis to perform an oversight review of the integrity of the financial statements and financial reporting process, compliance with legal and

regulatory requirements, our independent registered public accountant’s qualifications and independence, and the performance of our independent registered public accountant and internal audit function. The Audit Committee also reviews management’s assessment of the adequacy of internal controls. The functions of the Audit Committee are described in more detail in its charter, a copy of which is available on our website, www.bnymellon.com.

The Senior Risk and Control Committee (“SRCC”) is the most senior risk governance group at the Company and is responsible for reviewing on an ongoing basis the top risks of the Company. The SRCC provides oversight for all Risk Management, Compliance & Ethics activities and processes,

including the Risk Framework. The committee is chaired by the Chief Risk Officer and its members include the Chief Executive Officer, Chief Financial Officer and General Counsel.

The SRCC has 10 sub-committees:

- Asia Pacific Senior Risk & Control Committee and Europe, Middle East, Africa Senior Risk & Control Committee: The most senior risk governance groups for the regions with oversight responsibility for risk and control matters.
- Operational Risk Committee: Oversees the operational risk framework and policies, reviews and monitors program outputs and metrics, monitors resolution of significant operational risk matters, including changes to the risk and control environment, and escalates concerns to the SRCC.
- Enterprise Model Risk Committee: Communicates an aggregate view of model risk to SRCC and the Board. Establishes policy and serves as an escalation point for key decisions on models.
- Technology & Information Risk Committee: Oversees the risks and associated policies related to enterprise technology initiatives to help maintain and protect the confidentiality, integrity, and availability of BNY Mellon's information and technology assets from internal and external threats.
- Credit Portfolio Management Committees: Six Portfolio Management Committees, governed by the same charter and rules, manage, monitor and review one of Credit Risk's primary portfolio segments, including underwriting criteria, portfolio limits and composition, concentration, credit strategy, quality and exposure.
- Asset Liability Committee: The Asset Liability Committee ("ALCO") is the senior management committee responsible for balance sheet oversight, including capital, liquidity and interest rate risk management.
- Balance Sheet Risk Committee ("BSRC"): Provides governance over independent risk oversight of liquidity risks associated with assets and liabilities, liquidity risk limits calibration, and the adequacy of related control procedures.
- Resolvability Steering Committee: Oversees recovery and resolution planning, including but not limited to the project governance and oversight framework for all recovery and resolution planning requirements in relevant jurisdictions where BNY Mellon operates.
- Strategic Risk Committee: Considers for approval proposals for major strategic initiatives significantly impacting the risk profile of the company, including but not limited to acquisitions, material changes to existing products, material new products, significant business process changes and complex transactions.

Risk Types Overview

The understanding, identification, measurement and mitigation of risk are essential elements for the successful management of BNY Mellon. Our primary risk categories are:

Type of risk	Description
Operational	The risk of loss resulting from inadequate or failed internal processes, human factors and systems, breaches of technology and information systems or from external events.
Market	The risk of loss due to adverse changes in the financial markets. Our market risks are primarily interest rate, foreign exchange and equity risk. Market risk particularly impacts our exposures that are fair valued such as the securities portfolio, trading book and equity investments.
Credit	The risk of loss if any of our borrowers or other counterparties were to default on their obligations to us. Credit risk is resident in the majority of our assets, but primarily concentrated in the loan and securities books, as well as off-balance sheet exposures such as lending commitments, letters of credit and securities lending indemnifications.
Liquidity	The risk that BNY Mellon cannot meet its cash and collateral obligations at a reasonable cost for both expected and unexpected cash flows, without adversely affecting daily operations or financial conditions. Liquidity risk can arise from cash flow mismatches, market constraints from the inability to convert assets to cash, the inability to raise cash in the markets, deposit run-off or contingent liquidity events.
Strategic	The risk arising from adverse business decisions, poor implementation of business decisions or lack of responsiveness to changes in the financial industry and operating environment. Strategic and/or business risks may also arise from the acceptance of new businesses, the introduction or modification of products, strategic finance and risk management decisions, business process changes, complex transactions, acquisitions/ divestitures/ joint ventures and major capital expenditures/ investments.

Operational Risk

In providing a comprehensive array of products and services, we may be exposed to operational risk. Operational risk may result from, but is not limited to, errors related to transaction processing, breaches

of internal control systems and compliance requirements, fraud by employees or persons outside BNY Mellon or business interruption due to system failures or other events. Operational risk may also include breaches of our technology and information systems resulting from unauthorized access to confidential information or from internal or external threats, such as cyberattacks. Operational risk also includes potential legal or regulatory actions that could arise as a result of noncompliance with applicable laws and/or regulatory requirements. In the case of an operational event, we could suffer financial losses as well as reputational damage. To address these risks, we maintain comprehensive policies and procedures and an internal control framework designed to provide a sound operational environment. These controls have been designed to manage operational risk at appropriate levels given our financial strength, the business environment and markets in which we operate, and the nature of our businesses, and considering factors such as competition and regulation.

The organizational framework for operational risk is based upon a strong risk culture that incorporates both governance and risk management activities comprising:

- Accountability of Businesses - Business managers are responsible for maintaining an effective system of internal controls commensurate with their risk profiles and in accordance with BNY Mellon policies and procedures.
- Corporate Operational Risk Management is the independent second line function responsible for developing risk management policies and tools for assessing, measuring, monitoring and managing operational risk for BNY Mellon. The primary objectives of Corporate Operational Risk Management are to promote effective risk management, identify emerging risks and drive continuous improvement in controls and to optimize capital.
- Technology risk is a subset of operational risk. Technology Risk Management is the independent operational risk management function that drives the development of global technology policies, controls and methods for assessing, measuring and monitoring information and technology risk for BNY Mellon. Technology Risk Management partners with the businesses to drive better

understanding and a more accurate assessment of operational risks that can occur from technology operations.

- Operational resiliency is a top priority for the Company. The core of our enterprise resiliency strategy is built on the Enterprise Resiliency Office, with second line oversight from Resiliency Risk Management. Elements of the resiliency strategy include our Business Services Framework, IT Asset Management, Application transformation (Greenfield) and Mainframe modernization, as well as Disaster Recovery Testing and Business Continuity capabilities. We are also focused on the resiliency capabilities of our most important service providers. These capabilities are intended to enable the Company to deliver services to our clients, to prevent, respond to and recover from business disruptions and threats, and embed governance and management in order to prioritize delivery of critical assets and mitigate financial, operational, business, cyber and technological risks.

We have also established procedures that are designed to ensure compliance with generally accepted conduct, ethics and business practices which are defined in our corporate policies. These include training programs, such as for our “Code of Conduct” and “Know Your Customer” programs, and compliance training programs, such as those regarding information protection and suspicious activity reporting.

Market Risk

Our business activity tends to minimize outright our direct exposure to market risk, with such risk primarily limited to market volatility from trading activity in support of clients. More significant direct market risk is assumed in the form of interest rate and credit spread risk within the investment portfolio both as a means for forward asset/liability management and net interest revenue generation.

The Company has indirect market risk exposure associated with the change in the value of financial collateral underlying securities financing and derivatives positions. The Collateral Margin Review Committee reviews and approves the standards for collateral received or paid in respect of collateralized derivative agreements and securities financing transactions.

Oversight of market risk is performed by the SRCC and BSRC and through executive review meetings. Detailed reviews of stress tests results are conducted during the Markets Weekly Risk Review. Senior managers from Risk Management, Finance and Sales and Trading attend the review. Oversight of the Corporate Treasury function is provided by the Treasury Risk Committee, biweekly Portfolio Management Group risk meetings, Business Risk Committee and portfolio reviews.

The Business Risk Committee for the Markets business reviews key risk and control issues and related initiatives facing all Markets lines of business. Also addressed during the Business Risk Committee meetings are trading VaR and trading stressed VaR exposures against limits.

Finally, the Risk Quantification Review Group reviews back-testing results for the Company’s VaR model.

Credit Risk

We extend direct credit in order to foster client relationships and as a method by which to generate interest income from the deposits that result from business activity. We extend and incur intraday credit exposure in order to facilitate our various processing activities.

To balance the value of our activities with the credit risk incurred in pursuing them, we set and monitor internal credit limits for activities that entail credit risk, most often on the size of the exposure and the quality of the counterparty. For credit exposures driven by changing market rates and prices, exposure measures include an add-on for such potential changes.

We manage credit risk at both the individual exposure level as well as the portfolio level. Credit risk at the individual exposure level is managed through our credit approval system and involves four approval levels up to and including the Chief Risk Officer of the Company. The requisite approvals are based upon the size and relative risk of the aggregate exposure under consideration. The Credit Risk Group is responsible for approving the size, terms and maturity of all credit exposures, as well as the ongoing monitoring of the creditworthiness of the counterparty. In addition, it is responsible for

assigning and maintaining the internal risk ratings on each exposure.

The calculation of a fundamental credit measure is based on a projection of a statistically probable credit loss, used to help determine the appropriate loan loss reserve and to measure customer profitability. Credit loss considers three basic components: the estimated size of the exposure whenever default might occur, the probability of default before maturity and the severity of the loss we would incur, commonly called “loss given default.” For institutional lending, where most of our credit risk is created, unfunded commitments are assigned a usage given default percentage. Borrowers/counterparties are assigned ratings by Credit Portfolio Managers on an 18-grade scale, which translate to a scaled probability of default. Additionally, transactions are assigned loss given default ratings (on a 5-grade scale) that reflect the transactions’ structures, including the effects of guarantees, collateral and relative seniority of position.

The Enterprise Capital Adequacy Group is responsible for the calculation methodologies and the estimates of the inputs used in those methodologies for the determination of expected loss. These methodologies and input estimates are regularly evaluated to ensure their appropriateness and accuracy. As new techniques and data become available, the Enterprise Capital Adequacy Group attempts to incorporate, where appropriate, those techniques or data.

BNY Mellon seeks to limit both on- and off-balance sheet credit risk through prudent underwriting and the use of capital only where risk-adjusted returns warrant. We seek to manage risk and improve our portfolio diversification through syndications, asset sales, credit enhancements and active collateralization and netting agreements. In addition, we have a separate Credit Risk Review Group, which is part of Internal Audit, made up of experienced loan review officers who perform timely reviews of the loan files and credit ratings assigned to the loans.

Liquidity Risk

Access to global capital markets and financial market utilities are fundamental to both our operating model and overall strategy. Without such access, it would be difficult, if not impossible, to process payments as well as settle and clear transactions on behalf of

clients. Deterioration in our liquidity position, whether actual or perceived, can impact our market access by affecting participants’ willingness to transact with us. Changes to our liquidity can be caused by various factors, such as funding mismatches, market constraints limiting the ability to liquidate assets, inability to issue debt, run-off of core deposits and contingent liquidity events, such as additional collateral posting. Changes in economic conditions or exposure to credit, market, operational, legal and reputational risks can also affect our liquidity. Our liquidity risk management practices are designed to maintain a strong liquidity profile, by actively managing both the quality of the investment portfolio and intraday liquidity positions, and by having sufficient deposits and other funding to meet timely payment and settlement obligations under both normal and stressed conditions.

ALCO is responsible for appropriately executing Board-approved strategies, policies and procedures for managing liquidity. Senior management is responsible for regularly reporting the liquidity position of the Company to the Board of Directors. The Board of Directors approves liquidity risk tolerances and is responsible for oversight of liquidity risk management of the Company. The BSRC provides governance over independent Risk oversight of liquidity risks associated with assets and liabilities, liquidity risk limits calibration and the adequacy of related control procedures. The Treasury Risk Committee, which is chaired by independent risk management, is responsible for reviewing liquidity stress tests and various liquidity metrics, including contractual cash flow gaps for liquidity, liquidity stress metrics and ratios, LCR, net stable funding ratio (“NSFR”) and client deposit concentration. The Treasury Risk Committee validates and approves stress test methodologies and assumptions, and an independent Liquidity Risk function provides ongoing review and oversight of liquidity risk management.

BNY Mellon seeks to maintain an adequate liquidity cushion in both normal and stressed environments and seeks to diversify funding sources by line of business, customer and market segment with the objective that changes in funding requirements at the Parent and at our bank and broker-dealer subsidiaries can be accommodated routinely without material adverse impact on our financial condition. Additionally, we seek to maintain liquidity ratios within approved limits and liquidity risk tolerance,

maintain a liquid asset buffer that can be liquidated, financed and/or pledged as necessary, and control the levels and sources of wholesale funds.

Potential uses of liquidity include withdrawals of customer deposits and client drawdowns on unfunded credit or liquidity facilities. We actively monitor unfunded lending-related commitments, thereby reducing unanticipated funding requirements.

When monitoring liquidity, we evaluate multiple metrics in order to have sufficient liquidity for expected and unexpected events. Metrics include cash flow mismatches, asset maturities, debt spreads, peer ratios, liquid assets, unencumbered collateral, funding sources and balance sheet liquidity ratios. We monitor the LCR, as well as various internal liquidity limits as part of our standard analysis to monitor depositor and market funding concentration, liability maturity profile and potential liquidity draws due to off-balance sheet exposure.

We also perform liquidity stress tests (“LSTs”) to evaluate whether the Company and certain domestic bank subsidiaries maintain sufficient liquidity resources under multiple stress scenarios. LSTs are based on scenarios that measure liquidity risks under unlikely but plausible conditions. We perform these tests under various time horizons ranging from one day to one year in a base case, as well as supplemental tests to determine whether the Company and certain domestic subsidiaries’ liquidity is sufficient for severe market events and firm-specific events. The Parent’s LST framework includes the Resolution Liquidity Adequacy and Positioning (“RLAP”) test. The RLAP test is designed to ensure that the liquidity needs of certain key subsidiaries in a stress environment can be met

by available resources held directly within the entity itself or at the Parent or IHC, as applicable. Our results indicate that we have sufficient RLAP liquidity.

Strategic Risk

Our strategy includes, but is not limited to, improving organic growth across our businesses, driving quality solutions and operating efficiencies, and expanding technology-enabled solutions. Successful realization of our strategy requires that we provide expertise and insight through market-leading solutions that drive economies of scale, attract, develop and retain highly talented people capable of executing our strategy, while protecting our sound and stable financial profile. We must understand and meet market and client expectations with suitable products and offerings that are financially viable and scalable and that integrate into our business model. Failure to do so could impact both our growth strategy and our ability to service our existing clients, resulting in potential financial loss or litigation.

Changes in the markets in which we and our clients operate can evolve quickly. The introduction of new or disruptive technologies, geopolitical events and slowing economies are examples of events that can produce market uncertainty. Failure to either anticipate or participate in transformational change within a given market or appropriately and promptly react to market conditions or client preferences could result in poor strategic positioning and potential negative financial impact. While it is essential that we continue to innovate and respond to changing markets and client demand, we must do so in a manner that does not affect our financial position or jeopardize our fundamental business strategy.

Evolving Regulatory Environment

BNY Mellon engages in banking, investment advisory and other financial activities in the U.S. and 34 other countries, and is subject to extensive regulation in the jurisdictions in which it operates. Global supervisory authorities generally are charged with ensuring the safety and soundness of financial institutions, protecting the interests of customers, including depositors in banking entities and investors in mutual funds and other pooled vehicles, safeguarding the integrity of securities and other financial markets and promoting systemic resiliency and financial stability in the relevant country. They are not, however, generally charged with protecting the interests of our shareholders or non-depositor creditors. This discussion outlines the material elements of selected laws and regulations applicable to us. The impact of certain other laws and regulations, such as tax law, is discussed elsewhere in the Annual Report. Changes in these standards, or in their application, cannot be predicted, but may have a material effect on our businesses and results of operations.

The financial services industry has been the subject of enhanced regulatory oversight in the past decade globally, and this trend may continue in the future. Our businesses have been subject to a significant number of global reform measures.

Political developments have resulted and may continue to result in legislative and regulatory changes to key aspects of the Dodd-Frank Act and its implementing regulations. For example, the Economic Growth, Regulatory Relief, and Consumer Protection Act (the “Reform Act”) became law in 2018.

Enhanced Prudential Standards

The Federal Reserve has adopted rules (“SIFI Rules”) to implement liquidity requirements, stress testing of capital and overall risk management requirements affecting U.S. systemically important financial institutions (“SIFIs”). BNY Mellon must comply with enhanced liquidity and overall risk management standards, which include maintenance of a buffer of highly liquid assets based on projected funding needs for 30 days. The liquidity buffer is in addition to the U.S. banking agencies’ rules regarding the LCR, discussed below, and is described by the Federal

Reserve as being “complementary” to those liquidity standards.

Single Counterparty Credit Limits

On June 14, 2018, the Federal Reserve approved a final rule imposing single-counterparty credit limits (“SCCLs”) on, among other organizations, domestic BHCs, including BNY Mellon, that are G-SIBs. The SCCLs apply to the credit exposure of a covered firm and all of its subsidiaries to a single counterparty and all of its affiliates and connected entities. The final rule introduces new definitions of “subsidiary” and “affiliate” under a financial consolidation standard that is consistent with accounting standards. The final rule became applicable to BNY Mellon on Jan. 1, 2020.

The final rule establishes two primary credit exposure limits: (i) a covered domestic BHC may not have aggregate net credit exposure to any unaffiliated counterparty in excess of 25% of its Tier 1 capital; and (ii) a U.S. G-SIB is further prohibited from having aggregate net credit exposure in excess of 15% of its Tier 1 capital to any “major counterparty” (defined as a G-SIB or a nonbank SIFI).

As of Jan. 1, 2020, BNY Mellon was and continues to be in compliance with the two primary exposure limits based on the daily monitoring process we have established. The final rule provides a cure period of 90 days (or, with prior notice from the Federal Reserve Board, a longer or shorter period) for breaches of the SCCL rule. During the cure period, a company may not engage in additional credit transactions with the particular counterparty unless the company has obtained a temporary credit exposure limit increase from the Federal Reserve.

Capital Planning and Stress Testing

Payment of Dividends, Stock Repurchases and Other Capital Distributions

The Parent is a legal entity separate and distinct from its banks and other subsidiaries. Therefore, the Parent primarily relies on dividends, interest, distributions and other payments from its subsidiaries, including extensions of credit from the IHC, to meet its obligations, including its obligations with respect to its securities, and to provide funds for share repurchases and payment of common and

preferred dividends to its stockholders, to the extent declared by the Board of Directors. Various federal and state laws and regulations limit the amount of dividends that may be paid to the Parent by our bank subsidiaries without regulatory consent. If, in the opinion of the applicable federal regulatory agency, a depository institution under its jurisdiction is engaged in or is about to engage in an unsafe or unsound practice (which, depending on the financial condition of the bank, could include the payment of dividends), the regulator may require, after notice and hearing, that the bank cease and desist from such practice. The Office of the Comptroller of the Currency (“OCC”), the Federal Reserve and the Federal Deposit Insurance Corporation (“FDIC”) have indicated that the payment of dividends would constitute an unsafe and unsound practice if the payment would reduce a depository institution’s capital to an inadequate level. Moreover, under the Federal Deposit Insurance Act, as amended (the “FDI Act”), an insured depository institution (“IDI”) may not pay any dividends if the institution is undercapitalized or if the payment of the dividend would cause the institution to become undercapitalized. In addition, the federal bank regulatory agencies have issued policy statements which provide that FDIC-insured depository institutions and their holding companies should generally pay dividends only out of their current operating earnings.

In general, the amount of dividends that may be paid by our U.S. banking subsidiaries, including to the Parent, is limited to the lesser of the amounts calculated under a “recent earnings” test and an “undivided profits” test. Under the recent earnings test, a dividend may not be paid if the total of all dividends declared and paid by the entity in any calendar year exceeds the current year’s net income combined with the retained net income of the two preceding years, unless the entity obtains prior regulatory approval. Under the undivided profits test, a dividend may not be paid in excess of the entity’s “undivided profits” (generally, accumulated net profits that have not been paid out as dividends or transferred to surplus). The ability of our bank subsidiaries to pay dividends to the Parent may also be affected by the capital adequacy standards applicable to those subsidiaries, which include minimum requirements and buffers.

There are also limitations specific to the IHC’s ability to make distributions or extend credit to the Parent. The IHC is not permitted to pay dividends to the Parent if certain key capital, liquidity and operational risk indicators are breached. Additionally, if our projected financial resources deteriorate so severely that resolution of the Parent becomes imminent, the committed lines of credit provided by the IHC to the Parent will automatically terminate, with all outstanding amounts becoming due.

BNY Mellon’s capital distributions are subject to Federal Reserve oversight. The major component of that oversight is the Federal Reserve’s CCAR, implementing its capital plan rule. That rule requires BNY Mellon to submit annually a capital plan to the Federal Reserve. We are also required to collect and report certain related data on a quarterly basis to allow the Federal Reserve to monitor progress against the annual capital plan. Generally, BNY Mellon and other affected BHCs may pay dividends, repurchase stock and make other capital distributions only in accordance with a capital plan that has been reviewed by the Federal Reserve and as to which the Federal Reserve has not objected. The Federal Reserve may object to our capital plan for quantitative reasons, including if the plan does not show that the covered BHC will meet, for each quarter throughout the nine-quarter planning horizon covered by the capital plan, all minimum regulatory capital ratios under applicable capital rules as in effect for that quarter on a *pro forma* basis under the base case and stressed scenarios (including a severely adverse scenario provided by the Federal Reserve). The capital plan rule also stipulates that we may not make a capital distribution unless after giving effect to the distribution it will meet all minimum regulatory capital ratios.

The purpose of CCAR is to ensure that these BHCs have robust, forward-looking capital planning processes that account for their unique risks and that permit continued operations during times of economic and financial stress. The 2019 CCAR instructions, consistent with prior Federal Reserve guidance, provide that capital plans contemplating dividend payout ratios exceeding 30% of projected after-tax net income will receive particularly close scrutiny. BNY Mellon’s common stock dividend payout ratio was 26% for 2019. See “Capital” for information about our 2019 capital plan.

Regulatory Stress-Testing Requirements

In addition to the CCAR stress testing requirements, Federal Reserve regulations also include complementary Dodd-Frank Act Stress Tests (“DFAST”). The CCAR and DFAST requirements substantially overlap, and the Federal Reserve implements them at the BHC level on a coordinated basis. Under these DFAST regulations, as revised in 2019 pursuant to the Reform Act, we are required to undergo an annual regulatory stress test conducted by the Federal Reserve and to conduct an annual company-run stress test. In addition, The Bank of New York Mellon is required to conduct an annual company-run stress test (although the bank is permitted to combine certain reporting and disclosure of its stress test results with the results of BNY Mellon). The Reform Act eliminated the Dodd-Frank company-run stress test requirements for banks with less than \$250 billion in assets, including BNY Mellon, N.A. Results from our annual company-run stress test are reported to the appropriate regulators and published. The Federal Reserve published the results of its most recent annual 2019 DFAST stress-test on June 21, 2019. We published the results of our most recent annual company-run stress test on June 21, 2019, and the results of our final company-run mid-year stress test on Oct. 9, 2019, the requirement for which was eliminated in 2019 pursuant to the Reform Act.

Capital Requirements – Generally

As a BHC, we are subject to U.S. capital rules, administered by the Federal Reserve. Our bank subsidiaries are subject to similar capital requirements administered by the Federal Reserve in the case of The Bank of New York Mellon and by the OCC in the case of our national bank subsidiaries, BNY Mellon, N.A. and The Bank of New York Mellon Trust Company, National Association. These requirements are intended to ensure that banking organizations have adequate capital given the risk levels of their assets and off-balance sheet exposures.

Notwithstanding the detailed U.S. capital rules, the federal banking agencies retain significant discretion to set higher capital requirements for categories of BHCs or banks or for an individual BHC or bank as situations warrant.

U.S. Capital Rules – Minimum Risk-Based Capital Ratios and Capital Buffers

Consistent with the terms of the Basel III framework and the Dodd-Frank Act, the U.S. capital rules require Advanced Approaches banking organizations, such as BNY Mellon, to satisfy minimum risk-based capital ratios using both the U.S. capital rules’ standardized approach risk-weightings framework (the “Standardized Approach”) and the advanced approaches risk-weighting framework (the “Advanced Approaches”). See “Capital” for details on these requirements. In addition, these minimum ratios are supplemented by a capital conservation buffer of 2.5%, which was gradually phased in from Jan. 1, 2016 until Jan. 1, 2019. The capital conservation buffer can only be satisfied with CET1 capital.

When systemic vulnerabilities are meaningfully above normal, the capital conservation buffer may be expanded up to an additional 2.5% through the imposition of a countercyclical capital buffer. For internationally active banks such as BNY Mellon, the countercyclical capital buffer required threshold is a weighted average of the countercyclical capital buffers deployed in each of the jurisdictions in which the bank has private sector credit exposures. The Federal Reserve, in consultation with the OCC and FDIC, has affirmed the current countercyclical capital buffer level for U.S. exposures of 0% and noted that any future modifications to the buffer would generally be subject to a 12-month phase-in period. Any countercyclical capital buffer required threshold arising from exposures outside the United States will also generally be subject to a 12-month phase-in period.

For G-SIBs, like BNY Mellon, the U.S. capital rules’ buffers are also supplemented by a G-SIB risk-based capital surcharge, which is the higher of the surcharges calculated under two methods (referred to as “method 1” and “method 2”). The first method is based on the BCBS framework and considers a G-SIB’s size, interconnectedness, cross-jurisdictional activity, substitutability and complexity. The second method uses similar inputs, but is calibrated to result in significantly higher surcharges and replaces substitutability with a measure of reliance on short-term wholesale funding. Consistent with the phase-in of the capital conservation buffer, the G-SIB capital surcharge was gradually phased-in from

Jan. 1, 2016 until it became fully effective on Jan. 1, 2019. The G-SIB surcharge applicable to BNY Mellon for 2019 was 1.5%.

U.S. Capital Rules – Deductions from and Adjustments to Capital Elements

The U.S. capital rules provide for a number of deductions from and adjustments to CET1 capital. These include, for example, providing that unrealized gains and losses on all available-for-sale debt securities may not be filtered out for regulatory capital purposes, and the requirement that mortgage servicing rights, deferred tax assets dependent upon future taxable income and significant investments in non-consolidated financial entities be deducted from CET1 to the extent that any one such category exceeds 10% of CET1 or all such categories in the aggregate exceed 15% of CET1.

U.S. Capital Rules – Advanced Approaches Risk-Based Capital Rules

Under the U.S. capital rules' Advanced Approaches framework, credit risk risk-weightings are generally based on risk-sensitive approaches that largely rely on the use of internal credit models and parameters, whereas under the Standardized Approach credit risk risk-weightings are generally based on supervisory risk-weightings which vary primarily by counterparty type and asset class. BNY Mellon is required to comply with Advanced Approaches reporting and public disclosures. For purposes of determining whether we meet minimum risk-based capital requirements under the U.S. capital rules, our CET1 ratio, Tier 1 capital ratio, and total capital ratio is the lower of each ratio as calculated under the Standardized Approach and under the Advanced Approaches framework.

U.S. Capital Rules – Generally Applicable Risk-Based Capital Rules: Standardized Approach

The agencies' generally applicable risk-based capital rules (i.e., the Standardized Approach) calculate risk-weighted assets in the denominator of capital ratios using a broad array of risk weighting categories that are intended to be risk sensitive. The risk-weights for the Standardized Approach generally range from 0% to 1,250%. Higher risk-weights under the Standardized Approach apply to a variety of exposures, including certain securitization exposures,

equity exposures, claims on securities firms and exposures to counterparties on OTC derivatives.

Securities finance transactions, including transactions in which we serve as agent and provide securities replacement indemnification to a securities lender, are treated as repo-style transactions under the U.S. capital rules. The rules do not permit a banking organization to use a simple VaR approach to calculate exposure amounts for repo-style transactions or to use internal models to calculate the exposure amount for the counterparty credit exposure for repo-style transactions under the Standardized Approach (although these methodologies are allowed in the Advanced Approaches). Under the Standardized Approach, a banking organization may use a collateral haircut approach to recognize the credit risk mitigation benefits of financial collateral that secures a repo-style transaction, including an agented securities lending transaction, among other transactions. To apply the collateral haircut approach, a banking organization must determine the exposure amount and the relevant risk weight for the counterparty and collateral posted.

Federal Reserve Proposed Changes to CCAR and its Capital Rules

On April 10, 2018, the Federal Reserve issued a proposed rule that would integrate its regulatory capital, capital planning, and stress test rules, as well as the CCAR process. The proposal would introduce a stress capital buffer ("SCB") that would be part of the firm's quarterly capital requirements. The proposal would replace the current static 2.5% capital conservation buffer with an SCB requirement for Standardized Approach capital ratios that would, among other things, be tied to the projected decrease in a firm's common equity Tier 1 capital ratio in the Federal Reserve's supervisory severely adverse scenario. The proposed rule would introduce a new requirement that firms reduce their planned capital distributions if those distributions would not be consistent with the applicable buffer constraints based on the firms' own baseline scenario projections. In addition, the proposed rule would introduce a stress leverage buffer ("SLB") that is analogous to the SCB and applies to firms' Tier 1 leverage ratios.

Leverage Ratios

The U.S. capital rules require a minimum 4% leverage ratio for all banking organizations, as well as

a 3% Basel III-based SLR for Advanced Approaches banking organizations, including BNY Mellon. Unlike the Tier 1 leverage ratio, the SLR includes certain off-balance sheet exposures in the denominator, including the potential future credit exposure of derivative contracts and 10% of the notional amount of unconditionally cancelable commitments.

Pursuant to the Reform Act, on Nov. 19, 2019, the U.S. banking agencies finalized a rule to exclude certain central bank deposits from the total leverage exposure, the SLR denominator, and related TLAC and LTD measures of custody banks, including BNY Mellon and The Bank of New York Mellon. Under the final rule, qualifying central banks include a Federal Reserve Bank, the European Central Bank or a central bank of a member country of the Organisation for Economic Co-operation and Development (“OECD”), provided that an exposure to the OECD member country receives a zero percent risk weighting and the sovereign debt of such country is not, and has not been, in default in the past five years. The central bank deposit exclusion from the SLR denominator would equal the average daily balance over the applicable quarter of all deposits placed with a qualifying central bank up to an amount equal to the on-balance sheet deposit liabilities that are linked to fiduciary or custodial and safekeeping accounts. The rule is effective April 1, 2020. See “Federal Reserve and OCC Proposed Amendments to the Enhanced Supplementary Leverage Ratio Requirements for U.S. G-SIBs” below for a discussion of additional proposed amendments to applicable SLR requirements.

The U.S. G-SIBs (including BNY Mellon) are subject to an enhanced SLR, which requires us to maintain an SLR of greater than 5% (composed of the current minimum requirement of 3% plus a greater than 2% buffer) and requires bank subsidiaries of those BHCs to maintain at least a 6% SLR in order to qualify as “well capitalized” under the prompt corrective action regulations discussed below. At Dec. 31, 2019, our SLR was 6.1% and the SLR for our primary banking subsidiary, The Bank of New York Mellon, was 6.4%.

Federal Reserve and OCC Proposed Amendments to the Enhanced Supplementary Leverage Ratio Requirements for U.S. G-SIBs

On April 11, 2018, the Federal Reserve and the OCC issued a joint notice of proposed rule-making that

would recalibrate the enhanced SLR standards that apply to U.S. G-SIBs and certain of their IDI subsidiaries. The proposed rule would replace the 2% SLR buffer that currently applies to all U.S. G-SIBs with a buffer equal to 50% of the firm’s risk-based G-SIB surcharge.

For IDI subsidiaries of U.S. G-SIBs regulated by the Federal Reserve or the OCC, the proposal would replace the current 6% SLR threshold requirement for those institutions to be considered “well capitalized” under the agencies’ prompt corrective action framework with an SLR of at least 3% plus 50% of the G-SIB surcharge applicable to their top-tier holding companies. The proposed rule would also make corresponding changes to the TLAC SLR buffer and long-term debt requirements for U.S. G-SIBs, as well as technical changes to the Federal Reserve’s TLAC rule. The Federal Reserve and OCC have not yet issued a final rule.

BCBS Revisions to Components of Basel III

In December 2017, the BCBS released revisions to Basel III intended to reduce variability of RWA and improve the comparability of banks’ risk-based capital ratios. Among other measures, the final revisions: (i) establish a revised Standardized Approach for credit risk that enhances the Standardized Approach’s granularity and risk sensitivity; (ii) adjust the internal ratings-based approaches for credit risk by removing the use of the advanced internal ratings-based approach for certain asset classes and establishing input floors for the calculation of RWA; (iii) replace the advanced measurement approach for operational risk with a revised Standardized Approach for operational risk based on measures of a bank’s income and historical losses; (iv) revise the leverage ratio exposure measure, establish a “leverage ratio buffer” for G-SIBs, set at 50% of a G-SIB’s risk-based capital surcharge, and allow national discretion to exclude central bank placements in limited circumstances (see “Leverage Ratios” above); and (v) introduce a new 72.5% output floor based on the Standardized Approach. The revised standards are effective Jan. 1, 2022, with the output floor phasing in from 2022 to 2027.

In January 2019, the BCBS released revised minimum capital requirements for market risk. The revised standards also come into effect Jan. 1, 2022. While the U.S. regulators have implemented or issued

proposals to implement certain aspects of these revised Basel standards, there is continuing uncertainty regarding the extent to which the U.S. regulators will implement them.

Standardized Approach for Measuring Counterparty Credit Risk Exposures

On Nov. 19, 2019, the Federal Reserve, FDIC and OCC jointly issued a final rule, which amends the U.S. capital rules to implement a new approach for calculating the exposure amount for derivative contracts, which is called the Standardized Approach for Counterparty Credit Risk (“SA-CCR”). The final rule also incorporates SA-CCR into the determination of exposure amount of derivatives for total leverage exposure under the SLR and the cleared transaction framework under the U.S. capital rules. The mandatory compliance date of the SA-CCR rule for the Advanced Approaches Banks is Jan. 1, 2022. The final rule allows any banking organization to elect to adopt SA-CCR starting April 1, 2020, provided they receive approval from the Federal Reserve. BNY Mellon is evaluating what effect this final rule will have on our risk-weighted assets and capital ratios.

Total Loss-Absorbing Capacity

The Federal Reserve imposes external TLAC and related requirements for U.S. G-SIBs, including BNY Mellon, at the top-tier holding company level that became effective on Jan. 1, 2019.

U.S. G-SIBs are required to maintain a minimum eligible external TLAC equal to the greater of (i) 18% of RWAs plus a buffer (to be met using only CET1) equal to the sum of 2.5% of RWAs, the G-SIB surcharge calculated under method 1 and any applicable countercyclical buffer; and (ii) 7.5% of their total leverage exposure (the denominator of the SLR) plus a buffer (to be met using only Tier 1 Capital) equal to 2%.

U.S. G-SIBs are also required to maintain minimum external eligible LTD equal to the greater of (i) 6% of RWAs plus the G-SIB surcharge (calculated using the greater of method 1 and method 2), and (ii) 4.5% of total leverage exposure. In order to be deemed eligible LTD, debt instruments must, among other requirements, be unsecured, not be structured notes, be governed by U.S. law, and have a maturity of at least one year from the date of issuance. In addition, LTD issued on or after Dec. 31, 2016 must (i) not

have acceleration rights, other than in the event of non-payment or the bankruptcy or insolvency of the issuer and (ii) be governed by U.S. law. However, debt issued by a U.S. G-SIB prior to Dec. 31, 2016 is permanently grandfathered to the extent these securities would be ineligible only due to containing impermissible acceleration rights or being governed by foreign law.

Further, the top-tier holding companies of U.S. G-SIBs are not permitted to issue certain guarantees of subsidiary liabilities, incur liabilities guaranteed by subsidiaries, issue short-term debt to third parties, or enter into derivatives and certain other financial contracts with external counterparties. Certain liabilities are capped at 5% of the value of the U.S. G-SIB’s eligible external TLAC instruments. The Federal Reserve considered requiring internal TLAC at domestic subsidiaries of U.S. G-SIBs, but has not proposed rules regarding these instruments.

Foreign jurisdictions may impose internal TLAC requirements on the foreign subsidiaries of U.S. G-SIBs. The European Union’s Capital Requirements Regulation 2 (“CRR2”) will require EU material subsidiaries of non-EU G-SIBs (including BNY Mellon) to maintain a minimum level of internal loss absorbing capacity, broadly in line with the Financial Stability Board (“FSB”) TLAC term sheet, promulgated in November 2015. The Bank of New York Mellon SA/NV (“BNY Mellon SA/NV”) is considered an EU material subsidiary for purposes of this regulation.

Prompt Corrective Action

The FDI Act, as amended by the Federal Deposit Insurance Corporation Improvement Act of 1991 (“FDICIA”), requires the federal banking agencies to take “prompt corrective action” in respect of depository institutions that do not meet specified capital requirements. FDICIA establishes five capital categories for FDIC-insured banks: “well capitalized,” “adequately capitalized,” “undercapitalized,” “significantly undercapitalized,” and “critically undercapitalized.” The FDI Act imposes progressively more restrictive constraints on operations, management and capital distributions the less capital the institution holds. While these regulations apply only to banks, such as The Bank of New York Mellon and BNY Mellon, N.A., the Federal Reserve is authorized to take appropriate action against the parent bank holding company, such

as the Parent, based on the under-capitalized status of any banking subsidiary. In certain circumstances, the Parent would be required to guarantee the performance of the capital restoration plan if one of our banking subsidiaries were undercapitalized.

The federal banking agencies' prompt corrective action framework ("PCA rules") contain "well capitalized" thresholds for IDIs. Under these rules, an IDI is deemed to be "well capitalized" if it has capital ratios as detailed in the "Capital" disclosure.

The PCA rules require an Advanced Approaches banking organization to maintain an SLR of at least 3% to qualify for the "adequately capitalized" status. In addition, the U.S. federal banking agencies' revisions to the enhanced SLR establish a SLR "well capitalized" threshold of 6% for certain IDIs of U.S. G-SIBs, including The Bank of New York Mellon and BNY Mellon N.A. For a discussion of proposed amendments to the SLR as part of the PCA rules, see "Federal Reserve and OCC Proposed Amendments to the Enhanced Supplementary Leverage Ratio Requirements for U.S. G-SIBs" above.

Liquidity Standards – Basel III and U.S. Rules and Proposals

BNY Mellon is subject to the U.S. LCR Rule, which is designed to ensure that BNY Mellon and certain domestic bank subsidiaries maintain an adequate level of unencumbered HQLA equal to their expected net cash outflow for a 30-day time horizon under an acute liquidity stress scenario. As of Dec. 31, 2019, the Parent and its domestic bank subsidiaries were in compliance with applicable LCR requirements.

The BCBS issued the final NSFR document in October 2014, which contemplates an additional liquidity measure, referred to as NSFR, which is designed to promote more medium- and long-term funding of the assets and activities of banking entities over a one-year time horizon. In May 2016, the Federal Reserve, FDIC and OCC proposed an NSFR rule that would implement a quantitative long-term liquidity requirement applicable to large and internationally active banking organizations, including BNY Mellon. The proposed NSFR rule would implement a test similar to the Basel III framework's test for medium- and long-term funding of the assets and activities of banking entities over a one-year time horizon. Under the proposed rule,

BNY Mellon's NSFR would be expressed as a ratio of its available stable funding to its required stable funding amount, and BNY Mellon would be required to maintain an NSFR of 1.0. BNY Mellon continues to evaluate the potential effects of this proposal on its operations. A final NSFR rule has not been issued.

Separately, as noted above, the SIFI Rules address liquidity requirements for BHCs with \$100 billion or more in total assets, including BNY Mellon. These enhanced liquidity requirements include an independent review of liquidity risk management; establishment of cash flow projections; a contingency funding plan, and liquidity risk limits; liquidity stress testing under multiple stress scenarios and time horizons tailored to the specific products and profile of the company; and maintenance of a liquidity buffer of unencumbered highly liquid assets sufficient to meet projected net cash outflows over 30 days under a range of stress scenarios.

Volcker Rule

The provisions of the Dodd-Frank Act commonly referred to as the "Volcker Rule" prohibit "banking entities," including BNY Mellon, from engaging in proprietary trading and limit our sponsorship of, and investments in, private equity and hedge funds ("covered funds"), including our ability to own or provide seed capital to covered funds. In addition, the Volcker Rule restricts us from engaging in certain transactions with covered funds (including, without limitation, certain U.S. funds for which BNY Mellon acts as both sponsor/manager and custodian). These restrictions are subject to certain exceptions.

The restrictions concerning proprietary trading do not contain a broad exemption for asset-liability management functions, but contain more limited exceptions for, among other things, bona fide liquidity risk management and risk-mitigating hedging activities, as well as certain classes of exempted instruments, including government securities. Ownership interests in covered funds is generally limited to 3% of the total number or value of the outstanding ownership interests of any individual fund at any time more than one year after the date of its establishment. The aggregate value of all such ownership interests in covered funds is limited to 3% of the banking organization's Tier 1 capital, and such interests are subject to a deduction from its Tier 1 capital. The 2019 amendments to the

Volcker Rule (discussed below) remove the requirements that ownership interests in third-party covered funds held under the underwriting and market-making exemptions be subject to the aggregate limit and capital deduction, but preserve these requirements for ownership interests in covered funds sponsored or organized by BNY Mellon.

The Volcker Rule regulations also require us to develop and maintain a compliance program.

In 2019, the Federal Reserve, OCC, FDIC, the Commodity Futures Trading Commission (“CFTC”) and the Securities and Exchange Commission (“SEC”) approved a final rule to modify the current regulations implementing the Volcker Rule. The most impactful aspects of the revisions with respect to BNY Mellon concern the compliance requirements applicable to institutions with moderate exposure to trading assets and trading liabilities, which are institutions with less than \$20 billion and more than \$1 billion of trading assets and trading liabilities. Specifically, among other revisions, such “moderate trading” banks will not be required to file an annual CEO attestation and will not be required to file quantitative metrics. Furthermore, the comprehensive six-pillar compliance program associated with the Volcker Rule will no longer apply to “moderate trading” banks; rather, such banks are permitted to tailor their compliance programs to the size and nature of their activities. BNY Mellon expects to be treated as a “moderate trading” bank under the revised Volcker Rule. The final revisions are also likely to result in fewer financial instruments and other transactions being subject to the prohibitions on proprietary trading. The mandatory compliance date of the final rule is Jan. 1, 2021, but institutions may elect to comply as early as Jan. 1, 2020.

On Jan. 30, 2020, the Federal Reserve, OCC, FDIC, CFTC and SEC proposed revisions to the covered funds provisions of the Volcker Rule’s implementing regulations. We are currently reviewing the proposal.

Derivatives

Title VII of the Dodd-Frank Act imposes a comprehensive regulatory structure on the OTC derivatives markets in which BNY Mellon operates, including requirements relating to the business conduct of dealers, trade reporting, margin and recordkeeping. Title VII also requires persons acting

as swap dealers, including The Bank of New York Mellon, to register with the CFTC and become subject to the CFTC’s supervisory, examination and enforcement powers.

In addition, because BNY Mellon is subject to supervision by the Federal Reserve, we must comply with the U.S. prudential margin rules with respect to its OTC swap transactions. The variation margin requirements of these rules have been in effect, and the initial margin requirements became applicable in September 2019. Furthermore, various BNY Mellon subsidiaries are also subject to OTC derivatives regulation by local authorities in Europe and Asia.

SEC Rules on Mutual Funds

The SEC has adopted regulations that impose requirements on mutual funds, exchange-traded funds and other registered investment companies. These rules require mutual funds (other than money market funds) to provide portfolio-wide and position-level holdings data to the SEC on a monthly basis. This data includes the pricing of portfolio securities, information regarding repurchase and securities lending activities, and the terms of derivatives contracts. Information contained in reports for the last month of each fund’s fiscal quarter are made available to the public within 60 days of the end of the relevant quarter.

The rules also impose liquidity risk management requirements that are intended to reduce the risk that funds will not be able to meet shareholder redemptions and to minimize the impact of redemptions on remaining shareholders. In keeping with the SEC’s requirements, we have established a liquidity risk management program whereby each impacted fund classifies the investments in its portfolio into one of four liquidity categories; maintains a highly liquid investment minimum; and limits illiquid investments to 15% of net assets.

On Nov. 25, 2019, the SEC re-proposed Rule 18f-4 under the Investment Company Act of 1940 (the “‘40 Act”), which was first proposed in 2015 and which would permit most registered investment companies to enter into derivatives transactions and certain other transactions notwithstanding the ‘40 Act’s restrictions, provided that the funds comply with certain conditions. The conditions include the implementation of a derivatives risk management program and compliance with an outer leverage risk

limit. The proposal would also permit a fund to enter into certain financing transactions and unfunded commitments subject to specific conditions. The SEC also proposed sales practices rules with respect to trades in shares of certain leveraged investment vehicles. BNY Mellon is evaluating the potential impact of these proposals on our activities.

Recovery and Resolution Planning

As required by the Dodd-Frank Act, large financial institutions such as BNY Mellon are required to submit periodically to the Federal Reserve and the FDIC a plan – referred to as the 165(d) resolution plan – for its rapid and orderly resolution in the event of material financial distress or failure. In addition, certain large IDIs, such as The Bank of New York Mellon are required to submit periodically to the FDIC a separate plan for resolution in the event of the institution’s failure. The public portions of these resolution plans are available on the Federal Reserve’s and FDIC’s websites. BNY Mellon also maintains a comprehensive recovery plan, which describes actions it could take to avoid failure if faced with financial stress.

In October 2019, the Federal Reserve and FDIC issued a final rule modifying certain requirements for the 165(d) resolution plan. The final rule requires U.S. G-SIBs, such as BNY Mellon, to file alternating full and, more limited, targeted resolution plans every two years. BNY Mellon’s next targeted resolution plan is due on July 1, 2021, followed by a full resolution plan submission due on July 1, 2023. The final rule does not materially modify the components or informational requirements of full resolution plans.

If the Federal Reserve and FDIC jointly determine that our 165(d) resolution plan is not credible and we fail to address the deficiencies in a timely manner, the FDIC and the Federal Reserve may jointly impose more stringent capital, leverage or liquidity requirements or restrictions on our growth, activities or operations. If we continue to fail to adequately remedy any deficiencies, we could be required to divest assets or operations that the regulators determine necessary to facilitate our orderly resolution.

The resolution strategy set out in our 165(d) resolution plan is a single point of entry strategy, whereby certain key operating subsidiaries would be provided with sufficient capital and liquidity to

operate in the event of material financial stress or failure and only our parent holding company would file for bankruptcy. In connection with our single point of entry resolution strategy, we have established the IHC to facilitate the provision of capital and liquidity resources to certain key subsidiaries in the event of material financial distress or failure. In addition, we have a binding support agreement in place that requires the IHC to provide that support. The support agreement required the Parent to transfer its intercompany loans and most of its cash to the IHC, and requires the Parent to continue to transfer cash and other liquid financial assets to the IHC on an ongoing basis.

BNY Mellon and the other U.S. G-SIBs are subject to heightened supervisory expectations for recovery and resolution preparedness under Federal Reserve rules and guidance. The Federal Reserve incorporates reviews of our capabilities in respect of recovery and resolution preparedness as part of its ongoing supervision of BNY Mellon.

The European Union Bank Recovery and Resolution Directive (“BRRD”) provides the legal framework for recovery and resolution planning, including a set of harmonized powers to resolve or implement recovery of in-scope institutions, such as subsidiaries of non-European Economic Area (“EEA”) banks incorporated in the EEA. The BRRD gives relevant EEA regulators various powers, including (i) powers to intervene pre-resolution to require an institution to take remedial steps to avoid the need for resolution; (ii) resolution tools and powers to facilitate the resolution of failing entities, such as the power to “bail-in” the debt of an institution (including certain deposit obligations); (iii) the power to require a firm to change its structure to remove impediments to resolvability; and (iv) powers to require in-scope institutions to prepare recovery plans. Under the BRRD, resolution authorities (rather than the institutions themselves) are responsible for drawing up resolution plans based on information provided by relevant institutions.

In addition, under the BRRD in-scope institutions are required to maintain a minimum requirement for own funds, defined as regulatory capital, and eligible liabilities (“MREL”) that can be written down or bailed-in to absorb losses. MREL will be set on a case-by-case basis for each institution subject to the BRRD. MREL is the EU equivalent of TLAC, and is generally aligned with the FSB’s TLAC proposals. In

contrast to TLAC, MREL will apply to all EU-domiciled credit institutions and certain other firms subject to the BRRD (not only G-SIBs). Certain BRRD-related requirements have recently been amended under the EU Banking Reform Package, referred to below.

Rules on Resolution Stays for Qualified Financial Contracts

In 2017, the Federal Reserve, OCC and FDIC adopted rules requiring U.S. G-SIBs (and their subsidiaries and controlled entities) and the U.S. operations of foreign G-SIBs to amend their covered qualified financial contracts (“QFCs”), thereby facilitating the application of U.S. special resolution regimes as necessary.

The final rule allows these G-SIBs to comply with the rule by amending covered QFCs (with the consent of relevant counterparties) using the International Swaps and Derivatives Association (“ISDA”) 2018 U.S. Resolution Stay Protocol (the “Protocol”), ISDA 2015 Universal Stay Protocol or by executing appropriate bilateral amendments to the covered QFCs. BNY Mellon entities which have been confirmed to engage in covered QFC activities have adhered to the Protocol and, where necessary, have executed bilateral amendments to cover QFCs.

Cybersecurity Regulation

The New York State Department of Financial Services (“NYSDFS”) requires financial institutions regulated by NYSDFS, including BNY Mellon, to establish a cybersecurity program, adopt a written cybersecurity policy, designate a chief information security officer, and have policies and procedures in place to ensure the security of information systems and non-public information accessible to, or held by, third parties. The NYSDFS rule also includes a variety of other requirements to protect the confidentiality, integrity and availability of information systems, as well as the annual delivery of a certificate of compliance.

Insolvency of an Insured Depository Institution or a Bank Holding Company; Orderly Liquidation Authority

If the FDIC is appointed as conservator or receiver for an IDI such as The Bank of New York Mellon or

BNY Mellon, N.A., upon its insolvency or in certain other circumstances, the FDIC has the power to:

- Transfer any of the depository institution’s assets and liabilities to a new obligor, including a newly formed “bridge” bank without the approval of the depository institution’s creditors;
- Enforce the terms of the depository institution’s contracts pursuant to their terms without regard to any provisions triggered by the appointment of the FDIC in that capacity; or
- Repudiate or disaffirm any contract or lease to which the depository institution is a party, the performance of which is determined by the FDIC to be burdensome and the disaffirmance or repudiation of which is determined by the FDIC to promote the orderly administration of the depository institution.

In addition, under federal law, the claims of holders of domestic deposit liabilities and certain claims for administrative expenses against an IDI would be afforded a priority over other general unsecured claims against such an institution, including claims of debt holders of the institution, in the “liquidation or other resolution” of such an institution by any receiver. As a result, whether or not the FDIC ever sought to repudiate any debt obligations of The Bank of New York Mellon or BNY Mellon, N.A., the debt holders would be treated differently from, and could receive, if anything, substantially less than, the depositors of the bank.

The Dodd-Frank Act created a new resolution regime (known as the “orderly liquidation authority”) for systemically important financial companies, including BHCs and their affiliates. Under the orderly liquidation authority, the FDIC may be appointed as receiver for the systemically important institution, and its failed nonbank subsidiaries, for purposes of liquidating the entity if, among other conditions, it is determined that the institution is in default or in danger of default and the failure poses a risk to the stability of the U.S. financial system.

If the FDIC is appointed as receiver under the orderly liquidation authority, then the powers of the receiver, and the rights and obligations of creditors and other parties who have dealt with the institution, would be determined under the Dodd-Frank Act’s orderly liquidation authority provisions, and not under the insolvency law that would otherwise apply. The

powers of the receiver under the orderly liquidation authority were based on the powers of the FDIC as receiver for depository institutions under the FDI Act. However, the provisions governing the rights of creditors under the orderly liquidation authority were modified in certain respects to reduce disparities with the treatment of creditors' claims under the U.S. Bankruptcy Code as compared to the treatment of those claims under the new authority. Nonetheless, substantial differences in the rights of creditors exist between these two regimes, including the right of the FDIC to disregard the strict priority of creditor claims in some circumstances, the use of an administrative claims procedure to determine creditors' claims (as opposed to the judicial procedure utilized in bankruptcy proceedings), and the right of the FDIC to transfer assets or liabilities of the institution to a third party or a "bridge" entity.

Depositor Preference

Under U.S. federal law, claims of a receiver of an IDI for administrative expenses and claims of holders of U.S. deposit liabilities (including foreign deposits that are payable in the U.S. as well as in a foreign branch of the depository institution) are afforded priority over claims of other unsecured creditors of the institution, including depositors in non-U.S. branches. As a result, such depositors could receive, if anything, substantially less than the depositors in U.S. offices of the depository institution.

Transactions with Affiliates

Transactions between BNY Mellon's banking subsidiaries, on the one hand, and the Parent and its nonbank subsidiaries and affiliates, on the other, are subject to certain restrictions, limitations and requirements, which include limits on the types and amounts of transactions (including extensions of credit and asset purchases by our banking subsidiaries) that may take place and generally require those transactions to be on arm's-length terms. In general, extensions of credit by a BNY Mellon banking subsidiary to any nonbank affiliate, including the Parent, must be secured by designated amounts of specified collateral and are limited in the aggregate to 10% of the relevant bank's capital and surplus for transactions with a single affiliate and to 20% of the relevant bank's capital and surplus for transactions with all affiliates. There are also limitations on affiliate credit exposures arising from

derivative transactions and securities lending and borrowing transactions.

Deposit Insurance

Our U.S. banking subsidiaries, including The Bank of New York Mellon and BNY Mellon, N.A., accept deposits, and those deposits have the benefit of FDIC insurance up to the applicable limit. The current limit for FDIC insurance for deposit accounts is \$250,000 per depositor at each insured bank. Under the FDI Act, insurance of deposits may be terminated by the FDIC upon a finding that the IDI has engaged in unsafe and unsound practices, is in an unsafe or unsound condition to continue operations or has violated any applicable law, regulation, rule, order or condition imposed by a bank's federal regulatory agency.

The FDIC's Deposit Insurance Fund (the "DIF") is funded by assessments on IDIs. The FDIC assesses DIF premiums based on a bank's average consolidated total assets, less the average tangible equity of the IDI during the assessment period. For larger institutions, such as The Bank of New York Mellon and BNY Mellon, N.A., assessments are determined based on CAMELS ratings and forward-looking financial measures to calculate the assessment rate, which is subject to adjustments by the FDIC, and the assessment base.

Under the FDIC's regulations, a custody bank, including The Bank of New York Mellon and BNY Mellon, N.A., may deduct from its assessment base 100% of cash and balances due from depository institutions, securities, federal funds sold, and securities purchased under agreement to resell with a Standardized Approach risk-weight of 0% and may deduct 50% of such asset types with a Standardized Approach risk-weight of greater than 0% and up to and including 20%. This assessment base deduction may not exceed the average value of deposits that are classified as transaction accounts and are identified by the bank as being directly linked to a fiduciary or custodial and safekeeping account.

The Dodd-Frank Act requires the DIF reserve ratio to reach a minimum of 1.35% by Sept. 30, 2020, and authorizes the FDIC to implement special assessments on IDIs to reach the required ratio. On Sept. 30, 2018, the FDIC announced that the DIF reserve ratio had reached 1.36%.

Source of Strength and Liability of Commonly Controlled Depository Institutions

BHCs are required by law to act as a source of strength to their bank subsidiaries. Such support may be required by the Federal Reserve at times when we might otherwise determine not to provide it. In addition, any loans by BNY Mellon to its bank subsidiaries would be subordinate in right of payment to depositors and to certain other indebtedness of its banks. In the event of a BHC's bankruptcy, any commitment by the BHC to a federal bank regulator to maintain the capital of a subsidiary bank will be assumed by the bankruptcy trustee and entitled to a priority of payment. In addition, in certain circumstances, BNY Mellon's IDI subsidiaries could be held liable for losses incurred by another BNY Mellon IDI subsidiary. In the event of impairment of the capital stock of one of BNY Mellon's national bank subsidiaries or The Bank of New York Mellon, BNY Mellon, as the banks' stockholder, could be required to pay such deficiency.

Incentive Compensation Arrangements Proposal

Section 956 of the Dodd-Frank Act requires federal regulators to prescribe regulations or guidelines regarding incentive-based compensation practices at certain financial institutions, including BNY Mellon. In April 2016, a joint proposed rule was released, replacing a previous 2011 proposal, which each of six agencies must separately approve. The timeframe for final implementation is currently unknown.

Anti-Money Laundering and the USA PATRIOT Act

A major focus of governmental policy on financial institutions has been aimed at combating money laundering and terrorist financing. The USA PATRIOT Act of 2001 contains numerous anti-money laundering requirements for financial institutions that are applicable to BNY Mellon's bank, broker-dealer and investment adviser subsidiaries and mutual funds and private investment companies advised or sponsored by our subsidiaries. Those regulations impose obligations on financial institutions to maintain a broad anti-money laundering program that includes internal controls, independent testing, compliance management personnel, training, and customer due diligence processes, as well as appropriate policies, procedures and controls to detect, prevent and report money laundering, terrorist financing and other suspicious activity, and to verify

the identity of their customers. Certain of those regulations impose specific due diligence requirements on financial institutions that maintain correspondent or private banking relationships with non-U.S. financial institutions or persons.

Financial Crimes Enforcement Network ("FinCEN")

FinCEN has issued rules under the Bank Secrecy Act that apply to covered financial institutions, including The Bank of New York Mellon and BNY Mellon, N.A., setting forth five pillars of an effective anti-money laundering ("AML") program: development of internal policies, procedures and related controls; designation of a compliance officer; a thorough and ongoing training program; independent review for compliance; and customer due diligence ("CDD"). CDD requires a covered financial institution to implement and maintain risk-based procedures for conducting CDD that include the identification and verification of any beneficial owner(s) of each legal entity customer at the time a new account is opened on or after May 11, 2018.

New York State Department of Financial Services Anti-Money Laundering and Anti-Terrorism Regulations

The NYDFS has also issued regulations requiring regulated institutions, including The Bank of New York Mellon, to maintain a transaction monitoring program to monitor transactions for potential Bank Secrecy Act ("BSA") and AML violations and suspicious activity reporting, and a watch list filtering program to interdict transactions prohibited by applicable sanctions programs.

The regulations require a regulated institution to maintain programs to monitor and filter transactions for potential BSA and AML violations and prevent transactions with sanctioned entities. The regulations also require institutions to submit annually a Board resolution or senior officer compliance finding confirming steps taken to ascertain compliance with the regulation.

Privacy and Data Protection

The privacy provisions of the Gramm-Leach-Bliley Act generally prohibit financial institutions, including BNY Mellon, from disclosing nonpublic personal financial information of consumer customers to third parties for certain purposes (primarily marketing)

unless customers have the opportunity to “opt out” of the disclosure. The Fair Credit Reporting Act restricts information sharing among affiliates for marketing purposes.

In the EU, privacy law is primarily regulated by the General Data Protection Regulation (“GDPR”), which has been directly binding and applicable for each EU member state since May 25, 2018. The GDPR contains enhanced compliance obligations and increased penalties for non-compliance compared to prior EU data protection legislation.

Acquisitions/Transactions

Federal and state laws impose notice and approval requirements for mergers and acquisitions involving depository institutions or BHCs. The Bank Holding Company Act of 1956, as amended by the Gramm-Leach-Bliley Act and by the Dodd-Frank Act (the “BHC Act”) requires the prior approval of the Federal Reserve for the direct or indirect acquisition by a BHC of more than 5% of any class of the voting shares or all or substantially all of the assets of a commercial bank, savings and loan association or BHC. In reviewing bank acquisition and merger applications, the bank regulatory authorities will consider, among other things, the competitive effect of the transaction, financial and managerial resources, including the capital position of the combined organization, convenience and needs of the community factors, including the applicant’s record under the Community Reinvestment Act of 1977 (the “CRA”), the effectiveness of the subject organizations in combating money laundering activities and the risk to the stability of the U.S. banking or financial system. In addition, prior Federal Reserve approval would be required for BNY Mellon to acquire direct or indirect ownership or control of any voting shares of a company with assets of \$10 billion or more that is engaged in activities that are “financial in nature.”

New Rating System for the Supervision of Large Financial Institutions

On Nov. 2, 2018, the Federal Reserve issued a final rule (the “LFI Rule”) that establishes a new rating system for the supervision of large financial institutions (“LFIs”), including BNY Mellon. The LFI rating system applies to, among other entities, all BHCs with total consolidated assets of \$100 billion or

more. The LFI Rule became effective on Feb. 1, 2019.

The LFI rating system includes a new four-level rating scale and three component ratings. The four levels are: Broadly Meets Expectations; Conditionally Meets Expectations; Deficient-1; and Deficient-2. The component ratings are assigned for: Capital Planning and Positions; Liquidity Risk Management and Positions; and Governance and Controls. A firm must be rated “Broadly Meets Expectations” or “Conditionally Meets Expectations” for each of its component ratings to be considered “well managed” in accordance with various statutes and regulations that permit additional activities, prescribe expedited procedures or provide other benefits for “well managed” firms.

The Federal Reserve assigned initial ratings under the new rating system to BHCs that are subject to the Large Institution Supervision Coordinating Committee framework, including BNY Mellon, in 2019.

Regulated Entities of BNY Mellon and Ancillary Regulatory Requirements

BNY Mellon is registered as an FHC under the BHC Act. We are subject to supervision by the Federal Reserve. In general, the BHC Act limits an FHC’s business activities to banking, managing or controlling banks, performing certain servicing activities for subsidiaries, engaging in activities incidental to banking, and engaging in any activity, or acquiring and retaining the shares of any company engaged in any activity, that is either financial in nature or complementary to a financial activity and does not pose a substantial risk to the safety and soundness of depository institutions or the financial system generally.

A BHC’s ability to maintain FHC status is dependent on: (i) its U.S. depository institution subsidiaries qualifying on an ongoing basis as “well capitalized” and “well managed” under the prompt corrective action regulations of the appropriate regulatory agency (discussed above under “Prompt Corrective Action”); (ii) the BHC itself qualifying on an ongoing basis as “well capitalized” and “well managed” under applicable Federal Reserve regulations; and (iii) its U.S. depository institution subsidiaries continuing to maintain at least a “satisfactory” rating under the CRA.

An FHC that does not continue to meet all the requirements for FHC status will, depending on which requirements it fails to meet, lose the ability to undertake new activities, or make acquisitions, that are not generally permissible for BHCs without FHC status. As of Dec. 31, 2019, BNY Mellon and our U.S. bank subsidiaries were “well capitalized” based on the ratios and rules applicable to them.

The Bank of New York Mellon, BNY Mellon’s largest banking subsidiary, is a New York state-chartered bank, and a member of the Federal Reserve System and is subject to regulation, supervision and examination by the Federal Reserve, the FDIC and the NYSDFS. BNY Mellon’s national bank subsidiaries, BNY Mellon, N.A. and The Bank of New York Mellon Trust Company, National Association, are chartered as national banking associations subject to primary regulation, supervision and examination by the OCC.

We operate a number of broker-dealers that engage in securities underwriting and other broker-dealer activities in the United States. These companies are SEC-registered broker-dealers and members of Financial Industry Regulatory Authority, Inc. (“FINRA”), a securities industry self-regulatory organization. BNY Mellon’s nonbank subsidiaries engaged in securities-related activities are regulated by supervisory agencies in the countries in which they conduct business.

Certain of BNY Mellon’s public finance and advisory activities are regulated by the Municipal Securities Rulemaking Board and are required under the SEC’s Municipal Advisors Rule to register with the SEC if they provide advice to municipal entities or certain other persons on the issuance of municipal securities, or about certain investment strategies or municipal derivatives.

Certain of BNY Mellon’s subsidiaries are registered with the CFTC as commodity pool operators, introducing brokers and/or commodity trading advisors and, as such, are subject to CFTC regulation. The Bank of New York Mellon is provisionally registered as a Swap Dealer (as defined in the Dodd-Frank Act) with the CFTC, and is a member of the National Futures Association (“NFA”) in that same capacity. As a Swap Dealer, The Bank of New York Mellon is subject to regulation, supervision and examination by the CFTC and NFA.

Certain of our subsidiaries are registered investment advisors under the Investment Advisers Act of 1940 (“Advisers Act”), as amended, and as such are supervised by the SEC. They are also subject to various U.S. federal and state laws and regulations and to the laws and regulations of any countries in which they conduct business. Our subsidiaries advise both public investment companies which are registered with the SEC under the ‘40 Act, including the BNY Mellon Family of Funds, and private investment companies which are not registered under the ‘40 Act.

Certain of our investment management, trust and custody operations provide services to employee benefit plans that are subject to the Employee Retirement Income Security Act of 1974, as amended (“ERISA”), administered by the U.S. Department of Labor (“DOL”). ERISA imposes certain statutory duties, liabilities, disclosure obligations and restrictions on fiduciaries, as applicable, related to the services being performed and fees being paid.

SEC Regulation Best Interest

On June 5, 2019, the SEC adopted a package of rulemakings and interpretations designed to enhance the quality and transparency of retail investors’ relationships with investment advisers and broker-dealers while preserving access to a variety of investment services and products. Specifically, these actions include Regulation Best Interest, the Form CRS Relationship Summary, and two separate interpretations under the Advisers Act. Regulation Best Interest will require a broker-dealer to act in the “best interest” of a retail customer when making a recommendation of any securities transaction or investment strategy to any such customer. Regulation Best Interest, which has a compliance date of June 30, 2020, is designed to make it clear that a broker-dealer may not put its financial interests ahead of the interests of a retail customer in making recommendations. The Form CRS Relationship Summary, which also has a compliance date of June 30, 2020, will require registered investment advisers and broker-dealers to provide retail investors with information about the nature of their relationship with their investment professional, and would supplement other more detailed disclosures. In addition, the SEC finalized its interpretation of the fiduciary duty applicable to investment advisers under the Advisers Act. Finally, the SEC issued an interpretation of the “solely incidental” prong of the broker-dealer

exclusion under the Advisers Act, which is intended to more clearly delineate when a broker-dealer's performance of advisory activities causes it to become an investment adviser within the meaning of the Advisers Act. BNY Mellon continues to evaluate the impact that these developments may have on BNY Mellon.

Exchange-Traded Funds Rule

On Sept. 26, 2019, the SEC announced that it had adopted Rule 6c-11 (the "ETF Rule") under the '40 Act, which permits exchange-traded funds ("ETFs") that satisfy certain conditions to organize and operate without first obtaining an exemptive order from the SEC and requires an ETF to make certain disclosures, including historical data on an ETF's premiums, discounts and bid-ask spread information, as well as the ETF's daily portfolio holdings. The ETF Rule became effective on Dec. 23, 2019. One year after that date, all existing exemptive orders for ETFs that would be permitted to operate in reliance on the ETF Rule will be rescinded. The ETF Rule also requires ETFs using custom baskets to put written policies and procedures in place establishing that the custom baskets are in the best interests of the ETF and its shareholders. BNY Mellon is planning to launch ETFs in 2020 under the ETF Rule.

Operations and Regulations Outside the United States

In Europe, branches of The Bank of New York Mellon are subject to regulation in the countries in which they are established, in addition to being subject to oversight by the U.S. regulators referred to above. BNY Mellon SA/NV is a public limited liability company incorporated under the laws of Belgium, holds a banking license issued by the National Bank of Belgium ("NBB") and is authorized to carry out all banking and savings activities as a credit institution. The European Central Bank ("ECB") has responsibility for the direct supervision of significant banks and banking groups in the euro area, including BNY Mellon SA/NV. The ECB's supervision is carried out in conjunction with the relevant national prudential regulator (NBB in BNY Mellon SA/NV's case), as part of the single supervisory mechanism ("SSM"). BNY Mellon SA/NV conducts its activities in Belgium as well as through its branch offices in the UK, Ireland, Italy, Luxembourg, the Netherlands, France and Germany.

Certain of our financial services operations in the UK are subject to regulation and supervision by the Financial Conduct Authority ("FCA") and the Prudential Regulation Authority ("PRA"). The PRA is responsible for the authorization and prudential regulation of firms that carry on PRA-regulated activities, including banks. PRA-authorized firms are also subject to regulation by the FCA for conduct purposes. In contrast, FCA-authorized firms (such as investment management firms) have the FCA as their sole regulator for both prudential and conduct purposes. As a result, FCA-authorized firms must comply with FCA prudential and conduct rules and the FCA's Principles for Businesses, while dual-regulated firms must comply with the FCA conduct rules and FCA Principles, as well as the applicable PRA prudential rules and the PRA's Principles for Businesses.

The PRA regulates The Bank of New York Mellon (International) Limited, our UK-incorporated bank, as well as the London branch of The Bank of New York Mellon. Certain of BNY Mellon's UK-incorporated subsidiaries are authorized to conduct investment business in the UK. Their investment management advisory activities and their sale and marketing of retail investment products are regulated by the FCA. Certain UK investment funds, including investment funds of BNY Mellon, are registered with the FCA and are offered for sale to retail investors in the UK.

Since the financial crisis, the European Union and its Member States have engaged in a significant overhaul of bank regulation and supervision. To increase the resilience of banks and to reduce the impact of potential bank failures, new rules on capital requirements for banks and bank recovery and resolution have been adopted.

Aspects of the European Union's Banking Union have entered into force in most EU jurisdictions. The key components of the Banking Union include the single resolution mechanism ("SRM") and the SSM. The SRM approach endorses the bail-in rules established in the BRRD and is described in more detail above in the section addressing Recovery and Resolution.

The primary prudential framework in the EU is provided by the Capital Requirements Directive IV ("CRD4") and the Capital Requirements Regulation ("CRR"), both of which implement many elements of the Basel III framework. CRD4/CRR are being

updated by the Capital Requirements Directive V (“CRD5”) and the Capital Requirements Regulation II (“CRR2”) respectively, as described below under “EU Banking Reform Package.”

Our Investment Management and Investment Services businesses are subject to significant regulation in numerous jurisdictions around the world relating to, among other things, the safeguarding, administration and management of client assets and client funds.

Various new, revised and/or proposed European Union directives and regulations have or will have a significant impact on our provision of many of our products and services, including the Markets in Financial Instruments Directive II and Markets in Financial Instruments Regulation (collectively, “MiFID II”), the Alternative Investment Fund Managers Directive (“AIFMD”), the Directive on Undertakings for Collective Investment in Transferable Securities (“UCITS V”), the Central Securities Depositories Regulation, the regulation on OTC derivatives, central counterparties and trade repositories (commonly known as “EMIR”), the Securities Financing Transactions Regulation, the Payment Services Directive II and the Benchmarks Regulation. These European Union directives and regulations may impact our operations and risk profile but may also provide new opportunities for the provision of BNY Mellon products and services. Some of these European Union directives and regulations are still subject to finalization by the legislative authorities and/or substantial secondary legislation. This creates uncertainty as to business impact.

The types of activities in which the foreign branches of our banking subsidiaries and our international subsidiaries may engage are subject to various restrictions imposed by the Federal Reserve. Those foreign branches and international subsidiaries are also subject to the laws and regulatory authorities of the countries in which they operate and, in the case of banking subsidiaries, may be subject to regulatory capital requirements in the jurisdictions in which they operate.

EU Banking Reform Package

CRD5, CRR2, the Bank Resolution and Recovery Directive 2 (“BRRD2”) and Single Resolution Mechanism 2 (“SRMR2”) (collectively, “The EU

Banking Reform Package”) entered into force on June 27, 2019 and are being implemented in various phases between 2019 and 2024. This legislative package amends CRD4, CRR, the BRRD and the Single Resolution Mechanism Regulation.

Among other things, CRD5 includes a requirement for certain non-EU banking groups to have up to two “EU intermediate parent undertakings” (“EU IPU”). All EU credit institutions and certain EU investment firms in such non-EU banking groups would need to fall within a corporate structure headed by one of the EU IPU. BNY Mellon is assessing the impact of this requirement in conjunction with the Investment Firms Directive (“IFD”)/Investment Firms Regulation (“IFR”) legislation referred to below.

CRR2 includes provisions relating to the leverage ratio, NSFR, MREL (including closer alignment to the final FSB TLAC standard), a revised Basel market risk framework, counterparty credit risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures and reporting/disclosure requirements. Many of the elements of CRR2 will apply from June 27, 2021.

BRRD2 includes new rules on MREL to bring these in line with the FSB’s TLAC standard. BRRD2 also amends BRRD moratorium tools, and introduces an EU-wide requirement for contractual recognition of resolution stay powers. Currently only some Member States have contractual recognition of resolution stay powers. SRMR2 includes revisions to the MREL framework that mirror the amendments in BRRD2.

The extent to which the UK implements the EU Banking Reform Package depends on its policy stance after the end of the transition period under the EU withdrawal agreement. The UK government has expressed an intention to implement the remaining elements of the Basel III framework in the UK, in line with previous G20 commitments.

Investment Firms Directive and Investment Firms Regulation

IFD/IFR, previously referred to as the “new prudential regime for investment firms,” is a more tailored, proportionate prudential regime for investment firms. IFD/IFR entered into force on Dec. 25, 2019 and will generally apply from June 26, 2021 (immediately before CRR2 generally applies).

Under IFD/IFR, most EU investment firms will move from the current CRD4/CRR regime to the IFD/IFR regime on June 26, 2021. Accordingly, such firms will not need to implement CRD5/CRR2. We expect that most (if not all) of BNY Mellon's EU investment firms will be classified as "Class 2 investment firms," which means that they will become subject to the IFD/IFR regime.

The extent to which the UK implements IFD/IFR depends on its policy stance after the end of the transition period under the EU withdrawal agreement. The UK may implement many elements of IFD/IFR, as the UK supported the development of a more proportionate prudential regime for investment firms, and in order to maintain broad alignment with the EU in this area.

European Deposit Insurance Scheme

The European Commission has proposed a European Deposit Insurance Scheme ("EDIS") for euro area Member States. Under the EDIS proposal, existing national euro area deposit guarantee schemes would transition over a number of years to a mutualized or EU-reinsurance-based deposit guarantee scheme applicable in the euro area. It is unclear when the EDIS proposal will be implemented.

European Financial Markets and Market Infrastructure

The EU continues to develop proposals and regulations in relation to financial markets and market infrastructures. MiFID II took effect on Jan. 3, 2018. It affects EU Member States and those financial institutions conducting business in the EEA and has required significant change to comply with relevant regulatory requirements, including extensive transaction reporting and market transparency obligations and a heightened focus on how financial

institutions conduct business with and disclose information to their clients.

Capital Markets Union

A key policy objective of the 2014-19 European Commission was to develop a Capital Markets Union ("CMU") in the EU. While some initiatives were substantially advanced, including a new Prospectus Regulation and a new Securitization Regulation, which became fully effective in 2019, there has been little overall progress towards achieving the objective of creating a true pan-EU CMU.

Investment Services and Investment Management in the European Union

The AIFMD has a direct effect on our alternative fund manager clients and our depository business and other products offered across Europe as well as upon our Investment Management business. AIFMD imposes heightened obligations upon depositories, which have operational effects.

Our businesses servicing regulated funds in Europe and our investment management businesses in Europe are also affected by the revised directive governing UCITS V.

On July 12, 2018, the European Commission adopted regulations for depository safekeeping duties under AIFMD and UCITS V. The Commission recognized the use of omnibus account structures when accounting for assets in a chain of custody, but determined that depositories and trustees must maintain their own books and records and will no longer be allowed to rely on a custodian's records. BNY Mellon has initiated a project to implement any changes necessary to comply with these regulations by the Commission's deadline of April 1, 2020.

UK's Withdrawal from the EU ("Brexit")

The UK withdrew from the EU on Jan. 31, 2020. The UK and EU have agreed on terms for the UK's withdrawal from the EU, including a transition period until Dec. 31, 2020. During the transition period, the UK will continue to have access to the EU's single market by virtue of "EU passporting rights" and will abide by EU rules and regulations until the end of the transition period. During this time, UK financial services firms will have full EU "passporting" rights to provide services in a number of EU jurisdictions. At the end of the transition period, UK financial services firms will lose the benefit of transacting within the EU by virtue of the "passporting" rights unless an alternative agreement is made during the transition period.

BNY Mellon's plan for Brexit has always assumed that UK financial services firms will no longer benefit from "passporting" rights at the point of withdrawal and it currently assumes that an alternative agreement will not be made during the transition period.

BNY Mellon maintains a presence in the UK through the London branch of The Bank of New York Mellon, The Bank of New York Mellon (International) Limited, a credit institution incorporated and authorized in the UK, and a number of its investment management subsidiaries. We maintain a presence in the EU through BNY Mellon SA/NV, which is headquartered in Belgium and has a branch network in a number of other EU countries, and through certain of our investment management subsidiaries. BNY Mellon SA/NV has a general banking license for the provision of banking and investment services. We have undertaken adjustments to the operations of BNY Mellon SA/NV so that it may provide a wider range of services to clients domiciled in the EU. For a discussion of the risks regarding Brexit, see "Risk Factors - The UK's withdrawal from the EU may have negative effects on global economic conditions, global financial markets, and our business and results of operations."

Replacement of Interbank Offered Rates ("IBORs"), including LIBOR

Globally, financial market participants have begun to transition away from LIBOR and other IBORs to alternative reference rates in anticipation of the expected discontinuance of LIBOR and other IBORs by the end of 2021. This transition will impact assets and liabilities on our balance sheet that reference IBORs, investments that we manage linked to IBORs in our Investment Management business and the operational servicing of products that reference IBORs in our Investment Services business.

We are working to facilitate an orderly transition from IBORs to alternative reference rates for us and our clients. Accordingly, we have created a global transition program with senior management oversight that focuses on, among other things, evaluating and monitoring the impacts of the discontinuance of reference IBORs and the transition to replacement benchmarks on our business operations and financial condition; identifying and evaluating the scope of impacted financial instruments and contracts and the attendant risks; and implementing technology systems, models and analytics to support the transition. In addition, we continue to actively engage with our regulators and clients and participate in central bank and sector working groups.

There remain, however, a number of unknown factors regarding the transition from the IBORs and/or interest rate benchmark reforms that could impact our business. For a further discussion of the various risks, see "Risk Factors - Transitions away from and the anticipated replacement of LIBOR and other IBORs could adversely impact our business and results of operations."

Making or continuing an investment in securities issued by us involves certain risks that you should carefully consider. The following discussion sets forth the most significant risk factors that could affect our business, financial condition or results of operations. Some of these risks are interrelated and the occurrence of one may exacerbate the effect of others. However, factors other than those discussed below or in other of our reports filed with or furnished to the SEC also could adversely affect our business, financial condition or results of operations. We cannot assure you that the risk factors described below or elsewhere in our reports address all potential risks that we may face. These risk factors also serve to describe factors which may cause our results to differ materially from those described in forward-looking statements included herein or in other documents or statements that make reference to this Annual Report. See “Forward-looking Statements.”

Operational Risk

A communications or technology disruption or failure within our infrastructure or the infrastructure of third parties that results in a loss of information, delays our ability to access information or impacts our ability to provide services to our clients may materially adversely affect our business, financial condition and results of operations.

We use communications and information systems to conduct our business. Our businesses are highly dependent on our ability to process large volumes of data that require global capabilities and scale from our technology platforms. If our technology or communications fail, or those of industry utilities or our service providers fail, we could experience, and have in the past experienced, production and system outages or failures or other significant operational delays. Any such outage, failure or delay could adversely affect our ability to effect transactions or service our clients, which could expose us to liability for damages, result in the loss of business, damage our reputation, subject us to regulatory scrutiny or sanctions or expose us to litigation, any of which could have a material adverse effect on our business, financial condition and results of operations. Security or technology disruptions, failures or delays that impact our communications or information systems could also adversely affect our ability to manage our exposure to risk or expand our business.

Upgrading our computer systems, software and networks subjects us to the risk of disruptions, failures or delays due to the complexity and interconnectedness of our systems, software and networks. The failure to upgrade or maintain these computer systems, software and networks could result in greater susceptibility to attacks, unauthorized access and misuse, and could also prevent us from achieving our business continuity and resiliency objectives. There can be no assurance that any such disruptions, failures or delays will not occur or, if they do occur, that they will be adequately addressed.

Third parties with which we do business or that facilitate our business activities, including exchanges, clearing houses, financial intermediaries or vendors that provide services or security solutions for our operations, could also be sources of technology risk to us, including from breakdowns, capacity constraints, failures or delays of their own systems or other services that impair our ability to process transactions and communicate with customers and counterparties. In addition, we are exposed to the risk that a technology disruption or other information security event at a vendor common to our third-party service providers could impede their ability to provide products or services to us. We may not be able to effectively monitor or mitigate operational risks relating to the use of common vendors by third-party service providers, which could result in potential liability to clients and customers, regulatory fines, penalties or other sanctions, increased operational costs or harm to our reputation.

As our business areas evolve, whether due to the introduction of technology, new service offering requirements for our clients, or changes in regulation relative to these service offerings, unforeseen risks materially impacting our business operations could arise. The technology used can become increasingly complex and rely on the continued effectiveness of the programming code and integrity of the inputted data. Rapid technological changes and competitive pressures require us to make significant and ongoing investments in technology not only to develop competitive new products and services or adopt new technologies, but to sustain our current businesses. Our financial performance depends in part on our ability to develop and market these new products and services in a timely manner at a competitive price and adopt or develop new technologies that differentiate our products or provide cost efficiencies. The failure to conduct adequate review and consideration of

critical business changes prior to and during introduction and deployment of key technological systems or the failure to adequately align operational capabilities with evolving client commitments and expectations, subjects us to the risk of an adverse impact on our ability to service and retain customers and on our operations. The costs we incur in enhancing our technology could be substantial and may not ultimately improve our competitiveness or profitability.

We continue to evaluate and strengthen our business continuity and operational resiliency capabilities and have increased our investments in technology to steadily enhance those capabilities, including our ability to resume and sustain our operations. There can be no guarantee, however, that a technology outage will not occur or that our business continuity and operational resiliency capabilities will enable us to maintain our operations and appropriately respond to events. For a discussion of operational risk, see “Risk Management - Operational Risk.”

As a result of financial entities, central agents, clearing agents and houses, exchanges and technology systems across the globe becoming more interdependent and complex, a technology failure that significantly degrades, deletes or compromises the systems or data of one or more financial entities or suppliers could have a material impact on counterparties or other market participants, including us. A disruptive event or, failure or delay experienced by one institution could disrupt the functioning of the overall financial system.

A cybersecurity incident, or a failure to protect our computer systems, networks and information and our clients’ information against cybersecurity threats, could result in the theft, loss, unauthorized access to, disclosure, use or alteration of information, system or network failures, or loss of access to information. Any such incident or failure could adversely impact our ability to conduct our businesses, damage our reputation and cause losses.

We have been, and we expect to continue to be, the target of attempted cyber-attacks, computer viruses or other malicious software, denial of service efforts, phishing attacks and other information security threats, including unauthorized access attempts. These cybersecurity risks are expected to continue to increase and intensify. Although we deploy a broad range of sophisticated defenses, we could suffer a

material adverse impact or disruption as a result of a cybersecurity incident.

Cybersecurity incidents may occur through intentional or unintentional acts by individuals or groups having authorized or unauthorized access to our systems or our clients’ or counterparties’ information, which may include confidential information. These individuals or groups include employees, vendors and customers, as well as others with malicious intent. Malicious actors may also attempt to place individuals within BNY Mellon or fraudulently induce employees, vendors, customers or other users of our systems to disclose sensitive information in order to gain access to our data or that of our clients. A cybersecurity incident that results in the theft, loss, unauthorized access to, disclosure, use or alteration of information, system or network failures, or loss of access to information, may require us to reconstruct lost data (which may not be possible), reimburse clients for data and credit monitoring services, result in loss of customer business, or damage to our computers or systems and those of our customers and counterparties. These impacts could be costly and time-consuming and materially negatively impact our business operations, financial condition and reputation.

While we seek to mitigate these risks to ensure the integrity of our systems and information and continuously evolve our cybersecurity capabilities, it is possible that we may not anticipate or implement effective preventive measures against all cybersecurity threats, or detect all such threats, especially because the techniques used change frequently or are not recognized until after they are launched. Moreover, attacks can originate from a wide variety of sources, including malicious actors who are involved with organized crime or who may be linked to terrorist organizations or hostile foreign governments, or from cross-contamination of legitimate parties (including vendors, clients, financial market utilities, and other financial institutions).

The failure to maintain an adequate technology infrastructure and applications with effective cybersecurity controls relative to the type, size and complexity of operations, markets and products traded, access to trading venues and our market interconnectedness could impact operations and impede our productivity and growth, which could cause our earnings to decline or could impact our

ability to comply with regulatory obligations leading to regulatory fines and sanctions. We may be required to expend significant additional resources to modify, investigate or remediate vulnerabilities or other exposures arising from cybersecurity threats. A successful cyberattack could occur and persist for an extended period of time before being detected. In addition, because any investigation of a cybersecurity incident would be inherently unpredictable, the extent of a particular cybersecurity incident and the path of investigating the incident may not be immediately clear. It may take a significant amount of time before such an investigation can be completed and reliable information about the incident is known. While such an investigation is ongoing, we may not necessarily know the extent of the harm or how best to remediate it, certain errors or actions could be repeated or compounded before they are discovered and remediated, and communication to the public, regulators, clients and other stakeholders may be inaccurate, any or all of which could further increase the costs and consequences of a cybersecurity incident.

Our business may be materially adversely affected by operational risk.

We are required to accurately process large numbers of transactions each day on a timely basis. The transactions we process or execute are operationally complex and can involve numerous parties, jurisdictions, regulations and systems, and as such, are subject to execution and processing errors and failures. As our businesses evolve to even more complex and voluminous transactions, at ever increasing speeds, we must also evolve our processes, controls, workforce and technology to accurately and timely execute those transactions, which may result in an increased risk of error or significant operational delay. When errors or delays do occur, they may be difficult to detect and fix in a timely manner.

As a result, operational errors or significant operational delays could materially negatively impact our ability to conduct our business or service our clients, which could adversely affect our results of operations due to potentially higher expenses and lower revenues, could lower our capital ratios, create liability for us or our clients or negatively impact our reputation. An operational error impacting a large number of transactions could have unfavorable ripple effects in the financial markets.

Affiliates or third parties with which we do business or that facilitate our business activities could also be sources of execution and processing errors, failures or significant operational delays. In certain jurisdictions we may be deemed to be statutorily or criminally liable for operational errors, fraud, breakdowns or delays by these affiliates or third parties.

Additionally, as a result of regulations, including the Alternative Investment Fund Managers Directive and the Undertakings for Collective Investment in Transferable Securities V, where, in the European Economic Area we act as depositary, the Company could be exposed to restitution risk for, among other things, errors or fraud perpetrated by a sub-custodian resulting in a loss or delay in return of client's securities. Where we are not acting as a European Economic Area depositary, but where we provide custody services to a European Economic Area depositary, we may accept similar liabilities to that depositary as a matter of contract.

We rely on a variety of measures to protect our intellectual property and proprietary information, including copyrights, trademarks, patents and controls on access and distribution. These measures may not prevent misappropriation or infringement of our intellectual property or proprietary information and a resulting loss of competitive advantage. Furthermore, if a third party were to assert a claim of infringement or misappropriation of its proprietary rights, obtained through patents or otherwise, against us, we could be required to spend significant amounts to defend such claims, develop alternative methods of operations, pay substantial money damages, obtain a license from the third party or possibly stop providing one or more products or services.

We are also subject to laws and regulations relating to the privacy of the information of clients, employees and others, and any failure to comply with these laws and regulations could expose us to liability and/or reputational damage.

Our risk management framework may not be effective in mitigating risk and reducing the potential for losses.

Our risk management framework seeks to mitigate risk and loss to us. We have established comprehensive policies and procedures and an internal control framework designed to provide a sound operational environment for the types of risk to which we are subject, including operational risk,

credit risk, market risk, liquidity risk and strategic risk. We have also established frameworks to mitigate risk and loss to us as a result of the actions of affiliates or third parties with which we do business or that facilitate our business activities. However, as with any risk management framework, there are inherent limitations to our current and future risk management strategies, including risks that we have not appropriately anticipated or identified.

Our regulators remain focused on ensuring that financial institutions build and maintain robust risk management policies. If our regulators perceive the quality of our risk models and framework to be insufficient, it may negatively impact our regulators' evaluations of our capital plans and stress tests. Accurate and timely enterprise-wide risk information is necessary to enhance management's decision-making in times of crisis. If our risk management framework proves ineffective or if our enterprise-wide management information is incomplete or inaccurate, we could suffer unexpected losses, which could materially adversely affect our results of operations or financial condition.

In certain instances, we rely on models to measure, monitor and predict risks. However, these models are inherently limited because they involve techniques, including the use of historical data, trends, assumptions and judgments that cannot anticipate every economic and financial outcome in the markets in which we operate, nor can they anticipate the specifics and timing of such outcomes, especially during severe market downturns or stress events. These models may not appropriately capture all relevant risks or accurately predict future events or exposures. The risk of the unsuccessful development or implementation of our models, systems or processes cannot be completely eliminated. The models that we use to assess and control our market risk exposures also reflect assumptions about the degree of correlation among prices of various asset classes or other market indicators. The 2008 financial crisis and resulting regulatory reform highlighted both the importance and some of the limitations of managing unanticipated risks. In times of market stress or other unforeseen circumstances, previously uncorrelated indicators may become correlated, or previously correlated indicators may move in different directions. These types of market movements have at times limited the effectiveness of our hedging strategies and have caused us to incur significant losses, and they may do so in the future.

In addition, our businesses and the markets in which we operate are continuously evolving. We may fail to fully understand the implications of changes in our businesses or the financial markets or fail to adequately or timely enhance our risk framework to address those changes. If our risk framework is ineffective because it fails to keep pace with changes in the financial markets, regulatory requirements, our businesses, our counterparties, clients or service providers or for other reasons, we could incur losses, suffer reputational damage or find ourselves out of compliance with applicable regulatory or contractual mandates or expectations.

An important aspect of our risk management framework is creating a risk culture that is sustainable and appropriate to our role as a major financial institution in which all employees fully understand that there is risk in every aspect of our business and the importance of managing risk as it relates to their job functions. If we fail to create the appropriate environment that sensitizes all of our employees to managing risk, our business could be adversely impacted. For more information on how we monitor and manage our risk management framework, see "Risk Management - Overview."

We are subject to extensive government rulemaking, policies, regulation and supervision. These rules and regulations have, and in the future may, compel us to change how we manage our businesses, which could have a material adverse effect on our business, financial condition and results of operations.

As a large, internationally active financial services company, we operate in a highly regulated environment, and are subject to a comprehensive statutory and regulatory regime affecting all aspects of our business and operations, including oversight by governmental agencies both inside and outside the U.S. Regulations and related regulatory guidance and supervisory oversight impact how we analyze certain business opportunities, our regulatory capital and liquidity requirements, the revenue profile of certain of our core activities, the products and services we provide, how we monitor and manage operational risk and how we promote a sound governance and control environment. Any changes to the regulatory frameworks and environment in which we operate and the significant management attention and resources necessary to address those changes could materially adversely affect our business, financial

condition and results of operations and have other negative consequences.

The evolving regulatory environment and uncertainty about the timing and scope of future regulations may contribute to decisions we may make to suspend, reduce or withdraw from existing businesses, activities or initiatives, which may result in potential lost revenue or significant restructuring or related costs or exposures.

The monetary, tax and other policies of various governments, agencies and regulatory authorities both in the U.S. and globally have a significant impact on interest rates, currencies, commodity pricing (including oil), the imposition of tariffs or other limitations on international trade and travel, and overall financial market performance, which can impact our business and results of operations. Changes in these policies are beyond our control and can be difficult to predict and we cannot determine the ultimate effect that any such changes would have upon our business, financial condition or results of operations.

Basel III and the Dodd-Frank Act have had a significant impact on the regulatory structure of the global financial markets and have imposed significant operational, compliance and risk management costs, both as an initial matter, as we have had to develop and integrate appropriate systems and procedures, and on a recurring basis, as we monitor, support and refine those systems and procedures. While U.S. regulators have finalized regulations implementing various provisions of the Dodd-Frank Act and Basel III, additional regulations or modifications to existing regulations are expected to continue to occur. In addition, there is uncertainty about the timing and scope of any changes to Basel III and the Dodd-Frank Act and other regulations, as well as the cost of complying with any new regulatory regimes. The full impact of these standards on us, our business strategies and financial performance will remain uncertain as long as regulatory reforms continue to be adopted and market practices develop in response to such reforms, and any such regulatory changes could materially adversely impact us.

The regulatory and supervisory focus of U.S. banking agencies is primarily intended to protect the safety and soundness of the banking system and federally insured deposits, and not to protect investors in our securities. Regulatory and supervisory standards and

expectations across jurisdictions may be divergent and otherwise may not conform and/or may be applied in a manner that is not harmonized within a jurisdiction (in relation to national versus non-national financial services providers) and/or across jurisdictions. Additionally, banking regulators have wide supervisory discretion in the ongoing examination and enforcement of applicable banking statutes, regulations, and guidelines, and may restrict our ability to engage in certain activities or acquisitions, or may require us to maintain more capital or highly liquid assets.

The U.S. capital rules subject us and our U.S. banking subsidiaries to more stringent capital requirements, which could restrict growth, activities or operations, trigger divestiture of assets or operations or limit our ability to return capital to shareholders. Failure to meet current or future capital requirements, either at the end of each fiscal quarter or under hypothetical stressed conditions during the annual CCAR exercise, could materially adversely affect our financial condition. Additional impacts relating to compliance with these rules could include, but are not limited to, potential dilution of existing shareholders and competitive disadvantage compared to financial institutions not under the same regulatory framework. In addition, the SLR subjects us to a more stringent leverage requirement, which could restrict growth, activities, operations or could result in certain restrictions on capital distributions and discretionary bonus payments.

The LCR requires us to maintain significant holdings of high quality and potentially lower-yielding liquid assets. In calculating the LCR, we must also determine which deposits should be considered to be stable deposits. Stable deposits must meet a series of requirements and typically receive favorable outflow treatment under the LCR. BNY Mellon uses qualitative and quantitative analysis to identify core stable deposits. It is possible that our LCR could fall below 100% as a consequence of the inherent uncertainties associated with this analysis (including as a result of regulatory changes or additional guidance from our regulators). In addition to facing potential regulatory consequences (which could be significant), we may be required to remedy this shortfall by liquidating assets in our investment portfolio or raising additional debt, each of which could materially negatively impact our net interest revenue.

If and when the final rule regarding the NSFR is ultimately implemented in the U.S., those requirements could also require BNY Mellon to further increase its holdings of high quality, and potentially lower-yielding, liquid assets, and to reevaluate the composition of its liabilities structure to include more longer-dated debt.

We develop and submit plans for our rapid and orderly resolution in the event of material financial distress or failure to the Federal Reserve and the FDIC. If the agencies determine that our future submissions are not credible or would not facilitate an orderly resolution under the U.S. Bankruptcy Code, and we fail to address any such deficiencies in a timely manner, we may be subject to more stringent capital or liquidity requirements or restrictions on our growth, activities or operations.

Our global activities are also subject to extensive regulation by various non-U.S. regulators, including governments, securities exchanges, central banks and other regulatory bodies in the jurisdictions in which we operate, relating to, among other things, the safeguarding, administration and management of client assets and client funds.

Various new, revised and proposed directives and regulations globally have an impact on our provision of many of our products and services. Implementation of, and revisions to, these directives and regulations have affected our operations and risk profile, including the Capital Requirements Directive/Regulation, the Investment Firms Directive/Regulation, the Bank Recovery and Resolution Directive, the Deposit Guarantee Scheme Directive, MiFID II/MiFIR, Market Abuse Regulation, AIFMD, UCITS V, Payment Services Directive II, Securities Financing Transactions Regulation, Central Securities Depositories Regulation, European Market Infrastructure Regulation, EU Benchmark Regulation and Shareholder Rights Directive.

In addition, we are subject in our global operations to rules and regulations relating to corrupt and illegal payments and money laundering, economic sanctions and embargo programs administered by the U.S. Office of Foreign Assets Control and similar bodies and governmental agencies worldwide, and laws relating to doing business with certain individuals, groups and countries, such as the U.S. Foreign Corrupt Practices Act, the USA PATRIOT Act, the Iran Threat Reduction and Syria Human Rights Act of

2012 and the UK Bribery Act. While we have invested and continue to invest significant resources in training and in compliance monitoring, the geographical diversity of our operations, employees, clients and customers, as well as the vendors and other third parties that we deal with, presents the risk that we may be found in violation of such rules, regulations or laws and any such violation could subject us to significant penalties or adversely affect our reputation. In addition, such rules could impact our ability to engage in business with certain individuals, entities, groups and countries, which could materially adversely affect certain of our businesses and results of operations.

As privacy-related laws and regulations, such as the EU General Data Protection Regulation (“GDPR”), the California Consumer Privacy Act of 2018 and the New York Department of Financial Services’ cybersecurity regulation, are implemented, the time and resources needed for us to comply with such laws and regulations, as well as our potential liability for non-compliance and reporting obligations in the case of data breaches, may significantly increase. In addition, our businesses are increasingly subject to laws and regulations relating to privacy, surveillance, encryption and data localization in the jurisdictions in which we operate. Compliance with these laws and regulations may require us to change our policies, procedures and technology for information security and segregation of data, which could, among other things, make us more vulnerable to operational failures, and to monetary penalties for breach of such laws and regulations.

Failure to comply with laws, regulations or policies applicable to our business could result in sanctions by regulatory or governmental authorities, civil money penalties and reputational damage, which could have a material adverse effect on our business, financial condition and results of operations. If violations do occur, they could damage our reputation, increase our legal and compliance costs, and ultimately adversely impact our results of operations. Laws, regulations or policies currently affecting us and our subsidiaries, or regulatory and governmental authorities’ interpretation of these statutes and regulations may change at any time, which may adversely impact our business and results of operations.

See “Supervision and Regulation” for additional information regarding the potential impact of the regulatory environment on our business.

Regulatory or enforcement actions or litigation could materially adversely affect our results of operations or harm our businesses or reputation.

Like many major financial institutions, we and our affiliates are the subject of inquiries, investigations, lawsuits and proceedings by counterparties, clients, other third parties, tax authorities and regulatory and other governmental agencies in the U.S. and abroad, as well as the Department of Justice (the “DOJ”) and state attorneys general. See “Legal proceedings” in Note 22 of the Notes to Consolidated Financial Statements for a discussion of material legal and regulatory proceedings in which we are involved. The number of these investigations and proceedings, as well as the amount of penalties and fines sought, has remained elevated for many firms in the financial services industry, including us. We may become subject to heightened regulatory scrutiny, inquiries or investigations, and potentially client-related inquiries or claims, relating to broad, industry-wide concerns that could lead to increased expenses or reputational damage. The current trend of large settlements by financial institutions with governmental entities may adversely affect the outcomes for other financial institutions in similar actions, especially where governmental officials have announced that the large settlements will be used as the basis or a template for other settlements. Separately, policy makers globally continue to focus on protection of client assets, as well as tax avoidance and evasion.

The complexity of the federal and state regulatory and enforcement regimes in the U.S., coupled with the global scope of our operations and the increased aggressiveness of the tax and regulatory environment worldwide, also means that a single event may give rise to a large number of overlapping investigations and regulatory proceedings, either by multiple federal and state agencies in the U.S. or by multiple regulators and other governmental entities or tax authorities in different jurisdictions. Responding to inquiries, investigations, lawsuits and proceedings, regardless of the ultimate outcome of the matter, is time-consuming and expensive and can divert the attention of our senior management from our business. The outcome of such proceedings may be difficult to predict or estimate until late in the proceedings, which may last a number of years.

Certain of our subsidiaries are subject to periodic examination, special inquiries and potential proceedings by regulatory authorities. If compliance

failures or other violations are found during an examination, inquiry or proceeding, a regulatory agency could initiate actions and impose sanctions for violations, including, for example, regulatory agreements, cease and desist orders, civil monetary penalties or termination of a license and could lead to litigation by investors or clients, any of which could cause our earnings to decline.

Our businesses involve the risk that clients or others may sue us, claiming that we or third parties for whom they say we are responsible have failed to perform under a contract or otherwise failed to carry out a duty perceived to be owed to them, including perceived fiduciary or contractual duties. This risk may be heightened during periods when credit, equity or other financial markets are deteriorating in value or are particularly volatile, or when clients or investors are experiencing losses. As a publicly held company, we are also subject to the risk of claims under the federal securities laws. Volatility in our stock price increases this risk.

Increasingly, regulators, tax authorities and courts have sought to hold financial institutions liable for the misconduct of their clients where such regulators and courts have determined that the financial institution should have detected that the client was engaged in wrongdoing, even though the financial institution had no direct knowledge of the wrongdoing.

Actions brought against us may result in lawsuits, enforcement actions, injunctions, settlements, damages, fines or penalties, which could have a material adverse effect on our financial condition or results of operations or require changes to our business. Claims for significant monetary damages are asserted in many of these legal actions, while claims for disgorgement, penalties and/or other remedial sanctions may be sought in regulatory matters. Although we establish accruals for our litigation and regulatory matters in accordance with applicable accounting guidance when those matters proceed to a stage where they present loss contingencies that are both probable and reasonably estimable, there may be a material exposure to loss in excess of any amounts accrued, or in excess of any loss contingencies disclosed as reasonably possible. Such loss contingencies may not be probable and reasonably estimable until the proceedings have progressed significantly, which could take several years and occur close to resolution of the matter.

Each of the risks outlined above could result in increased regulatory supervision and affect our ability to attract and retain customers or maintain access to the capital markets.

Our businesses may be negatively affected by adverse events, publicity, government scrutiny or other reputational harm.

We are subject to reputational, legal and regulatory risk in the ordinary course of our business. The public perception of financial institutions remains negative. Harm to our reputation can result from numerous sources, including adverse publicity arising from events occurring at BNY Mellon or in the financial markets, our perceived failure to comply with legal and regulatory requirements or deliver appropriate standards of service and quality, or a failure to appropriately describe our products and services, the purported actions of our employees or the use of social media by our employees, alleged financial reporting irregularities involving ourselves or other large and well-known companies and perceived conflicts of interest. In particular, a cybersecurity event impacting us or our customers' data could have a negative impact on our reputation and customer confidence in BNY Mellon and our cybersecurity defenses and business continuity and resiliency capabilities. Our reputation could also be harmed by the failure of an affiliate, joint venture or a vendor or other third party with which we do business to comply with laws or regulations. Damage to our reputation could affect the confidence of clients, rating agencies, regulators, employees, stockholders and other stakeholders and could in turn have an impact on our business and results of operations.

Additionally, governmental scrutiny from regulators, tax authorities, legislative bodies and law enforcement agencies with respect to financial services companies has remained at elevated levels. Press coverage and other public statements, including information posted on social media, that assert some form of wrongdoing (including, in some cases, press coverage and public statements that do not directly involve BNY Mellon) often result in some type of investigation or in lawsuits. Certain enforcement authorities have recently required admissions of wrongdoing, and in some cases, criminal pleas, as part of the resolution of matters brought by them against financial institutions. Any such resolution of a matter involving BNY Mellon could lead to increased exposure to civil litigation, could adversely

affect our reputation and ability to do business in certain products and in certain jurisdictions and could have other negative effects.

Failure to satisfy regulatory standards, including "well capitalized" and "well managed" status or capital adequacy and liquidity rules more generally, could result in limitations on our activities and adversely affect our business and financial condition.

Under U.S. and international regulatory capital adequacy rules and other regulatory requirements, BNY Mellon and our subsidiary banks must meet thresholds that include quantitative measures of assets, liabilities and certain off-balance sheet items, subject to qualitative judgments by regulators about components, risk weightings and other factors. As discussed in "Supervision and Regulation," BNY Mellon is registered with the Federal Reserve as a BHC and an FHC. An FHC's ability to maintain its status as an FHC is dependent upon a number of factors, including its U.S. bank subsidiaries' qualifying on an ongoing basis as "well capitalized" and "well managed" under the banking agencies' prompt corrective action regulations as well as applicable Federal Reserve regulations. Failure by an FHC or one of its U.S. bank subsidiaries to qualify as "well capitalized" and "well managed," if unremedied over a period of time, would cause it to lose its status as an FHC and could affect the confidence of clients in it, compromising its competitive position. Additionally, an FHC that does not continue to meet all the requirements for FHC status could lose the ability to undertake new activities or make acquisitions that are not generally permissible without FHC status or to continue such activities.

The failure by one of our bank subsidiaries to maintain its status as "well capitalized" could lead to, among other things, higher FDIC assessments and could have reputational and associated business consequences.

If we or our subsidiary banks fail to meet U.S. and international minimum capital rules and other regulatory requirements, we may not be able to deploy capital in the operation of our business or distribute capital to stockholders, which may adversely affect our business.

Failure to meet any current or future capital or liquidity requirements, including those imposed by the U.S. capital rules, the LCR, or by regulators in implementing other portions of the Basel III framework, could materially adversely affect our financial condition. Compliance with U.S. and international regulatory capital and liquidity requirements may impact our ability to return capital to shareholders and may impact our operations by requiring us to liquidate assets, increase borrowings, issue additional equity or other securities, or cease or alter certain operations, which may adversely affect our results of operations.

Finally, our regulatory capital ratios, liquidity metrics, and related components are based on our current interpretation, expectations and understanding of the applicable rules and are subject to, among other things, ongoing regulatory review, regulatory approval of certain statistical models, additional refinements, modifications or enhancements (whether required or otherwise) to our models, and further implementation guidance. Any modifications resulting from these ongoing reviews or the continued implementation of the U.S. capital rules, the LCR, the resolution planning process, and related amendments could result in changes in our risk-weighted assets, capital components, liquidity inflows and outflows, HQLA, or other elements involved in the calculation of these measures, which could impact these ratios. Further, because operational risk is currently measured based not only upon our historical operational loss experience but also upon ongoing events in the banking industry generally, our level of operational risk-weighted assets could significantly increase or otherwise remain elevated and may potentially be subject to significant volatility, negatively impacting our capital and liquidity ratios. The uncertainty caused by these factors could ultimately impact our ability to meet our goals, supervisory requirements, and regulatory standards.

A failure or circumvention of our controls and procedures could have a material adverse effect on our business, reputation, results of operations and financial condition.

Management regularly reviews and updates our internal controls, disclosure controls and procedures, and corporate governance policies and procedures. Any system of controls, however well designed and operated, is based in part on certain assumptions and can provide only reasonable, not absolute, assurances

that the objectives of the system will be met. Any failure or circumvention of our controls and procedures or failure to comply with regulations related to controls and procedures could have a material adverse effect on our business, reputation, results of operations and financial condition. If we identify material weaknesses in our internal control over financial reporting or are otherwise required to restate our financial statements, we could be required to implement expensive and time-consuming remedial measures and could lose investor confidence in the accuracy and completeness of our financial reports. In addition, there are risks that individuals, either employees or contractors, may circumvent established control mechanisms in order to, for example, exceed exposure, liquidity, trading or investment management limitations, or commit fraud.

The application of our Title I preferred resolution strategy or resolution under the Title II orderly liquidation authority could adversely affect the Parent's liquidity and financial condition and the Parent's security holders.

In 2017, in connection with our single point of entry resolution strategy under Title I of the Dodd-Frank Act, the Parent entered into a binding support agreement with certain key subsidiaries to facilitate the provision of capital and liquidity resources to them in the event of material financial distress or failure. The support agreement requires the Parent to transfer significant excess liquid financial assets to the IHC on an ongoing basis, subject to certain amounts retained by the Parent to meet its near-term cash needs, in exchange for unsecured subordinated funding notes issued by the IHC as well as a committed line of credit to the Parent to service its near term obligations. The Parent's and the IHC's obligations under the support agreement are secured.

If our projected liquidity resources deteriorate so severely that resolution of the Parent becomes imminent, the committed line of credit the IHC provided to the Parent will automatically terminate, with all amounts outstanding becoming due and payable, and the support agreement will require the Parent to transfer most of its remaining assets (other than stock in subsidiaries and a cash reserve to fund bankruptcy expenses) to the IHC. As a result, during a period of severe financial stress the Parent could become unable to meet its debt and payment obligations (including with respect to its securities),

causing the Parent to seek protection under bankruptcy laws earlier than it otherwise would have.

If the Parent were to become subject to a bankruptcy proceeding and our single point of entry strategy is successful, our material entities will not be subject to insolvency proceedings and their creditors would not be expected to suffer losses, while the Parent's security holders, including unsecured debt holders, could face significant losses, potentially including the loss of their entire investment. The single point of entry strategy, in which the Parent would be the only legal entity to enter resolution proceedings, is designed to result in greater risk of loss to holders of the Parent's unsecured senior debt securities and other securities than would be the case under a different resolution strategy.

Further, if the single point of entry strategy is not successful, our liquidity and financial condition would be adversely affected and all security holders may, as a consequence, be in a worse position than if the strategy had not been implemented.

In addition, Title II of the Dodd-Frank Act established an orderly liquidation process in the event of the failure of a large systemically important financial institution, such as BNY Mellon, in order to avoid or mitigate serious adverse effects on the U.S. financial system. Specifically, if BNY Mellon is in default or danger of default, and certain specified conditions are met, the FDIC may be appointed receiver under the orderly liquidation authority, and we would be resolved under that authority instead of the U.S. Bankruptcy Code.

U.S. supervisors have indicated that a single point of entry strategy may be a desirable strategy to resolve a large financial institution such as BNY Mellon under Title II in a manner that would, similar to our preferred strategy under our Title I resolution plan, impose losses on shareholders, unsecured debt holders and other unsecured creditors of the Parent, while permitting the holding company's subsidiaries to continue to operate and remain solvent. Under such a strategy, assuming the Parent entered resolution proceedings and its subsidiaries remained solvent, losses at the subsidiary level would be absorbed by the Parent and ultimately borne by the Parent's security holders (including holders of the Parent's unsecured debt securities), while third-party creditors of the Parent's subsidiaries would not be expected to suffer losses. Accordingly, the Parent's

security holders (including holders of unsecured debt securities and other unsecured creditors) could face losses in excess of what otherwise would have been the case.

Impacts from climate change, natural disasters, acts of terrorism, pandemics, global conflicts and other geopolitical events may have a negative impact on our business and operations.

In conducting our business and maintaining and supporting our global operations, which includes vendors and other third parties, we are subject to risks of loss from the outbreak of hostilities, acts of terrorism, impacts from climate change, natural disasters, pandemics, global conflicts or other similar catastrophic events that could have a negative impact on our business and operations. We may also be impacted by unfavorable political, economic, legal or other developments, including but not limited to social or political instability, changes in governmental policies or policies of central banks, sanctions, expropriation, nationalization, confiscation of assets, price, capital and exchange controls, the imposition of tariffs or other limitations on international trade and travel, and changes in laws and regulations.

While we have business continuity and disaster recovery plans in place, such events could still damage our facilities, disrupt or delay normal business operations (including communications and technology), result in harm or cause travel limitations on our employees, with a similar impact on our clients, suppliers and counterparties. Catastrophic events, including those caused by climate change, could also negatively impact the purchase of our products and services if those events result in reduced capital markets activity, lower asset price levels, or disruptions in general economic activity, or in financial market settlement functions, which could negatively impact our business and results of operation. In addition, catastrophic events, including those caused by climate change, war, terror attacks, political unrest, global conflicts, efforts to combat terrorism and other potential military activities and outbreaks of hostilities may lead, and in some cases have led, to an increase in delinquencies, bankruptcies or defaults that could result in our experiencing higher levels of non-performing assets, net charge-offs and provisions for credit losses, negatively impacting our business and operations.

Our international clients accounted for 35% of our revenue in 2019. Given the scope of our global operations, clients and counterparties, persistent disruptions in the global financial markets, uncertainty around and escalating use of tariffs, a breakdown of the Eurozone or persistent weakness in a leading global currency could have a material adverse impact on our business or results of operations.

Market Risk

We are dependent on fee-based business for a substantial majority of our revenue and our fee-based revenues could be adversely affected by slowing in market activity, weak financial markets, underperformance and/or negative trends in savings rates or in investment preferences.

Our principal operational focus is on fee-based business, which is distinct from commercial banking institutions that earn most of their revenues from loans and other traditional interest-generating products and services. In 2019, 80% of our total revenue was fee-based. Our fee-based businesses include investment management and performance fees, custody, corporate trust, depositary receipts, clearing, collateral management and treasury services, which are highly competitive businesses.

Fees for many of our products and services are based on the volume of transactions processed, the market value of assets managed and/or administered, securities lending volume and spreads, and fees for other services rendered. Corporate actions, cross-border investing, global mergers and acquisitions activity, new debt and equity issuances, and secondary trading volumes, among other things, all affect the level of our fee revenue. If the volume of these activities decrease due to low client activity, weak financial markets or otherwise, our fee-based revenues will also decrease, which would negatively impact our results of operations.

Poor investment returns in our Investment Management business, due to weak market conditions or underperformance (relative to competitors or benchmarks) have resulted in reduced market values of portfolios that we manage and/or administer and may affect our ability to retain existing assets and attract new client assets. Market and regulatory trends have also resulted in increased demand for lower fee asset management products, and

performance-based fees, both of which have impacted and may continue to impact our fee revenue. Some of these dynamics have also negatively impacted our Investment Services business fees and any of these dynamics may also occur in the future. Significant declines in the volume of capital markets activity would reduce the number of transactions we process and the amount of securities we lend and therefore would also have an adverse effect on our results of operations. Our business generally benefits when individuals invest their savings in mutual funds and other collective funds, unit investment trusts or exchange-traded funds, or contribute more to defined contribution plans.

When our Investment Management revenues decline, we may have, and in the past have had, declines in the fair value in our Asset Management reporting unit, one of the two reporting units in our Investment Management segment. If the fair value of the Asset Management reporting unit declines below its carrying value, we would be required to take an impairment charge.

Weakness and volatility in financial markets and the economy generally may materially adversely affect our business, results of operations and financial condition.

As a financial institution, our Investment Management, Depositary Receipts and Markets, including Securities Lending, businesses, are particularly sensitive to economic and market conditions, including in the capital and credit markets. When these markets are volatile or disruptive, we could experience a decline in our marked-to-market assets, including in our securities portfolio and our equity investments, including seed capital. Our results of operations may be materially affected by conditions in the financial markets and the economy generally, both in the U.S. and elsewhere around the world.

Our foreign exchange trading generates revenues which are primarily driven by the volume of client transactions and the spread realized on these transactions, both of which are impacted by market volatility and the impact of foreign exchange hedging activities. Our clients' cross-border investing activity could decrease in reaction to economic and political uncertainties, including changes in laws or regulations governing cross-border transactions, such as currency controls or tariffs. Volumes and/or

spreads in some of our products tend to benefit from currency volatility and are likely to decrease during times of lower currency volatility. Our revenues also depend on our ability to manage the risk associated with the currency transactions we execute and program pricing.

A variety of factors impact global economies and financial markets, including interest rates and their associated yield curves, commodity pricing, such as a continued weakness in oil prices when compared to historic highs, certain market and political instabilities, volatile debt and equity market values, the strength of the U.S. dollar, the imposition of tariffs or other limitations on international trade or travel, high unemployment and governmental budget deficits (including, in the U.S., at the federal, state and municipal level), contagion risk from possible default by other countries on sovereign debt, declining business and consumer confidence and the risk of increased inflation. Any resulting economic pressure on consumers and lack of confidence in the financial markets may adversely affect certain portions of our business, financial condition and results of operations. In particular, we face the following risks in connection with these factors, some of which are discussed at greater length in separate risk factors:

- Geopolitical tension and economic instability in countries around the world can at times increase the demand for low-risk investments, particularly in U.S. Treasuries and the dollar. A “flight to safety” has historically increased BNY Mellon’s balance sheet, which has negatively impacted, and could continue to negatively impact, our leverage-based regulatory capital measures. A sustained “flight to safety” has historically triggered a decline in trading, capital markets and cross-border activity which would likely decrease our revenue, negatively impacting our results of operations, financial condition and, if sustained in the long term, our business.
- The fees earned by our Investment Management business are higher as assets under management and/or investment performance increase. Those fees are also impacted by the composition of the assets under management, with higher fees for some asset categories as compared to others. Uncertain and volatile capital markets, particularly declines, could result in reductions in assets under management because of investors’ decisions to withdraw assets, switch from higher to lower fee products or from simple declines in the value of assets under management as markets decline. At Dec. 31, 2019, we estimate that a 5% change in global equity markets, spread evenly throughout the year, would impact fee revenue by less than 1% and diluted earnings per common share by \$0.03 to \$0.05.
- Market conditions resulting in lower transaction volumes could have an adverse effect on the revenues and profitability of certain of our businesses such as clearing, settlement, payments and trading.
- Uncertain and volatile capital markets, particularly declines, could reduce the value of our investments in securities, including pension and other post-retirement plan assets and produce downward pressure on our stock price and credit availability without regard to our underlying financial strength.
- Derivative instruments we hold to hedge and manage exposure to market risks, including interest rate risk, equity price risk, foreign currency risk and credit risk associated with our products and businesses might not perform as intended or expected, resulting in higher realized losses and unforeseen stresses on liquidity. Our derivative-based hedging strategies also rely on the performance of counterparties to such derivatives. These counterparties may fail to perform for various reasons resulting in losses on under-collateralized positions.
- A decline in oil prices may negatively impact capital markets and the ability of certain of our clients, including oil and gas exploration and production companies and sovereign funds in oil-exporting countries, to continue using our services. Increased defaults among oil and gas exploration and production companies may also negatively impact the high-yield market and our high-yield funds.
- The process we use to estimate our projected credit losses and to ascertain the fair value of securities held by us is subject to uncertainty in that it requires use of statistical models and difficult, subjective and complex judgments, including forecasts of economic conditions and how these conditions might impair the ability of our borrowers and others to meet their obligations. In uncertain and volatile capital markets, our ability to estimate our projected credit losses may be impaired, which could

adversely affect our overall profitability and results of operations.

For a discussion of our management of market risk, see “Risk Management - Market Risk.”

Changes in interest rates and yield curves could have a material adverse effect on our profitability.

We earn revenue, known as “net interest revenue,” on the difference between the interest income earned on our interest-earning assets, such as the loans we make and the securities we hold in our investment securities portfolio, and the interest expense incurred on our interest-bearing liabilities, such as deposits and borrowed money. Additionally, we may earn net interest revenue on certain interest-earning assets and interest-bearing liabilities, such as reverse repurchase agreements and repurchase agreements, respectively, that may be netted and excluded from the balance sheet based on specific accounting criteria. Our net interest margin, which is the result of dividing net interest revenue by average interest-earning assets, is sensitive to changes in the spread between short-term and long-term interest rates (the “yield curve”). Our net interest margin tends to increase in a positive yield curve environment and decrease when the yield curve flattens or inverts. A flattening of the yield curve, on its own or together with the current low interest rate environment, may continue to adversely impact our revenue and results of operations by compressing our net interest spreads, particularly if we are unable to replace our higher-yielding maturing assets with assets of comparable yields, which will constrain our ability to grow net interest margins.

The decrease in rates in the past year, and any further future rate decreases will likely adversely impact our revenue and results of operations by:

- continued compression of our net interest spreads, depending on our balance sheet position;
- constraining our ability to achieve a net interest margin consistent with historical averages;
- sustained weakness of our spread-based revenues, resulting in continued voluntary waiving of particular fees on certain money market mutual funds and related distribution fees by us in order to prevent the yields on such funds from becoming uneconomic; and
- adversely impacting the value of fixed-rate mortgage-backed securities we hold if there are

increases in mortgage prepayment speeds, which can be caused by refinancing activity.

A rise in rates could trigger one or more of the following, which could adversely impact our business, results of operations and financial condition, including:

- less liquidity in bonds and fixed-income funds in the case of a sharp rise in interest rates resulting in lower performance, yield and fees;
- increased number of delinquencies, bankruptcies or defaults and more nonperforming assets and net charge-offs, as borrowers may have more difficulty making higher interest payments;
- higher redemptions from our fixed-income funds or separate accounts, as clients move funds into investments with higher rates of return;
- decreases in deposit levels, which may reduce our LCR measure;
- reduction in accumulated OCI in our shareholders’ equity and therefore our tangible common equity due to the impact of rising long term rates on our available-for-sale securities in our investment portfolio, which could negatively impact our risk-based and leverage based regulatory capital ratios; or
- higher funding costs.

A more detailed discussion of the interest rate and market risks we face is contained in “Risk Management.”

Transitions away from and the anticipated replacement of LIBOR and other IBORs could adversely impact our business and results of operations.

Globally, financial market participants have begun to transition away from LIBOR and other interbank offered rates (together, the “IBORs”) to alternative reference rates as the UK Financial Conduct Authority will no longer persuade or compel contributing bank to submit rates for the calculation of LIBOR after 2021. This transition is further supported by the requirements of the EU Benchmarks Regulation, which no longer permits IBORs that rely on quotes or estimates submitted by contributing banks that are not anchored in transaction-based data. Various regulators, industry bodies and other market participants in the United States and other countries

are engaged in initiatives to develop, introduce and encourage the use of alternative rates to replace certain benchmarks. In the United States, the Secured Overnight Financing Rate (“SOFR”) has been identified as an alternative benchmark rate to U.S. dollar LIBOR. There is no assurance that SOFR or other alternative benchmark rates will be accepted or widely used by market participants. The characteristics of these new rates are not similar to, nor do they produce the economic equivalent of, the benchmarks they seek to replace. If a particular benchmark were to be discontinued and an alternative rate has not been successfully introduced to replace that benchmark, this could result in widespread dislocation in the financial markets, engender volatility in the pricing of securities, derivatives and other instruments, and suppress capital markets activities, all of which could have adverse effects on our results of operations. Transitions to SOFR and other alternative rates or benchmarks may cause LIBOR or the applicable or alternative benchmark rates to perform differently, or have other consequences which cannot be predicted. In the event any such benchmark or other referenced financial metric is significantly changed or discontinued (for example, when LIBOR and other IBORs cease to be published), or are no longer recognized as an acceptable benchmark, there may be uncertainty as to the calculation of the applicable interest rate or payment amount, depending on the terms of the governing instrument. In addition, even if the method of calculation of a fallback rate is clear, the resulting interest rate or payment amount may be different than the interest rate or payment amount that would have applied based on the original benchmark.

We may be adversely impacted by the changes involving LIBOR and other benchmark rates as a result of our business activities and our underlying operations. We utilize benchmark rates in a variety of agreements and instruments and are responsible for the use of benchmark rates in a variety of capacities, as well as in our operational functions. We could be subject to claims alleging that, notwithstanding any uncertainty around the rate environment, we did not correctly discharge our responsibilities. We could also face claims in connection with the interpretation and implementation of fallback provisions.

Fluctuations in interest rates triggered by the transition away from LIBOR and other IBORs could adversely affect the availability or cost of floating-rate funding. We could experience losses on a

product or have to pay more or receive less on securities that we own or have issued. We may also not be able to successfully amend or renegotiate IBOR-based agreements and instruments. A variety of factors may affect the transition from existing IBOR-based rates to alternative benchmark rates, including for example, whether transactions that serve as the basis for alternative benchmark rates and IBOR-based rates are similarly secured (or unsecured) transactions, or are of a similar tenor.

Divergences between existing IBOR-based and alternative benchmark rates may result in our hedges being ineffective. In addition, uncertainty relating to LIBOR or another benchmark could result in, and in some cases have resulted in, pricing volatility, increased capital requirements, loss of market share in certain products, adverse tax or accounting consequences, higher compliance, legal and operational costs, and risks associated with client disclosures, discretionary actions taken or negotiation of fallback provisions, as well as business continuity and systems and model disruption, all of which may adversely impact our business and results of operations. Use of alternative benchmark rates may also, in some cases, be limited or prohibited by contract, law or regulation.

There can be no assurance that we, other market participants, clients and vendors will be adequately prepared for an actual discontinuation of IBORs, that existing assets and liabilities based on or linked to IBORs will transition successfully to alternative benchmark rates or that appropriate systems and analytics would be developed for one or more alternative benchmark rates, any of which could adversely impact our business, financial condition and results of operations.

The UK’s withdrawal from the EU may have negative effects on global economic conditions, global financial markets, and our business and results of operations.

On Jan. 31, 2020, the UK withdrew from the EU with terms governing a transition period until Dec. 31, 2020. While the UK will continue to have access to the EU’s single market during the transition period, the future relationship between the UK and the EU has yet to be negotiated, the uncertainty of which may create volatility in the global financial markets in the short- and medium-term and may negatively disrupt regional and global financial markets.

In the event the UK and the EU fail to negotiate a future economic relationship covering financial services by the end of the transition period, we, and other financial institutions, may face disruption to our operations. This includes potential uncertainty with regard to divergent regulatory standards after the end of the transition period, which may affect operational capabilities and could lead to increased operational, regulatory and compliance costs. The effects of the UK's exit from the EU, including those described above, could adversely affect our business, results of operations and financial condition.

We have executed plans adjusting our business and operations so we may continue providing our products and services to our UK and EU clients after the UK's withdrawal from the EU. However, given the potential negative disruption to regional and global financial markets, our results of operations and business prospects could be negatively affected. For additional information regarding Brexit, see "Other Matters - UK's Withdrawal from the EU ("Brexit").

We may experience losses on securities related to volatile and illiquid market conditions, reducing our earnings and impacting our financial condition.

We maintain an investment securities portfolio of various holdings, types and maturities. At Dec. 31, 2019, approximately 72% of these securities were classified as available-for-sale, which are recorded on our balance sheet at fair value with unrealized gains or losses reported as a component of accumulated other comprehensive income, net of tax. The securities in our held-to-maturity portfolio, recorded on our balance sheet at amortized cost, were approximately 28% of our securities portfolio at Dec. 31, 2019. Our available-for-sale securities portfolio, to the extent unhedged, may have more volatility than a portfolio comprised exclusively of U.S. Treasury securities or a more traditional loan portfolio.

Our investment securities portfolio represents a greater proportion of our consolidated total assets (approximately 32% at Dec. 31, 2019), and our loans represent a smaller proportion of our consolidated total assets (approximately 14% at Dec. 31, 2019), in comparison to many other major U.S. financial institutions due to our custody and trust bank business model. As such, our capital levels and results of operations and financial condition are materially exposed to the risks associated with our investment securities and loan portfolio.

If any of our available-for-sale securities experience a credit impairment, it would negatively impact our earnings. If our held-to-maturity securities experience a loss in fair value, it would negatively impact the fair value of our securities portfolio, although it would not impact our earnings unless a credit event occurred. Many of these securities experienced significant liquidity, valuation and credit quality deterioration during the 2008 financial crisis and could experience a similar deterioration in the future. U.S. state and municipal bonds have been experiencing stress in light of fiscal concerns.

Under the U.S. capital rules, after-tax changes in the fair value of available-for-sale investment securities are included in CET1 capital. Since loans and held-to-maturity securities are not subject to fair-value accounting, changes in the fair value of these instruments (other than incurred credit losses) are not similarly included in the determination of CET1 capital. As a result, we may experience increased variability in our CET1 capital relative to those major financial institutions who maintain a lower proportion of their consolidated total assets in an available-for-sale accounting classification.

Generally, the fair value of available-for-sale securities is determined based on market prices available from third-party sources. During periods of market disruption, it may be difficult to value certain of our investment securities if trading becomes less frequent and/or market data becomes less observable. As a result, valuations may include inputs and assumptions that are less observable or require greater estimation and judgment as well as valuation methods which are more complex. These values may not be ultimately realizable in a market transaction, and such values may change very rapidly as market conditions change and valuation assumptions are modified. Decreases in value may have a material adverse effect on our results of operations or financial condition. If any of our securities suffer credit losses, we may recognize the credit losses as an impairment which would impact our revenue in the period in which we recognize the losses. The decision on whether to record an impairment is determined in part by management's assessment of the financial condition and prospects of a particular issuer, projections of future cash flows and recoverability of the particular security. Management's conclusions on such assessments are highly judgmental and include assumptions and projections of future cash flows which may ultimately prove to be incorrect as

assumptions, facts and circumstances change. On the other hand, we are limited in the actions we can take related to our held-to-maturity securities absent a significant deterioration in the issuer's creditworthiness. Therefore, we may be constrained in our ability to liquidate a held-to-maturity security that is deteriorating in value, which would negatively impact the fair value of our securities portfolio. If our determinations change about our intention or ability to not sell available-for-sale securities that have experienced a reduction in fair value below their amortized cost, we could be required to recognize a loss in earnings for the entire difference between fair value and amortized cost.

For information regarding our investment securities portfolio, refer to "Consolidated balance sheet review - Securities" and for information regarding the sensitivity of and risks associated with the market value of portfolio investments and interest rates, refer to "Critical accounting estimates - Fair value - Securities."

Credit and Liquidity Risk

The failure or perceived weakness of any of our significant clients or counterparties, many of whom are major financial institutions and sovereign entities, and our assumption of credit and counterparty risk, could expose us to loss and adversely affect our business.

We have exposure to clients and counterparties in many different industries, particularly financial institutions, as a result of trading, clearing and financing, providing custody services, securities lending services or other relationships. We routinely execute transactions with global clients and counterparties in the financial industry as well as sovereigns and other governmental or quasi-governmental entities. Our direct exposure consists of the extension of secured and unsecured credit to clients and use of our balance sheet. In addition to traditional credit activities, we also extend intraday credit in order to facilitate our various processing, settlement and intermediation activities. Our ability to engage in funding or other transactions could be adversely affected by the actions and commercial soundness of other financial institutions or sovereign entities, as defaults or non-performance (or even uncertainty concerning such default or non-performance) by one or more financial institutions, or the financial services industry generally, have in the

past led to market-wide liquidity problems and could lead to losses or defaults by us or by other institutions (including our counterparties and/or clients) in the future. The consolidation and failures of financial institutions during the 2008 financial crisis increased the concentration of our client and counterparty risk.

As a result of our membership in several industry clearing or settlement exchanges and central counterparty clearinghouses, we may be required to guarantee obligations and liabilities or provide financial support in the event that other members do not honor their obligations or default. These obligations may be limited to members that dealt with the defaulting member or to the amount (or a multiple of the amount) of our contribution to a clearing or settlement exchange guarantee fund, or, in a few cases, the obligation may be unlimited.

The degree of client demand for short-term credit also tends to increase during periods of market turbulence. For example, investors in mutual funds for which we act as custodian may engage in significant redemption activity due to adverse market or economic conditions. We may then extend intraday credit to our fund clients in order to facilitate their ability to pay such redemptions. This may negatively impact our leverage-based capital ratios, and in times of sustained market volatility, may result in significant leverage-based ratio declines.

When we provide credit to clients in connection with providing cash management, clearing, custodial and other services, we are exposed to potential loss if the client experiences credit difficulties. We are also generally not able to net exposures across affiliated clients or counterparties and may not be able to net exposures to the same legal entity across multiple products. In addition, we may incur a loss in relation to one entity or product even though our exposure to one of the entities' affiliates is over-collateralized. Moreover, not all of our client or counterparty exposure is secured.

In our agency securities lending program, we act as agent on behalf of our clients, the lenders of securities, in securities lending transactions with our clients' counterparties (including broker-dealers), acting as borrowers, wherein securities are lent by our clients and the securities loans are collateralized by cash or securities posted by such counterparties. Typically, in the case of cash collateral, our clients authorize us as their agent to invest the cash collateral

in approved investments pursuant to each client's investment guidelines and instructions. Such approved investments may include reverse repurchase transactions with repo counterparties. In many cases, in the securities loans we enter into on behalf of our clients, we agree to replace the client's loaned securities that the borrower fails to return due to certain defaults by the borrower, mainly the borrower's insolvency. Therefore, in situations where the market value of the loaned securities that the borrower fails to return to a client (which loaned securities we are obligated to replace and return to the client) exceeds the amount of proceeds resulting from the liquidation of the client's approved investments and cash and non-cash collateral of such client, we may be responsible for the shortfall amount necessary to purchase any replacement securities. In addition, in certain cases, we may also assume the risk of loss related to approved investments that are reverse repurchase transactions as described above. In these two scenarios, we, rather than our clients, are exposed to the risks of the defaulting counterparty in the securities lending transactions and, where applicable, in the reverse repurchase transactions. For further discussion on our securities lending indemnifications, see "Commitments and contingent liabilities - Off-balance sheet arrangements" in Note 22 of the Notes to Consolidated Financial Statements.

From time to time, we assume concentrated credit risk at the individual obligor, counterparty or group level, potentially exposing us to a single market or political event or a correlated set of events. For example, we may be exposed to defaults by companies located in countries with deteriorating economic conditions or by companies in certain industries. Such concentrations may be material. Our material counterparty exposures change daily, and the counterparties or groups of related counterparties to which our risk exposure is material also vary during any reported period; however, our largest exposures tend to be to other financial institutions, clearing organizations, and governmental entities, both inside and outside the U.S. Concentration of counterparty exposure presents significant risks to us and to our clients because the failure or perceived weakness of our counterparties (or in some cases of our clients' counterparties) has the potential to expose us to risk of financial loss. Changes in market perception of the financial strength of particular financial institutions or sovereign issuers can occur rapidly, are often based on a variety of factors and are difficult to predict.

Although our overall business is subject to these interdependencies, several of our businesses are particularly sensitive to them, including our currency and other trading activities, our securities lending and securities finance businesses and our investment management business. If we experience any of the losses described above, it may materially and adversely affect our results of operations.

We are also subject to the risk that our rights against third parties may not be enforceable in all circumstances. In addition, deterioration in the credit quality of third parties whose securities or obligations we hold, including a deterioration in the value of collateral posted by third parties to secure their obligations to us under derivatives contracts and other agreements, could result in losses and/or adversely affect our ability to rehypothecate or otherwise use those securities or obligations for liquidity purposes. Disputes with clients and counterparties as to the valuation of collateral can significantly increase in times of market stress and illiquidity. In addition, disruptions in the liquidity or transparency of the financial markets may result in our inability to sell, syndicate or realize the value of our positions, thereby leading to increased concentrations. An inability to reduce our positions may not only increase the market and credit risks associated with such positions, but may also increase the level of RWA on our balance sheet, thereby increasing our capital requirements and funding costs, all of which could adversely affect the operations and profitability of our businesses.

Under U.S. regulatory restrictions on credit exposure, which include a broadening of the measure of credit exposure, we are required to limit our exposures to specific obligors or groups, including financial institutions. These regulatory credit exposure restrictions may adversely affect our businesses and may require us to modify our operating models or the policies and practices we use.

Our business, financial condition and results of operations could be adversely affected if we do not effectively manage our liquidity.

BNY Mellon's operating model and overall strategy rely heavily on our access to financial market utilities and global capital markets. Without such access, it would be difficult to process payments and settle and clear transactions on behalf of our clients. Deterioration in our liquidity position, whether actual

or perceived, can impact our market access by affecting participants' willingness to transact with us. Changes to our liquidity can be caused by various factors, such as funding mismatches, market constraints disabling asset to cash conversion, inability to issue debt, run-offs of core deposits, and contingent liquidity events such as additional collateral posting. Changes in economic conditions or exposure to credit, market, operational, legal and reputational risks can also affect our liquidity.

Our business is dependent in part on our ability to meet our cash and collateral obligations at a reasonable cost for both expected and unexpected cash flows. We also must manage liquidity risks on an intraday basis, in a manner designed to ensure that we can access required funds during the business day to make payments or settle immediate obligations, often in real time. We receive client deposits through a variety of investment management and investment servicing businesses and we rely on those deposits as a low-cost and stable source of funding. Our ability to continue to receive those deposits, and other short-term funding sources, is subject to variability based on a number of factors, including volume and volatility in the global securities markets, the relative interest rates that we are prepared to pay for those deposits, and the perception of the safety of those deposits or other short-term obligations relative to alternative short-term investments available to our clients. We could lose deposits if we suffer a significant decline in the level of our business activity, our credit ratings are materially downgraded, interest rates rise, or we are subject to significant negative press or significant regulatory action or litigation, among other reasons. If we were to lose a significant amount of deposits we may need to replace such funding with more expensive funding and/or reduce assets, which would reduce our net interest revenue.

In addition, our access to the debt capital markets is a significant source of liquidity. Events or circumstances often outside of our control, such as market disruptions, government fiscal and monetary policies, or loss of confidence by securities purchasers or counterparties in us or in the funds markets, could limit our access to capital markets, increase our cost of borrowing, adversely affect our liquidity, or impair our ability to execute our business plan. In addition, clearing organizations, regulators, clients and financial institutions with which we interact may exercise the right to require additional

collateral based on market perceptions or market conditions, which could further impair our access to and cost of funding. Market perception of sovereign default risks can also lead to inefficient money markets and capital markets, which could further impact BNY Mellon's funding availability and cost. Conversely, excess liquidity inflows could increase interest expense, limit our financial flexibility, and increase the size of our total assets in a manner that could have a negative impact on our capital ratios.

Under the U.S. capital rules, the size of the capital surcharge that applies to U.S. G-SIBs is based in part on its reliance on short-term wholesale funding, including certain types of deposit funding, which may increase the cost of such funding. Furthermore, certain non-U.S. authorities require large banks to incorporate a separate subsidiary in countries in which they operate, and to maintain independent capital and liquidity at foreign subsidiaries. These requirements could hinder our ability to efficiently manage our funding and liquidity in a centralized manner, requiring us to hold more capital and liquidity overall.

In addition, our cost of funding could be affected by actions that we may take in order to satisfy applicable LCR and NSFR requirements, to lower our G-SIB surcharge, to satisfy the amount of eligible long-term debt outstanding under the TLAC Rule, to address obligations under our resolution plan or to satisfy regulatory requirements in non-U.S. jurisdictions relating to the pre-positioning of liquidity in certain subsidiaries.

If we are unable to raise funds using the methods described above, we would likely need to finance or liquidate unencumbered assets, such as our central bank deposits and bank placements, or securities in our investment portfolio to meet funding needs. We may be unable to sell some of our assets, or we may have to sell assets at a discount from market value, either of which could adversely affect our financial condition and results of operations. Further, our ability to sell assets may be impaired if other market participants are seeking to sell similar assets at the same time, which could occur in a liquidity or other market crisis. Additionally, if we experience cash flow mismatches, deposit run-off or market constraints resulting from our inability to convert assets to cash or access capital markets, our liquidity could be severely impacted. During periods of market uncertainty, our level of client deposits has in

recent years tended to increase; however, because these deposits have high potential run-off rates, we have historically deposited these so-called excess deposits with central banks and in other highly liquid and low-yielding instruments.

If we are unable to continue to fund our assets through deposits or access capital markets on favorable terms or if we suffer an increase in our borrowing costs or otherwise fail to manage our liquidity effectively, our liquidity, net interest margin, financial results and condition may be materially adversely affected. In certain cases, this could require us to raise additional capital through the issuance of preferred or common stock, which could dilute the ownership of existing stockholders, and/or reduce our common stock dividend to preserve capital.

For a further discussion of our liquidity, see “Liquidity and dividends.”

We could incur losses if our allowance for credit losses, including loan and lending-related commitments reserves, is inadequate.

When we loan money, commit to loan money or provide credit or enter into another contract with a counterparty, we incur credit risk, or the risk of loss if our borrowers do not repay their loans or our counterparties fail to perform according to the terms of their agreements. Our revenues and profitability are adversely affected when our borrowers default, in whole or in part, on their loan obligations to us or when there is a significant deterioration in the credit quality of our loan portfolio. We reserve for potential future credit losses by recording a provision for credit losses through earnings. The allowance for loan losses and allowance for lending-related commitments represents management’s estimate of probable losses inherent in our credit portfolio as of Dec. 31, 2019 and, upon adoption of ASU 2016-13, Financial Instruments - Credit Losses: Measurement of Credit Losses on Financial Instruments in the first quarter 2020, will represent current expected credit losses over the lifetime of the related credit exposure. We use a quantitative methodology and qualitative framework for determining the allowance for loan losses and the allowance for lending-related commitments. Within this qualitative framework, management applies judgment when assessing internal risk factors and environmental factors to compute an additional allowance for each component

of the loan portfolio. As is the case with any such judgments, we could fail to identify these factors or accurately estimate their impact. We cannot provide any assurance as to whether charge-offs related to our credit exposure may occur in the future. Current and future market and economic developments may increase default and delinquency rates and negatively impact the quality of our credit portfolio, which may impact our charge-offs. Although our estimates contemplate current conditions, and, after adoption of ASU 2016-13, will contemplate current conditions and how we expect them to change over the life of the portfolio, it is reasonably possible that actual conditions could be worse than anticipated in those estimates, which could materially affect our results of operations and financial condition. See “Critical accounting estimates.”

Any material reduction in our credit ratings or the credit ratings of our principal bank subsidiaries, The Bank of New York Mellon or BNY Mellon, N.A., could increase the cost of funding and borrowing to us and our rated subsidiaries and have a material adverse effect on our results of operations and financial condition and on the value of the securities we issue.

Our debt and preferred stock and the debt and deposits of our principal bank subsidiaries, The Bank of New York Mellon and BNY Mellon, N.A., are currently rated investment grade by the major rating agencies. These rating agencies regularly evaluate us and our rated subsidiaries. Their credit ratings are based on a number of factors, including our financial strength, performance, prospects and operations, as well as factors not entirely within our control, including conditions affecting the financial services industry generally and the U.S. government. Rating agencies employ different models and formulas to assess the financial strength of a rated company, and from time to time rating agencies have, in their discretion, altered these models. Changes to rating agency models, general economic conditions or other circumstances outside our control could negatively impact a rating agency’s judgment of the rating or outlook it assigns to us or our rated subsidiaries. As a result, we or our rated subsidiaries may not be able to maintain our respective credit ratings or outlook on our securities.

A material reduction in our credit ratings or the credit ratings of our rated subsidiaries, which can occur at any time without notice, could have a material

adverse effect on our access to credit markets, the related cost of funding and borrowing, our credit spreads, our liquidity and on certain trading revenues, particularly in those businesses where counterparty creditworthiness is critical. In addition, in connection with certain over-the-counter derivatives contracts and other trading agreements, counterparties may require us or our rated subsidiaries to provide additional collateral or to terminate these contracts and agreements and collateral financing arrangements in the event of a credit ratings downgrade below certain ratings levels. The requirement to provide additional collateral or terminate these contracts and agreements could impair our liquidity by requiring us to find other sources of financing or to make significant cash payments or securities movements. A downgrade by any one rating agency, depending on the agency's relative ratings of the firm at the time of the downgrade, may have an impact comparable to the impact of a downgrade by all rating agencies. If a rating agency downgrade were to occur during broader market instability, our options for responding to events may be more limited and more expensive, possibly significantly. An increase in the costs of our funding and borrowing, or an impairment of our liquidity, could have a material adverse effect on our results of operations and financial condition. A material reduction in our credit ratings also could decrease the number of investors and counterparties willing or permitted to do business with or lend to us and adversely affect the value of the securities we have issued or may issue in the future.

We cannot predict what actions rating agencies may take, or what actions we may elect or be required to take in response thereto, which may adversely affect us. For further discussion on the impact of a credit rating downgrade, see "Disclosure of contingent features in OTC derivative instruments" in Note 23 of the Notes to Consolidated Financial Statements.

Strategic Risk

New lines of business, new products and services or transformational or strategic project initiatives may subject us to additional risks, and the failure to implement these initiatives could affect our results of operations.

From time to time, we may launch new lines of business, offer new products and services within existing lines of business or undertake transformational or strategic projects. There are

substantial risks and uncertainties associated with these efforts. We invest significant time and resources in developing and marketing new lines of business, products and services and executing on our transformational and strategic initiatives. For example, we have devoted considerable resources to developing new technology solutions for our clients. If these technology solutions are not successful, it could adversely impact our reputation, business and results of operations.

Regulatory requirements can affect whether initiatives are able to be brought to market in a manner that is timely and attractive to our customers. Initial timetables for the development and introduction of new lines of business or new products or services and price and profitability targets may not be met. Furthermore, our revenues and costs may fluctuate because new businesses or products and services generally require startup costs while revenues may take time to develop, which may adversely impact our results of operations.

From time to time we undertake transformational or strategic project initiatives. Significant effort and resources are necessary to manage and oversee the successful completion of these initiatives. These initiatives often place significant demands on management and a limited number of employees with subject matter expertise and may involve significant costs to implement as well as increase operational risk as employees learn to process transactions under new systems. The failure to properly execute on these transformational or strategic initiatives could adversely impact our business, reputation and results of operations.

Legal, regulatory and reputational risks may also exist in connection with dealing with new products or markets, or clients and customers whose businesses focus on such products or markets, where there is regulatory uncertainty or different or conflicting regulations depending on the regulator or the jurisdiction.

We are subject to competition in all aspects of our business, which could negatively affect our ability to maintain or increase our profitability.

Many businesses in which we operate are intensely competitive around the world. Larger and more geographically diverse companies, and financial technology firms that invest substantial resources in

developing and designing new technology (in particular digital and mobile technology) and that are not subject to the same level of regulation, may be able to offer financial products and services at more competitive prices than we are able to offer. Pricing pressures, as a result of the willingness of competitors to offer comparable or improved products or services at a lower price, may result in a reduction in the price we can charge for our products and services, which could, and in some cases has, negatively affected our ability to maintain or increase our profitability.

In addition, technological advances have made it possible for other types of non-depository institutions, such as financial technology firms, outsourcing companies and data processing companies, to offer a variety of products and services competitive with certain areas of our business. Competitors may develop technological advances that could negatively impact our transaction execution or the pricing of our clearing, settlement, payments and trading activities. In the future, financial technology firms may be able to provide traditional banking products and services by obtaining a bank-like charter, such as the OCC's fintech charter, or offer cryptocurrencies.

Markets, and the manner in which our clients interact and transact within markets, can evolve quickly, particularly if new or disruptive technologies are introduced. Our failure to either anticipate, or participate in, the transformational change within a given market could result in potential negative financial impact. In addition, business continuity and operational resiliency are competitive factors and any delay in our ability to maintain operations during, and recover quickly from, unexpected events could impact our ability to retain clients. Increased competition in any of these areas may require us to make additional capital investments in our businesses in order to remain competitive. For example, along with other financial institutions, we are researching ways to adapt robotic process automation and distributed ledger technology to bank services. If we are not able to adapt these technologies as successfully as our peers, we may become less competitive.

Furthermore, regulations could impact our ability to conduct certain of our businesses in a cost-effective manner or at all. The more restrictive laws and

regulations applicable to the largest U.S. financial services institutions, including the U.S. capital rules, can put us at a competitive disadvantage relative to both our non-U.S. competitors and U.S. competitors not subject to the same laws and regulations. See "Supervision and Regulation."

Our business may be adversely affected if we are unable to attract and retain employees.

Our success depends, in large part, on our ability to attract new employees, retain and motivate our existing employees, and continue to compensate our employees competitively amid heightened regulatory restrictions. Competition for the most skilled employees in most activities in which we engage can be intense, and we may not be able to recruit and retain key personnel.

We rely on certain employees with subject matter expertise to assist in the implementation of important initiatives. As technology and risk management increase in focus in the financial industry, competition for technologists and risk personnel has intensified, which could constrain our ability to execute on certain of our strategic initiatives.

Our ability to attract and retain key executives and other employees may be negatively affected by recent changes to immigration policies and restrictions applicable to incentive and other compensation programs, including limits on our ability to deduct for federal income tax purposes compensation in excess of \$1 million paid to certain current and former executives, as well as deferral, clawback requirements and other limits on incentive compensation. Some of these restrictions may not apply to some of our competitors and to other institutions with which we compete for talent, in particular as we are more often competing for personnel with financial technology providers and other entities that are not regulated banking organizations that may not have the same limitations on compensation as we do.

The loss of employees' skills, knowledge of the market, industry experience, and the cost of finding replacements may hurt our business. If we are unable to continue to attract and retain highly qualified employees, our performance, including our competitive position, could be adversely affected.

Our strategic transactions present risks and uncertainties and could have an adverse effect on our business, results of operations and financial condition.

From time to time, to achieve our strategic objectives, we have acquired, disposed of, or invested in (including through joint venture relationships) companies and businesses and have entered into strategic alliances or other collaborations with third party service providers to deliver products and services to clients, and may do so in the future. Our ability to pursue or complete strategic transactions is in certain instances subject to regulatory approval and we cannot be certain when or if, or on what terms and conditions, any required regulatory approvals would be granted. Moreover, to the extent we pursue a strategic transaction, there can be no guarantee that the transaction will close when anticipated, or at all. If a strategic transaction does not close, or if the strategic transaction fails to maximize shareholder value or required regulatory approval is not obtained, it could have an adverse effect on our business, results of operations and financial condition.

Each acquisition poses integration challenges, including successfully retaining and assimilating clients and key employees, capitalizing on certain revenue synergies and integrating the acquired company's culture, control functions, systems and technology. In some cases, acquisitions involve entry into new businesses or new geographic or other markets, and these situations also present risks and uncertainties in instances where we may be inexperienced in these new areas. We may be required to spend a significant amount of time and resources to integrate these acquisitions. The anticipated integration benefits may take longer to achieve than projected and the time and cost needed to consolidate control functions, platforms and systems may significantly exceed our estimates. If we fail to successfully integrate strategic acquisitions, including doing so in a timely and cost-effective manner, we may not realize the expected benefits, which could have an adverse impact on our business, financial condition and results of operations. In addition, we may incur expenses, costs, losses, penalties, taxes and other liabilities related to the conduct of the acquired businesses prior to the date of our ownership (including in connection with the defense and/or settlement of legal and regulatory claims, investigations and proceedings) which may not be recoverable through indemnification or

otherwise. If the purchase price we pay in an acquisition exceeds the fair value of assets acquired less the liabilities we assume, then we may need to recognize goodwill on our consolidated balance sheet. Goodwill is an intangible asset that is not eligible for inclusion in regulatory capital under applicable requirements. Further, if the value of the acquisition declines, we may be required to record an impairment charge.

Each disposition also poses challenges, including separating the disposed businesses, products and systems in a way that is cost-effective and is not disruptive to us or our customers. In addition, the inherent uncertainty involved in the process of evaluating, negotiating or executing a potential sale of one of our companies or businesses may cause the loss of key clients, employees and business partners which could have an adverse impact on our business, financial condition and results of operations.

Joint ventures, non-controlling investments, strategic alliances and other collaborations contain potentially increased financial, legal, reputational, operational, regulatory and/or compliance risks. We may be dependent on joint venture partners, firms with which we collaborate, controlling shareholders or management who may have business interests, strategies or goals that are inconsistent with ours. Business decisions or other actions or omissions of the joint venture partner, the firms with which we collaborate, controlling shareholders or management may adversely affect the value of our investment (or, in the case of strategic alliances or other collaborations, the value of our products or services), impacting our results of operations, result in litigation or regulatory action against us and otherwise damage our reputation and brand.

Other Risks

Tax law changes or challenges to our tax positions with respect to historical transactions may adversely affect our net income, effective tax rate and our overall results of operations and financial condition.

In the course of our business, we receive inquiries and challenges from both U.S. and non-U.S. tax authorities on the amount of taxes we owe. If we are not successful in defending these inquiries and challenges, we may be required to adjust the timing or amount of taxable income or deductions or the allocation of income among tax jurisdictions, all of

which can require a greater provision for taxes or otherwise negatively affect earnings. Probabilities and outcomes are reviewed as events unfold, and adjustments to the reserves are made when necessary, but the reserves may prove inadequate because we cannot necessarily accurately predict the outcome of any challenge, settlement or litigation or the extent to which it will negatively affect us or our business. Future tax laws or the expiration of or changes in existing tax laws, or the interpretation of those laws worldwide, could also have a material impact on our business or net income. Our actions taken in response to, or reliance upon, such changes in the tax laws may impact our tax position in a manner that may result in lower earnings. See Note 12 of the Notes to Consolidated Financial Statements for further information.

Our ability to return capital to shareholders is subject to the discretion of our Board of Directors and may be limited by U.S. banking laws and regulations, including those governing capital and the approval of our capital plan, applicable provisions of Delaware law or our failure to pay full and timely dividends on our preferred stock.

Holders of our common and preferred stock are only entitled to receive such dividends or other distributions of capital as our Board of Directors may declare out of funds legally available for such payments. Although we have historically declared cash dividends on our common and preferred stock, we are not required to do so. In addition to the Board of Directors' approval, our ability to take certain actions, including our ability to declare dividends or repurchase our common stock, is dependent on, among other things, Federal Reserve non-objection under the annual regulatory review of the results of the CCAR process and the supervisory stress tests required under the Dodd-Frank Act. These evaluations, in turn, are dependent on, among other things, our successful demonstration that we can maintain capital levels above regulatory minimums in the event of a stressed market environment. There can be no assurance that the Federal Reserve will not object to our future capital plans or otherwise limit our ability to make capital distributions or that we will perform adequately on our supervisory stress tests. If the Federal Reserve objects to our proposed capital actions or otherwise limits our ability to make capital distributions or we underperform on our stress tests, we may be required to revise our stress-testing or capital management approaches, resubmit our

capital plan or postpone, or cancel or alter our planned capital actions, and we would not be permitted to make any capital distributions other than those to which the Federal Reserve has indicated its non-objection. The Federal Reserve is also able, outside the CCAR non-objection process, to restrict our ability to make capital distributions and subject us to other supervisory or enforcement actions. We may also be required to resubmit our capital plan in the event of changes in our risk profile (including a material change in business strategy or risk exposure), financial condition or corporate structure.

Our ability to accurately predict or explain the outcome of the CCAR process is influenced by evolving supervisory criteria. Although the Federal Reserve will no longer object to our annual capital plan as part of CCAR on qualitative grounds, BNY Mellon will continue to be subject to a rigorous evaluation of its capital planning processes. If the Federal Reserve determined that our capital planning processes were weak, we could, for example, be subject to a deficient supervisory rating, and potentially an enforcement action, for failing to meet supervisory expectations. In addition, BNY Mellon, as noted, remains subject to a potential objection on quantitative grounds. The Federal Reserve may, as part of its stated goal to continually evolve its annual stress testing requirements, adjust several parameters of the annual stress testing process, including the severity of the stress test scenario and the addition of components deemed important by the Federal Reserve (e.g., a counterparty failure). Further, because the Federal Reserve's proprietary stress test models and qualitative assessment may differ from the modeling techniques and capital planning practices employed by us, it is foreseeable that our stress test results (using our own models, estimation methodologies and processes) may not be consistent with those disclosed by the Federal Reserve. In addition, the Federal Reserve has proposed to replace the capital conservation buffer with a "stress capital buffer," which would result in the integration of the G-SIB surcharge with stress-based capital requirements.

The Federal Reserve's instructions for the 2019 CCAR provide that, for large BHCs like BNY Mellon, common stock dividend payout ratios exceeding 30% of after-tax net income available to common shareholders under certain baseline scenarios will receive particularly close scrutiny. A failure to increase dividends along with our

competitors, or any reduction of, or elimination of, our common stock dividend would likely adversely affect the market price of our common stock, impact our return on equity and market perceptions of BNY Mellon.

Our ability to declare or pay dividends on, or purchase, redeem or otherwise acquire, shares of our common stock or any of our shares that rank junior to preferred stock as to the payment of dividends and/or the distribution of any assets on any liquidation, dissolution or winding-up of BNY Mellon will be prohibited, subject to certain exceptions, in the event that we do not declare and pay in full dividends for the then-current dividend period of our Series A preferred stock or the last preceding dividend period of our Series C, Series D, Series E or Series F preferred stock.

In addition, regulatory capital rules that are or will be applicable to us including the U.S. capital rules risk-based capital requirements, the SLR, enhanced SLR, the TLAC Rule and the U.S. G-SIB surcharge may limit or otherwise restrict how we utilize our capital, including common stock dividends and stock repurchases, and may require us to increase or alter the mix of our outstanding regulatory capital instruments.

Any requirement to increase our regulatory capital ratios or alter the composition of our capital could require us to liquidate assets or otherwise change our business and/or investment plans, which may negatively affect our financial results. Further, any requirement to maintain higher levels of capital may constrain our ability to return capital to shareholders either in the form of common stock dividends or stock repurchases.

The Parent is a non-operating holding company, and as a result, is dependent on dividends from its subsidiaries and extensions of credit from its IHC to meet its obligations, including with respect to its securities, and to provide funds for share repurchases and payment of dividends to its stockholders.

The Parent is a non-operating holding company, whose principal assets and sources of income are its principal U.S. bank subsidiaries - The Bank of New York Mellon and BNY Mellon, N.A. - and its other subsidiaries, including the IHC. The Parent is a legal entity separate and distinct from its banks, the IHC

and other subsidiaries. Therefore, the Parent primarily relies on dividends, interest, distributions, and other payments from its subsidiaries, including extensions of credit from the IHC, to meet its obligations, including with respect to its securities, and to provide funds for share repurchases and payment of common and preferred dividends to its stockholders, to the extent declared by the Board of Directors.

There are various limitations on the extent to which our banks and other subsidiaries can finance or otherwise supply funds to the Parent (by dividend or otherwise) and certain of our affiliates. Each of these restrictions can reduce the amount of funds available to meet the Parent's obligations. Many of our subsidiaries, including our bank subsidiaries, are subject to laws and regulations that restrict dividend payments or authorize regulatory bodies to block or reduce the flow of funds from those subsidiaries to the Parent or other subsidiaries. In addition, our bank subsidiaries would not be permitted to distribute a dividend if doing so would constitute an unsafe and unsound practice or if the payment would reduce their capital to an inadequate level. Our subsidiaries may also choose to restrict dividend payments to the Parent in order to increase their own capital or liquidity levels. Our bank subsidiaries are also subject to restrictions on their ability to lend to or transact with non-bank affiliates, minimum regulatory capital and liquidity requirements, and restrictions on their ability to use funds deposited with them in bank or brokerage accounts to fund their businesses. See "Supervision and Regulation" and "Liquidity and Dividends" and Note 19 of the Notes to Consolidated Financial Statements. Further, we evaluate and manage liquidity on a legal entity basis, which may place legal and other limitations on our ability to utilize liquidity from one legal entity to satisfy the liquidity requirements of another, including the Parent.

There are also limitations specific to the IHC's ability to make distributions or extend credit to the Parent. The IHC is not permitted to pay dividends to the Parent if certain key capital, liquidity and operational risk indicators are breached, and if the resolution of the Parent is imminent, the committed lines of credit provided by the IHC to the Parent will automatically terminate, with all outstanding amounts becoming due. See "The application of our Title I preferred resolution strategy or resolution under the Title II orderly liquidation authority could adversely affect

the Parent's liquidity and financial condition and the Parent's security holders."

Because the Parent is a holding company, its rights and the rights of its creditors, including the holders of its securities, to a share of the assets of any subsidiary upon the liquidation or recapitalization of the subsidiary, will be subject to the prior claims of the subsidiary's creditors (including, in the case of our banking subsidiaries, their depositors) except to the extent that the Parent may itself be a creditor with recognized claims against the subsidiary. The rights of holders of securities issued by the Parent to benefit from those distributions will also be junior to those prior claims. Consequently, securities issued by the Parent will be effectively subordinated to all existing and future liabilities of our subsidiaries.

Changes in accounting standards governing the preparation of our financial statements and future events could have a material impact on our reported financial condition, results of operations, cash flows and other financial data.

From time to time, the Financial Accounting Standards Board ("FASB"), the SEC and bank regulators change the financial accounting and reporting standards governing the preparation of our financial statements or the interpretation of those standards. These changes are difficult to predict and can materially impact how we record and report our

financial condition, results of operations, cash flows and other financial data. In some cases, we may be required to apply a new or revised standard retrospectively potentially resulting in the restatement of our prior period financial statements and our related disclosures.

Additionally, our accounting policies and methods are fundamental to how we record and report our financial condition and results of operations. The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates based upon assumptions about future economic and market conditions which affect reported amounts and related disclosures in our financial statements. Amounts subject to estimates are items such as the allowance for loan losses and lending-related commitments, the fair value of financial instruments and derivatives, goodwill and other intangibles and litigation and regulatory contingencies. Among other effects, such changes in estimates could result in future impairments of goodwill and intangible assets and establishment of allowances for loan losses and lending-related commitments as well as litigation and regulatory contingencies. If subsequent events occur that are materially different than the assumptions and estimates we used, our reported financial condition, results of operation and cash flows may be materially negatively impacted. See "Recent Accounting Developments" for a discussion of recent developments to our accounting standards.

Recently issued accounting standards

The following ASU issued by the FASB had not yet been adopted as of Dec. 31, 2019.

ASU 2016-13, Financial Instruments – Credit Losses: Measurement of Credit Losses on Financial Instruments

In June 2016, the FASB issued an ASU, *Financial Instruments – Credit Losses: Measurement of Credit Losses on Financial Instruments*. This ASU introduces a new current expected credit losses model, which applies to financial assets subject to credit losses and measured at amortized cost, including held-to-maturity securities and certain off-balance sheet credit exposures. The guidance also changes current practice for the impairment model for available-for-sale debt securities by requiring the use of an allowance to record estimated credit losses and subsequent recoveries. The standard requires a cumulative effect of initial application to be recognized in retained earnings at the date of initial application.

In conjunction with adopting the new standard, we developed expected credit loss models and approaches that include consideration of multiple forecast scenarios and other methodologies. We expect to record an after-tax increase to retained earnings as of Jan. 1, 2020 of approximately \$50 million primarily attributable to a reduction to the allowance for credit losses for our commercial lending portfolios. The Company is currently developing the required disclosures and finalizing changes to internal control.

Explanation of GAAP and Non-GAAP financial measures

BNY Mellon has included in this Annual Report certain Non-GAAP financial measures on a tangible basis as a supplement to generally accepted accounting principles (“GAAP”) information, which exclude goodwill and intangible assets, net of deferred tax liabilities. We believe that the return on tangible common equity is additional useful information for investors because it presents a measure of those assets that can generate income, and the tangible book value per common share is additional useful information because it presents the level of tangible assets in relation to shares of common stock outstanding.

The presentation of the growth rates of investment management and performance fees on a constant currency basis permits investors to assess the

significance of changes in foreign currency exchange rates. Growth rates on a constant currency basis were determined by applying the current period foreign currency exchange rates to the prior period revenue. We believe that this presentation, as a supplement to GAAP information, gives investors a clearer picture of the related revenue results without the variability caused by fluctuations in foreign currency exchange rates.

BNY Mellon has also included the operating margin for the Investment Management business net of distribution and servicing expense that was passed to third parties who distribute or service our managed funds. We believe that this measure is useful when evaluating the performance of the Investment Management business relative to industry competitors.

The following table presents the reconciliation of the return on common equity and tangible common equity.

Return on common equity and tangible common equity reconciliation <i>(dollars in millions)</i>	2019	2018	2017	2016	2015
Net income applicable to common shareholders of The Bank of New York Mellon Corporation – GAAP	\$ 4,272	\$ 4,097	\$ 3,915	\$ 3,425	\$ 3,053
Add: Amortization of intangible assets	117	180	209	237	261
Less: Tax impact of amortization of intangible assets	28	42	72	81	89
Adjusted net income applicable to common shareholders of The Bank of New York Mellon Corporation, excluding amortization of intangible assets – Non-GAAP	\$ 4,361	\$ 4,235	\$ 4,052	\$ 3,581	\$ 3,225
Average common shareholders’ equity	\$ 37,505	\$ 37,818	\$ 36,145	\$ 35,504	\$ 35,564
Less: Average goodwill	17,329	17,458	17,441	17,497	17,731
Average intangible assets	3,162	3,314	3,508	3,737	3,992
Add: Deferred tax liability – tax deductible goodwill (a)	1,098	1,072	1,034	1,497	1,401
Deferred tax liability – intangible assets (a)	670	692	718	1,105	1,148
Average tangible common shareholders’ equity – Non-GAAP	\$ 18,782	\$ 18,810	\$ 16,948	\$ 16,872	\$ 16,390
Return on common shareholders’ equity – GAAP	11.4%	10.8%	10.8%	9.6%	8.6%
Return on tangible common shareholders’ equity – Non-GAAP	23.2%	22.5%	23.9%	21.2%	19.7%

(a) Deferred tax liabilities are based on fully phased-in U.S. capital rules.

Supplemental Information (unaudited) (continued)

The following table presents the reconciliation of book value and tangible book value per common share.

Book value and tangible book value per common share reconciliation <i>(dollars in millions, except per share amounts and unless otherwise noted)</i>	Dec. 31,				
	2019	2018	2017	2016	2015
BNY Mellon shareholders' equity at year end – GAAP	\$ 41,483	\$ 40,638	\$ 41,251	\$ 38,811	\$ 38,037
Less: Preferred stock	3,542	3,542	3,542	3,542	2,552
BNY Mellon common shareholders' equity at year end – GAAP	37,941	37,096	37,709	35,269	35,485
Less: Goodwill	17,386	17,350	17,564	17,316	17,618
Intangible assets	3,107	3,220	3,411	3,598	3,842
Add: Deferred tax liability – tax deductible goodwill (a)	1,098	1,072	1,034	1,497	1,401
Deferred tax liability – intangible assets (a)	670	692	718	1,105	1,148
BNY Mellon tangible common shareholders' equity at year end – Non-GAAP	\$ 19,216	\$ 18,290	\$ 18,486	\$ 16,957	\$ 16,574
Year-end common shares outstanding <i>(in thousands)</i>	900,683	960,426	1,013,442	1,047,488	1,085,343
Book value per common share – GAAP	\$ 42.12	\$ 38.63	\$ 37.21	\$ 33.67	\$ 32.69
Tangible book value per common share – Non-GAAP	\$ 21.33	\$ 19.04	\$ 18.24	\$ 16.19	\$ 15.27

(a) *Deferred tax liabilities are based on fully phased-in U.S. capital rules.*

The following table presents the impact of changes in foreign currency exchange rates on our consolidated investment management and performance fees.

Constant currency reconciliation – Consolidated <i>(dollars in millions)</i>	2019	2018	2019 vs. 2018
Investment management and performance fees – GAAP (a)	\$ 3,389	\$ 3,647	(7)%
Impact of changes in foreign currency exchange rates	—	(53)	
Adjusted investment management and performance fees – Non-GAAP	\$ 3,389	\$ 3,594	(6)%

(a) *In 2019, we reclassified certain platform-related fees to clearing services fees from investment management and performance fees. Prior periods have been reclassified.*

The following table presents the impact of changes in foreign currency exchange rates on investment management and performance fees reported in the Investment Management business.

Constant currency reconciliation – Investment Management business <i>(dollars in millions)</i>	2019	2018	2019 vs. 2018
Investment management and performance fees – GAAP	\$ 3,373	\$ 3,632	(7)%
Impact of changes in foreign currency exchange rates	—	(53)	
Adjusted investment management and performance fees – Non-GAAP	\$ 3,373	\$ 3,579	(6)%

The following table presents the reconciliation of the pre-tax operating margin for the Investment Management business.

Pre-tax operating margin reconciliation – Investment Management business <i>(dollars in millions)</i>	2019	2018	2017
Income before income taxes – GAAP	\$ 1,079	\$ 1,263	\$ 1,141
Total revenue – GAAP	\$ 3,721	\$ 4,084	\$ 3,997
Less: Distribution and servicing expense	376	407	422
Adjusted total revenue, net of distribution and servicing expense – Non-GAAP	\$ 3,345	\$ 3,677	\$ 3,575
Pre-tax operating margin – GAAP (a)	29%	31%	29%
Adjusted pre-tax operating margin, net of distribution and servicing expense – Non-GAAP (a)	32%	34%	32%

(a) *Income before taxes divided by total revenue.*

Rate/volume analysis

Rate/volume analysis (a)	2019 over (under) 2018			2018 over (under) 2017		
	Due to change in			Due to change in		
	Average balance	Average rate	Net change	Average balance	Average rate	Net change
<i>(in millions)</i>						
Interest revenue						
Interest-earning assets:						
Interest-bearing deposits with the Federal Reserve and other central banks	\$ (49)	\$ (34)	\$ (83)	\$ (9)	\$ 221	\$ 212
Interest-bearing deposits with banks (primarily foreign banks)	(1)	47	46	(1)	100	99
Federal funds sold and securities purchased under resale agreements	420	618	1,038	11	682	693
Margin loans	(115)	59	(56)	(2)	169	167
Non-margin loans:						
Domestic offices	(16)	1	(15)	(21)	222	201
Foreign offices	(29)	23	(6)	(25)	103	78
Total non-margin loans	(45)	24	(21)	(46)	325	279
Securities:						
U.S. government obligations	(82)	27	(55)	(31)	92	61
U.S. government agency obligations	63	90	153	76	247	323
State and political subdivisions (b)	(28)	5	(23)	(19)	(12)	(31)
Other securities:						
Domestic offices (b)	86	(74)	12	(25)	151	126
Foreign offices	17	52	69	3	26	29
Total other securities (b)	103	(22)	81	(22)	177	155
Trading securities (primarily domestic) (b)	31	(2)	29	60	5	65
Total securities (b)	87	98	185	64	509	573
Total interest revenue (b)	\$ 297	\$ 812	\$ 1,109	\$ 17	\$ 2,006	\$ 2,023
Interest expense						
Interest-bearing liabilities:						
Interest-bearing deposits:						
Domestic offices	\$ 206	\$ 215	\$ 421	\$ 35	\$ 395	\$ 430
Foreign offices	(8)	304	296	—	285	285
Total interest-bearing deposits	198	519	717	35	680	715
Federal funds purchased and securities sold under repurchase agreements	(176)	855	679	(56)	589	533
Trading liabilities	4	2	6	—	22	22
Other borrowed funds:						
Domestic offices	(14)	18	4	24	10	34
Foreign offices	(1)	(2)	(3)	(2)	—	(2)
Total other borrowed funds	(15)	16	1	22	10	32
Commercial paper	(2)	6	4	—	22	22
Payables to customers and broker-dealers	(9)	56	47	(10)	137	127
Long-term debt	(4)	89	85	18	278	296
Total interest expense	\$ (4)	\$ 1,543	\$ 1,539	\$ 9	\$ 1,738	\$ 1,747
Changes in net interest revenue (b)	\$ 301	\$ (731)	\$ (430)	\$ 8	\$ 268	\$ 276

(a) Changes which are solely due to balance changes or rate changes are allocated to such categories on the basis of the respective percentage changes in average balances and average rates. Changes in interest revenue or interest expense arising from the combination of rate and volume variances are allocated proportionately to rate and volume based on their relative absolute magnitudes.

(b) Presented on an FTE basis.

Selected Quarterly Data (unaudited)

Selected Quarterly Data <i>(dollars in millions, except per share amounts)</i>	Quarter ended							
	2019				2018			
	Dec. 31	Sept. 30	June 30	March 31	Dec. 31	Sept. 30	June 30	March 31
Consolidated income statement								
Fee and other revenue	\$ 3,946	\$ 3,128	\$ 3,112	\$ 3,032	\$ 3,146	\$ 3,168	\$ 3,210	\$ 3,270
Income (loss) from consolidated investment management funds	17	3	10	26	(24)	10	12	(11)
Net interest revenue	815	730	802	841	885	891	916	919
Total revenue	4,778	3,861	3,924	3,899	4,007	4,069	4,138	4,178
Provision for credit losses	(8)	(16)	(8)	7	—	(3)	(3)	(5)
Noninterest expense	2,964	2,590	2,647	2,699	2,987	2,738	2,747	2,739
Income before taxes	1,822	1,287	1,285	1,193	1,020	1,334	1,394	1,444
Provision for income taxes	373	246	264	237	150	220	286	282
Net income	1,449	1,041	1,021	956	870	1,114	1,108	1,162
Net (income) loss attributable to noncontrolling interests	(9)	(3)	(4)	(10)	11	(3)	(5)	9
Net income applicable to shareholders of The Bank of New York Mellon Corporation	1,440	1,038	1,017	946	881	1,111	1,103	1,171
Preferred stock dividends	(49)	(36)	(48)	(36)	(49)	(36)	(48)	(36)
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	\$ 1,391	\$ 1,002	\$ 969	\$ 910	\$ 832	\$ 1,075	\$ 1,055	\$ 1,135
Basic earnings per common share	\$ 1.52	\$ 1.07	\$ 1.01	\$ 0.94	\$ 0.84	\$ 1.07	\$ 1.04	\$ 1.11
Diluted earnings per common share	\$ 1.52	\$ 1.07	\$ 1.01	\$ 0.94	\$ 0.84	\$ 1.06	\$ 1.03	\$ 1.10
Average balances								
Interest-bearing deposits with banks	\$ 77,415	\$ 75,354	\$ 75,422	\$ 77,440	\$ 78,582	\$ 75,907	\$ 85,424	\$ 92,918
Securities	122,314	121,496	117,820	119,317	118,904	118,505	117,761	118,459
Trading securities	6,695	5,653	5,764	5,102	5,543	4,261	3,784	4,183
Loans	52,717	50,835	50,373	51,358	53,834	53,807	57,066	58,606
Total interest-earning assets	297,987	294,154	287,417	282,185	285,706	279,218	292,086	302,069
Total assets	354,341	350,679	342,384	336,165	338,591	332,341	346,328	358,175
Deposits	232,056	226,428	220,501	214,462	220,635	209,313	217,567	226,709
Long-term debt	28,117	28,386	27,681	28,254	28,201	28,074	28,349	28,407
Preferred stock	3,542	3,542	3,542	3,542	3,542	3,542	3,542	3,542
Total The Bank of New York Mellon Corporation common shareholders' equity	37,842	37,597	37,487	37,086	37,886	38,036	37,750	37,593
Net interest margin	1.09%	0.99% (a)	1.12%	1.20%	1.24%	1.27%	1.26%	1.22%
Annualized return on common equity	14.6%	10.6%	10.4%	10.0%	8.7%	11.2%	11.2%	12.2%
Pre-tax operating margin	38%	33%	33%	31%	25%	33%	34%	35%
Common stock data (b)								
Closing price per share (c)	\$ 50.33	\$ 45.21	\$ 44.15	\$ 50.43	\$ 47.07	\$ 50.99	\$ 53.93	\$ 51.53
Cash dividends per share	\$ 0.31	\$ 0.31	\$ 0.28	\$ 0.28	\$ 0.28	\$ 0.28	\$ 0.24	\$ 0.24
Market capitalization (c)	\$ 45,331	\$ 41,693	\$ 41,619	\$ 48,288	\$ 45,207	\$ 50,418	\$ 53,927	\$ 52,080

(a) Includes the impact of the lease-related impairment of \$70 million recorded in the third quarter of 2019. Excluding the lease-related impairment, the adjusted net interest margin would have been 1.09% (Non-GAAP) in the third quarter of 2019. We believe providing the adjusted net interest margin is useful to investors as it is more reflective of the actual rates earned.

(b) At Dec. 31, 2019, there were 26,415 shareholders registered with our stock transfer agent, compared with 27,805 at Dec. 31, 2018 and 29,472 at Dec. 31, 2017. In addition, there were 44,876 of BNY Mellon's current and former employees at Dec. 31, 2019 who participate in BNY Mellon's 401(k) Retirement Savings Plan. All shares of BNY Mellon's common stock held by the Plan for its participants are registered in the name of The Bank of New York Mellon, as trustee.

(c) At period end.

Forward-looking Statements

Some statements in this document are forward-looking. These include all statements about the usefulness of Non-GAAP measures, the future results of BNY Mellon, our businesses, financial, liquidity and capital condition, results of operations, liquidity, risk and capital management and processes, goals, strategies, outlook, objectives, expectations (including those regarding our performance results, expenses, nonperforming assets, products, impacts of currency fluctuations, impacts of trends on our businesses, regulatory, technology, market, economic or accounting developments and the impacts of such developments on our businesses, legal proceedings and other contingencies), effective tax rate, net interest revenue, estimates (including those regarding expenses, losses inherent in our credit portfolios and capital ratios), intentions (including those regarding our capital returns and expenses, including our investments in technology and pension expense), targets, opportunities, potential actions, growth and initiatives.

In this report, any other report, any press release or any written or oral statement that BNY Mellon or its executives may make, words, such as “estimate,” “forecast,” “project,” “anticipate,” “likely,” “target,” “expect,” “intend,” “continue,” “seek,” “believe,” “plan,” “goal,” “could,” “should,” “would,” “may,” “might,” “will,” “strategy,” “synergies,” “opportunities,” “trends,” “future” and words of similar meaning, may signify forward-looking statements.

Actual results may differ materially from those expressed or implied as a result of a number of factors, including those discussed in “Risk Factors,” such as:

- a communications or technology disruption or failure within our infrastructure or the infrastructure of third parties that results in a loss of information, delays our ability to access information or impacts our ability to provide services to our clients may materially adversely affect our business, financial condition and results of operations;
- a cybersecurity incident, or a failure to protect our computer systems, networks and information and our clients’ information against cybersecurity threats, could result in the theft, loss, unauthorized access to, disclosure, use or alteration of information, system or network failures, or loss of access to information; any such incident or failure could adversely impact

- our ability to conduct our businesses, damage our reputation and cause losses;
- our business may be materially adversely affected by operational risk;
- our risk management framework may not be effective in mitigating risk and reducing the potential for losses;
- we are subject to extensive government rulemaking, regulation and supervision; these rules and regulations have, and in the future may, compel us to change how we manage our businesses, which could have a material adverse effect on our business, financial condition and results of operations;
- regulatory or enforcement actions or litigation could materially adversely affect our results of operations or harm our businesses or reputation;
- our businesses may be negatively affected by adverse events, publicity, government scrutiny or other reputational harm;
- failure to satisfy regulatory standards, including “well capitalized” and “well managed” status or capital adequacy and liquidity rules more generally, could result in limitations on our activities and adversely affect our business and financial condition;
- a failure or circumvention of our controls and procedures could have a material adverse effect on our business, reputation, results of operations and financial condition;
- the application of our Title I preferred resolution strategy or resolution under the Title II orderly liquidation authority could adversely affect the Parent’s liquidity and financial condition and the Parent’s security holders;
- impacts from climate change, natural disasters, acts of terrorism, pandemics, global conflicts and other geopolitical events may have a negative impact on our business and operations;
- we are dependent on fee-based business for a substantial majority of our revenue and our fee-based revenues could be adversely affected by slowing in market activity, weak financial markets, underperformance and/or negative trends in savings rates or in investment preferences;
- weakness and volatility in financial markets and the economy generally may materially adversely affect our business, results of operations and financial condition;
- changes in interest rates and yield curves could have a material adverse effect on our profitability;

- transitions away from and the anticipated replacement of LIBOR and other IBORs could adversely impact our business and results of operations;
- the UK's withdrawal from the EU may have negative effects on global economic conditions, global financial markets, and our business and results of operations;
- we may experience losses on securities related to volatile and illiquid market conditions, reducing our earnings and impacting our financial condition;
- the failure or perceived weakness of any of our significant clients or counterparties, many of whom are major financial institutions and sovereign entities, and our assumption of credit and counterparty risk, could expose us to loss and adversely affect our business;
- our business, financial condition and results of operations could be adversely affected if we do not effectively manage our liquidity;
- we could incur losses if our allowance for credit losses, including loan and lending-related commitments reserves, is inadequate;
- any material reduction in our credit ratings or the credit ratings of our principal bank subsidiaries, The Bank of New York Mellon or BNY Mellon, N.A., could increase the cost of funding and borrowing to us and our rated subsidiaries and have a material adverse effect on our results of operations and financial condition and on the value of the securities we issue;
- new lines of business, new products and services or transformational or strategic project initiatives may subject us to additional risks, and the failure to implement these initiatives could affect our results of operations;
- we are subject to competition in all aspects of our business, which could negatively affect our ability to maintain or increase our profitability;
- our business may be adversely affected if we are unable to attract and retain employees;
- our strategic transactions present risks and uncertainties and could have an adverse effect on our business, results of operations and financial condition;
- tax law changes or challenges to our tax positions with respect to historical transactions may adversely affect our net income, effective tax rate and our overall results of operations and financial condition;
- our ability to return capital to shareholders is subject to the discretion of our Board of Directors and may be limited by U.S. banking laws and regulations, including those governing capital and the approval of our capital plan, applicable provisions of Delaware law or our failure to pay full and timely dividends on our preferred stock;
- the Parent is a non-operating holding company, and as a result, is dependent on dividends from its subsidiaries and extensions of credit from its IHC to meet its obligations, including with respect to its securities, and to provide funds for share repurchases and payment of dividends to its stockholders; and
- changes in accounting standards governing the preparation of our financial statements and future events could have a material impact on our reported financial condition, results of operations, cash flows and other financial data.

Investors should consider all risk factors discussed in our 2019 Annual Report and any subsequent reports filed with the SEC by BNY Mellon pursuant to the Exchange Act. All forward-looking statements speak only as of the date on which such statements are made, and BNY Mellon undertakes no obligation to update any statement to reflect events or circumstances after the date on which such forward-looking statement is made or to reflect the occurrence of unanticipated events. The contents of BNY Mellon's website or any other websites referenced herein are not part of this report.

Acronyms

ABS	Asset-backed security	IHC	Intermediate holding company
APAC	Asia-Pacific region	LCR	Liquidity coverage ratio
ASC	Accounting Standards Codification	LIBOR	London Interbank Offered Rate
ASU	Accounting Standards Update	LTD	Long-term debt
AUC/A	Assets under custody and/or administration	MBS	Mortgage-backed security
AUM	Assets under management	N/A	Not applicable or Not available
BCBS	Basel Committee on Banking Supervision	N/M	Not meaningful
BHCs	Bank holding companies	NSFR	Net stable funding ratio
CCAR	Comprehensive Capital Analysis and Review	OCC	Office of the Comptroller of the Currency
CET1	Common Equity Tier 1 capital	OCI	Other comprehensive income
CFTC	Commodity Futures Trading Commission	OTC	Over-the-counter
CLO	Collateralized loan obligation	RMBS	Residential mortgage-backed security
EMEA	Europe, the Middle East and Africa	RWAs	Risk-weighted assets
FASB	Financial Accounting Standards Board	S&P	Standard & Poor's
FDIC	Federal Deposit Insurance Corporation	SBIC	Small business investment company
FHC	Financial holding company	SBLC	Standby letters of credit
FICC	Fixed Income Clearing Corporation	SEC	Securities and Exchange Commission
FINRA	Financial Industry Regulatory Authority, Inc.	SIFIs	Systemically important financial institutions
FTE	Fully taxable equivalent	SLR	Supplementary leverage ratio
GAAP	Generally accepted accounting principles	TLAC	Total loss-absorbing capacity
G-SIBs	Global systemically important banks	VaR	Value-at-risk
HQLA	High-quality liquid assets	VIE	Variable interest entity
IDI	Insured depository institution		

Assets under custody and/or administration (“AUC/A”) – Assets that we hold directly or indirectly on behalf of clients under a safekeeping or custody arrangement or for which we provide administrative services for clients. The following types of assets under administration are not and historically have not been included in AUC/A: performance and risk analytics, transfer agency and asset aggregation services. To the extent that we provide more than one AUC/A service for a client’s assets, the value of the asset is only counted once in the total amount of AUC/A.

Assets under management (“AUM”) – Includes assets beneficially owned by our clients or customers which we hold in various capacities that are either actively or passively managed, as well as the value of hedges supporting customer liabilities. These assets and liabilities are not on our balance sheet.

CAMELS – An international bank-rating system where bank supervisory authorities rate institutions according to six factors. The six factors are Capital adequacy, Asset quality, Management quality, Earnings, Liquidity and Sensitivity to market risk.

Collateral management – A comprehensive program designed to simplify collateralization and expedite securities transfers for buyers and sellers.

Credit valuation adjustment (“CVA”) – The market value of counterparty credit risk on OTC derivative transactions.

Debit valuation adjustment (“DVA”) – The market value of our credit risk on OTC derivative transactions.

Depositary Receipts – A negotiable security that generally represents a non-U.S. company’s publicly traded equity.

Economic capital – The amount of capital required to absorb potential losses and reflects the probability of remaining solvent with a target debt rating over a one-year time horizon.

Global systemically important bank (“G-SIB”) – A financial institution whose distress or disorderly failure, because of its size, complexity and systemic interconnectedness, would cause significant disruption to the wider financial system and economic activity.

Grantor Trust – A legal, passive entity through which pass-through securities are sold to investors.

High-quality liquid assets (“HQLA”) – Unencumbered assets of the types identified in the U.S. LCR rule, which the U.S. banking agencies describe as able to be convertible into cash with little or no expected loss of value during a period of liquidity stress.

Investment grade – Represents Moody’s long-term rating of Baa3 or better; and/or a Standard & Poor’s, Fitch or DBRS long-term rating of BBB- or better; or if unrated, an equivalent rating using our internal risk ratings. Instruments that fall below these levels are considered to be non-investment grade.

Real estate investment trust (“REIT”) – An investor-owned corporation, trust or association that sells shares to investors and invests in income-producing property.

Repurchase agreement (“Repo”) – An instrument used to raise short-term funds whereby securities are sold with an agreement for the seller to buy back the securities at a later date.

Reverse repurchase agreement – The purchase of securities with the agreement to sell them at a higher price at a specific future date.

Sub-custodian – A local provider (e.g., a bank) contracted to provide specific custodial-related services in a selected country or geographic area.

Management of BNY Mellon is responsible for establishing and maintaining adequate internal control over financial reporting for BNY Mellon, as such term is defined in Rule 13a-15(f) under the Exchange Act.

BNY Mellon's management, including its principal executive officer and principal financial officer, has assessed the effectiveness of BNY Mellon's internal control over financial reporting as of December 31, 2019. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission in Internal Control – Integrated Framework (2013). Based upon such assessment, management believes that, as of December 31, 2019, BNY Mellon's internal control over financial reporting is effective based upon those criteria.

KPMG LLP, the independent registered public accounting firm that audited BNY Mellon's 2019 financial statements included in this Annual Report under "Financial Statements" and "Notes to Consolidated Financial Statements," has issued a report with respect to the effectiveness of BNY Mellon's internal control over financial reporting. This report appears on page 110.

To the Shareholders and Board of Directors
The Bank of New York Mellon Corporation:

Opinion on Internal Control Over Financial Reporting

We have audited The Bank of New York Mellon Corporation and subsidiaries (BNY Mellon) internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, BNY Mellon maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of BNY Mellon as of December 31, 2019 and 2018, the related consolidated statements of income, comprehensive income, cash flows, and changes in equity for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements), and our report dated February 27, 2020 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

BNY Mellon's management is responsible 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 Report of Management on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on BNY Mellon's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to BNY Mellon 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 audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. 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 audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

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 (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) 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.

/s/ KPMG LLP

New York, New York
February 27, 2020

Consolidated Income Statement

<i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Fee and other revenue			
Investment services fees:			
Asset servicing fees	\$ 4,563	\$ 4,608	\$ 4,383
Clearing services fees <i>(a)</i>	1,648	1,616	1,598
Issuer services fees	1,130	1,099	977
Treasury services fees	559	554	557
Total investment services fees <i>(a)</i>	7,900	7,877	7,515
Investment management and performance fees <i>(a)</i>	3,389	3,647	3,539
Foreign exchange and other trading revenue	654	732	668
Financing-related fees	196	207	216
Distribution and servicing	129	139	160
Investment and other income	968	240	64
Total fee revenue	13,236	12,842	12,162
Net securities (losses) gains — including other-than-temporary impairment	(17)	(47)	6
Noncredit-related portion of other-than-temporary impairment (recognized in other comprehensive income)	1	1	3
Net securities (losses) gains	(18)	(48)	3
Total fee and other revenue	13,218	12,794	12,165
Operations of consolidated investment management funds			
Investment income (loss)	57	(12)	74
Interest of investment management fund note holders	1	1	4
Income (loss) from consolidated investment management funds	56	(13)	70
Net interest revenue			
Interest revenue	7,548	6,432	4,382
Interest expense	4,360	2,821	1,074
Net interest revenue	3,188	3,611	3,308
Total revenue	16,462	16,392	15,543
Provision for credit losses	(25)	(11)	(24)
Noninterest expense			
Staff	6,063	6,145	6,033
Professional, legal and other purchased services	1,345	1,334	1,276
Software and equipment	1,222	1,062	985
Net occupancy	564	630	570
Sub-custodian and clearing	450	450	414
Distribution and servicing	374	406	419
Business development	213	228	229
Bank assessment charges	125	170	220
Amortization of intangible assets	117	180	209
Other	427	606	602
Total noninterest expense	10,900	11,211	10,957
Income			
Income before income taxes	5,587	5,192	4,610
Provision for income taxes	1,120	938	496
Net income	4,467	4,254	4,114
Net (income) loss attributable to noncontrolling interests (includes \$(26), \$12 and \$(33) related to consolidated investment management funds, respectively)	(26)	12	(24)
Net income applicable to shareholders of The Bank of New York Mellon Corporation	4,441	4,266	4,090
Preferred stock dividends	(169)	(169)	(175)
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	\$ 4,272	\$ 4,097	\$ 3,915

(a) In 2019, we reclassified certain platform-related fees to clearing services fees from investment management and performance fees. Prior periods have been reclassified.

Consolidated Income Statement (continued)

Net income applicable to common shareholders of The Bank of New York Mellon Corporation used for the earnings per share calculation <i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	\$ 4,272	\$ 4,097	\$ 3,915
Less: Earnings allocated to participating securities	18	27	43
Net income applicable to common shareholders of The Bank of New York Mellon Corporation after required adjustment for the calculation of basic and diluted earnings per common share	\$ 4,254	\$ 4,070	\$ 3,872

Average common shares and equivalents outstanding of The Bank of New York Mellon Corporation <i>(in thousands)</i>	Year ended Dec. 31,		
	2019	2018	2017
Basic	939,623	1,002,922	1,034,281
Common stock equivalents	5,087	6,801	13,030
Less: Participating securities	(1,601)	(2,582)	(7,021)
Diluted	943,109	1,007,141	1,040,290
Anti-dilutive securities (a)	4,014	6,804	12,383

(a) Represents stock options, restricted stock, restricted stock units and participating securities outstanding but not included in the computation of diluted average common shares because their effect would be anti-dilutive.

Earnings per share applicable to common shareholders of The Bank of New York Mellon Corporation <i>(in dollars)</i>	Year ended Dec. 31,		
	2019	2018	2017
Basic	\$ 4.53	\$ 4.06	\$ 3.74
Diluted	\$ 4.51	\$ 4.04	\$ 3.72

See accompanying Notes to Consolidated Financial Statements.

Consolidated Comprehensive Income Statement

<i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Net income	\$ 4,467	\$ 4,254	\$ 4,114
Other comprehensive income (loss), net of tax:			
Foreign currency translation adjustments	151	(313)	853
Unrealized gain (loss) on assets available-for-sale:			
Unrealized gain (loss) arising during the period	512	(416)	153
Reclassification adjustment	14	36	(3)
Total unrealized gain (loss) on assets available-for-sale	526	(380)	150
Defined benefit plans:			
Prior service cost arising during the period	(1)	—	—
Net (loss) gain arising during the period	(87)	(189)	342
Foreign exchange adjustment	—	—	1
Amortization of prior service credit, net loss and initial obligation included in net periodic benefit cost	34	69	68
Total defined benefit plans	(54)	(120)	411
Net unrealized gain (loss) on cash flow hedges	3	(10)	9
Total other comprehensive income (loss), net of tax <i>(a)</i>	626	(823)	1,423
Total comprehensive income	5,093	3,431	5,537
Net (income) loss attributable to noncontrolling interests	(26)	12	(24)
Other comprehensive (income) loss attributable to noncontrolling interests	(3)	11	(15)
Comprehensive income applicable to shareholders of The Bank of New York Mellon Corporation	\$ 5,064	\$ 3,454	\$ 5,498

(a) Other comprehensive income (loss) attributable to The Bank of New York Mellon Corporation shareholders was \$623 million for the year ended Dec. 31, 2019, \$(812) million for the year ended Dec. 31, 2018 and \$1,408 million for the year ended Dec. 31, 2017.

See accompanying Notes to Consolidated Financial Statements.

Consolidated Balance Sheet

<i>(dollars in millions, except per share amounts)</i>	Dec. 31,	
	2019	2018
Assets		
Cash and due from banks	\$ 4,830	\$ 5,864
Interest-bearing deposits with the Federal Reserve and other central banks	95,042	67,988
Interest-bearing deposits with banks (\$2,437 and \$2,394 is restricted)	14,811	14,148
Federal funds sold and securities purchased under resale agreements	30,182	46,795
Securities:		
Held-to-maturity (fair value of \$34,805 and \$33,302)	34,483	33,982
Available-for-sale	88,550	85,809
Total securities	123,033	119,791
Trading assets	13,571	7,035
Loans	54,953	56,564
Allowance for loan losses	(122)	(146)
Net loans	54,831	56,418
Premises and equipment	3,625	1,832
Accrued interest receivable	624	671
Goodwill	17,386	17,350
Intangible assets	3,107	3,220
Other assets (includes \$419 and \$742, at fair value)	20,221	21,298
Subtotal assets of operations	381,263	362,410
Assets of consolidated investment management funds, at fair value	245	463
Total assets	\$ 381,508	\$ 362,873
Liabilities		
Deposits:		
Noninterest-bearing (principally U.S. offices)	\$ 57,630	\$ 70,783
Interest-bearing deposits in U.S. offices	101,542	74,904
Interest-bearing deposits in non-U.S. offices	100,294	93,091
Total deposits	259,466	238,778
Federal funds purchased and securities sold under repurchase agreements	11,401	14,243
Trading liabilities	4,841	3,479
Payables to customers and broker-dealers	18,758	19,731
Commercial paper	3,959	1,939
Other borrowed funds	599	3,227
Accrued taxes and other expenses	5,642	5,669
Other liabilities (including allowance for lending-related commitments of \$94 and \$106, also includes \$607 and \$88, at fair value)	7,612	5,774
Long-term debt (includes \$387 and \$371, at fair value)	27,501	29,163
Subtotal liabilities of operations	339,779	322,003
Liabilities of consolidated investment management funds, at fair value	1	2
Total liabilities	339,780	322,005
Temporary equity		
Redeemable noncontrolling interests	143	129
Permanent equity		
Preferred stock – par value \$0.01 per share; authorized 100,000,000 shares; issued 35,826 and 35,826 shares	3,542	3,542
Common stock – par value \$0.01 per share; authorized 3,500,000,000 shares; issued 1,374,443,376 and 1,364,877,915 shares	14	14
Additional paid-in capital	27,515	27,118
Retained earnings	31,894	28,652
Accumulated other comprehensive loss, net of tax	(2,638)	(3,171)
Less: Treasury stock of 473,760,338 and 404,452,246 common shares, at cost	(18,844)	(15,517)
Total The Bank of New York Mellon Corporation shareholders' equity	41,483	40,638
Nonredeemable noncontrolling interests of consolidated investment management funds	102	101
Total permanent equity	41,585	40,739
Total liabilities, temporary equity and permanent equity	\$ 381,508	\$ 362,873

See accompanying Notes to Consolidated Financial Statements.

Consolidated Statement of Cash Flows

<i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Operating activities			
Net income	\$ 4,467	\$ 4,254	\$ 4,114
Net (income) loss attributable to noncontrolling interests	(26)	12	(24)
Net income applicable to shareholders of The Bank of New York Mellon Corporation	4,441	4,266	4,090
Adjustments to reconcile net income to net cash provided by operating activities:			
Provision for credit losses	(25)	(11)	(24)
Pension plan contributions	(45)	(55)	(114)
Depreciation and amortization	1,315	1,339	1,474
Deferred tax (benefit) expense	(69)	(525)	133
Net securities losses (gains)	18	48	(3)
Change in trading assets and liabilities	(5,167)	(574)	(694)
Change in accruals and other, net	(372)	1,508	(195)
Net cash provided by operating activities	96	5,996	4,667
Investing activities			
Change in interest-bearing deposits with banks	(970)	(2,011)	2,199
Change in interest-bearing deposits with the Federal Reserve and other central banks	(26,763)	21,954	(29,613)
Purchases of securities held-to-maturity	(8,822)	(5,055)	(8,329)
Paydowns of securities held-to-maturity	5,149	4,346	4,448
Maturities of securities held-to-maturity	3,192	6,317	3,992
Purchases of securities available-for-sale	(46,435)	(32,404)	(26,151)
Sales of securities available-for-sale	11,444	8,247	6,001
Paydowns of securities available-for-sale	7,516	7,716	9,129
Maturities of securities available-for-sale	26,504	9,063	6,319
Net change in loans	1,486	4,620	2,794
Sales of loans and other real estate	147	263	392
Change in federal funds sold and securities purchased under resale agreements	16,615	(18,662)	(2,334)
Net change in seed capital investments	74	59	(124)
Purchases of premises and equipment/capitalized software	(1,210)	(1,108)	(1,197)
Proceeds from the sale of premises and equipment	—	23	—
Proceeds from the sale of an equity method investment	849	—	—
Dispositions, net of cash	—	84	—
Other, net	676	(153)	(231)
Net cash (used for) provided by investing activities	(10,548)	3,299	(32,705)
Financing activities			
Change in deposits	20,663	(2,874)	17,069
Change in federal funds purchased and securities sold under repurchase agreements	(2,822)	(920)	5,174
Change in payables to customers and broker-dealers	(981)	(433)	(813)
Change in other borrowed funds	(2,651)	164	1,852
Change in commercial paper	2,020	(1,136)	3,075
Net proceeds from the issuance of long-term debt	2,993	5,143	4,738
Repayments of long-term debt	(5,250)	(3,650)	(1,046)
Proceeds from the exercise of stock options	65	80	431
Issuance of common stock	21	40	34
Treasury stock acquired	(3,327)	(3,269)	(2,686)
Common cash dividends paid	(1,120)	(1,052)	(901)
Preferred cash dividends paid	(169)	(169)	(175)
Other, net	17	(22)	26
Net cash provided by (used for) financing activities	9,459	(8,098)	26,778
Effect of exchange rate changes on cash	2	(72)	189
Change in cash and due from banks and restricted cash			
Change in cash and due from banks and restricted cash	(991)	1,125	(1,071)
Cash and due from banks and restricted cash at beginning of year	8,258	7,133	8,204
Cash and due from banks and restricted cash at end of year	\$ 7,267	\$ 8,258	\$ 7,133
Cash and due from banks and restricted cash:			
Cash and due from banks at end of year (unrestricted cash)	\$ 4,830	\$ 5,864	\$ 5,382
Restricted cash at end of year	2,437	2,394	1,751
Cash and due from banks and restricted cash at end of year	\$ 7,267	\$ 8,258	\$ 7,133
Supplemental disclosures			
Interest paid	\$ 4,400	\$ 2,711	\$ 1,033
Income taxes paid	989	983	498
Income taxes refunded	669	175	20

See accompanying Notes to Consolidated Financial Statements.

Consolidated Statement of Changes in Equity

<i>(in millions, except per share amount)</i>	The Bank of New York Mellon Corporation shareholders						Non-redeemable noncontrolling interests of consolidated investment management funds	Total permanent equity	Redeemable noncontrolling interests/ temporary equity
	Preferred stock	Common stock	Additional paid-in capital	Retained earnings	Accumulated other comprehensive (loss) income, net of tax	Treasury stock			
Balance at Dec. 31, 2018	\$ 3,542	\$ 14	\$ 27,118	\$ 28,652	\$ (3,171)	\$(15,517)	\$ 101	\$ 40,739	(a) \$ 129
Reclassification of certain tax effects related to adopting Accounting Standards Update ("ASU") 2018-02	—	—	—	90	(90)	—	—	—	—
Adjusted balance at Jan. 1, 2019	3,542	14	27,118	28,742	(3,261)	(15,517)	101	40,739	129
Shares issued to shareholders of noncontrolling interests	—	—	—	—	—	—	—	—	77
Redemption of subsidiary shares from noncontrolling interests	—	—	—	—	—	—	—	—	(48)
Other net changes in noncontrolling interests	—	—	6	—	—	—	(25)	(19)	(18)
Net income	—	—	—	4,441	—	—	26	4,467	—
Other comprehensive income	—	—	—	—	623	—	—	623	3
Dividends:									
Common stock at \$1.18 per share	—	—	—	(1,120)	—	—	—	(1,120)	—
Preferred stock	—	—	—	(169)	—	—	—	(169)	—
Repurchase of common stock	—	—	—	—	—	(3,327)	—	(3,327)	—
Common stock issued under:									
Employee benefit plans	—	—	28	—	—	—	—	28	—
Direct stock purchase and dividend reinvestment plan	—	—	11	—	—	—	—	11	—
Stock awards and options exercised	—	—	352	—	—	—	—	352	—
Balance at Dec. 31, 2019	\$ 3,542	\$ 14	\$ 27,515	\$ 31,894	\$ (2,638)	\$(18,844)	\$ 102	\$ 41,585	(a) \$ 143

(a) Includes total The Bank of New York Mellon Corporation common shareholders' equity of \$37,096 million at Dec. 31, 2018 and \$37,941 million at Dec. 31, 2019.

Consolidated Statement of Changes in Equity (continued)

(in millions, except per share amount)	The Bank of New York Mellon Corporation shareholders						Non-redeemable noncontrolling interests of consolidated investment management funds	Total permanent equity	Redeemable noncontrolling interests/ temporary equity
	Preferred stock	Common stock	Additional paid-in capital	Retained earnings	Accumulated other comprehensive (loss), net of tax	Treasury stock			
Balance at Dec. 31, 2017	\$ 3,542	\$ 14	\$ 26,665	\$ 25,635	\$ (2,357)	\$(12,248)	\$ 316	\$ 41,567	(a) \$ 179
Adjustment for the cumulative effect of applying ASU 2014-09 for contract revenue	—	—	—	(55)	—	—	—	(55)	—
Adjustment for the cumulative effect of applying ASU 2017-12 for derivatives and hedging	—	—	—	27	(2)	—	—	25	—
Adjusted balance at Jan. 1, 2018	3,542	14	26,665	25,607	(2,359)	(12,248)	316	41,537	179
Shares issued to shareholders of noncontrolling interests	—	—	—	—	—	—	—	—	61
Redemption of subsidiary shares from noncontrolling interests	—	—	—	—	—	—	—	—	(92)
Other net changes in noncontrolling interests	—	—	12	—	—	—	(203)	(191)	(8)
Net income (loss)	—	—	—	4,266	—	—	(12)	4,254	—
Other comprehensive (loss)	—	—	—	—	(812)	—	—	(812)	(11)
Dividends:									
Common stock at \$1.04 per share	—	—	—	(1,052)	—	—	—	(1,052)	—
Preferred stock	—	—	—	(169)	—	—	—	(169)	—
Repurchase of common stock	—	—	—	—	—	(3,269)	—	(3,269)	—
Common stock issued under:									
Employee benefit plans	—	—	31	—	—	—	—	31	—
Direct stock purchase and dividend reinvestment plan	—	—	30	—	—	—	—	30	—
Stock awards and options exercised	—	—	380	—	—	—	—	380	—
Balance at Dec. 31, 2018	\$ 3,542	\$ 14	\$ 27,118	\$ 28,652	\$ (3,171)	\$(15,517)	\$ 101	\$ 40,739	(a) \$ 129

(a) Includes total The Bank of New York Mellon Corporation common shareholders' equity of \$37,709 million at Dec. 31, 2017 and \$37,096 million at Dec. 31, 2018.

Consolidated Statement of Changes in Equity (continued)

<i>(in millions, except per share amount)</i>	The Bank of New York Mellon Corporation shareholders						Non-redeemable noncontrolling interests of consolidated investment management funds	Total permanent equity	Redeemable noncontrolling interests/temporary equity
	Preferred stock	Common stock	Additional paid-in capital	Retained earnings	Accumulated other comprehensive (loss) income, net of tax	Treasury stock			
Balance at Dec. 31, 2016	\$ 3,542	\$ 13	\$ 25,962	\$ 22,621	\$ (3,765)	\$ (9,562)	\$ 618	\$ 39,429	(a) \$ 151
Shares issued to shareholders of noncontrolling interests	—	—	—	—	—	—	—	—	56
Redemption of subsidiary shares from noncontrolling interests	—	—	—	—	—	—	—	—	(70)
Other net changes in noncontrolling interests	—	—	(35)	—	—	—	(335)	(370)	36
Net income (loss)	—	—	—	4,090	—	—	33	4,123	(9)
Other comprehensive income	—	—	—	—	1,408	—	—	1,408	15
Dividends:									
Common stock at \$0.86 per share	—	—	—	(901)	—	—	—	(901)	—
Preferred stock	—	—	—	(175)	—	—	—	(175)	—
Repurchase of common stock	—	—	—	—	—	(2,686)	—	(2,686)	—
Common stock issued under:									
Employee benefit plans	—	—	28	—	—	—	—	28	—
Direct stock purchase and dividend reinvestment plan	—	—	26	—	—	—	—	26	—
Stock awards and options exercised	—	1	684	—	—	—	—	685	—
Balance at Dec. 31, 2017	\$ 3,542	\$ 14	\$ 26,665	\$ 25,635	\$ (2,357)	\$ (12,248)	\$ 316	\$ 41,567	(a) \$ 179

(a) Includes total The Bank of New York Mellon Corporation common shareholders' equity of \$35,269 million at Dec. 31, 2016 and \$37,709 million at Dec. 31, 2017.

See accompanying Notes to Consolidated Financial Statements.

Note 1—Summary of significant accounting and reporting policies

General

In this Annual Report, references to “our,” “we,” “us,” “BNY Mellon,” the “Company” and similar terms refer to The Bank of New York Mellon Corporation and its consolidated subsidiaries. The term “Parent” refers to The Bank of New York Mellon Corporation but not its subsidiaries.

Nature of operations

BNY Mellon is a global leader in providing a broad range of financial products and services in domestic and international markets. Through our two principal businesses, Investment Services and Investment Management, we serve institutions, corporations and high-net-worth individuals. See Note 24 for the primary products and services of our principal businesses and other information.

Basis of presentation

The accounting and financial reporting policies of BNY Mellon, a global financial services company, conform to U.S. generally accepted accounting principles (“GAAP”) and prevailing industry practices.

In the opinion of management, all adjustments necessary for a fair presentation of financial position, results of operations and cash flows for the periods presented have been made. Certain immaterial reclassifications have been made to prior periods to place them on a basis comparable with current period presentation.

Use of estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates based upon assumptions about future economic and market conditions which affect reported amounts and related disclosures in our financial statements. Our most significant estimates pertain to our allowance for loan losses and lending-related commitments, fair value of financial instruments and derivatives, goodwill and other intangibles and litigation and regulatory contingencies. Although our current estimates contemplate current conditions and how we expect

them to change in the future, it is reasonably possible that actual conditions could be worse than anticipated in those estimates, which could materially affect our results of operations and financial condition.

Foreign currency translation

Assets and liabilities denominated in foreign currencies are translated to U.S. dollars at the rate of exchange on the balance sheet date. Transaction gains and losses are included in the income statement. Translation gains and losses on investments in foreign entities with functional currencies that are not the U.S. dollar are recorded as foreign currency translation adjustments in other comprehensive income (“OCI”). Revenue and expense transactions are translated at the applicable daily rate or the weighted average monthly exchange rate when applying the daily rate is not practical.

Acquired businesses

The income statement and balance sheet include results of acquired businesses accounted for under the acquisition method of accounting pursuant to Accounting Standards Codification (“ASC”) 805, *Business Combinations* and equity investments from the dates of acquisition. Contingent purchase consideration is measured at its fair value and recorded on the purchase date. Any subsequent changes in the fair value of a contingent consideration liability are recorded through the income statement.

Consolidation

We evaluate an entity for possible consolidation in accordance with ASC 810, *Consolidation*. We first determine whether or not we have variable interests in the entity, which are investments or other interests that absorb portions of an entity’s expected losses or receive portions of the entity’s expected returns. Our variable interests may include decision-maker or service provider fees, direct and indirect investments and investments made by related parties, including related parties under common control. If it is determined that we do not have a variable interest in the entity, no further analysis is required and the entity is not consolidated.

If we hold a variable interest in the entity, further analysis is performed to determine if the entity is a variable interest entity (“VIE”) or a voting model entity (“VME”).

We consider the underlying facts and circumstances of individual entities when assessing whether or not an entity is a VIE. An entity is determined to be a VIE if the equity investors:

- do not have sufficient equity at risk for the entity to finance its activities without additional subordinated financial support; or
- lack one or more of the following characteristics of a controlling financial interest:
 - the power, through voting rights or similar rights, to direct the activities of an entity that most significantly impact the entity's economic performance;
 - the obligation to absorb the expected losses of the entity; and
 - the right to receive the expected residual returns of the entity.

We reconsider and reassess whether or not we are the primary beneficiary of a VIE when governing documents or contractual arrangements are changed that would reallocate the obligation to absorb expected losses or receive expected residual returns between BNY Mellon and the other investors. This could occur when BNY Mellon disposes of its variable interests in the fund, when additional variable interests are issued to other investors or when we acquire additional variable interests in the VIE.

We consolidate a VIE if it is determined that we have a controlling financial interest in the entity. We have a controlling financial interest in a VIE when we have both (1) the power to direct the activities of the VIE that most significantly impact the VIE's economic performance and (2) the obligation to absorb losses or the right to receive benefits of the VIE that could potentially be significant to that VIE.

For entities that do not meet the definition of a VIE, the entity is considered a VME. We consolidate these entities if we can exert control over the financial and operating policies of an investee, which can occur if we have a 50% or more voting interest in the entity.

See Note 14 for additional disclosures related to our variable interests.

Equity method investments, including renewable energy investments

Equity investments of less than a majority but at least 20% ownership are accounted for by the equity method and included in other assets. Earnings on these investments are reflected as investment services fees, investment management and performance fees or investment and other income, as appropriate, in the period earned.

A loss in value of an equity investment that is determined to be other-than-temporary is recognized by reducing the carrying value of the equity investment to its fair value.

Renewable energy investment projects through limited liability companies are accounted for using the equity method of accounting. The hypothetical liquidation at book value ("HLBV") methodology is used to determine the pre-tax loss that is recognized in each period. HLBV estimates the liquidation value at the beginning and end of each period, with the difference recognized as the amount of loss under the equity method.

The pre-tax losses are reported in investment and other income on the income statement. The corresponding tax benefits and credits are recorded as a reduction to provision for income taxes on the income statement. The pre-tax losses, tax benefits and credits are included in our projected annual effective tax rate.

See Note 8 for the amount of our renewable energy investments. Below are our most significant equity method investments, other than the investments in renewable energy.

Equity method investments at Dec. 31, 2019		
<i>(dollars in millions)</i>	Percentage ownership	Book value
CIBC Mellon Global Securities Services Company ("CIBC Mellon")	50.0%	\$ 626
Siguler Guff	20.0%	\$ 233

Restricted cash and securities

Cash and securities may be segregated under federal and other regulatory requirements and consists of excess client funds held by our broker-dealer entities. Restricted cash is included in interest-bearing deposits with banks on the balance sheet and with

cash and due from banks when reconciling the beginning and end-of-period balances on the consolidated statement of cash flows.

Securities purchased under resale agreements and securities sold under repurchase agreements

Securities purchased under resale agreements and securities sold under repurchase agreements are accounted for as collateralized financings. Generally, these agreements are recorded at the amounts at which the securities will be subsequently resold or repurchased, plus accrued interest.

Securities purchased under resale agreements are fully collateralized with high-quality liquid securities. Collateral requirements are monitored and additional collateral is received or provided, as required. As such, these transactions carry minimal credit risk and are not allocated an allowance for credit losses.

Where an enforceable netting agreement exists, resale and repurchase agreements executed with the same counterparty and the same maturity date are reported on a net basis on the balance sheet.

Securities – Debt

Debt securities are classified as available-for-sale, held-to-maturity or trading securities when they are purchased. Debt securities are classified as available-for-sale securities when we intend to hold the securities for an indefinite period of time or when the securities may be used for tactical asset/liability purposes and may be sold from time to time to effectively manage interest rate exposure, prepayment risk and liquidity needs. Debt securities are classified as held-to-maturity securities when we intend and have the ability to hold them until maturity. Debt securities are classified as trading securities when our intention is to resell the securities.

Available-for-sale securities are measured at fair value. The difference between fair value and amortized cost representing unrealized gains or losses on assets classified as available-for-sale, are recorded net of tax as an addition to or deduction from OCI, unless a security is deemed to have other-than-temporary impairment (“OTTI”). Realized gains and losses on sales of available-for-sale securities are reported on the income statement. The cost of debt securities sold is determined on a specific identification method. Held-to-maturity securities are measured at amortized cost.

Trading securities are measured at fair value and included in trading assets on the balance sheet. Trading revenue includes both realized and unrealized gains and losses. The liability incurred on short-sale transactions, representing the obligation to deliver securities, is included in trading liabilities at fair value.

Income on securities purchased is adjusted for amortization of premium and accretion of discount on a level yield basis, generally over their contractual life.

We routinely conduct periodic reviews to identify and evaluate each security not measured at fair value through earnings to determine whether OTTI has occurred. We examine various factors when determining whether an impairment, representing the fair value of a security being below its amortized cost, is other-than-temporary. The following are examples of factors that we consider:

- The length of time and the extent to which the fair value has been less than the amortized cost basis;
- Whether management has an intent to sell the security;
- Whether the decline in fair value is attributable to specific conditions, such as conditions in an industry or in a geographic area, affecting a particular investment;
- Whether a debt security has been downgraded by a rating agency;
- Whether a debt security exhibits cash flow deterioration; and
- For each non-agency residential mortgage-backed security (“RMBS”), we compare the remaining credit enhancement that protects the individual security from losses against the projected losses of principal and/or interest expected to come from the underlying mortgage collateral, to determine whether such credit losses might directly impact the relevant security.

When we do not intend to sell the security and it is more likely than not that we will not be required to sell the security prior to recovery of its cost basis, the credit component of an OTTI of a debt security is recognized in earnings and the non-credit component is recognized in OCI. For held-to-maturity debt securities, the amount of OTTI recorded in OCI for the non-credit portion of a previous OTTI is amortized prospectively, as an increase to the

carrying amount of the security, over the remaining life of the security on the basis of the timing of future estimated cash flows of the securities.

The determination of whether a credit loss exists is based on the best estimate of the present value of cash flows to be collected from the debt security. Generally, cash flows are discounted at the effective interest rate implicit in the debt security at the time of acquisition. For debt securities that are beneficial interests in securitized financial assets and are not high credit quality, ASC 325, *Investments - Other*, provides that cash flows be discounted at the current yield used to accrete the beneficial interest.

If we intend to sell the security or it is more likely than not that we will be required to sell the security prior to recovery of its cost basis, the credit and non-credit components of OTTI are recognized in earnings and subsequently accreted to interest income on an effective yield basis over the life of the security.

The accounting policy for the determination of the fair value of financial instruments has been identified as a “critical accounting estimate” as it requires us to make numerous assumptions based on available market data. See Note 4 for these disclosures.

Securities – Equity

Investments in equity securities that do not result in consolidation and are not accounted for under the equity method are measured at fair value with changes in the fair value recognized through earnings, unless one of two available exceptions applies. The first exception, a scope exception, allows Federal Reserve Bank stock, Federal Home Loan Bank stock and exchange memberships to remain accounted for at cost, less impairment. The second practicability exception is an election available for equity investments that do not have readily determinable fair values. For certain investments where the Company has chosen the practicability exception, such investments are accounted for in other assets on the balance sheet at cost adjusted for impairment, if any, plus or minus observable price changes in orderly transactions for an identical or similar investment of the same issuer with any such changes reflected in investment and other income. Equity securities with readily determinable fair values are classified in trading assets with changes in fair value reflected in foreign exchange and other trading revenue.

Loans

Loans are reported at amortized cost, net of any unearned income and deferred fees and costs. Certain loan origination and upfront commitment fees, as well as certain direct loan origination and commitment costs, are deferred and amortized as a yield adjustment over the lives of the related loans. Loans held for sale are carried at the lower of cost or fair value.

A modified loan is considered a troubled debt restructuring (“TDR”) if the debtor is experiencing financial difficulties and the creditor grants a concession to the debtor that would not otherwise be considered. A TDR may include a transfer of real estate or other assets from the debtor to the creditor, or a modification of the term of the loan. TDRs are accounted for as impaired loans (see the Nonperforming assets policy).

Nonperforming assets

Commercial loans are placed on nonaccrual status when principal or interest is past due 90 days or more, or when there is reasonable doubt that interest or principal will be collected.

When a first or second lien residential mortgage loan reaches 90 days delinquent, it is subject to an impairment test and placed on nonaccrual status.

When a loan is placed on nonaccrual status, previously accrued and uncollected interest is reversed against current period interest revenue. Interest receipts on nonaccrual and impaired loans are recognized as interest revenue or are applied to principal when we believe the ultimate collectability of principal is in doubt. Nonaccrual loans generally are restored to an accrual basis when principal and interest become current and remain current for a specified period.

A loan is considered to be impaired when it is probable that we will be unable to collect all principal and interest amounts due according to the contractual terms of the loan agreement. An impairment allowance is measured based upon the loan’s market value, the present value of expected future cash flows, discounted at the loan’s initial effective interest rate, or at fair value of the collateral if the loan is collateral dependent. If the loan valuation is less than the recorded value of the loan, an impairment allowance is established by a provision for credit loss

or a write-down is taken. Impairment allowances are not needed when the recorded investment in an impaired loan is less than the loan valuation.

Allowance for loan losses and allowance for lending-related commitments

The allowance for loan losses, presented as a valuation allowance to loans, and the allowance for lending-related commitments recorded in other liabilities, are referred to as BNY Mellon's allowance for credit losses. The accounting policy for determining the allowances has been identified as a "critical accounting estimate" as it requires us to make numerous complex and subjective estimates and assumptions relating to amounts which are inherently uncertain.

The allowance for loan losses is maintained to absorb losses inherent in the loan portfolio as of the balance sheet date based on our judgment. The allowance determination methodology is designed to provide procedural discipline in assessing the appropriateness of the allowance. Credit losses are charged against the allowance. Recoveries are added to the allowance.

The methodology for determining the allowance for lending-related commitments considers the same factors as the allowance for loan losses, as well as an estimate of the probability of drawdown at default. We utilize a quantitative methodology and qualitative framework for determining the allowance for loan losses and the allowance for lending-related commitments. Within this qualitative framework, management applies judgment when assessing internal risk factors and environmental factors to compute an additional allowance for each component of the loan portfolio.

The components of the allowance for loan losses and the allowance for lending-related commitments are inclusive of the qualitative allowance framework and consist of the following three elements:

- an allowance for impaired credits of \$1 million or greater;
- an allowance for higher risk-rated credits and pass-rated credits; and
- an allowance for residential mortgage loans.

Our lending is primarily to institutional customers. As a result, our loans are generally larger than \$1 million. Therefore, the first element, impaired

credits, is based on individual analysis of all impaired loans of \$1 million and greater. The allowance is measured by the difference between the recorded value of impaired loans and their impaired value. Impaired value is either the present value of the expected future cash flows from the borrower, the market value of the loan, or the fair value of the collateral, if the loan is collateral dependent.

The second element, higher risk-rated credits and pass-rated credits, is based on our incurred loss model. Individual credit analyses are performed on such loans before being assigned a credit rating. All borrowers are collectively evaluated based on their credit rating. The loss inherent in each loan incorporates the borrower's credit rating, facility rating and maturity. The loss given default, derived from the facility rating, incorporates a recovery expectation and an estimate of the use of the facility at default (usage given default). The borrower's probability of default is derived from the associated credit rating. Borrower ratings are reviewed at least annually and are periodically mapped to third-party databases, including rating agency and default and recovery databases, to ensure ongoing consistency and validity. Higher risk-rated credits are reviewed quarterly.

The third element, the allowance for residential mortgage loans, is determined by segregating mortgage pools into delinquency periods ranging from current through foreclosure. Each of these delinquency periods is assigned a probability of default. A specific loss given default is assigned for each mortgage pool. We assign all residential mortgage pools, except home equity lines of credit, a probability of default and loss given default based on default and loss data derived from internal historical data related to our residential mortgage portfolio. The resulting incurred loss factor (the probability of default multiplied by the loss given default) is applied against the loan balance to determine the allowance held for each pool. This approach is applied to the other residential mortgage portfolio (a relatively small sub-segment of our mortgage loans). The allowance for wealth management loans and mortgages originated by our Wealth Management business (the majority of mortgage loans held) is assessed using the second element described above. For home equity lines of credit, probability of default and loss given default are based on external data from third-party databases due to the small size of the portfolio and insufficient internal data.

The qualitative framework is used to determine an additional allowance for each portfolio based on the factors below:

Internal risk factors:

- Ratio of nonperforming loans to total non-margin loans;
- Ratio of criticized assets to total loans and lending-related commitments;
- Borrower concentration; and
- Significant concentrations in high risk industries and countries.

Environmental risk factors:

- U.S. non-investment grade default rate;
- Unemployment rate; and
- Change in real gross domestic product.

The objective of the qualitative framework is to capture incurred losses that may not have been fully captured in the quantitative reserve, which is based primarily on historical data. Management determines the qualitative allowance for each period based on judgment informed by consideration of internal and external risk factors and other considerations that may be deemed relevant during the period. Once determined in the aggregate, our qualitative allowance is then allocated to each of our loan classes based on the respective classes' quantitative allowance balances with the allocations adjusted, when necessary, for class specific risk factors.

For each risk factor, we calculate the minimum and maximum values, and percentiles in-between, to evaluate the distribution of our historical experience. The distribution of historical experience is compared to the risk factor's current quarter observed experience to assess the current risk inherent in the portfolio and overall direction/trend of a risk factor relative to our historical experience.

Based on this analysis, we assign a risk level—no impact, low, moderate, high and elevated—to each risk factor for the current quarter. Management assesses the impact of each risk factor to determine an aggregate risk level. We do not quantify the impact of any particular risk factor. Management's assessment of the risk factors, as well as the trend in the quantitative allowance, supports management's judgment for the overall required qualitative allowance. A smaller qualitative allowance may be required when our quantitative allowance has reflected incurred losses associated with the

aggregate risk level. A greater qualitative allowance may be required if our quantitative allowance does not yet reflect the incurred losses associated with the aggregate risk level.

The allocation of the allowance for credit losses is inherently judgmental, and the entire allowance for credit losses is available to absorb credit losses regardless of the nature of the loss.

Premises and equipment

Premises and equipment are carried at cost less accumulated depreciation and amortization. Depreciation and amortization is computed using the straight-line method over the estimated useful life of the owned asset and, for leasehold improvements, over the lesser of the remaining term of the leased facility or the estimated economic life of the improvement. For owned and capitalized assets, estimated useful lives range from 2 to 40 years. Maintenance and repairs are charged to expense as incurred, while major improvements are capitalized and amortized to operating expense over their identified useful lives.

Leasing

We determine if an arrangement is a lease at inception. Right-of-use ("ROU") assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments. The ROU assets and lease liabilities are recognized based on the present value of the future minimum lease payments over the lease term at commencement date. For all leases, we use a discount rate that represents a collateralized incremental borrowing rate based on similar terms and information available at commencement date of the lease in determining the present value of lease payments. In addition to the lease payments, the determination of an ROU asset may also include certain adjustments related to lease incentives and initial direct costs incurred. Options to extend or terminate a lease are included in the determination of the ROU asset and lease liability only when it is reasonably certain that we will exercise that option.

Lease expense for operating leases is recognized on a straight-line basis over the lease term, while the lease expense for finance leases is recognized using the effective interest method. ROU assets are reviewed for impairment when events or circumstances indicate that the carrying amount may not be recoverable. For

operating leases, if deemed impaired, the ROU asset is written down and the remaining balance is subsequently amortized on a straight-line basis which results in lease expense recognition that is similar to finance leases.

For all leases, we have elected to account for the contractual lease and non-lease components as a single lease component and include them in the calculation of the lease liability. The non-lease variable components, such as maintenance expense and other variable costs including non-index or rate escalations, have been excluded from the calculation. Additionally, for certain equipment leases, we apply a portfolio approach to account for the operating lease ROU assets and liabilities.

For subleasing activities, the rental income is reported as part of net occupancy expense, as this activity is not a significant business activity and is part of the Company's customary business practice.

For direct finance leases, unearned revenue is accreted over the lives of the leases in decreasing amounts to provide a constant rate of return on the net investment in the leases. We have leveraged lease transactions that were entered into prior to Dec. 31, 2018. These leases are grandfathered under ASC 842, *Leases*, which became effective Jan. 1, 2019, and will continue to be accounted for under the prior guidance unless the leases are subsequently modified. Revenue on leveraged leases is recognized on a basis to achieve a constant yield on the outstanding investment in the lease, net of the related deferred tax liability, in the years in which the net investment is positive. Gains and losses on residual values of leased equipment sold are included in investment and other income. Impairment of leveraged lease residual values that is deemed other-than-temporary is reflected in net interest revenue. Considering the nature of these leases and the number of significant assumptions, there is risk associated with the income recognition on these leases should any of the assumptions change materially in future periods.

Software

We capitalize costs relating to acquired software and internal-use software development projects that provide new or significantly improved functionality. We capitalize projects that are expected to result in longer-term operational benefits, such as replacement systems or new applications that result in significantly increased operational efficiencies or

functionality. All other costs incurred in connection with an internal-use software project are expensed as incurred. Capitalized software is recorded in other assets on the balance sheet. We record amortization of capitalized software in software and equipment expense on the income statement.

Identified intangible assets and goodwill

Identified intangible assets with estimable lives are amortized in a pattern consistent with the assets' identifiable cash flows or using a straight-line method over their remaining estimated benefit periods if the pattern of cash flows is not estimable. Intangible assets with estimable lives are reviewed for possible impairment when events or changed circumstances may affect the underlying basis of the asset.

Goodwill and intangibles with indefinite lives are not amortized, but are assessed annually for impairment, or more often if events and circumstances indicate it is more likely than not they may be impaired and to determine if the lives are no longer indefinite and should be amortized. The amount of goodwill impairment is determined by the excess of the carrying value of the reporting unit over its fair value. The accounting policy for valuing and impairment testing of identified intangible assets and goodwill has been identified as a "critical accounting estimate" as it requires us to make numerous complex and subjective estimates. See Note 7 for additional disclosures related to goodwill and intangible assets.

Investments in qualified affordable housing projects

Investments in qualified affordable housing projects through a limited liability entity are accounted for utilizing the proportional amortization method. Under the proportional amortization method, the initial cost of the investment is amortized to the provision for income taxes in proportion to the tax credits and other tax benefits received. The net investment performance, including tax credits and other benefits received, is recognized in the income statement as a component of the provision for income taxes. Additionally, the value of the commitments to fund qualified affordable housing projects is included in other assets on the balance sheet and a liability is recorded for the unfunded portion.

Seed capital

Seed capital investments are generally classified as other assets and carried at fair value. Unrealized gains and losses on seed capital investments are

recorded in investment and other income. Certain risk retention investments in our collateralized loan obligations (“CLOs”) are classified as available-for-sale securities.

Noncontrolling interests

Noncontrolling interests included in permanent equity are adjusted for the income or loss attributable to the noncontrolling interest holders and any distributions to those shareholders. Redeemable noncontrolling interests are reported as temporary equity. We recognize changes in the redemption value of the redeemable noncontrolling interests as they occur and adjust the carrying value to be equal to the redemption value.

Fee revenue

Investment Services and Investment Management revenue is based on terms specified in a contract with a customer, and excludes any amounts collected on behalf of third parties. Revenue is recognized when, or as, a performance obligation is satisfied by transferring control of a good or service to a customer. A performance obligation may be satisfied over time or at a point in time. Revenue from a performance obligation satisfied over time is recognized by measuring our progress in satisfying the performance obligation in a manner that reflects the transfer of goods and services to the customer. Revenue from a performance obligation satisfied at a point in time is recognized at the point in time the customer obtains control of the promised good or service. The amount of revenue recognized reflects the consideration we expect to be entitled to in exchange for the promised goods and services. Taxes assessed by a governmental authority, that are both imposed on, and concurrent with, a specific revenue-producing transaction, are collected from a customer and are excluded from revenue.

Performance fees are recognized in the period in which the performance fees are earned and become determinable. Performance fees are constrained until all uncertainties are resolved and reversal of previously recorded amounts is not probable. Performance fees are generally calculated as a percentage of the applicable portfolio’s performance in excess of a benchmark index or a peer group’s performance. When a portfolio underperforms its benchmark or fails to generate positive performance, subsequent years’ performance must generally exceed this shortfall prior to fees being earned. Amounts

billable, which are subject to a clawback if future performance thresholds in current or future years are not met, are not recognized since the fees are potentially uncollectible. These fees are recognized when it is determined that they will be collected. When a multi-year performance contract provides that fees earned are billed ratably over the performance period, only the portion of the fees earned that are non-refundable are recognized.

Additionally, we recognize revenue from non-refundable, implementation fees under outsourcing contracts using a straight-line method, commencing in the period the ongoing services are performed through the expected term of the contractual relationship. Incremental direct set-up costs of implementation, up to the related customer margin or minimum fee revenue amount, are deferred and amortized over the same period that the related implementation fees are recognized. If a client terminates an outsourcing contract prematurely, the unamortized deferred incremental direct set-up costs and the unamortized deferred implementation fees related to that contract are recognized in the period the contract is terminated.

We record foreign exchange and other trading revenue, financing-related fees and other revenue when the services are provided and earned based on contractual terms, when amounts are determined and collectability is reasonably assured.

Net interest revenue

Revenue on interest-earning assets and expense on interest-bearing liabilities are recognized based on the effective yield of the related financial instrument. The amortization of premiums and accretion of discounts are included in interest revenue and are adjusted for prepayments when they occur, such that, the effective yield remains constant throughout the contractual life of the security. Negative interest incurred on assets or charged on liabilities is presented as contra interest income and contra expense, respectively.

Pension

The measurement date for BNY Mellon’s pension plans is December 31. Plan assets are determined based on fair value generally representing observable market prices. The projected benefit obligation is determined based on the present value of projected benefit distributions at an assumed discount rate. The

discount rate utilized is based on the yield curves of high-quality corporate bonds available in the marketplace. The net periodic pension expense or credit includes service costs (if applicable), interest costs based on an assumed discount rate, an expected return on plan assets based on an actuarially derived market-related value, amortization of prior service cost and amortization of prior years' actuarial gains and losses.

Actuarial gains and losses include gains or losses related to changes in the amount of the projected benefit obligation or plan assets resulting from demographic or investment experience different than assumed, changes in the discount rate or other assumptions. To the extent an actuarial gain or loss exceeds 10% of the greater of the projected benefit obligation or the market-related value of plan assets, the excess is generally recognized over the future service periods of active employees. Benefit accruals under the U.S. pension plans and the largest foreign pension plan in the United Kingdom ("UK") are frozen. Future unrecognized actuarial gains and losses for these frozen plans that exceed a threshold amount are amortized over the average future life expectancy of plan participants with a maximum of 15 years.

Our expected long-term rate of return on plan assets is based on anticipated returns for each applicable asset class. Anticipated returns are weighted for the expected allocation for each asset class and are based on forecasts for prospective returns in the equity and fixed-income markets, which should track the long-term historical returns for these markets. We also consider the growth outlook for U.S. and global economies, as well as current and prospective interest rates.

The market-related value utilized to determine the expected return on plan assets is based on the fair value of plan assets adjusted for the difference between expected returns and actual performance of plan assets. The difference between actual experience and expected returns on plan assets is included as an adjustment in the market-related value over a five-year period.

See Note 18 for additional disclosures related to pensions.

Stock-based compensation

Compensation expense relating to share-based payments is recognized in staff expense on the income statement, on a straight-line basis, over the applicable vesting period.

Certain stock compensation grants vest when the employee retires. New grants with this feature are expensed by the first date the employee is eligible to retire. We estimate forfeitures when recording compensation cost related to share-based payment awards.

Severance

BNY Mellon provides separation benefits for U.S.-based employees through The Bank of New York Mellon Corporation Supplemental Unemployment Benefit Plan. These benefits are provided to eligible employees separated from their jobs for business reasons not related to individual performance. Basic separation benefits are generally based on the employee's years of continuous benefited service. Severance for employees based outside of the U.S. is determined in accordance with local agreements and legal requirements. Severance expense is recorded when management commits to an action that will result in separation and the amount of the liability can be reasonably estimated.

Income taxes

We record current tax liabilities or assets through charges or credits to the current tax provision for the estimated taxes payable or refundable for the current year. Deferred tax assets and liabilities are recorded for future tax consequences attributable to differences between the financial statement carrying amounts of assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. A deferred tax valuation allowance is established if it is more likely than not that all or a portion of the deferred tax assets will not be realized. A tax position that fails to meet a more-likely-than-not recognition threshold will result in either reduction of current or deferred tax assets, and/or recording of current or deferred tax liabilities. Interest and penalties related to income taxes are recorded as income tax expense.

Derivative financial instruments

Derivatives are recorded on the balance sheet at fair value and include futures, forwards, interest rate swaps, foreign currency swaps and options and similar products. Derivatives in an unrealized gain position are recognized as assets while derivatives in unrealized loss position are recognized as liabilities. Derivatives are reported net by counterparty and after consideration of cash collateral, to the extent subject to legally enforceable netting agreements.

Derivatives designated and effective in qualifying hedging relationships are classified in other assets or other liabilities on the balance sheet. All other derivatives are classified within trading assets or trading liabilities on the balance sheet. Gains and losses on trading derivatives are generally included in foreign exchange and other trading revenue.

We enter into various derivative financial instruments for non-trading purposes primarily as part of our asset/liability management process. These non-trading derivatives are designated as one of three types of hedge activities: fair value, cash flow or net investment hedges. Gains and losses on derivatives associated with fair value hedges are recorded in income as well as any change in the value of the related hedged item associated with the designated risks being hedged. Gains and losses on cash flow hedges are recorded in OCI, until reclassified into earnings in the same period the hedged item impacts earnings. Foreign currency transaction gains and losses related to a hedged net investment in a foreign operation, net of their tax effect, are recorded with cumulative foreign currency translation adjustments within OCI.

To qualify for hedge accounting, each hedge relationship is required to be highly effective at reducing the risk associated with the exposure being hedged, both prospectively and retrospectively. We formally document all relationships including hedging instruments and hedged items, as well as our risk management objectives and strategy for undertaking each hedging transaction. At inception, the potential cause of ineffectiveness related to each of our hedges is assessed to determine if we can expect the hedge to be highly effective over the life of the transaction. At hedge inception, we document the methodology to be utilized for evaluating effectiveness on an ongoing basis, and we monitor ongoing hedge effectiveness at least quarterly.

For qualifying fair value hedges, changes in the fair value of the derivative, and changes in the value of the hedged item associated with the designated risks being hedged, are recognized in earnings. Certain amounts excluded from the assessment of effectiveness are recorded in OCI and recognized in earnings through an amortization approach over the life of the derivative. We discontinue hedge accounting prospectively when we determine that the hedge is no longer effective or the derivative expires, is sold, or management discontinues the derivative's hedge designation. Subsequent gains and losses on these derivatives are included in foreign exchange and other trading revenue. For discontinued fair value hedges, the accumulated gain or loss on the hedged item is amortized on a yield basis over the remaining life of the hedged item.

For qualifying cash flow hedges, changes in the fair value of the derivative are recorded in OCI, until reclassified into earnings in the same period the hedged item impacts earnings. If the hedge relationship is terminated, then the change in value will be reclassified from OCI to earnings when the cash flows that were previously hedged affect earnings. If cash flow hedge accounting is discontinued as a result of a forecasted transaction no longer being probable to occur, then the amount reported in OCI is immediately reclassified to current earnings.

Derivative amounts affecting earnings are recognized in the same income statement line as the hedged item affects earnings, principally interest income, interest expense and other revenue.

Foreign currency transaction gains and losses related to qualifying hedges of net investments in a foreign operation are recorded with cumulative foreign currency translation adjustments within OCI net of their tax effect. The Company evaluates effectiveness of its foreign currency derivatives designated as hedges of its net investments utilizing the forward rate method.

The determination of fair value of derivative financial instruments has been identified as a "critical accounting estimate." See Note 23 for additional disclosures related to derivative financial instruments.

Earnings per common share

Earnings per common share is calculated using the two-class method under which earnings are allocated

to common shareholders and holders of participating securities. Unvested stock-based compensation awards that contain non-forfeitable rights to dividends or dividend equivalents are considered participating securities under the two-class method.

Basic earnings per share is calculated by dividing net income allocated to common shareholders of BNY Mellon by the average number of common shares outstanding and vested stock-based compensation awards where recipients have satisfied either the explicit vesting terms or retirement-eligibility requirements.

Diluted earnings per common share is computed under the more dilutive of either the treasury stock method or the two-class method. We increase the average number of shares of common stock outstanding by the assumed number of shares of common stock that would be issued assuming the exercise of stock options and the issuance of shares related to stock-based compensation awards using the treasury stock method, if dilutive. Diluted earnings per share is calculated by dividing net income allocated to common shareholders of BNY Mellon by the adjusted average number of common shares outstanding.

Statement of cash flows

We have defined cash as cash and due from banks. Cash flows from hedging activities are classified in the same category as the items hedged. Distributions received from equity method investees are classified as cash inflows from operating activities on the statement of cash flows. Excess returns on investments of equity method investments are classified as cash flows from investing activities on the statement of cash flows.

Note 2—Accounting changes and new accounting guidance

The following accounting changes and new accounting guidance were adopted in 2019.

ASU 2016-02, Leases

In February 2016, the Financial Accounting Standards Board (“FASB”) issued an ASU, *Leases*. The primary objective of this ASU is to increase transparency and comparability by recognizing lease assets and liabilities on the balance sheet and expand related disclosures. This ASU requires a “right-of-use” asset and a payment obligation liability on the balance sheet for most leases and subleases. Additionally, depending on the lease classification under the standard, it may result in different expense recognition patterns and classification than under existing accounting principles. For leases classified as finance leases, it will result in higher expense recognition in the earlier periods and lower expense in the later periods of the lease.

The Company adopted this guidance on Jan. 1, 2019 using the alternative transition method on a prospective basis (and elected to utilize the basket of practical expedients available at implementation) and recognized right-of-use assets of \$1.3 billion and lease liabilities of \$1.5 billion on the consolidated balance sheet, both based on the present value of the expected remaining lease payments. See Note 6 for the disclosures required by this ASU.

ASU 2018-02, Income Statement—Reporting Comprehensive Income: Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income

In February 2018, the FASB issued an ASU, *Income Statement—Reporting Comprehensive Income: Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income*. This ASU permits a reclassification from accumulated other comprehensive income to retained earnings for the tax effects of items within accumulated other comprehensive income that do not reflect the lower statutory tax rate which was enacted by the 2017 U.S. tax legislation. BNY Mellon adopted this guidance in the first quarter of 2019, which resulted in a \$90 million reclassification that decreased accumulated other comprehensive income and increased retained earnings.

Note 3—Acquisitions and dispositions

We sometimes structure our acquisitions with both an initial payment and later contingent payments tied to post-closing revenue or income growth. Contingent payments totaled \$6 million in 2019.

At Dec. 31, 2019, we are potentially obligated to pay additional consideration which, using reasonable assumptions, could range from \$5 million to \$13 million over the next two years, but could be higher as certain of the arrangements do not contain a contractual maximum.

Transaction in 2019

On Nov. 8, 2019, BNY Mellon, along with the other holders of Promontory Interfinancial Network, LLC (“PIN”), completed the sale of their interests in PIN. BNY Mellon recorded an after-tax gain of \$622 million on the sale of this equity investment.

Transactions in 2018

On Jan. 2, 2018, BNY Mellon completed the sale of CenterSquare Investment Management (“CenterSquare”), one of our Investment Management investment firms, and recorded a gain on this transaction. CenterSquare had approximately \$10 billion in assets under management (“AUM”) in U.S. and global real estate and infrastructure investments. In addition, goodwill of \$52 million was removed from the consolidated balance sheet as a result of this sale.

On June 29, 2018, BNY Mellon completed the exchange of its majority equity interest in Amherst Capital Management LLC for a minority equity stake in Amherst Holdings LLC. Goodwill of \$13 million was removed from the consolidated balance sheet and a gain was recorded as a result of this sale.

Note 4—Securities

The following tables present the amortized cost, the gross unrealized gains and losses and the fair value of securities at Dec. 31, 2019, Dec. 31, 2018 and Dec. 31, 2017, respectively.

Securities at Dec. 31, 2019		Gross unrealized		Fair value
<i>(in millions)</i>	Amortized cost	Gains	Losses	
Available-for-sale:				
Agency RMBS	\$ 27,022	\$ 164	\$ 143	\$ 27,043
U.S. Treasury	14,979	472	20	15,431
Sovereign debt/sovereign guaranteed	12,548	109	11	12,646
Agency commercial mortgage-backed securities (“MBS”)	9,231	203	17	9,417
Foreign covered bonds	4,189	15	7	4,197
CLOs	4,078	1	16	4,063
Supranational	3,697	18	6	3,709
Foreign government agencies	2,638	7	2	2,643
Non-agency commercial MBS	2,134	46	2	2,178
Other asset-backed securities (“ABS”)	2,141	7	5	2,143
U.S. government agencies	1,890	61	2	1,949
Non-agency RMBS <i>(a)</i>	1,038	202	7	1,233
State and political subdivisions	1,017	27	—	1,044
Corporate bonds	832	21	—	853
Other debt securities	1	—	—	1
Total securities available-for-sale <i>(b)</i>	\$ 87,435	\$ 1,353	\$ 238	\$ 88,550
Held-to-maturity:				
Agency RMBS	\$ 27,357	\$ 292	\$ 46	\$ 27,603
U.S. Treasury	3,818	28	3	3,843
Agency commercial MBS	1,326	21	3	1,344
U.S. government agencies	1,023	1	2	1,022
Sovereign debt/sovereign guaranteed	756	31	—	787
Non-agency RMBS	80	4	1	83
Foreign covered bonds	79	—	—	79
Supranational	27	—	—	27
State and political subdivisions	17	—	—	17
Total securities held-to-maturity	\$ 34,483	\$ 377	\$ 55	\$ 34,805
Total securities	\$ 121,918	\$ 1,730	\$ 293	\$ 123,355

(a) Includes \$640 million that was included in the former Grantor Trust.

(b) Includes gross unrealized gains of \$32 million and gross unrealized losses of \$65 million recorded in accumulated other comprehensive income related to securities that were transferred from available-for-sale to held-to-maturity. The unrealized gains and losses are primarily related to Agency RMBS and will be amortized into net interest revenue over the contractual lives of the securities.

Securities at Dec. 31, 2018 (in millions)	Amortized cost	Gross unrealized		Fair value
		Gains	Losses	
Available-for-sale:				
Agency RMBS	\$ 25,594	\$ 83	\$ 369	\$ 25,308
U.S. Treasury	20,190	96	210	20,076
Sovereign debt/sovereign guaranteed	10,663	108	21	10,750
Agency commercial MBS	9,836	16	161	9,691
CLOs	3,410	—	46	3,364
Supranational	2,985	7	8	2,984
Foreign covered bonds	2,890	7	19	2,878
State and political subdivisions	2,251	18	22	2,247
Other ABS	1,776	1	4	1,773
U.S. government agencies	1,676	5	24	1,657
Non-agency commercial MBS	1,491	1	28	1,464
Non-agency RMBS (a)	1,095	241	11	1,325
Foreign government agencies	1,164	1	4	1,161
Corporate bonds	1,074	6	26	1,054
Other debt securities	72	5	—	77
Total securities available-for-sale (b)	\$ 86,167	\$ 595	\$ 953	\$ 85,809
Held-to-maturity:				
Agency RMBS	\$ 25,507	\$ 32	\$ 632	\$ 24,907
U.S. Treasury	4,727	3	77	4,653
U.S. government agencies	1,497	—	10	1,487
Agency commercial MBS	1,195	—	26	1,169
Sovereign debt/sovereign guaranteed	833	26	—	859
Non-agency RMBS	100	4	2	102
Foreign covered bonds	80	1	—	81
Supranational	26	1	—	27
State and political subdivisions	17	—	—	17
Total securities held-to- maturity	\$ 33,982	\$ 67	\$ 747	\$ 33,302
Total securities	\$ 120,149	\$ 662	\$ 1,700	\$ 119,111

- (a) Includes \$832 million that was included in the former Grantor Trust.
- (b) Includes gross unrealized gains of \$39 million and gross unrealized losses of \$87 million recorded in accumulated other comprehensive income related to securities that were transferred from available-for-sale to held-to-maturity. The unrealized gains and losses are primarily related to Agency RMBS and will be amortized into net interest revenue over the contractual lives of the securities.

The following table presents the realized gains, losses and impairments, on a gross basis.

Net securities (losses) gains (in millions)	2019	2018	2017
Realized gross gains	\$ 23	\$ 8	\$ 47
Realized gross losses	(39)	(55)	(40)
Recognized gross impairments	(2)	(1)	(4)
Total net securities (losses) gains	\$ (18)	\$ (48)	\$ 3

In 2018, we adopted the new accounting guidance included in ASU 2016-01, *Financial Instruments—Overall: Recognition and Measurement of Financial Assets and Financial Liabilities*. As a result, money market fund investments were reclassified to trading assets, primarily from available-for-sale securities.

In 2018, certain debt securities with an aggregate amortized cost of \$1,117 million and fair value of \$1,070 million were transferred from held-to-maturity securities to available-for-sale securities as part of the adoption of ASU 2017-12, *Derivatives and Hedging: Targeted Improvements to Accounting for Hedging Activities*.

The following table presents pre-tax net securities (losses) gains by type.

Net securities (losses) gains (in millions)	2019	2018	2017
U.S. Treasury	\$ (13)	\$ (4)	\$ (16)
Agency RMBS	1	(42)	(12)
Other	(6)	(2)	31
Total net securities (losses) gains	\$ (18)	\$ (48)	\$ 3

Temporarily impaired securities

At Dec. 31, 2019, the gross unrealized losses on the securities portfolio were primarily attributable to an increase in interest rates from the date of purchase, and for certain securities that were transferred from available-for-sale to held-to-maturity, an increase in interest rates through the date they were transferred. Specifically, \$65 million of the unrealized losses at Dec. 31, 2019 and \$87 million at Dec. 31, 2018 reflected in the available-for-sale sections of the tables below relate to certain securities (primarily

Agency RMBS) that were transferred in prior periods from available-for-sale to held-to-maturity. The unrealized losses will be amortized into net interest revenue over the contractual lives of the securities. The transfer created a new cost basis for the securities. As a result, if these securities have experienced unrealized losses since the date of transfer, the corresponding fair value and unrealized losses would be reflected in the held-to-maturity sections of the following tables. We do not intend to sell these securities, and it is not more likely than not that we will have to sell these securities.

The following tables show the aggregate fair value of securities with a continuous unrealized loss position for less than 12 months and those that have been in a continuous unrealized loss position for 12 months or more.

Temporarily impaired securities at Dec. 31, 2019 <i>(in millions)</i>	Less than 12 months		12 months or more		Total	
	Fair value	Unrealized losses	Fair value	Unrealized losses	Fair value	Unrealized losses
Available-for-sale:						
Agency RMBS	\$ 8,373	\$ 33	\$ 5,912	\$ 110	\$ 14,285	\$ 143
U.S. Treasury	1,976	16	766	4	2,742	20
Sovereign debt/sovereign guaranteed	4,045	10	225	1	4,270	11
Agency commercial MBS	1,960	12	775	5	2,735	17
Foreign covered bonds	1,009	4	690	3	1,699	7
CLOs	1,066	2	1,499	14	2,565	16
Supranational	1,336	6	360	—	1,696	6
Foreign government agencies	1,706	2	47	—	1,753	2
Non-agency commercial MBS	525	2	45	—	570	2
Other ABS	456	3	305	2	761	5
U.S. government agencies	377	2	—	—	377	2
Non-agency RMBS (a)	101	—	113	7	214	7
State and political subdivisions	—	—	16	—	16	—
Corporate bonds	82	—	21	—	103	—
Total securities available-for-sale (b)	\$ 23,012	\$ 92	\$ 10,774	\$ 146	\$ 33,786	\$ 238
Held-to-maturity:						
Agency RMBS	\$ 4,714	\$ 17	\$ 3,729	\$ 29	\$ 8,443	\$ 46
U.S. Treasury	406	3	821	—	1,227	3
Agency commercial MBS	375	3	—	—	375	3
U.S. government agencies	506	2	45	—	551	2
Non-agency RMBS	6	—	40	1	46	1
Total securities held-to-maturity	\$ 6,007	\$ 25	\$ 4,635	\$ 30	\$ 10,642	\$ 55
Total temporarily impaired securities	\$ 29,019	\$ 117	\$ 15,409	\$ 176	\$ 44,428	\$ 293

- (a) Includes \$2 million of securities with an unrealized loss of less than \$1 million for less than 12 months and \$2 million of securities with an unrealized loss of less than \$1 million for 12 months or more that were included in the former Grantor Trust.
- (b) Includes gross unrealized losses of \$65 million for 12 months or more recorded in accumulated other comprehensive income related to securities that were transferred from available-for-sale to held-to-maturity. The unrealized losses are primarily related to Agency RMBS and will be amortized into net interest revenue over the contractual lives of the securities. There were no gross unrealized losses for less than 12 months.

Notes to Consolidated Financial Statements (continued)

Temporarily impaired securities at Dec. 31, 2018 <i>(in millions)</i>	Less than 12 months		12 months or more		Total	
	Fair value	Unrealized losses	Fair value	Unrealized losses	Fair value	Unrealized losses
Available-for-sale:						
Agency RMBS	\$ 6,678	\$ 30	\$ 9,250	\$ 339	\$ 15,928	\$ 369
U.S. Treasury	6,126	23	6,880	187	13,006	210
Sovereign debt/sovereign guaranteed	2,185	8	988	13	3,173	21
Agency commercial MBS	4,505	50	3,082	111	7,587	161
CLOs	3,280	46	2	—	3,282	46
Supranational	974	2	481	6	1,455	8
Foreign covered bonds	1,058	7	736	12	1,794	19
State and political subdivisions	316	1	668	21	984	22
Other ABS	1,289	4	23	—	1,312	4
U.S. government agencies	513	4	673	20	1,186	24
Non-agency commercial MBS	1,015	14	362	14	1,377	28
Non-agency RMBS (a)	94	1	157	10	251	11
Foreign government agencies	397	1	256	3	653	4
Corporate bonds	685	24	50	2	735	26
Total securities available-for-sale (b)	\$ 29,115	\$ 215	\$ 23,608	\$ 738	\$ 52,723	\$ 953
Held-to-maturity:						
Agency RMBS	\$ 4,602	\$ 56	\$ 17,107	\$ 576	\$ 21,709	\$ 632
U.S. Treasury	157	2	4,343	75	4,500	77
U.S. government agencies	—	—	1,111	10	1,111	10
Agency commercial MBS	477	7	654	19	1,131	26
Non-agency RMBS	22	1	31	1	53	2
Total securities held-to-maturity	\$ 5,258	\$ 66	\$ 23,246	\$ 681	\$ 28,504	\$ 747
Total temporarily impaired securities	\$ 34,373	\$ 281	\$ 46,854	\$ 1,419	\$ 81,227	\$ 1,700

(a) Includes \$22 million of securities with an unrealized loss of less than \$1 million for less than 12 months and \$3 million of securities with an unrealized loss of less than \$1 million for 12 months or more that were included in the former Grantor Trust.

(b) Includes gross unrealized losses of \$87 million for 12 months or more recorded in accumulated other comprehensive income related to securities that were transferred from available-for-sale to held-to-maturity. The unrealized losses are primarily related to Agency RMBS and will be amortized into net interest revenue over the contractual lives of the securities. There were no gross unrealized losses for less than 12 months.

The following table shows the maturity distribution by carrying amount and yield (on a tax equivalent basis) of our securities portfolio.

Maturity distribution and yields on securities at Dec. 31, 2019 <i>(dollars in millions)</i>	U.S. Treasury		U.S. government agencies		State and political subdivisions		Other bonds, notes and debentures		Mortgage/asset-backed		Total
	Amount	Yield (a)	Amount	Yield (a)	Amount	Yield (a)	Amount	Yield (a)	Amount	Yield (a)	
Securities available-for-sale:											
One year or less	\$ 2,104	2.51%	\$ 25	2.73%	\$ 162	2.90%	\$ 8,241	1.19%	\$ —	—%	\$ 10,532
Over 1 through 5 years	6,876	1.70	411	2.07	774	3.26	13,909	0.99	—	—	21,970
Over 5 through 10 years	3,693	2.21	1,513	2.70	94	2.57	1,705	0.87	—	—	7,005
Over 10 years	2,758	3.11	—	—	14	2.50	194	1.67	—	—	2,966
Mortgage-backed securities	—	—	—	—	—	—	—	—	39,871	2.87	39,871
Asset-backed securities	—	—	—	—	—	—	—	—	6,206	2.90	6,206
Total	\$ 15,431	2.18%	\$ 1,949	2.56%	\$ 1,044	3.13%	\$ 24,049	1.06%	\$ 46,077	2.87%	\$ 88,550
Securities held-to-maturity:											
One year or less	\$ 881	1.44%	\$ 135	1.69%	\$ —	—%	\$ 138	0.78%	\$ —	—%	\$ 1,154
Over 1 through 5 years	2,937	1.98	688	2.04	3	5.68	610	0.77	—	—	4,238
Over 5 through 10 years	—	—	200	2.58	—	—	114	0.22	—	—	314
Over 10 years	—	—	—	—	14	4.76	—	—	—	—	14
Mortgage-backed securities	—	—	—	—	—	—	—	—	28,763	2.94	28,763
Total	\$ 3,818	1.86%	\$ 1,023	2.10%	\$ 17	4.94%	\$ 862	0.70%	\$ 28,763	2.94%	\$ 34,483

(a) Yields are based upon the amortized cost of securities.

Other-than-temporary impairment

For each security in the securities portfolio, a quarterly review is conducted to determine if an OTTI has occurred. See Note 1 for a discussion of the determination of OTTI.

The following table reflects securities credit losses recorded in earnings. The beginning balance represents the credit loss component for which OTTI occurred on debt securities in prior periods. The additions represent the first time a debt security was credit impaired or when subsequent credit impairments have occurred. The deductions represent credit losses on securities that have been sold, are required to be sold, or for which it is our intention to sell.

Debt securities credit loss roll forward <i>(in millions)</i>	2019	2018
Beginning balance as of Dec. 31	\$ 78	\$ 84
Add: Initial OTTI credit losses	—	—
Subsequent OTTI credit losses	1	1
Less: Realized losses for securities sold	7	7
Ending balance as of Dec. 31	\$ 72	\$ 78

Pledged assets

At Dec. 31, 2019, BNY Mellon had pledged assets of \$118 billion, including \$80 billion pledged as collateral for potential borrowings at the Federal Reserve Discount Window and \$6 billion pledged as collateral for borrowing at the Federal Home Loan Bank. The components of the assets pledged at Dec. 31, 2019 included \$98 billion of securities, \$13 billion of loans, \$7 billion of trading assets and less than \$1 billion of interest-bearing deposits with banks.

If there has been no borrowing at the Federal Reserve Discount Window, the Federal Reserve generally allows banks to freely move assets in and out of their pledged assets account to sell or repledge the assets for other purposes. BNY Mellon regularly moves assets in and out of its pledged assets account at the Federal Reserve.

At Dec. 31, 2018, BNY Mellon had pledged assets of \$120 billion, including \$96 billion pledged as collateral for potential borrowing at the Federal Reserve Discount Window and \$7 billion pledged as collateral for borrowing at the Federal Home Loan Bank. The components of the assets pledged at Dec. 31, 2018 included \$100 billion of securities, \$15 billion of loans, \$4 billion of trading assets and \$1 billion of interest-bearing deposits with banks.

At Dec. 31, 2019 and Dec. 31, 2018, pledged assets included \$29 billion and \$13 billion, respectively, for which the recipients were permitted to sell or repledge the assets delivered.

We also obtain securities as collateral, including receipts under resale agreements, securities borrowed, derivative contracts and custody agreements on terms which permit us to sell or repledge the securities to others. At Dec. 31, 2019 and Dec. 31, 2018, the market value of the securities received that can be sold or repledged was \$153 billion and \$151 billion, respectively. We routinely sell or repledge these securities through delivery to third parties. As of Dec. 31, 2019 and Dec. 31, 2018, the market value of securities collateral sold or repledged was \$107 billion and \$101 billion, respectively.

Restricted cash and securities

Cash and securities may be segregated under federal and other regulations or requirements. At both Dec. 31, 2019 and Dec. 31, 2018, cash segregated under federal and other regulations or requirements was \$2 billion. Restricted cash is included in interest-bearing deposits with banks on the consolidated balance sheet. Securities segregated under federal and other regulations or requirements were \$1 billion at Dec. 31, 2019 and \$2 billion at Dec. 31, 2018. Restricted securities were sourced from securities purchased under resale agreements and are included in federal funds sold and securities purchased under resale agreements on the consolidated balance sheet.

Note 5—Loans and asset quality**Loans**

The table below provides the details of our loan portfolio and industry concentrations of credit risk at Dec. 31, 2019 and Dec. 31, 2018.

Loans <i>(in millions)</i>	Dec. 31,	
	2019	2018
Domestic:		
Commercial	\$ 1,442	\$ 1,949
Commercial real estate	5,575	4,787
Financial institutions	4,852	5,091
Lease financings	537	706
Wealth management loans and mortgages	16,050	15,843
Other residential mortgages	494	594
Overdrafts	524	1,550
Other	1,167	1,181
Margin loans	11,907	13,343
Total domestic	42,548	45,044
Foreign:		
Commercial	347	183
Commercial real estate	7	—
Financial institutions	7,626	6,492
Lease financings	576	551
Wealth management loans and mortgages	140	122
Other (primarily overdrafts)	2,230	4,031
Margin loans	1,479	141
Total foreign	12,405	11,520
Total loans (a)	\$ 54,953	\$ 56,564

(a) Net of unearned income of \$313 million at Dec. 31, 2019 and \$358 million at Dec. 31, 2018 primarily related to domestic and foreign lease financings.

Our loan portfolio consists of three portfolio segments: commercial, lease financings and mortgages. We manage our portfolio at the class level, which consists of six classes of financing receivables: commercial, commercial real estate, financial institutions, lease financings, wealth management loans and mortgages, and other residential mortgages.

The following tables are presented for each class of financing receivables and provide additional information about our credit risks and the adequacy of our allowance for credit losses.

Allowance for credit losses

Activity in the allowance for credit losses is presented below.

Allowance for credit losses activity for the year ended Dec. 31, 2019										
<i>(in millions)</i>	Commercial	Commercial real estate	Financial institutions	Lease financings	Wealth management loans and mortgages	Other residential mortgages	All other	Foreign	Total	
Beginning balance	\$ 81	\$ 75	\$ 22	\$ 5	\$ 21	\$ 16	\$ —	\$ 32	\$	252
Charge-offs	(12)	—	—	—	(1)	(1)	—	—		(14)
Recoveries	—	—	—	—	—	3	—	—		3
Net (charge-offs) recoveries	(12)	—	—	—	(1)	2	—	—		(11)
Provision	(9)	1	(2)	(2)	—	(5)	—	(8)		(25)
Ending balance	\$ 60	\$ 76	\$ 20	\$ 3	\$ 20	\$ 13	\$ —	\$ 24	\$	216
Allowance for:										
Loan losses	\$ 11	\$ 57	\$ 5	\$ 3	\$ 18	\$ 13	\$ —	\$ 15	\$	122
Lending-related commitments	49	19	15	—	2	—	—	9		94
Individually evaluated for impairment:										
Loan balance	\$ —	\$ —	\$ —	\$ —	\$ 15	\$ —	\$ —	\$ —	\$	15
Allowance for loan losses	—	—	—	—	—	—	—	—		—
Collectively evaluated for impairment:										
Loan balance	\$ 1,442	\$ 5,575	\$ 4,852	\$ 537	\$ 16,035	\$ 494	\$ 13,598 (a)	\$ 12,405	\$	54,938
Allowance for loan losses	11	57	5	3	18	13	—	15		122

(a) Includes \$524 million of domestic overdrafts, \$11,907 million of margin loans and \$1,167 million of other loans at Dec. 31, 2019.

Allowance for credit losses activity for the year ended Dec. 31, 2018										
<i>(in millions)</i>	Commercial	Commercial real estate	Financial institutions	Lease financings	Wealth management loans and mortgages	Other residential mortgages	All other	Foreign	Total	
Beginning balance	\$ 77	\$ 76	\$ 23	\$ 8	\$ 22	\$ 20	\$ —	\$ 35	\$	261
Charge-offs	—	—	—	—	—	(1)	—	—		(1)
Recoveries	—	—	—	—	—	2	—	1		3
Net recoveries	—	—	—	—	—	1	—	1		2
Provision	4	(1)	(1)	(3)	(1)	(5)	—	(4)		(11)
Ending balance	\$ 81	\$ 75	\$ 22	\$ 5	\$ 21	\$ 16	\$ —	\$ 32	\$	252
Allowance for:										
Loan losses	\$ 24	\$ 56	\$ 7	\$ 5	\$ 18	\$ 16	\$ —	\$ 20	\$	146
Lending-related commitments	57	19	15	—	3	—	—	12		106
Individually evaluated for impairment:										
Loan balance	\$ —	\$ —	\$ —	\$ —	\$ 4	\$ —	\$ —	\$ —	\$	4
Allowance for loan losses	—	—	—	—	—	—	—	—		—
Collectively evaluated for impairment:										
Loan balance	\$ 1,949	\$ 4,787	\$ 5,091	\$ 706	\$ 15,839	\$ 594	\$ 16,074 (a)	\$ 11,520	\$	56,560
Allowance for loan losses	24	56	7	5	18	16	—	20		146

(a) Includes \$1,550 million of domestic overdrafts, \$13,343 million of margin loans and \$1,181 million of other loans at Dec. 31, 2018.

Notes to Consolidated Financial Statements (continued)

Allowance for credit losses activity for the year ended Dec. 31, 2017

<i>(in millions)</i>	Commercial	Commercial real estate	Financial institutions	Lease financings	Wealth management loans and mortgages	Other residential mortgages	All other	Foreign	Total
Beginning balance	\$ 82	\$ 73	\$ 26	\$ 13	\$ 23	\$ 28	\$ —	\$ 36	\$ 281
Charge-offs	—	—	—	—	—	(1)	—	—	(1)
Recoveries	—	—	—	—	—	5	—	—	5
Net recoveries	—	—	—	—	—	4	—	—	4
Provision	(5)	3	(3)	(5)	(1)	(12)	—	(1)	(24)
Ending balance	\$ 77	\$ 76	\$ 23	\$ 8	\$ 22	\$ 20	\$ —	\$ 35	\$ 261
Allowance for:									
Loans losses	\$ 24	\$ 58	\$ 7	\$ 8	\$ 18	\$ 20	\$ —	\$ 24	\$ 159
Unfunded commitments	53	18	16	—	4	—	—	11	102
Individually evaluated for impairment:									
Loan balance	\$ —	\$ —	\$ 1	\$ —	\$ 5	\$ —	\$ —	\$ —	\$ 6
Allowance for loan losses	—	—	—	—	1	—	—	—	1
Collectively evaluated for impairment:									
Loan balance	\$ 2,744	\$ 4,900	\$ 5,567	\$ 772	\$ 16,415	\$ 708	\$ 17,783	(a) \$ 12,645	\$ 61,534
Allowance for loan losses	24	58	7	8	17	20	—	24	158

(a) Includes \$963 million of domestic overdrafts, \$15,689 million of margin loans and \$1,131 million of other loans at Dec. 31, 2017.

Nonperforming assets

The table below presents our nonperforming assets.

Nonperforming assets <i>(in millions)</i>	Dec. 31,	
	2019	2018
Nonperforming loans:		
Other residential mortgages	\$ 62	\$ 67
Wealth management loans and mortgages	24	9
Total nonperforming loans	86	76
Other assets owned	3	3
Total nonperforming assets	\$ 89	\$ 79

At Dec. 31, 2019, undrawn commitments to borrowers whose loans were classified as nonaccrual or reduced rate were not material.

Lost interest

The table below presents the amount of lost interest income.

Lost interest <i>(in millions)</i>	2019	2018	2017
	Amount by which interest income recognized on nonperforming loans exceeded reversals		
Total	\$ —	\$ —	\$ —
Foreign	—	—	—
Amount by which interest income would have increased if nonperforming loans at year-end had been performing for the entire year			
Total	\$ 6	\$ 5	\$ 5
Foreign	—	—	—

Impaired loans

The tables below present information about our impaired loans. We use the discounted cash flow method as the primary method for valuing impaired loans.

Impaired loans <i>(in millions)</i>	2019		2018		2017	
	Average recorded investment	Interest revenue recognized	Average recorded investment	Interest revenue recognized	Average recorded investment	Interest revenue recognized
Impaired loans with an allowance:						
Commercial	\$ 39	\$ —	\$ —	\$ —	\$ —	\$ —
Financial institutions	—	—	—	—	1	—
Wealth management loans and mortgages	—	—	1	—	2	—
Lease financings	—	—	—	—	1	—
Total impaired loans with an allowance	39	—	1	—	4	—
Impaired loans without an allowance: (a)						
Wealth management loans and mortgages	11	—	4	—	3	—
Total impaired loans	\$ 50	\$ —	\$ 5	\$ —	\$ 7	\$ —

(a) When the discounted cash flows, collateral value or market price equals or exceeds the carrying value of the loan, then the loan does not require an allowance under the accounting standard related to impaired loans.

Impaired loans <i>(in millions)</i>	Dec. 31, 2019			Dec. 31, 2018		
	Recorded investment	Unpaid principal balance	Related allowance (a)	Recorded investment	Unpaid principal balance	Related allowance (a)
Impaired loans without an allowance: (b)						
Wealth management loans and mortgages	\$ 15	\$ 15	N/A	\$ 4	\$ 4	N/A
Total impaired loans (c)	\$ 15	\$ 15	—	\$ 4	\$ 4	—

(a) The allowance for impaired loans is included in the allowance for loan losses.

(b) When the discounted cash flows, collateral value or market price equals or exceeds the carrying value of the loan, then the loan does not require an allowance under the accounting standard related to impaired loans.

(c) Excludes an aggregate of less than \$1 million of impaired loans in amounts individually less than \$1 million at both Dec. 31, 2019 and Dec. 31, 2018, respectively. The allowance for loan losses associated with these loans totaled less than \$1 million at both Dec. 31, 2019 and Dec. 31, 2018, respectively.

Past due loans

The table below presents our past due loans.

Past due loans and still accruing interest <i>(in millions)</i>	Dec. 31, 2019				Dec. 31, 2018			
	Days past due			Total past due	Days past due			Total past due
	30-59	60-89	≥90		30-59	60-89	≥90	
Financial institutions	\$ 1	\$ 30	\$ —	\$ 31	\$ 3	\$ 3	\$ —	\$ 6
Wealth management loans and mortgages	22	5	—	27	22	1	5	28
Commercial real estate	6	12	—	18	1	—	—	1
Other residential mortgages	8	3	—	11	12	6	7	25
Total past due loans	\$ 37	\$ 50	\$ —	\$ 87	\$ 38	\$ 10	\$ 12	\$ 60

Troubled debt restructurings

A modified loan is considered a TDR if the debtor is experiencing financial difficulties and the creditor grants a concession to the debtor that would not otherwise be considered. A TDR may include a transfer of real estate or other assets from the debtor

to the creditor, or a modification of the term of the loan. Not all modified loans are considered TDRs.

We modified 12 other residential loans with an aggregate pre- and post-modification recorded investment of \$6 million in 2019, and 17 other residential loans with an aggregate pre- and post-

modification recorded investment of \$4 million in 2018.

The modifications of the other residential mortgage loans in 2019 and 2018 consisted of reducing the stated interest rates and, in certain cases, a forbearance of default and extending the maturity dates. The modified loans are primarily collateral dependent for which the value is based on the fair value of the collateral.

TDRs that subsequently defaulted

There were nine residential mortgage loans and one wealth management loan, with an aggregate recorded

The following tables present information about credit quality indicators.

Commercial loan portfolio

Commercial loan portfolio – Credit risk profile by creditworthiness category <i>(in millions)</i>	Commercial		Commercial real estate		Financial institutions	
	Dec. 31,		Dec. 31,		Dec. 31,	
	2019	2018	2019	2018	2019	2018
Investment grade	\$ 1,744	\$ 2,036	\$ 5,045	\$ 4,184	\$ 10,265	\$ 9,586
Non-investment grade	45	96	537	603	2,213	1,997
Total	\$ 1,789	\$ 2,132	\$ 5,582	\$ 4,787	\$ 12,478	\$ 11,583

The commercial loan portfolio is divided into investment grade and non-investment grade categories based on the assigned internal credit ratings, which are generally consistent with those of the public rating agencies. Customers with ratings consistent with BBB- (Standard & Poor’s (“S&Ps”))/Baa3 (Moody’s) or better are considered to be investment grade. Those clients with ratings lower than this threshold are considered to be non-investment grade.

Wealth management loans and mortgages

Wealth management loans and mortgages – Credit risk profile by internally assigned grade			
<i>(in millions)</i>	Dec. 31,		
	2019	2018	
Wealth management loans:			
Investment grade	\$ 7,254	\$ 6,901	
Non-investment grade	140	106	
Wealth management mortgages	8,796	8,958	
Total	\$ 16,190	\$ 15,965	

Wealth management non-mortgage loans are not typically rated by external rating agencies. A

investment of \$4 million, which were restructured in a TDR during the previous 12 months and subsequently defaulted in 2019.

Credit quality indicators

Our credit strategy is to focus on investment-grade clients that are active users of our non-credit services. Each customer is assigned an internal credit rating, which is mapped to an external rating agency grade equivalent, if possible, based upon a number of dimensions, which are continually evaluated and may change over time.

majority of the wealth management loans are secured by the customers’ investment management accounts or custody accounts. Eligible assets pledged for these loans are typically investment grade fixed-income securities, equities and/or mutual funds. Internal ratings for this portion of the wealth management portfolio, therefore, would equate to investment-grade external ratings. Wealth management loans are provided to select customers based on the pledge of other types of assets, including business assets, fixed assets or a modest amount of commercial real estate. For the loans collateralized by other assets, the credit quality of the obligor is carefully analyzed, but we do not consider this portfolio of loans to be investment grade.

Credit quality indicators for wealth management mortgages are not correlated to external ratings. Wealth management mortgages are typically loans to high-net-worth individuals, which are secured primarily by residential property. These loans are primarily interest-only, adjustable rate mortgages with a weighted-average loan-to-value ratio of 62% at origination. In the wealth management portfolio, less

than 1% of the mortgages were past due at Dec. 31, 2019.

At Dec. 31, 2019, the wealth management mortgage portfolio consisted of the following geographic concentrations: California - 23%; New York - 17%; Massachusetts - 10%; Florida - 8%; and other - 42%.

Other residential mortgages

The other residential mortgage portfolio primarily consists of 1-4 family residential mortgage loans and totaled \$494 million at Dec. 31, 2019 and \$594 million at Dec. 31, 2018. These loans are not typically correlated to external ratings. Included in this portfolio at Dec. 31, 2019 were \$91 million of mortgage loans purchased in 2005, 2006 and the first quarter of 2007, of which, 10% of the serviced loan balance was at least 60 days delinquent.

Overdrafts

Overdrafts primarily relate to custody and securities clearance clients and totaled \$2.7 billion at Dec. 31, 2019 and \$5.5 billion at Dec. 31, 2018. Overdrafts occur on a daily basis primarily in the custody and securities clearance business and are generally repaid within two business days.

Other loans

Other loans primarily include loans to consumers that are fully collateralized with equities, mutual funds and fixed-income securities.

Margin loans

We had \$13.4 billion of secured margin loans at Dec. 31, 2019, compared with \$13.5 billion at Dec. 31, 2018. Margin loans are collateralized with marketable securities, and borrowers are required to maintain a daily collateral margin in excess of 100% of the value of the loan. We have rarely suffered a loss on these types of loans and do not allocate any of our allowance for credit losses to margin loans.

Reverse repurchase agreements

Reverse repurchase agreements are transactions fully collateralized with high-quality liquid securities. These transactions carry minimal credit risk and therefore are not allocated an allowance for credit losses.

Note 6—Leasing

We have operating and finance leases for corporate offices, data centers and certain equipment. Our leases have remaining lease terms of one year to 20 years, some of which include options to extend or terminate the lease. In some of our corporate office locations, we may enter into sublease arrangements for portions or all of the space and/or lease term.

The following table presents the consolidated balance sheet information related to operating and finance leases.

Balance sheet information <i>(dollar in millions)</i>	Dec. 31, 2019		
	Operating leases	Finance leases	Total
Right-of-use assets <i>(a)</i>	\$ 1,530	\$ 12	\$ 1,542
Lease liability <i>(b)</i>	\$ 1,772	\$ 2	\$ 1,774
Weighted average:			
Remaining lease term	11.3 years	2.6 years	
Discount rate <i>(annualized)</i>	2.76%	2.88%	

(a) Included in premises and equipment on the consolidated balance sheet.

(b) Operating lease liabilities are included in other liabilities and finance lease liabilities are included in other borrowed funds, both on the consolidated balance sheet.

The following table presents the components of lease expense.

Lease expense <i>(in millions)</i>	Year ended Dec. 31, 2019
Operating lease expense	\$ 266
Variable lease expense	39
Sublease income	(33)
Finance lease expense:	
Amortization of right-of-use assets	7
Interest on lease liabilities	—
Total finance lease expense	\$ 7
Total lease expense	\$ 279

The following table presents cash flow information related to leases.

Cash flow information <i>(in millions)</i>	Year ended Dec. 31, 2019
Cash paid for amounts included in measurement of liabilities:	
Operating cash flows from finance leases	\$ —
Operating cash flows from operating leases	\$ 285
Financing cash flows from finance leases	\$ 20

See Note 26 for information on non-cash operating and/or finance lease transactions.

The following table presents the maturities of lease liabilities.

Maturities of lease liabilities <i>(in millions)</i>	Operating leases	Finance leases
For the year ended Dec. 31,		
2020	\$ 284	\$ 2
2021	224	—
2022	199	—
2023	166	—
2024	136	—
2025 and thereafter	1,057	—
Total lease payments	2,066	2
Less: Imputed interest	(294)	—
Total	\$ 1,772	\$ 2

The following table presents the maturity of lease liabilities on operating leases prior to adopting ASU 2016-02, *Leases*.

Maturities of lease liabilities <i>(in millions)</i>	Operating leases
For the year ended Dec. 31,	
2020	\$ 244
2021	211
2022	172
2023	136
2024 and thereafter	432
Total	\$ 1,195

Note 7—Goodwill and intangible assets

Goodwill

The table below provides a breakdown of goodwill by business.

Goodwill by business <i>(in millions)</i>	Investment Services	Investment Management	Other	Consolidated
Balance at Dec. 31, 2017	\$ 8,389	\$ 9,128	\$ 47	\$ 17,564
Dispositions	—	(65)	—	(65)
Foreign currency translation	(56)	(93)	—	(149)
Balance at Dec. 31, 2018	\$ 8,333	\$ 8,970	\$ 47	\$ 17,350
Foreign currency translation	(1)	37	—	36
Balance at Dec. 31, 2019	\$ 8,332	\$ 9,007	\$ 47	\$ 17,386

Total goodwill increased in 2019 compared with 2018 reflecting the impact of foreign currency translation on non-U.S. dollar denominated goodwill.

Intangible assets

The table below provides a breakdown of intangible assets by business.

Intangible assets – net carrying amount by business <i>(in millions)</i>	Investment Services	Investment Management	Other	Consolidated
Balance at Dec. 31, 2017	\$ 888	\$ 1,674	\$ 849	\$ 3,411
Amortization	(129)	(51)	—	(180)
Foreign currency translation	(1)	(10)	—	(11)
Balance at Dec. 31, 2018	\$ 758	\$ 1,613	\$ 849	\$ 3,220
Amortization	(80)	(37)	—	(117)
Foreign currency translation	—	4	—	4
Balance at Dec. 31, 2019	\$ 678	\$ 1,580	\$ 849	\$ 3,107

Intangible assets decreased in 2019 compared with 2018 primarily reflecting amortization.

The table below provides a breakdown of intangible assets by type.

Intangible assets (in millions)	Dec. 31, 2019				Dec. 31, 2018		
	Gross carrying amount	Accumulated amortization	Net carrying amount	Remaining weighted-average amortization period	Gross carrying amount	Accumulated amortization	Net carrying amount
Subject to amortization: (a)							
Customer contracts—Investment Services	\$ 1,520	\$ (1,214)	\$ 306	10 years	\$ 1,572	\$ (1,186)	\$ 386
Customer relationships—Investment Management	712	(544)	168	11 years	899	(699)	200
Other	64	(16)	48	14 years	26	(12)	14
Total subject to amortization	2,296	(1,774)	522	10 years	2,497	(1,897)	600
Not subject to amortization: (b)							
Tradenames	1,293	N/A	1,293	N/A	1,332	N/A	1,332
Customer relationships	1,292	N/A	1,292	N/A	1,288	N/A	1,288
Total not subject to amortization	2,585	N/A	2,585	N/A	2,620	N/A	2,620
Total intangible assets	\$ 4,881	\$ (1,774)	\$ 3,107	N/A	\$ 5,117	\$ (1,897)	\$ 3,220

(a) Excludes fully amortized intangible assets.

(b) Intangible assets not subject to amortization have an indefinite life.

Estimated annual amortization expense for current intangibles for the next five years is as follows:

For the year ended Dec. 31,	Estimated amortization expense (in millions)
2020	\$ 104
2021	81
2022	63
2023	52
2024	45

Impairment testing

The goodwill impairment test is performed at least annually at the reporting unit level. Intangible assets not subject to amortization are tested for impairment annually or more often if events or circumstances indicate they may be impaired.

BNY Mellon's three business segments include seven reporting units for which goodwill impairment testing is performed on an annual basis. The Investment Services segment is comprised of four reporting units; the Investment Management segment is comprised of two reporting units and one reporting unit is included in the Other segment. As a result of the annual goodwill impairment test of the seven reporting units conducted in the second quarter of 2019, no goodwill impairment was recognized.

Note 8—Other assets

The following table provides the components of other assets presented on the consolidated balance sheet.

Other assets (in millions)	Dec. 31,	
	2019	2018
Corporate/bank-owned life insurance	\$ 5,219	\$ 4,937
Accounts receivable	3,802	3,692
Fails to deliver	1,671	2,274
Software	1,590	1,652
Prepaid pension assets	1,464	1,357
Renewable energy investments	1,144	1,264
Equity in a joint venture and other investments	1,102	1,064
Qualified affordable housing project investments	1,024	999
Prepaid expense	491	385
Federal Reserve Bank stock	466	484
Income taxes receivable	388	1,125
Seed capital	184	224
Fair value of hedging derivatives	21	289
Other (a)	1,655	1,552
Total other assets	\$ 20,221	\$ 21,298

(a) At Dec. 31, 2019 and Dec. 31, 2018, other assets include \$22 million and \$111 million, respectively, of Federal Home Loan Bank stock, at cost.

Non-readily marketable equity securities

Non-readily marketable equity securities do not have readily determinable fair values. These investments are valued using a measurement alternative where the investments are carried at cost, less any impairment, and plus or minus changes resulting from observable price changes in orderly transactions for an identical

or similar investment of the same issuer. The observable price changes are recorded in investment and other income on the consolidated income statement. Our non-readily marketable equity securities totaled \$61 million at Dec. 31, 2019 and \$55 million at Dec. 31, 2018 and are included in equity in a joint venture and other investments in the table above.

The following table presents the adjustments on the non-readily marketable equity securities.

Non-readily marketable equity securities <i>(in millions)</i>	2019	2018	Life- to-date
Upward adjustments	\$ 4	\$ 28	\$ 32
Downward adjustments	(3)	(1)	(4)
Net adjustments	\$ 1	\$ 27	\$ 28

Qualified affordable housing project investments

We invest in affordable housing projects primarily to satisfy the Company's requirements under the Community Reinvestment Act. Our total investment in qualified affordable housing projects totaled \$1.0 billion at both Dec. 31, 2019 and Dec. 31, 2018. Commitments to fund future investments in qualified affordable housing projects totaled \$422 million at Dec. 31, 2019 and \$479 million at Dec. 31, 2018 and

are recorded in other liabilities. A summary of the commitments to fund future investments is as follows: 2020 – \$152 million; 2021 – \$161 million; 2022 – \$82 million; 2023 – \$5 million; 2024 – \$2 million; and 2025 and thereafter – \$20 million.

Tax credits and other tax benefits recognized were \$148 million in 2019, \$163 million in 2018 and \$156 million in 2017.

Amortization expense included in the provision for income taxes was \$121 million in 2019, \$136 million in 2018 and \$153 million in 2017.

Investments valued using net asset value ("NAV") per share

In our Investment Management business, we make seed capital investments in certain funds we manage. We also hold private equity investments, specifically small business investment companies ("SBICs"), which are compliant with the Volcker Rule, and certain other corporate investments. Seed capital, private equity and other corporate investments are included in other assets on the consolidated balance sheet. The fair value of certain of these investments was estimated using the NAV per share for our ownership interest in the funds.

The table below presents information on our investments valued using NAV.

Investments valued using NAV <i>(in millions)</i>	Dec. 31, 2019		Dec. 31, 2018	
	Fair value	Unfunded commitments	Fair value	Unfunded commitments
Seed capital (a)	\$ 59	\$ —	\$ 54	\$ —
Private equity investments (SBICs) (b)	89	55	74	41
Other (c)	33	—	87	—
Total	\$ 181	\$ 55	\$ 215	\$ 41

- (a) Primarily includes leveraged loans and structured credit funds which are generally not redeemable. Distributions from such investments will be received as the underlying investments in the funds, which have a life of six years, are liquidated.
- (b) Private equity investments include Volcker Rule-compliant investments in SBICs that invest in various sectors of the economy. Private equity investments do not have redemption rights. Distributions from such investments will be received as the underlying investments in the private equity investments, which have a life of 10 years, are liquidated.
- (c) Primarily relates to investments in funds that relate to deferred compensation arrangements with employees. Investments in funds can be redeemed on a quarterly basis with redemption notice periods up to 95 days. At Dec. 31, 2018, also included investments which could be redeemed daily or monthly with a redemption notice period of one day.

Note 9—Deposits

Total time deposits in denominations of \$250,000 or more were \$44.1 billion at Dec. 31, 2019 and \$32.1 billion at Dec. 31, 2018. At Dec. 31, 2019, the scheduled maturities of all time deposits are as follows: 2020 – \$48.3 billion; 2021 – \$2 million; 2022 – \$- million; 2023 – \$- million; 2024 – \$- million; and 2025 and thereafter – \$1 million.

Note 10—Contract revenue

Fee revenue in Investment Services and Investment Management is primarily variable, based on levels of assets under custody and/or administration (“AUC/A”), AUM and the level of client-driven transactions, as specified in fee schedules.

Investment services fees are based primarily on the market value of AUC/A; client accounts, balances and the volume of transactions; securities lending volume and spreads; and fees for other services. Certain fees based on the market value of assets are calculated in arrears on a monthly or quarterly basis.

Substantially all services within the Investment Services business are provided over time. Revenue on these services is recognized using the time elapsed method, equal to the expected invoice amount, which typically represents the value provided to the customer for our performance completed to date.

Clearing services revenue includes multiple types of fees, some of which are driven by customer actions

and are delivered at a point-in-time. These transaction-based fees are generally recognized on trade date. Other contractual clearing services fees are driven by the amount of AUC/A or the number of accounts or securities positions and are billed on a monthly or quarterly basis.

Investment management fees are dependent on the overall level and mix of AUM. The management fees, expressed in basis points, are charged for managing those assets. Management fees are typically subject to fee schedules based on the overall level of assets managed and products in which those assets are invested.

Investment management fee revenue also includes transactional- and account-based fees. These fees along with distribution and servicing fees are recognized when the services have been completed. Clients are generally billed for services performed on a monthly or quarterly basis.

Performance fees are generally calculated as a percentage of the applicable portfolio’s performance in excess of a benchmark index or a peer group’s performance. Performance fees are recognized at the end of the measurement period when they are determinable.

See Note 24 for additional information on our principal businesses, Investment Services and Investment Management, and the primary services provided.

Disaggregation of contract revenue

Contract revenue is included in fee revenue on the consolidated income statement. The following table presents fee revenue related to contracts with customers, disaggregated by type of fee revenue, for each business segment.

Disaggregation of contract revenue by business segment (a)

(in millions)	Year ended Dec. 31,							
	2019				2018			
	IS	IM	Other	Total	IS	IM	Other	Total
Fee revenue - contract revenue:								
Investment services fees:								
Asset servicing fees	\$ 4,365	\$ 85	\$ 1	\$ 4,451	\$ 4,395	\$ 88	\$ 1	\$ 4,484
Clearing services fees (b)	1,649	—	(1)	1,648	1,615	—	—	1,615
Issuer services fees	1,130	—	—	1,130	1,099	—	—	1,099
Treasury services fees	560	1	—	561	553	1	—	554
Total investment services fees (b)	7,704	86	—	7,790	7,662	89	1	7,752
Investment management and performance fees (b)	17	3,373	—	3,390	16	3,619	—	3,635
Financing-related fees	59	—	1	60	61	1	(2)	60
Distribution and servicing	(49)	178	—	129	(51)	191	—	140
Investment and other income	282	(197)	—	85	279	(202)	2	79
Total fee revenue - contract revenue	8,013	3,440	1	11,454	7,967	3,698	1	11,666
Fee and other revenue - not in scope of ASC 606 (c)(d)	881	26	887	1,794	959	83	84	1,126
Total fee and other revenue	\$ 8,894	\$ 3,466	\$ 888	\$ 13,248	\$ 8,926	\$ 3,781	\$ 85	\$ 12,792

- (a) Business segment data has been determined on an internal management basis of accounting, rather than the generally accepted accounting principles used for consolidated financial reporting.
- (b) In 2019, we reclassified certain platform-related fees to clearing services fees from investment management and performance fees. Prior periods have been reclassified.
- (c) Primarily includes investment and other income, foreign exchange and other trading revenue, financing-related fees, asset servicing fees and net securities gains (losses), all of which are accounted for using other accounting guidance.
- (d) The Investment Management business includes income from consolidated investment management funds, net of noncontrolling interests, of \$30 million in 2019 and a loss of \$1 million in 2018.

IS - Investment Services segment.

IM - Investment Management segment.

Contract balances

Our clients are billed based on fee schedules that are agreed upon in each customer contract. Receivables from customers were \$2.4 billion at Dec. 31, 2019 and \$2.5 billion at Dec. 31, 2018. An allowance is maintained for accounts receivable which is generally based on the number of days outstanding. Adjustments to the allowance are recorded in other expense on the consolidated income statement. We recorded a provision of \$15 million in 2019 and \$11 million in 2018.

Contract assets represent accrued revenues that have not yet been billed to the customers due to certain contractual terms other than the passage of time and were \$32 million at Dec. 31, 2019 and \$36 million at Dec. 31, 2018. Accrued revenues recorded as contract assets are usually billed on an annual basis.

There were no impairments recorded on contract assets in 2019.

Both receivables from customers and contract assets are included in other assets on the consolidated balance sheet.

Contract liabilities represent payments received in advance of providing services under certain contracts and were \$168 million at Dec. 31, 2019 and \$171 million at Dec. 31, 2018. Contract liabilities are included in other liabilities on the consolidated balance sheet. Revenue recognized in 2019 relating to contract liabilities as of Dec. 31, 2018 was \$99 million.

Changes in contract assets and liabilities primarily relate to either party's performance under the contracts.

Contract costs

Incremental costs for obtaining contracts that are deemed recoverable are capitalized as contract costs. Such costs result from the payment of sales incentives, primarily in the Wealth Management business, and totaled \$86 million at Dec. 31, 2019 and \$98 million at Dec. 31, 2018. Capitalized sales incentives are amortized based on the transfer of goods or services to which the assets relate and typically average nine years. The amortization of capitalized sales incentives, which is primarily included in staff expense on the consolidated income statement, totaled \$22 million in both 2019 and 2018.

Costs to fulfill a contract are capitalized when they relate directly to an existing contract or a specific anticipated contract, generate or enhance resources that will be used to fulfill performance obligations and are recoverable. Such costs generally represent set-up costs, which include any direct cost incurred at the inception of a contract which enables the fulfillment of the performance obligation and totaled \$16 million at Dec. 31, 2019 and \$20 million at Dec. 31, 2018. These capitalized costs are amortized on a straight-line basis over the expected contract period which generally ranges from seven to nine years. The amortization is included in other expense on the consolidated income statement and totaled \$5 million in both 2019 and 2018. There were no impairments recorded on capitalized contract costs in 2019.

Unsatisfied performance obligations

We do not have any unsatisfied performance obligations other than those that are subject to a practical expedient election under ASC 606, *Revenue From Contracts With Customers*. The practical expedient election applies to (i) contracts with an original expected length of one year or less, and (ii) contracts for which we recognize revenue at the amount to which we have the right to invoice for services performed.

Note 11—Net interest revenue

The following table provides the components of net interest revenue presented on the consolidated income statement.

Net interest revenue (in millions)	Year ended Dec. 31,		
	2019	2018	2017
Interest revenue			
Deposits with the Federal Reserve and other central banks	\$ 448	\$ 531	\$ 319
Deposits with banks	265	219	120
Federal funds sold and securities purchased under resale agreements	2,154	1,116	423
Margin loans	454	510	343
Non-margin loans	1,335	1,356	1,077
Securities:			
Taxable	2,701	2,520	1,977
Exempt from federal income taxes	36	54	64
Total securities	2,737	2,574	2,041
Trading securities	155	126	59
Total interest revenue	7,548	6,432	4,382
Interest expense			
Deposits in domestic offices	958	537	107
Deposits in foreign offices	636	340	55
Federal funds purchased and securities sold under repurchase agreements	1,437	758	225
Trading liabilities	35	29	7
Other borrowed funds	59	58	26
Commercial paper	55	51	29
Customer payables	238	191	64
Long-term debt	942	857	561
Total interest expense	4,360	2,821	1,074
Net interest revenue	3,188	3,611	3,308
Provision for credit losses	(25)	(11)	(24)
Net interest revenue after provision for credit losses	\$ 3,213	\$ 3,622	\$ 3,332

Note 12—Income taxes

The components of the income tax provision are as follows:

Provision for income taxes (in millions)	Year ended Dec. 31,		
	2019	2018	2017
Current tax expense (benefit):			
Federal	\$ 592	\$ 902	\$ (99)
Foreign	484	442	388
State and local	113	119	74
Total current tax expense	1,189	1,463	363
Deferred tax (benefit) expense:			
Federal	(3)	(556)	36
Foreign	(13)	9	14
State and local	(53)	22	83
Total deferred tax (benefit) expense	(69)	(525)	133
Provision for income taxes	\$ 1,120	\$ 938	\$ 496

In December 2017, the Tax Cuts and Jobs Act of 2017 (“U.S. tax legislation”) was signed into law. Also in December 2017, the Securities and Exchange Commission staff issued Staff Accounting Bulletin No.118 (“SAB 118”). SAB 118 allowed the recording of a provisional estimate to reflect the income tax impact of the U.S. tax legislation and provided a measurement period up to one year from the enactment date. Due to the timing of the enactment and the complexity involved in applying the provisions of the U.S. tax legislation, we recorded a provisional tax benefit of \$710 million in the fourth quarter of 2017.

In 2018, we completed our analysis of the U.S. tax legislation and recorded an additional \$106 million tax benefit.

The components of income before taxes are as follows:

Income before taxes <i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Domestic	\$ 3,516	\$ 3,008	\$ 2,699
Foreign	2,071	2,184	1,911
Income before taxes	\$ 5,587	\$ 5,192	\$ 4,610

The components of our net deferred tax liability are as follows:

Net deferred tax liability <i>(in millions)</i>	Dec. 31,	
	2019	2018
Depreciation and amortization	\$ 2,136	\$ 2,060
Pension obligation	282	300
Renewable energy investment	268	295
Equity investments	63	65
Lease financings	42	130
Securities valuation	1	(15)
Credit losses on loans	(46)	(54)
Reserves not deducted for tax	(120)	(143)
Employee benefits	(257)	(266)
Other assets	(43)	(65)
Other liabilities	229	189
U.S. foreign tax credits	(39)	—
Valuation allowance	39	—
Net deferred tax liability	\$ 2,555	\$ 2,496

As of Dec. 31, 2019, BNY Mellon has \$39 million of U.S. foreign tax credit carryforwards which will expire in 2029. We believe it is more likely than not that the benefit from these foreign tax credits will not be realized. Accordingly, we have recorded a valuation allowance of \$39 million. We believe it is

more likely than not that we will fully realize our remaining deferred tax assets. This conclusion is based on historical financial results and profit forecasts.

As of Dec. 31, 2019, we had approximately \$280 million of earnings attributable to foreign subsidiaries that have been permanently reinvested abroad and for which no local distribution tax provision has been recorded. If these earnings were to be repatriated, the estimated tax liability as of Dec. 31, 2019 would be up to \$60 million.

The statutory federal income tax rate is reconciled to our effective income tax rate below:

Effective tax rate	Year ended Dec. 31,		
	2019	2018	2017
Federal rate	21.0%	21.0%	35.0%
State and local income taxes, net of federal income tax benefit	0.9	2.1	1.8
Foreign operations	2.4	0.5	(4.2)
Tax credits	(3.2)	(3.3)	(3.7)
Tax-exempt income	(0.7)	(0.8)	(1.9)
Leverage lease adjustment	—	—	(1.4)
Federal Deposit Insurance Corporation (“FDIC”) assessment	0.2	0.5	—
Stock compensation	(0.4)	(0.6)	(1.1)
U.S. tax legislation	—	(1.7)	(13.3)
Other – net	(0.2)	0.4	(0.4)
Effective tax rate	20.0%	18.1%	10.8%

Unrecognized tax positions <i>(in millions)</i>	2019	2018	2017
	Beginning balance at Jan. 1, – gross	\$ 103	\$ 128
Prior period tax positions:			
Increases	60	6	20
Decreases	(3)	(8)	(4)
Current period tax positions	17	9	10
Settlements	(4)	(32)	(44)
Ending balance at Dec. 31, – gross	\$ 173	\$ 103	\$ 128

Our total tax reserves as of Dec. 31, 2019 were \$173 million compared with \$103 million at Dec. 31, 2018. If these tax reserves were unnecessary, \$173 million would affect the effective tax rate in future periods. We recognize accrued interest and penalties, if applicable, related to income taxes in income tax expense. Included in the balance sheet at Dec. 31, 2019 is accrued interest, where applicable, of \$31 million. The additional tax expense related to interest for the year ended Dec. 31, 2019 was \$13 million, compared with \$8 million for the year ended Dec. 31, 2018.

It is reasonably possible the total reserve for uncertain tax positions could decrease within the next 12 months by approximately \$100 million as a result of adjustments related to tax years that are still subject to examination.

Our federal income tax returns are closed to examination through 2013. Our New York State, New York City and UK income tax returns are closed to examination through 2012.

Note 13—Long-term debt

Long-term debt (in millions)	Dec. 31, 2019			Dec. 31, 2018	
	Rate	Maturity	Amount	Rate	Amount
Senior debt:					
Fixed rate	1.95 - 4.60%	2020 - 2028	\$ 23,519	2.05 - 5.45%	\$ 24,995
Floating rate	1.71 - 2.96%	2020 - 2038	2,328	2.61 - 3.86%	2,628
Subordinated debt (a)	3.00 - 7.50%	2021 - 2029	1,654	3.00 - 7.50%	1,540
Total			\$ 27,501		\$ 29,163

(a) Fixed rate.

Total long-term debt maturing during the next five years is as follows: 2020 – \$4.0 billion, 2021 – \$5.9 billion, 2022 – \$2.3 billion, 2023 – \$5.5 billion and 2024 – \$2.5 billion.

Note 14—Variable interest entities and securitization

We have variable interests in VIEs, which include investments in retail, institutional and alternative investment funds, including CLO structures in which we provide asset management services, some of which are consolidated.

We earn management fees from these funds as well as performance fees in certain funds and may also provide start-up capital for new funds. The funds are primarily financed by our customers' investments in the funds' equity or debt.

Additionally, we invest in qualified affordable housing and renewable energy projects, which are

designed to generate a return primarily through the realization of tax credits. The projects, which are structured as limited partnerships and limited liability companies, are also VIEs, but are not consolidated.

The following table presents the incremental assets and liabilities included in the consolidated balance sheet as of Dec. 31, 2019 and Dec. 31, 2018. The net assets of any consolidated VIE are solely available to settle the liabilities of the VIE and to settle any investors' ownership liquidation requests, including any seed capital we invested in the VIE.

Consolidated investments (in millions)	Dec. 31, 2019			Dec. 31, 2018		
	Investment Management funds	Securitization	Total consolidated investments	Investment Management funds	Securitization	Total consolidated investments
Trading assets	\$ 229	\$ 400	\$ 629	\$ 243	\$ 400	\$ 643
Other assets	16	—	16	220	—	220
Total assets	\$ 245 (a)	\$ 400	\$ 645	\$ 463 (b)	\$ 400	\$ 863
Other liabilities	\$ 1	\$ 387	\$ 388	\$ 2	\$ 371	\$ 373
Total liabilities	\$ 1 (a)	\$ 387	\$ 388	\$ 2 (b)	\$ 371	\$ 373
Nonredeemable noncontrolling interests	\$ 102 (a)	\$ —	\$ 102	\$ 101 (b)	\$ —	\$ 101

(a) Includes VMEs with assets of \$50 million, liabilities of \$1 million and nonredeemable noncontrolling interests of \$1 million.

(b) Includes VMEs with assets of \$253 million, liabilities of \$2 million and nonredeemable noncontrolling interests of less than \$1 million.

We have not provided financial or other support that was not otherwise contractually required to be provided to our VIEs. Additionally, creditors of any consolidated VIEs do not have any recourse to the general credit of BNY Mellon.

Non-consolidated VIEs

As of Dec. 31, 2019 and Dec. 31, 2018, the following assets and liabilities related to the VIEs where we are

not the primary beneficiary were included in our consolidated balance sheets and primarily related to accounting for our investments in qualified affordable housing and renewable energy projects.

The maximum loss exposure indicated in the table below relates solely to our investments in, and unfunded commitments to, the VIEs.

Non-consolidated VIEs <i>(in millions)</i>	Dec. 31, 2019			Dec. 31, 2018		
	Assets	Liabilities	Maximum loss exposure	Assets	Liabilities	Maximum loss exposure
Securities - Available-for-sale (a)	\$ 208	\$ —	\$ 208	\$ 214	\$ —	\$ 214
Other	2,400	422	2,822	2,450	479	2,929

(a) Includes investments in the Company's sponsored CLOs.

Note 15—Shareholders' equity

Common stock

BNY Mellon has 3.5 billion authorized shares of common stock with a par value of \$0.01 per share. At Dec. 31, 2019, 900,683,038 shares of common stock were outstanding.

Common stock repurchase program

In June 2018, in connection with the Federal Reserve's non-objection to our 2018 capital plan, BNY Mellon announced a share repurchase plan providing for the repurchase of up to \$2.4 billion of common stock. The 2018 capital plan began in the third quarter of 2018 and continued through the second quarter of 2019.

In December 2018, BNY Mellon announced that the Federal Reserve approved the repurchase of \$830 million of additional common stock. Our Board of Directors approved the additional share repurchases, which were completed in the fourth quarter of 2018. These repurchases were in addition to the Company's repurchase of \$2.4 billion of common stock previously approved by the Board and announced in June 2018.

In June 2019, in connection with the Federal Reserve's non-objection to our 2019 capital plan, BNY Mellon announced a share repurchase plan providing for the repurchase of up to \$3.94 billion of common stock starting in the third quarter of 2019 and continuing through the second quarter of 2020. This new share repurchase plan replaces all previously authorized share repurchase plans.

Share repurchases may be executed through open market repurchases, in privately negotiated transactions or by other means, including through repurchase plans designed to comply with Rule 10b5-1 and other derivative, accelerated share repurchase and other structured transactions. In 2019, we repurchased 69.3 million common shares at an average price of \$48.01 per common share for a total of \$3.3 billion. At Dec. 31, 2019, the maximum dollar value of shares that may yet be purchased under the June 2019 program, including employee benefit plan repurchases, totaled \$1.9 billion.

Preferred stock

BNY Mellon has 100 million authorized shares of preferred stock with a par value of \$0.01 per share. The following table summarizes BNY Mellon's preferred stock issued and outstanding at Dec. 31, 2019 and Dec. 31, 2018.

Preferred stock summary <i>(a)</i>		Total shares issued and outstanding		Carrying value <i>(b)</i>	
		Dec. 31,		Dec. 31,	
		2019	2018	2019	2018
	Per annum dividend rate				
Series A	Greater of (i) three-month LIBOR plus 0.565% for the related distribution period; or (ii) 4.000%	5,001	5,001	\$ 500	\$ 500
Series C	5.2%	5,825	5,825	568	568
Series D	4.50% to but excluding June 20, 2023, then a floating rate equal to the three-month LIBOR plus 2.46%	5,000	5,000	494	494
Series E	4.95% to and including June 20, 2020, then a floating rate equal to the three-month LIBOR plus 3.42%	10,000	10,000	990	990
Series F	4.625% to and including Sept. 20, 2026, then a floating rate equal to the three-month LIBOR plus 3.131%	10,000	10,000	990	990
Total		35,826	35,826	\$ 3,542	\$ 3,542

(a) All outstanding preferred stock is noncumulative perpetual preferred stock with a liquidation preference of \$100,000 per share.

(b) The carrying value of the Series C, Series D, Series E and Series F preferred stock is recorded net of issuance costs.

Holders of both the Series A and Series C preferred stock are entitled to receive dividends on each dividend payment date (March 20, June 20, September 20 and December 20 of each year), if declared by BNY Mellon's Board of Directors. Holders of the Series D preferred stock are entitled to receive dividends, if declared by BNY Mellon's Board of Directors, on each June 20 and December 20, to but excluding June 20, 2023; and on each March 20, June 20, September 20 and December 20, from and including June 20, 2023. Holders of the Series E preferred stock are entitled to receive dividends, if declared by BNY Mellon's Board of Directors, on each June 20 and December 20, to and including June 20, 2020; and on each March 20, June 20, September 20 and December 20, from and including Sept. 20, 2020. Holders of the Series F preferred stock are entitled to receive dividends, if declared by BNY Mellon's Board of Directors, on each March 20 and September 20, commencing March 20, 2017, to and including Sept. 20, 2026; and on each March 20, June 20, September 20 and December 20, commencing Dec. 20, 2026. BNY Mellon's ability to declare or pay dividends on, or

purchase, redeem or otherwise acquire, shares of our common stock or any of our shares that rank junior to the preferred stock as to the payment of dividends and/or the distribution of any assets on any liquidation, dissolution or winding-up of BNY Mellon will be prohibited, subject to certain restrictions, in the event that we do not declare and pay in full preferred dividends for the then current dividend period of the Series A preferred stock or the last preceding dividend period of the Series C, Series D, Series E and Series F preferred stock.

All of the outstanding shares of the Series A preferred stock are owned by Mellon Capital IV, which will pass through any dividend on the Series A preferred stock to the holders of its Normal Preferred Capital Securities. All of the outstanding shares of the Series C, Series D, Series E and Series F preferred stock are held by the depositary of the depositary shares, which will pass through the applicable portion of any dividend on the Series C, Series D, Series E and Series F preferred stock to the holders of record of their respective depositary shares.

The table below presents the dividends paid on our preferred stock.

Preferred dividends paid		2019		2018		2017	
<i>(dollars in millions, except per share amounts)</i>	Depositary shares per share	Per share	Total dividend	Per share	Total dividend	Per share	Total dividend
		Series A	100 <i>(a)</i>	\$ 4,055.55	\$ 20	\$ 4,055.55	\$ 20
Series C	4,000	5,200.00	31	5,200.00	31	5,200.00	31
Series D	100	4,500.00	22	4,500.00	22	4,500.00	22
Series E	100	4,950.00	50	4,950.00	50	4,950.00	50
Series F	100	4,625.00	46	4,625.00	46	5,254.51	52
Total			\$ 169		\$ 169		\$ 175

(a) Represents Normal Preferred Capital Securities.

The preferred stock is not subject to the operation of a sinking fund and is not convertible into, or exchangeable for, shares of our common stock or any other class or series of our other securities. We may redeem the Series A or Series C preferred stock, in whole or in part, at our option. We may also, at our option, redeem the shares of the Series D preferred stock, in whole or in part, on or after the dividend payment date in June 2023, the Series E preferred stock, in whole or in part, on or after the dividend payment date in June 2020, and the Series F preferred stock, in whole or in part, on or after the dividend payment date in September 2026. The Series C, Series D, Series E or Series F preferred stock can be redeemed, in whole but not in part, at any time within 90 days following a regulatory capital treatment event. Redemption of the preferred stock is subject to the prior approval of the Federal Reserve.

Temporary equity

Temporary equity was \$143 million at Dec. 31, 2019 and \$129 million at Dec. 31, 2018. Temporary equity represents the redemption value recorded for redeemable noncontrolling interests resulting from equity-classified share-based payment arrangements that are currently redeemable or are expected to become redeemable.

Capital adequacy

Regulators establish certain levels of capital for bank holding companies and banks, including BNY Mellon and our bank subsidiaries, in accordance with established quantitative measurements. For the Parent to maintain its status as a financial holding company, our U.S. bank subsidiaries and BNY Mellon must, among other things, qualify as “well capitalized.”

As of Dec. 31, 2019 and Dec. 31, 2018, BNY Mellon and our U.S. bank subsidiaries were “well capitalized.”

The regulatory capital ratios of our consolidated and largest bank subsidiary, The Bank of New York Mellon, are shown below.

Consolidated and largest bank subsidiary regulatory capital ratios (a)	Dec. 31,	
	2019	2018
Consolidated regulatory capital ratios:		
Common Equity Tier 1 (“CET1”) ratio	11.5%	10.7%
Tier 1 capital ratio	13.7	12.8
Total capital ratio	14.4	13.6
Tier 1 leverage ratio	6.6	6.6
Supplementary leverage ratio (“SLR”) (b)	6.1	6.0
The Bank of New York Mellon regulatory capital ratios:		
CET1 ratio	15.1%	14.0%
Tier 1 capital ratio	15.1	14.3
Total capital ratio	15.2	14.7
Tier 1 leverage ratio	6.9	7.6
SLR (b)	6.4	6.8

- (a) For our CET1, Tier 1 capital and Total capital ratios, our effective capital ratios under U.S. capital rules are the lower of the ratios as calculated under the Standardized and Advanced Approaches, which for the periods noted above was the Advanced Approaches. The Tier 1 leverage ratio is based on Tier 1 capital and quarterly average total assets. For BNY Mellon to qualify as “well capitalized,” its Tier 1 capital and Total capital ratios must be at least 6% and 10%, respectively. For The Bank of New York Mellon, our largest bank subsidiary, to qualify as “well capitalized,” its CET1, Tier 1 capital, Total capital and Tier 1 leverage ratios must be at least 6.5%, 8%, 10% and 5%, respectively.
- (b) The SLR is based on Tier 1 capital and total leverage exposure, which includes certain off-balance sheet exposures. For The Bank of New York Mellon to qualify as “well capitalized,” its SLR must be at least 6%.

Failure to satisfy regulatory standards, including “well capitalized” status or capital adequacy rules more generally, could result in limitations on our activities and adversely affect our financial condition. If a bank holding company (“BHC”) such as BNY Mellon or bank such as The Bank of New York Mellon or BNY Mellon, N.A. fails to qualify as “adequately capitalized,” regulatory sanctions and limitations are imposed.

The following table presents our capital components and risk-weighted assets (“RWAs”) determined under the Standardized and Advanced Approaches, the average assets used for leverage capital purposes and leverage exposure used for SLR purposes.

Regulatory capital ratio components <i>(in millions)</i>	Dec. 31,	
	2019	2018
CET1:		
Common shareholders’ equity	\$ 37,941	\$ 37,096
Adjustments for:		
Goodwill and intangible assets <i>(a)</i>	(18,725)	(18,806)
Net pension fund assets	(272)	(320)
Equity method investments	(311)	(361)
Deferred tax assets	(46)	(42)
Other	(47)	—
Total CET1	18,540	17,567
Other Tier 1 capital:		
Preferred stock	3,542	3,542
Other	(86)	(65)
Total Tier 1 capital	\$ 21,996	\$ 21,044
Tier 2 capital:		
Subordinated debt	\$ 1,248	\$ 1,250
Allowance for credit losses	216	252
Other	(11)	(10)
Total Tier 2 capital – Standardized Approach	1,453	1,492
Excess of expected credit losses	—	65
Less: Allowance for credit losses	216	252
Total Tier 2 capital – Advanced Approaches	\$ 1,237	\$ 1,305
Total capital:		
Standardized Approach	\$ 23,449	\$ 22,536
Advanced Approaches	\$ 23,233	\$ 22,349
Risk-weighted assets:		
Standardized Approach	\$ 148,695	\$ 149,618
Advanced Approaches:		
Credit Risk	\$ 95,490	\$ 92,917
Market Risk	4,020	3,454
Operational Risk	61,388	68,300
Total Advanced Approaches	\$ 160,898	\$ 164,671
Average assets for Tier 1 leverage ratio	\$ 334,869	\$ 319,007
Total leverage exposure for SLR	\$ 362,452	\$ 347,943

(a) Reduced by deferred tax liabilities associated with intangible assets and tax deductible goodwill.

The following table presents the amount of capital by which BNY Mellon and our largest bank subsidiary, The Bank of New York Mellon, exceeded the capital thresholds determined under U.S. capital rules.

Capital above thresholds at Dec. 31, 2019		
<i>(in millions)</i>	Consolidated <i>(a)</i>	The Bank of New York Mellon <i>(b)</i>
CET1	\$ 4,864	\$ 11,045
Tier 1 capital	5,906	9,130
Total capital	3,925	6,623
Tier 1 leverage ratio	8,601	5,424
SLR	3,873	1,157

(a) Based on minimum required standards, with applicable buffers.

(b) Based on well capitalized standards.

Note 16—Other comprehensive income (loss)

Components of other comprehensive income (loss)	Year ended Dec. 31,								
	2019			2018			2017		
	Pre-tax amount	Tax (expense) benefit	After-tax amount	Pre-tax amount	Tax (expense) benefit	After-tax amount	Pre-tax amount	Tax (expense) benefit	After-tax amount
<i>(in millions)</i>									
Foreign currency translation:									
Foreign currency translation adjustments arising during the period (a)	\$ 135	\$ 16	\$ 151	\$ (157)	\$ (156)	\$ (313)	\$ 659	\$ 194	\$ 853
Total foreign currency translation	135	16	151	(157)	(156)	(313)	659	194	853
Unrealized gain (loss) on assets available-for-sale:									
Unrealized gain (loss) arising during period	680	(168)	512	(542)	126	(416)	237	(84)	153
Reclassification adjustment (b)	18	(4)	14	48	(12)	36	(3)	—	(3)
Net unrealized gain (loss) on assets available-for-sale	698	(172)	526	(494)	114	(380)	234	(84)	150
Defined benefit plans:									
Prior service cost arising during the period	(1)	—	(1)	—	—	—	—	—	—
Net (loss) gain arising during the period	(121)	34	(87)	(244)	55	(189)	454	(112)	342
Foreign exchange adjustment	—	—	—	—	—	—	1	—	1
Amortization of prior service credit, net loss and initial obligation included in net periodic benefit cost (b)	52	(18)	34	93	(24)	69	100	(32)	68
Total defined benefit plans	(70)	16	(54)	(151)	31	(120)	555	(144)	411
Unrealized gain (loss) on cash flow hedges:									
Unrealized hedge gain (loss) arising during period	16	(7)	9	(15)	4	(11)	33	(9)	24
Reclassification of net loss (gain) to net income:									
Interest rate contracts - interest expense	(7)	2	(5)	—	—	—	—	—	—
Foreign exchange (“FX”) contracts - other revenue	—	—	—	(2)	—	(2)	(8)	2	(6)
FX contracts - trading revenue	—	—	—	—	—	—	(2)	1	(1)
FX contracts - staff expense	(3)	2	(1)	4	(1)	3	(10)	2	(8)
Total reclassifications to net income	(10)	4	(6)	2	(1)	1	(20)	5	(15)
Net unrealized gain (loss) on cash flow hedges	6	(3)	3	(13)	3	(10)	13	(4)	9
Total other comprehensive income (loss)	\$ 769	\$ (143)	\$ 626	\$ (815)	\$ (8)	\$ (823)	\$ 1,461	\$ (38)	\$ 1,423

(a) Includes the impact of hedges of net investments in foreign subsidiaries. See Note 23 for additional information.

(b) The reclassification adjustment related to the unrealized gain (loss) on assets available-for-sale is recorded as net securities gains on the consolidated income statement. The amortization of prior service credit, net loss and initial obligation included in net periodic benefit cost is recorded as staff expense on the consolidated income statement.

Changes in accumulated other comprehensive income (loss) attributable to The Bank of New York Mellon Corporation shareholders

<i>(in millions)</i>	Foreign currency translation	Pensions	Other post-retirement benefits	Unrealized gain (loss) on assets available-for-sale	Unrealized gain (loss) on cash flow hedges	Total accumulated other comprehensive income (loss), net of tax
2016 ending balance	\$ (2,451)	\$ (1,306)	\$ (42)	\$ 36	\$ (2)	\$ (3,765)
Change in 2017	838	419	(8)	150	9	1,408
2017 ending balance	\$ (1,613)	\$ (887)	\$ (50)	\$ 186	\$ 7	\$ (2,357)
Adjustment for the cumulative effect of applying ASU 2017-12 for derivatives and hedging	—	—	—	(2)	—	(2)
Adjusted balance at Jan. 1, 2018	(1,613)	(887)	(50)	184	7	(2,359)
Change in 2018	(302)	(118)	(2)	(380)	(10)	(812)
2018 ending balance	\$ (1,915)	\$ (1,005)	\$ (52)	\$ (196)	\$ (3)	\$ (3,171)
Adjustment for the cumulative effect of applying ASU 2018-02 for income taxes	115	(213)	—	6	2	(90)
Adjusted balance at Jan. 1, 2019	(1,800)	(1,218)	(52)	(190)	(1)	(3,261)
Change in 2019	148	(57)	3	526	3	623
2019 ending balance	\$ (1,652)	\$ (1,275)	\$ (49)	\$ 336	\$ 2	\$ (2,638)

Note 17—Stock-based compensation

Our Long-Term Incentive Plans provide for the issuance of restricted stock, restricted stock units (“RSUs”) and other stock-based awards, including options, to employees and directors of BNY Mellon. At Dec. 31, 2019, under the Long-Term Incentive Plan approved in April 2019, we may issue 35,660,228 new stock-based awards, all of which may be issued as restricted stock or RSUs. Stock-based compensation expense related to retirement eligibility vesting totaled \$84 million in 2019, \$93 million in 2018 and \$109 million in 2017.

Restricted stock, RSUs and Performance share units

Restricted stock and RSUs are granted under our long-term incentive plans at no cost to the recipient. These awards are subject to forfeiture until certain restrictions have lapsed, including continued employment, for a specified period. The recipient of a share of restricted stock is entitled to voting rights and generally is entitled to dividends on the common stock. An RSU entitles the recipient to receive a share of common stock after the applicable restrictions lapse. The recipient generally is entitled to receive cash payments equivalent to any dividends paid on the underlying common stock during the period the RSU is outstanding but does not receive voting rights.

The fair value of restricted stock and RSUs is equal to the fair market value of our common stock on the date of grant. The expense is recognized over the vesting period, which is generally zero to four years. The total compensation expense recognized for restricted stock and RSUs was \$222 million in 2019, \$270 million in 2018 and \$273 million in 2017. The total income tax benefit recognized in the consolidated income statement related to compensation costs was \$53 million in 2019, \$65 million in 2018 and \$66 million in 2017.

BNY Mellon’s Executive Committee members were granted a target award of 576,855 performance share units (“PSUs”) in 2019, 362,798 in 2018 and 793,847 in 2017. The 2019 and 2018 awards cliff vest in 3 years with the number of shares that vest determined based on a payout table that references performance conditions related to average revenue growth and average operating margin, both as adjusted and subject to Human Resources and Compensation Committee discretion. These awards are classified as

equity and marked-to-market to earnings as a result of this discretion. The 2017 awards cliff vest in 3 years with the number of shares that vest determined based on a payout table that references changes in the interest rate environment since the grant date along with a performance condition that references operating earnings per share achieved in 2019 with the potential of a risk modifier based on the extent of growth in RWAs and subject to Human Resources and Compensation Committee discretion. These awards are liability classified as they contain an interest rate condition that is not linked to performance or market and marked-to-market to earnings as a result of the discretion.

The following table summarizes our non-vested PSU, restricted stock and RSU activity for 2019.

Non-vested PSU, restricted stock and RSU activity	Number of shares	Weighted-average fair value at grant date
Non-vested PSUs, restricted stock and RSUs at Dec. 31, 2018	14,211,712	\$ 49.43
Granted	6,179,808	51.59
Vested	(6,201,276)	43.21
Forfeited	(1,456,946)	49.74
Non-vested PSUs, restricted stock and RSUs at Dec. 31, 2019	12,733,298	\$ 50.77

As of Dec. 31, 2019, \$208 million of total unrecognized compensation costs related to non-vested PSUs, restricted stock and RSUs is expected to be recognized over a weighted-average period of 2.2 years.

The total fair value of restricted stock, RSUs and PSUs that vested was \$278 million in 2019, \$289 million in 2018 and \$260 million in 2017. The actual excess tax benefit realized for the tax deductions from shares vested totaled \$11 million in 2019, \$26 million in 2018 and \$34 million in 2017. The tax benefits were recognized in the provision for income taxes.

Subsidiary Long-Term Incentive Plans

BNY Mellon also has several subsidiary Long-Term Incentive Plans which have issued restricted subsidiary shares to certain employees. These share awards are subject to forfeiture until certain restrictions have lapsed, including continued employment for a specified period of time. The shares are generally non-voting and non-dividend paying. Once the restrictions lapse, which generally

occurs in three to five years, the shares can only be sold, at the option of the employee, to BNY Mellon at a price based generally on the fair value of the subsidiary at the time of repurchase. In certain instances BNY Mellon has an election to call the shares.

Stock options

Our Long-Term Incentive Plans provide for the issuance of stock options at fair market value at the date of grant to officers and employees of BNY

Mellon. Generally, each option granted is exercisable between one and 10 years from the date of grant. No stock options were granted in 2019, 2018 and 2017.

Compensation costs that were charged against income were less than \$1 million in 2019, 2018 and 2017. The income tax benefit recognized in the consolidated income statement related to compensation costs was less than \$1 million in 2019, 2018 and 2017.

A summary of the status of our options as of Dec. 31, 2019, and changes during the year, is presented below:

Stock option activity	Shares subject to option	Weighted-average exercise price	Weighted-average remaining contractual term (in years)
Balance at Dec. 31, 2018	6,714,283	\$ 25.67	2.0
Granted	—	—	
Exercised	(2,543,235)	25.14	
Canceled/Expired	(27,473)	21.93	
Balance at Dec. 31, 2019	4,143,575	\$ 26.03	1.4
Vested and expected to vest at Dec. 31, 2019	4,143,575	26.03	1.4
Exercisable at Dec. 31, 2019	4,143,575	26.03	1.4

Stock options outstanding at Dec. 31, 2019					
Range of exercise prices	Options outstanding			Options exercisable (a)	
	Outstanding	Weighted-average remaining contractual life (in years)	Weighted-average exercise price	Exercisable	Weighted-average exercise price
\$ 18 to 31	4,143,575	1.4	\$ 26.03	4,143,575	\$ 26.03

(a) At Dec. 31, 2018 and Dec. 31, 2017, 6,714,283 and 9,302,140 options were exercisable at a weighted-average price per common share of \$25.67 and \$27.27, respectively.

Aggregate intrinsic value of options (in millions)			
	2019	2018	2017
Outstanding at Dec. 31,	\$ 101	\$ 144	\$ 247
Exercisable at Dec. 31,	\$ 101	\$ 144	\$ 247

The total intrinsic value of options exercised was \$63 million in 2019, \$61 million in 2018 and \$159 million in 2017.

Cash received from option exercises totaled \$65 million in 2019, \$80 million in 2018 and \$431 million in 2017. The actual excess tax benefit realized for the tax deductions from options exercised totaled \$10 million in 2019, \$10 million in 2018 and \$16 million in 2017. The tax benefits were recognized in the provision for income taxes.

Note 18—Employee benefit plans

BNY Mellon has defined benefit and/or defined contribution retirement plans and other post-retirement plans providing healthcare benefits.

The defined benefit pension plans cover approximately 11,200 U.S. employees and approximately 13,100 non-U.S. employees.

BNY Mellon has one qualified and several non-qualified defined benefit pension plans in the U.S. and several pension plans overseas.

Effective June 30, 2015, the benefit accruals under the U.S. qualified and non-qualified defined benefit plans were frozen. This change resulted in no additional benefits being earned by participants in

those plans based on service or pay after June 30, 2015. These plans were previously closed to new participants effective Dec. 31, 2010, at which time a non-elective contribution was added to the Company's defined contribution plan for employees not eligible to join the pension plan. Employees previously participating in the pension plan received this non-elective contribution starting July 1, 2015.

Effective Dec. 31, 2018, the benefit accruals were frozen under our largest foreign plan, which covers certain UK employees. This change results in no additional benefits being earned by participants in that plan based on service or pay after Dec. 31, 2018. Most UK employees currently earn benefits only on a defined contribution basis. UK employees impacted by the pension plan freeze began earning benefits on a defined contribution basis on Jan. 1, 2019.

Pension and post-retirement healthcare plans

The following tables report the combined data for our domestic and foreign defined benefit pension and post-retirement healthcare plans.

<i>(dollars in millions)</i>	Pension Benefits				Healthcare Benefits			
	Domestic		Foreign		Domestic		Foreign	
	2019	2018	2019	2018	2019	2018	2019	2018
Weighted-average assumptions used to determine benefit obligations								
Discount rate	3.45%	4.45%	2.02%	2.95%	3.45%	4.45%	2.10%	3.10%
Rate of compensation increase	N/A	N/A	3.19	2.98	3.00	3.00	N/A	N/A
Cash balance interest crediting rate	4.00	4.00	N/A	N/A	N/A	N/A	N/A	N/A
Change in benefit obligation (a)								
Benefit obligation at beginning of period	\$ (4,123)	\$ (4,405)	\$ (1,104)	\$ (1,322)	\$ (149)	\$ (175)	\$ (5)	\$ (4)
Service cost	—	—	(11)	(28)	(1)	(1)	—	—
Interest cost	(178)	(169)	(32)	(32)	(6)	(7)	—	—
Amendments	—	—	(1)	—	—	—	—	—
Actuarial gain (loss)	(585)	219	(264)	173	(1)	22	(1)	(1)
Curtailments	—	—	—	11	—	—	—	—
Benefits paid	227	232	40	25	12	12	—	—
Foreign exchange adjustment	N/A	N/A	(22)	69	N/A	N/A	—	—
Benefit obligation at end of period	(4,659)	(4,123)	(1,394)	(1,104)	(145)	(149)	(6)	(5)
Change in fair value of plan assets								
Fair value at beginning of period	5,040	5,496	1,316	1,393	99	107	—	—
Actual return on plan assets	910	(257)	191	1	18	(8)	—	—
Employer contributions	15	33	30	22	12	12	—	—
Benefit payments	(227)	(232)	(40)	(25)	(12)	(12)	—	—
Foreign exchange adjustment	N/A	N/A	32	(75)	N/A	N/A	—	—
Fair value at end of period	5,738	5,040	1,529	1,316	117	99	—	—
Funded status at end of period	\$ 1,079	\$ 917	\$ 135	\$ 212	\$ (28)	\$ (50)	\$ (6)	\$ (5)
Amounts recognized in accumulated other comprehensive loss (income) consist of:								
Net loss	\$ 1,557	\$ 1,598	\$ 221	\$ 105	\$ 70	\$ 84	\$ 1	\$ —
Prior service cost (credit)	—	—	2	1	(33)	(40)	—	—
Total loss (before tax effects)	\$ 1,557	\$ 1,598	\$ 223	\$ 106	\$ 37	\$ 44	\$ 1	\$ —

(a) The benefit obligation for pension benefits is the projected benefit obligation, and for healthcare benefits, it is the accumulated benefit obligation.

A number of key assumptions and measurement date values determine pension expense. The key elements include the long-term rate of return on plan assets, the discount rate, the market-related value of plan assets and the price used to value stock in the Employee Stock Ownership Plan ("ESOP").

The discount rate for U.S. pension plans was determined after reviewing equivalent rates obtained

by discounting the pension plans' expected cash flows using various high-quality, long-term corporate bond yield curves. We also reviewed the results of several models that matched bonds to our pension cash flows. After reviewing the various indices and models, we selected a discount rate of 3.45% as of Dec. 31, 2019. The discount rates for foreign pension plans are based on high-quality corporate bond rates in countries that have an active corporate bond market. In those

Notes to Consolidated Financial Statements (continued)

countries with no active corporate bond market, discount rates are based on local government bond rates plus a credit spread.

Actuarial losses on the benefit obligation for the domestic and foreign pension plans in 2019 are

primarily attributable to decreases in discount rates. Actuarial gains on the benefit obligation for the domestic and foreign pension plans in 2018 are primarily attributable to increases in discount rates.

Net periodic benefit (credit) cost <i>(dollars in millions)</i>	Pension Benefits						Healthcare Benefits					
	Domestic			Foreign			Domestic			Foreign		
	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017
Weighted-average assumptions as of Jan. 1:												
Market-related value of plan assets	\$ 5,304	\$ 5,238	\$ 5,026	\$ 1,277	\$ 1,266	\$ 994	\$ 111	\$ 108	\$ 102	N/A	N/A	N/A
Discount rate	4.45%	3.97%	4.35%	2.95%	2.45%	2.53%	4.45%	3.97%	4.35%	3.10%	2.50%	2.60%
Expected rate of return on plan assets	6.500	6.625	6.625	3.54	4.56	4.61	6.500	6.625	6.625	N/A	N/A	N/A
Rate of compensation increase	N/A	N/A	N/A	2.98	3.02	3.60	3.00	3.00	3.00	N/A	N/A	N/A
Cash balance interest crediting rate	4.00	4.00	4.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Components of net periodic benefit (credit) cost :												
Service cost	\$ —	\$ —	\$ —	\$ 11	\$ 28	\$ 31	\$ 1	\$ 1	\$ 1	\$ —	\$ —	\$ —
Interest cost	178	169	180	32	32	33	6	7	7	—	—	—
Expected return on assets	(337)	(339)	(325)	(45)	(57)	(50)	(7)	(8)	(7)	—	—	—
Amortization of:												
Prior service cost (credit)	—	—	—	—	—	—	(7)	(9)	(10)	—	—	—
Net actuarial loss	53	68	67	2	22	35	4	7	6	—	—	—
Settlement loss	—	5	2	—	—	—	—	—	—	—	—	—
Net periodic benefit (credit) cost	\$ (106)	\$ (97)	\$ (76)	\$ —	\$ 25	\$ 49	\$ (3)	\$ (2)	\$ (3)	\$ —	\$ —	\$ —

Changes in other comprehensive loss (income) in 2019 <i>(in millions)</i>	Pension Benefits		Healthcare Benefits	
	Domestic	Foreign	Domestic	Foreign
Net loss (gain) arising during period	\$ 12	\$ 118	\$ (10)	\$ 1
Recognition of prior years' net (loss)	(53)	(2)	(4)	—
Prior service cost arising during the period	—	1	—	—
Recognition of prior years' service credit	—	—	7	—
Total recognized in other comprehensive (income) loss (before tax effects)	\$ (41)	\$ 117	\$ (7)	\$ 1

<i>(in millions)</i>	Domestic		Foreign	
	2019	2018	2019	2018
Pension benefits:				
Prepaid benefit cost	\$ 1,249	\$ 1,077	\$ 222	\$ 280
Accrued benefit cost	(170)	(160)	(87)	(68)
Total pension benefits	\$ 1,079	\$ 917	\$ 135	\$ 212
Healthcare benefits:				
Accrued benefit cost	\$ (28)	\$ (50)	\$ (6)	\$ (5)
Total healthcare benefits	\$ (28)	\$ (50)	\$ (6)	\$ (5)

The accumulated benefit obligation for all defined benefit plans was \$6.0 billion at Dec. 31, 2019 and \$5.2 billion at Dec. 31, 2018.

Plans with obligations in excess of plan assets (in millions)	Pension Benefits				Healthcare Benefits			
	Domestic		Foreign		Domestic		Foreign	
	2019	2018	2019	2018	2019	2018	2019	2018
Projected benefit obligation	\$ 170	\$ 160	\$ 384	\$ 245	N/A	N/A	N/A	N/A
Fair value of plan assets	—	—	297	177	N/A	N/A	N/A	N/A
Accumulated benefit obligation	170	160	164	67	85	80	6	5
Fair value of plan assets	—	—	114	27	—	—	—	—

Assumed healthcare cost trend

The assumed healthcare cost trend rate used in determining domestic benefit expense for 2020 is 6.40%, decreasing to 4.75% in 2024 for pre-Medicare costs and 5.35% decreasing to 4.75% in 2024 for Medicare costs. This projection is based on various economic models that forecast a decreasing growth rate of healthcare expenses over time. The underlying assumption is that healthcare expense growth cannot outpace gross national product growth indefinitely, and over time a lower equilibrium growth rate will be achieved. In addition to the assumed health care cost trend rate, a separate adjustment to projected 2021 costs is assumed due to the repeal of the Health Insurance Tax.

The following benefit payments for the pension and healthcare plans, which reflect expected future service as appropriate, are expected to be paid over the next 10 years:

Expected benefit payments (in millions)		Domestic	Foreign
Pension benefits:			
Year	2020	\$ 254	\$ 20
	2021	265	20
	2022	260	21
	2023	266	24
	2024	275	24
	2025-2029	1,333	144
Total pension benefits		\$ 2,653	\$ 253
Healthcare benefits:			
Year	2020	\$ 12	\$ —
	2021	10	—
	2022	10	—
	2023	10	—
	2024	9	—
	2025-2029	42	1
Total healthcare benefits		\$ 93	\$ 1

Plan contributions

We expect to make cash contributions to fund our defined benefit pension plans in 2020 of \$15 million for the domestic plans and \$11 million for the foreign plans.

We expect to make cash contributions to fund our post-retirement healthcare plans in 2020 of \$12 million for the domestic plans and less than \$1 million for the foreign plans.

Investment strategy and asset allocation

We are responsible for the administration of various employee pension and healthcare post-retirement benefits plans, both domestically and internationally. The domestic plans are administered by BNY Mellon's Benefits Administration Committee, a named fiduciary. Subject to the following, at all relevant times, BNY Mellon's Benefits Investment Committee, another named fiduciary to the domestic plans, is responsible for the investment of plan assets. The Benefits Investment Committee's responsibilities include the investment of all domestic defined benefit plan assets, as well as the determination of investment options offered to participants in all domestic defined contribution plans. The Benefits Investment Committee conducts periodic reviews of investment performance, asset allocation and investment manager suitability. In addition, the Benefits Investment Committee has oversight of the Regional Governance Committees for the foreign defined benefit plans.

Our investment objective for U.S. and foreign plans is to maximize total return while maintaining a broadly diversified portfolio for the primary purpose of satisfying obligations for future benefit payments. Our plans are primarily invested in fixed income and equity securities. In general, for the domestic plan's

portfolio, fixed income securities can range from 40% to 80% of plan assets, equity securities and alternative investments can range from 20% to 60% of plan assets and cash equivalents can be held in amounts ranging from 0% to 10% of plan assets. Actual asset allocation within the approved ranges varies from time to time based on economic conditions (both current and forecast), the timing of transitional reallocations and the advice of professional advisors.

Our pension assets were invested as follows:

Asset allocations	Domestic		Foreign	
	2019	2018	2019	2018
Fixed income	56%	45%	80%	36%
Equities	42	52	8	48
Alternative investments	2	2	10	9
Private equities	—	1	—	—
Real estate	—	—	—	4
Cash	—	—	2	3
Total pension benefits	100%	100%	100%	100%

We held no The Bank of New York Mellon Corporation stock in our pension plans at Dec. 31, 2019 and Dec. 31, 2018. Assets of the U.S. post-retirement healthcare plan are invested in an insurance contract.

Fair value measurement of plan assets

In accordance with ASC 715, *Compensation - Retirement Benefits*, we have established a three-level hierarchy for fair value measurements of its pension plan assets based upon the transparency of inputs to the valuation of an asset as of the measurement date. The valuation hierarchy is consistent with guidance in ASC 820, *Fair Value Measurement*, which is detailed in Note 20.

The following is a description of the valuation methodologies used for assets measured at fair value, as well as the general classification of such assets pursuant to the valuation hierarchy.

Cash and currency

This category consists primarily of foreign currency balances and is included in Level 1 of the valuation hierarchy. Foreign currency is translated monthly based on current exchange rates.

Common and preferred stock and mutual funds

These investments include equities and mutual funds and are valued at the closing price reported in the active market in which the individual securities are traded, if available. Common and preferred stock and mutual funds are included in Level 1 of the valuation hierarchy.

Derivative instruments

Our derivative positions are valued using internally developed models that use as their basis readily observable market parameters, and we classify them in Level 2 of the valuation hierarchy. Such derivative financial instruments include equity puts and calls.

Collective trust funds

Collective trust funds include commingled and U.S. equity funds that have no readily available market quotations. The fair value of the funds is based on the securities in the portfolio, which typically are the amount that the fund might reasonably expect to receive for the securities upon a sale. These funds are valued using observable inputs on either a daily or monthly basis. Collective trust funds are included in Level 2 of the valuation hierarchy.

Fixed-income investments

Fixed-income investments include U.S. Treasury securities, U.S. government agencies, sovereign government obligations, U.S. corporate bonds and foreign corporate debt funds. U.S. Treasury securities are valued at the closing price reported in the active market in which the individual security is traded and included as Level 1 of the valuation hierarchy. U.S. government agencies, sovereign government obligations, U.S. corporate bonds and foreign corporate debt funds are valued based on quoted prices for comparable securities with similar yields and credit ratings. When quoted prices are not available for identical or similar bonds, the bonds are valued using discounted cash flows that maximize observable inputs, such as current yields of similar instruments, but includes adjustments for certain risks that may not be observable, such as credit and liquidity risks. U.S. government agencies, sovereign government obligations, U.S. corporate bonds and foreign corporate debt funds are primarily included in Level 2 of the valuation hierarchy.

Other assets measured at NAV

Other assets measured at NAV include funds of funds and venture capital and partnership interests, property funds and other funds. There are no readily available market quotations for these funds. The fair value of the funds of funds is based on NAVs of the funds in the portfolio, which reflects the value of the underlying securities. The fair value of the underlying securities is typically the amount that the fund might reasonably expect to receive upon selling those hard to value or illiquid securities within the portfolios. These funds are either valued on a daily or monthly basis. The fair value of the venture capital and partnership interests is based on the pension plan's ownership percentage of the fair value of the underlying funds as provided by the fund managers. These funds are typically valued on a quarterly basis. The pension plan's venture capital and partnership interests are valued at NAV as a practical expedient for fair value.

The following tables present the fair value of each major category of plan assets as of Dec. 31, 2019 and Dec. 31, 2018, by captions and by ASC 820, *Fair Value Measurement*, valuation hierarchy.

Plan assets measured at fair value on a recurring basis— domestic plans at Dec. 31, 2019				
<i>(in millions)</i>	Level 1	Level 2	Level 3	Total fair value
Common and preferred stock:				
U.S. equity	\$ 1,638	\$ —	\$ —	\$ 1,638
Non-U.S. equity	195	—	—	195
Derivatives	—	(130)	—	(130)
Collective trust funds:				
Commingled	—	1,982	—	1,982
U.S. equity	—	688	—	688
Fixed income:				
U.S. Treasury securities	362	—	—	362
U.S. government agencies	—	7	—	7
Sovereign government obligations	3	—	—	3
U.S. corporate bonds	—	814	—	814
Other	—	15	—	15
Mutual funds	3	—	—	3
Total domestic plan assets in the fair value hierarchy	\$ 2,201	\$ 3,376	\$ —	\$ 5,577
Other assets measured at NAV:				
Funds of funds				134
Venture capital and partnership interests				27
Total domestic plan assets, at fair value				\$ 5,738

Plan assets measured at fair value on a recurring basis— foreign plans at Dec. 31, 2019				
<i>(in millions)</i>	Level 1	Level 2	Level 3	Total fair value
Equity funds	\$ —	\$ 129	\$ —	\$ 129
Sovereign/government obligation funds	—	130	—	130
Corporate debt funds	—	1,091	—	1,091
Cash and currency	20	—	—	20
Total foreign plan assets in the fair value hierarchy	\$ 20	\$ 1,350	\$ —	\$ 1,370
Other assets measured at NAV				159
Total foreign plan assets, at fair value				\$ 1,529

Plan assets measured at fair value on a recurring basis— domestic plans at Dec. 31, 2018				
<i>(in millions)</i>	Level 1	Level 2	Level 3	Total fair value
Common and preferred stock:				
U.S. equity	\$ 1,514	\$ —	\$ —	\$ 1,514
Non-U.S. equity	160	—	—	160
Collective trust funds:				
Commingled	—	435	—	435
U.S. equity	—	934	—	934
Fixed income:				
U.S. Treasury securities	630	—	—	630
U.S. government agencies	—	44	—	44
Sovereign government obligations	3	5	—	8
U.S. corporate bonds	—	972	—	972
Other	—	69	—	69
Mutual funds	114	—	—	114
Total domestic plan assets in the fair value hierarchy	\$ 2,421	\$ 2,459	\$ —	\$ 4,880
Other assets measured at NAV:				
Funds of funds				130
Venture capital and partnership interests				30
Total domestic plan assets, at fair value				\$ 5,040

Plan assets measured at fair value on a recurring basis— foreign plans at Dec. 31, 2018				
<i>(in millions)</i>	Level 1	Level 2	Level 3	Total fair value
Equity funds	\$ —	\$ 194	\$ —	\$ 194
Sovereign/government obligation funds	—	126	—	126
Corporate debt funds	—	418	—	418
Cash and currency	356	—	—	356
Total foreign plan assets in the fair value hierarchy	\$ 356	\$ 738	\$ —	\$ 1,094
Other assets measured at NAV				222
Total foreign plan assets, at fair value				\$ 1,316

Funds of funds and venture capital and partnership interests valued using NAV per share

Certain pension and post-retirement plan assets are invested in funds of funds, venture capital and partnership interests, property funds and other contracts valued using NAV. The funds of funds investments are redeemable at NAV under agreements with the funds of funds managers.

Assets valued using NAV at Dec. 31, 2019				
<i>(dollars in millions)</i>	Fair value	Unfunded commitments	Redemption frequency	Redemption notice period
Funds of funds (a)	\$ 136	\$ —	Monthly	30-45 days
Venture capital and partnership interests (b)	158	—	N/A	N/A
Property funds (c)	4	—	Monthly	0-90 days
Other contracts (d)	22	—	N/A	N/A
Total	\$ 320	\$ —		

Assets valued using NAV at Dec. 31, 2018				
<i>(dollars in millions)</i>	Fair value	Unfunded commitments	Redemption frequency	Redemption notice period
Funds of funds (a)	\$ 147	\$ —	Monthly	30-45 days
Venture capital and partnership interests (b)	148	—	N/A	N/A
Property funds (c)	52	—	Monthly	0-90 days
Corporate debt	19	—	N/A	N/A
Other contracts (d)	16	—	N/A	N/A
Total	\$ 382	\$ —		

- (a) Funds of funds include multi-strategy hedge funds that utilize investment strategies that invest over both long-term investment and short-term investment horizons.
- (b) Venture capital and partnership interests do not have redemption rights. Distributions from such funds will be received as the underlying investments are liquidated.
- (c) Property funds include funds invested in regional real estate vehicles that hold direct interest in real estate properties.
- (d) Other contracts include assets invested in pooled accounts at insurance companies that are privately valued by the asset manager.

Defined contribution plans

We sponsor defined contribution plans in the U.S. and in certain non-U.S. locations, all of which are administered in accordance with local laws. The most significant defined contribution plan is The Bank of New York Mellon Corporation 401(k) Savings Plan sponsored by the Company in the U.S. and covers substantially all U.S. employees.

Under The Bank of New York Mellon Corporation 401(k) Savings Plan, the Company matched 100% of the first 4% of an employee's eligible base pay plus 50% of the next 2% of eligible pay contributed by the participant for a maximum matching contribution of 5% for 2019, 2018 and 2017, subject to statutory limits. In addition, annual non-elective contribution equal to 2% of eligible base pay were also made during 2017-2019.

At Dec. 31, 2019 and Dec. 31, 2018, The Bank of New York Mellon Corporation 401(k) Savings Plan owned 11.5 million and 12.7 million shares of our common stock, respectively. The fair value of total assets was \$7.4 billion at Dec. 31, 2019 and \$6.2 billion at Dec. 31, 2018. We recorded expenses of \$244 million in 2019, \$244 million in 2018 and \$232 million in 2017 primarily for contributions to our defined contribution plans.

We also have an ESOP covering certain domestic full-time employees hired on or before July 1, 2008. The ESOP works in conjunction with the defined benefit pension plan. Employees are entitled to the higher of their benefit under the ESOP or such defined benefit pension plan at retirement. Benefits payable under the defined benefit pension plan are offset by the equivalent value of benefits earned under the ESOP.

At Dec. 31, 2019 and Dec. 31, 2018, the ESOP owned 4.6 million and 5.0 million shares of our common stock, respectively. The fair value of total ESOP assets was \$235 million at Dec. 31, 2019 and \$236 million at Dec. 31, 2018. The Company is not permitted to make contributions to the ESOP.

The Benefits Investment Committee appointed Fiduciary Counselors, Inc. to serve as the independent fiduciary to (i) make all fiduciary decisions related to the continued prudence of offering the common stock of BNY Mellon or its affiliates as an investment option under the plans, other than plan sponsor decisions, and (ii) select and monitor any actively or passively managed investments of BNY Mellon or its affiliates to be offered to participants as investment options under the plans, excluding self-directed accounts.

Note 19—Company financial information (Parent Corporation)

In connection with our single point of entry resolution strategy, we have established an intermediate holding company (“IHC”) to facilitate the provision of capital and liquidity resources to certain key subsidiaries in the event of material financial distress or failure. In 2017, we entered into a binding support agreement with those key subsidiaries and other related entities that requires the IHC to provide that support. The support agreement requires the Parent to transfer cash and other liquid financial assets to the IHC, subject to certain amounts retained by the Parent to meet its near-term cash needs. The Parent’s and the IHC’s obligations under the support agreement are secured. The IHC has provided the Parent with a committed line of credit that allows the Parent to draw funds necessary to service near-term obligations. As a result, during business-as-usual circumstances, the Parent is expected to continue to have access to the funds necessary to pay dividends, repurchase common stock, service its debt and satisfy its other obligations. If our projected liquidity resources deteriorate so severely that resolution of the Parent becomes imminent, the committed line of credit the IHC provided to the Parent will automatically terminate, with all amounts outstanding becoming due and payable, and the support agreement will require the Parent to transfer most of its remaining assets (other than stock in subsidiaries and a cash reserve to fund bankruptcy expenses) to the IHC. As a result, during a period of severe financial stress, the Parent could become unable to meet its debt and payment obligations (including with respect to its securities), causing the Parent to seek protection under bankruptcy laws earlier than it otherwise would have.

Our bank subsidiaries are subject to dividend limitations under the Federal Reserve Act, as well as national and state banking laws. Under these statutes, prior regulatory consent is required for dividends in any year that would exceed the bank’s net profits for such year combined with retained net profits for the prior two years. Additionally, such bank subsidiaries may not declare dividends in excess of net profits on hand, as defined, after deducting the amount by which the principal amount of all loans, on which interest is past due for a period of six months or more, exceeds the allowance for credit losses.

The payment of dividends also is limited by minimum capital requirements imposed on banks. As of Dec. 31, 2019, our bank subsidiaries exceeded these minimum requirements.

Subsequent to Dec. 31, 2019, our U.S. bank subsidiaries could declare dividends to the Parent of approximately \$1.1 billion, without the need for a regulatory waiver. In addition, at Dec. 31, 2019, non-bank subsidiaries of the Parent had liquid assets of approximately \$1.8 billion.

The bank subsidiaries declared dividends of \$3.2 billion in 2019, \$3.8 billion in 2018 and \$1.3 billion in 2017. The Federal Reserve and the Office of the Comptroller of the Currency have issued additional guidelines that require BHCs and national banks to continually evaluate the level of cash dividends in relation to their respective operating income, capital needs, asset quality and overall financial condition.

The Federal Reserve policy with respect to the payment of cash dividends by BHCs provides that, as a matter of prudent banking, a BHC should not maintain a rate of cash dividends unless its net income available to common shareholders has been sufficient to fully fund the dividends, and the prospective rate of earnings retention appears to be consistent with the holding company’s capital needs, asset quality and overall financial condition. The Federal Reserve can also prohibit a dividend if payment would constitute an unsafe or unsound banking practice. Any increase in BNY Mellon’s ongoing quarterly dividends would require approval from the Federal Reserve.

BNY Mellon and other affected BHCs may pay dividends, repurchase stock, and make other capital distributions only in accordance with a capital plan that has been reviewed by the Federal Reserve and as to which the Federal Reserve has not objected. The Federal Reserve may object to a capital plan if the plan does not show that the covered BHC will meet, for each quarter throughout the nine-quarter planning horizon covered by the capital plan, all minimum regulatory capital ratios under applicable capital rules as in effect for that quarter on a *pro forma* basis under the base case and stressed scenarios (including a severely adverse scenario provided by the Federal Reserve). The capital plan rules also stipulate that a covered BHC may not make a capital distribution unless after giving effect to the distribution it will meet all minimum regulatory capital ratios. As part

of this process, BNY Mellon also provides the Federal Reserve with estimates of the composition and levels of regulatory capital, RWAs and other measures under an identified scenario.

In June 2019, in connection with the Federal Reserve's non-objection to our 2019 capital plan, we announced a share repurchase plan providing for the repurchase of up to \$3.94 billion of common stock starting in the third quarter of 2019 and continuing through the second quarter of 2020. This new share repurchase plan replaces all previously authorized share repurchase plans.

The Federal Reserve Act limits, and requires collateral for, extensions of credit by our insured subsidiary banks to BNY Mellon and certain of its non-bank affiliates. Also, there are restrictions on the amounts of investments by such banks in stock and other securities of BNY Mellon and such affiliates, and restrictions on the acceptance of their securities as collateral for loans by such banks. Extensions of credit by the banks to each of our affiliates are limited to 10% of such bank's regulatory capital, and in the aggregate for BNY Mellon and all such affiliates to 20%, and collateral must be between 100% and 130% of the amount of the credit, depending on the type of collateral.

Our insured subsidiary banks are required to maintain reserve balances with Federal Reserve Banks under the Federal Reserve Act and Regulation D. Required balances averaged \$6.8 billion and \$6.1 billion for the years 2019 and 2018, respectively.

In the event of impairment of the capital stock of one of the Parent's national banks or The Bank of New

York Mellon, the Parent, as the banks' stockholder, could be required to pay such deficiency.

The Parent guarantees the debt issued by Mellon Funding Corporation, a wholly owned financing subsidiary of the Company. The Parent also guarantees committed and uncommitted lines of credit of Pershing LLC and Pershing Limited subsidiaries. The Parent guarantees described above are full and unconditional and contain the standard provisions relating to parent guarantees of subsidiary debt. Additionally, the Parent guarantees or indemnifies obligations of its consolidated subsidiaries as needed. Generally, there are no stated notional amounts included in these indemnifications and the contingencies triggering the obligation for indemnification are not expected to occur. As a result, we are unable to develop an estimate of the maximum payout under these indemnifications. However, we believe the possibility is remote that we will have to make any material payment under these guarantees and indemnifications.

The condensed financial statements of the Parent include the accounts of the Parent; Mellon Funding Corporation and MIPA, LLC, a single-member limited liability company, created to hold and administer corporate-owned life insurance. MIPA, LLC was dissolved in 2019 via a liquidating dividend of its assets to the Parent.

Financial data for the Parent, the financing subsidiary and the single-member limited liability company are combined for financial reporting purposes because of the limited function of these entities and the unconditional guarantee by BNY Mellon of their obligations.

The Parent's condensed financial statements are as follows:

Condensed Income Statement—The Bank of New York Mellon Corporation (Parent Corporation)

<i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Dividends from bank subsidiaries	\$ 3,209	\$ 3,874	\$ 1,405
Dividends from nonbank subsidiaries	2,075	1,869	382
Interest revenue from bank subsidiaries	4	13	25
Interest revenue from nonbank subsidiaries	153	200	171
(Loss) gain on securities held for sale	(11)	1	—
Other revenue	39	36	67
Total revenue	5,469	5,993	2,050
Interest expense (including, \$64, \$59, \$73, to subsidiaries, respectively)	941	658	663
Other expense	197	439	254
Total expense	1,138	1,097	917
Income before income taxes and equity in undistributed net income of subsidiaries	4,331	4,896	1,133
(Benefit) for income taxes	(208)	(165)	(526)
Equity in undistributed net income:			
Bank subsidiaries	(139)	(508)	1,524
Nonbank subsidiaries	41	(287)	907
Net income	4,441	4,266	4,090
Preferred stock dividends	(169)	(169)	(175)
Net income applicable to common shareholders of The Bank of New York Mellon Corporation	\$ 4,272	\$ 4,097	\$ 3,915

Condensed Balance Sheet—The Bank of New York Mellon Corporation (Parent Corporation)

<i>(in millions)</i>	Dec. 31,	
	2019	2018
Assets:		
Cash and due from banks	\$ 345	\$ 909
Securities	8	27
Investment in and advances to subsidiaries and associated companies:		
Banks	32,511	31,285
Other	36,948	37,986
Subtotal	69,459	69,271
Corporate-owned life insurance	773	761
Other assets	319	740
Total assets	\$ 70,904	\$ 71,708
Liabilities:		
Deferred compensation	\$ 455	\$ 445
Affiliate borrowings	1,500	1,616
Other liabilities	1,631	1,246
Long-term debt	25,835	27,763
Total liabilities	29,421	31,070
Shareholders' equity	41,483	40,638
Total liabilities and shareholders' equity	\$ 70,904	\$ 71,708

Condensed Statement of Cash Flows—The Bank of New York Mellon Corporation (Parent Corporation)

<i>(in millions)</i>	Year ended Dec. 31,		
	2019	2018	2017
Operating activities:			
Net income	\$ 4,441	\$ 4,266	\$ 4,090
Adjustments to reconcile net income to net cash provided by operating activities:			
Equity in undistributed net loss (income) of subsidiaries	98	795	(2,431)
Change in accrued interest receivable	(12)	27	(6)
Change in accrued interest payable	(17)	29	42
Change in taxes payable (a)	331	224	(600)
Other, net	(107)	(257)	38
Net cash provided by operating activities	4,734	5,084	1,133
Investing activities:			
Purchases of securities	—	—	(991)
Proceeds from sales of securities	—	13	2,729
Change in loans	—	—	7
Acquisitions of, investments in, and advances to subsidiaries (b)	1,495	(53)	(7,208)
Other, net	—	1	—
Net cash provided by (used for) investing activities	1,495	(39)	(5,463)
Financing activities:			
Proceeds from issuance of long-term debt	1,745	4,144	4,738
Repayments of long-term debt	(4,250)	(3,650)	(997)
Change in advances from subsidiaries	242	(1,561)	(3,930)
Issuance of common stock	86	120	465
Treasury stock acquired	(3,327)	(3,269)	(2,686)
Cash dividends paid	(1,289)	(1,221)	(1,076)
Net cash (used for) financing activities	(6,793)	(5,437)	(3,486)
Change in cash and due from banks	(564)	(392)	(7,816)
Cash and due from banks at beginning of year	909	1,301	9,117
Cash and due from banks at end of year	\$ 345	\$ 909	\$ 1,301
Supplemental disclosures			
Interest paid	\$ 958	\$ 629	\$ 705
Income taxes paid	2	12	61
Income taxes refunded	—	7	15

- (a) Includes payments received from subsidiaries for taxes of \$823 million in 2019, \$837 million in 2018 and \$189 million in 2017.
- (b) Includes \$2,139 million of cash outflows, net of \$3,634 million of cash inflows in 2019, \$2,807 million of cash outflows, net of \$2,754 million of cash inflows in 2018 and \$10,296 million of cash outflows, net of \$3,088 million of cash inflows in 2017.

Note 20—Fair value measurement

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. A three-level hierarchy for fair value measurements is utilized based upon the transparency of inputs to the valuation of an asset or liability as of the measurement date. BNY Mellon's own creditworthiness is considered when valuing liabilities.

Fair value focuses on exit price in an orderly transaction (that is, not a forced liquidation or distressed sale) between market participants at the measurement date under current market conditions. If there has been a significant decrease in the volume and level of activity for the asset or liability, a change in valuation technique or the use of multiple valuation techniques may be appropriate. In such instances, determining the price at which willing market participants would transact at the measurement date under current market conditions depends on the facts and circumstances and requires the use of significant judgment. The objective is to determine from weighted indicators of fair value a reasonable point within the range that is most representative of fair value under current market conditions.

Determination of fair value

We have established processes for determining fair values. Fair value is based upon quoted market prices in active markets, where available. For financial instruments where quotes from recent exchange transactions are not available, we determine fair value based on discounted cash flow analysis, comparison to similar instruments and the use of financial models. Discounted cash flow analysis is dependent upon estimated future cash flows and the level of interest rates. Model-based pricing uses inputs of observable prices, where available, for interest rates, foreign exchange rates, option volatilities and other factors. Models are benchmarked and validated by an independent internal risk management function. Our valuation process takes into consideration factors such as counterparty credit quality, liquidity, concentration concerns and observability of model parameters. Valuation adjustments may be made to record financial instruments at fair value.

Most derivative contracts are valued using models which are calibrated to observable market data and employ standard market pricing theory for their valuations. Valuation models incorporate counterparty credit risk by discounting each trade's expected exposures to the counterparty using the counterparty's credit spreads, as implied by the credit default swap market. We also adjust expected liabilities to the counterparty using BNY Mellon's own credit spreads, as implied by the credit default swap market. Accordingly, the valuation of our derivative positions is sensitive to the current changes in our own credit spreads as well as those of our counterparties.

In certain cases, recent prices may not be observable for instruments that trade in inactive or less active markets. Upon evaluating the uncertainty in valuing financial instruments subject to liquidity issues, we make an adjustment to their value. The determination of the liquidity adjustment includes the availability of external quotes, the time since the latest available quote and the price volatility of the instrument.

Certain parameters in some financial models are not directly observable and, therefore, are based on management's estimates and judgments. These financial instruments are normally traded less actively. We apply valuation adjustments to mitigate the possibility of error and revision in the model based estimate value. Examples include products where parameters such as correlation and recovery rates are unobservable.

The methods described above for instruments that trade in inactive or less active markets may produce a current fair value calculation that may not be indicative of net realizable value or reflective of future fair values. We believe our methods of determining fair value are appropriate and consistent with other market participants. However, the use of different methodologies or different assumptions to value certain financial instruments could result in a different estimate of fair value.

Valuation hierarchy

A three-level valuation hierarchy is used for disclosure of fair value measurements based upon the transparency of inputs to the valuation of an asset or liability as of the measurement date. The three levels are described below.

Level 1: Inputs to the valuation methodology are quoted prices (unadjusted) for identical assets or liabilities in active markets. Level 1 assets and liabilities include certain debt and equity securities, derivative financial instruments actively traded on exchanges and highly liquid government bonds.

Level 2: Observable inputs other than Level 1 prices, for example, quoted prices for similar assets and liabilities in active markets, quoted prices for identical or similar assets or liabilities in markets that are not active, and inputs that are observable or can be corroborated, either directly or indirectly, for substantially the full term of the financial instrument. Level 2 assets and liabilities include debt instruments that are traded less frequently than exchange-traded securities and derivative financial instruments whose model inputs are observable in the market or can be corroborated by market-observable data. Examples in this category are MBS, corporate debt securities and over-the-counter (“OTC”) derivative contracts.

Level 3: Inputs to the valuation methodology are unobservable and significant to the fair value measurement.

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

Valuation methodology

Following is a description of the valuation methodologies used for instruments measured at fair value, as well as the general classification of such instruments pursuant to the valuation hierarchy.

Securities

We determine fair value primarily based on pricing sources with reasonable levels of price transparency. Where quoted prices are available in an active market, we classify the securities within Level 1 of the valuation hierarchy. Securities include both long and short positions. Level 1 securities include U.S. Treasury and certain sovereign debt securities that are actively traded in highly liquid OTC markets, money market funds and exchange-traded equities.

If quoted market prices are not available, fair values are primarily determined using pricing models using observable trade data, market data, quoted prices of securities with similar characteristics or discounted

cash flows. Examples of such instruments, which would generally be classified within Level 2 of the valuation hierarchy, include MBS, state and political subdivisions, certain sovereign debt, corporate bonds and foreign covered bonds.

Specifically, the pricing sources obtain recent transactions for similar types of securities (e.g., vintage, position in the securitization structure) and ascertain variables such as discount rate and speed of prepayment for the types of transaction and apply such variables to similar types of bonds. We view these as observable transactions in the current marketplace and classify such securities as Level 2. Pricing sources discontinue pricing any specific security whenever they determine there is insufficient observable data to provide a good faith opinion on price.

In certain cases where there is limited activity or less transparency around inputs to the valuation, we classify those securities in Level 3 of the valuation hierarchy. As of Dec. 31, 2019 we have no instruments included in Level 3 of the valuation hierarchy.

At Dec. 31, 2019, approximately 99% of our securities were valued by pricing sources with reasonable levels of price transparency. The remaining securities were generally valued using observable inputs. Additional disclosures of securities are provided in Note 4.

Derivative financial instruments

We classify exchange-traded derivative financial instruments valued using quoted prices in Level 1 of the valuation hierarchy. Examples include exchange-traded equity and foreign exchange options. Since few other classes of derivative contracts are listed on an exchange, most of our derivative positions are valued using models that use as their basis readily observable market parameters, and we classify them in Level 2 of the valuation hierarchy. Such derivative financial instruments include swaps and options, foreign exchange spot and forward contracts and credit default swaps.

Derivatives valued using models with significant unobservable market parameters in markets that lack two-way flow are classified in Level 3 of the valuation hierarchy. Examples may include long-dated swaps and options, where parameters may be

unobservable for longer maturities; and certain highly structured products, where correlation risk is unobservable. As of Dec. 31, 2019 we have no Level 3 derivatives. Additional disclosures of derivative instruments are provided in Note 23.

Seed capital

In our Investment Management business, we make seed capital investments in certain funds we manage. Seed capital is generally included in other assets on the consolidated balance sheet. When applicable, we value seed capital based on the published NAV of the fund.

For other types of investments in funds, we consider all of the rights and obligations inherent in our ownership interest, including the reported NAV as well as other factors that affect the fair value of our interest in the fund.

Interests in securitizations

For the interests in securitizations that are classified in trading assets – equity instruments and long-term debt, we use discounted cash flow models, which generally include assumptions of projected finance charges related to the securitized assets, estimated net

credit losses, prepayment assumptions and estimates of payments to third-party investors. When available, we compare our fair value estimates and assumptions to market activity and to the actual results of the securitized portfolio.

Other assets measured at NAV

We hold private equity investments, specifically SBICs, which are compliant with the Volcker Rule. There are no readily available market quotations for these investment partnerships. The fair value of the SBICs is based on our ownership percentage of the fair value of the underlying investments as provided by the partnership managers. These investments are typically valued on a quarterly basis. Our SBIC private equity investments are valued at NAV as a practical expedient for fair value.

The following tables present the financial instruments carried at fair value at Dec. 31, 2019 and Dec. 31, 2018, by caption on the consolidated balance sheet and by the three-level valuation hierarchy. We have included credit ratings information in certain of the tables because the information indicates the degree of credit risk to which we are exposed, and significant changes in ratings classifications could result in increased risk for us.

Notes to Consolidated Financial Statements (continued)

Assets measured at fair value on a recurring basis at Dec. 31, 2019 <i>(dollars in millions)</i>	Level 1	Level 2	Level 3	Netting (a)	Total carrying value
Available-for-sale securities:					
Agency RMBS	\$ —	\$ 27,043	\$ —	\$ —	\$ 27,043
U.S. Treasury	15,431	—	—	—	15,431
Sovereign debt/sovereign guaranteed	7,784	4,862	—	—	12,646
Agency commercial MBS	—	9,417	—	—	9,417
Foreign covered bonds	—	4,197	—	—	4,197
CLOs	—	4,063	—	—	4,063
Supranational	—	3,709	—	—	3,709
Foreign government agencies	—	2,643	—	—	2,643
Non-agency commercial MBS	—	2,178	—	—	2,178
Other ABS	—	2,143	—	—	2,143
U.S. government agencies	—	1,949	—	—	1,949
Non-agency RMBS (b)	—	1,233	—	—	1,233
State and political subdivisions	—	1,044	—	—	1,044
Corporate bonds	—	853	—	—	853
Other debt securities	—	1	—	—	1
Total available-for-sale securities	23,215	65,335	—	—	88,550
Trading assets:					
Debt instruments	1,568	4,243	—	—	5,811
Equity instruments (c)	4,539	—	—	—	4,539
Derivative assets not designated as hedging:					
Interest rate	4	3,686	—	(1,792)	1,898
Foreign exchange	—	5,331	—	(4,021)	1,310
Equity and other contracts	—	19	—	(6)	13
Total derivative assets not designated as hedging	4	9,036	—	(5,819)	3,221
Total trading assets	6,111	13,279	—	(5,819)	13,571
Other assets:					
Derivative assets designated as hedging:					
Foreign exchange	—	21	—	—	21
Total derivative assets designated as hedging	—	21	—	—	21
Other assets (d)	38	179	—	—	217
Assets measured at NAV (d)					181
Subtotal assets of operations at fair value	29,364	78,814	—	(5,819)	102,540
Percentage of assets of operations prior to netting	27%	73%	—%	—	
Assets of consolidated investment management funds	212	33	—	—	245
Total assets	\$ 29,576	\$ 78,847	\$ —	\$ (5,819)	\$ 102,785
Percentage of total assets prior to netting	27%	73%	—%	—	

Notes to Consolidated Financial Statements (continued)

Liabilities measured at fair value on a recurring basis at Dec. 31, 2019 <i>(dollars in millions)</i>	Level 1	Level 2	Level 3	Netting (a)	Total carrying value
Trading liabilities:					
Debt instruments	\$ 1,477	\$ 107	\$ —	\$ —	\$ 1,584
Equity instruments	73	—	—	—	73
Derivative liabilities not designated as hedging:					
Interest rate	6	3,244	—	(1,986)	1,264
Foreign exchange	—	5,340	—	(3,428)	1,912
Equity and other contracts	3	6	—	(1)	8
Total derivative liabilities not designated as hedging	9	8,590	—	(5,415)	3,184
Total trading liabilities	1,559	8,697	—	(5,415)	4,841
Long-term debt (c)	—	387	—	—	387
Other liabilities – derivative liabilities designated as hedging:					
Interest rate	—	350	—	—	350
Foreign exchange	—	257	—	—	257
Total other liabilities – derivative liabilities designated as hedging	—	607	—	—	607
Subtotal liabilities of operations at fair value	1,559	9,691	—	(5,415)	5,835
Percentage of liabilities of operations prior to netting	14%	86%	—%		
Liabilities of consolidated investment management funds	1	—	—	—	1
Total liabilities	\$ 1,560	\$ 9,691	\$ —	\$ (5,415)	\$ 5,836
Percentage of total liabilities prior to netting	14%	86%	—%		

(a) ASC 815, *Derivatives and Hedging*, permits the netting of derivative receivables and derivative payables under legally enforceable master netting agreements and permits the netting of cash collateral. Netting is applicable to derivatives not designated as hedging instruments included in trading assets or trading liabilities and derivatives designated as hedging instruments included in other assets or other liabilities. Netting is allocated to the derivative products based on the net fair value of each product.

(b) Includes \$640 million in Level 2 that was included in the former Grantor Trust.

(c) Includes certain interests in securitizations.

(d) Includes seed capital, private equity investments and other assets.

Notes to Consolidated Financial Statements (continued)

Assets measured at fair value on a recurring basis at Dec. 31, 2018 <i>(dollars in millions)</i>	Level 1	Level 2	Level 3	Netting (a)	Total carrying value
Available-for-sale securities:					
Agency RMBS	\$ —	\$ 25,308	\$ —	\$ —	\$ 25,308
U.S. Treasury	20,076	—	—	—	20,076
Sovereign debt/sovereign guaranteed	6,613	4,137	—	—	10,750
Agency commercial MBS	—	9,691	—	—	9,691
CLOs	—	3,364	—	—	3,364
Supranational	—	2,984	—	—	2,984
Foreign covered bonds	—	2,878	—	—	2,878
State and political subdivisions	—	2,247	—	—	2,247
Other ABS	—	1,773	—	—	1,773
U.S. government agencies	—	1,657	—	—	1,657
Non-agency commercial MBS	—	1,464	—	—	1,464
Non-agency RMBS (b)	—	1,325	—	—	1,325
Foreign government agencies	—	1,161	—	—	1,161
Corporate bonds	—	1,054	—	—	1,054
Other debt securities	—	77	—	—	77
Total available-for-sale securities	26,689	59,120	—	—	85,809
Trading assets:					
Debt instruments	801	2,594	—	—	3,395
Equity instruments (c)	1,114	—	—	—	1,114
Derivative assets not designated as hedging:					
Interest rate	7	3,583	—	(2,202)	1,388
Foreign exchange	—	4,807	—	(3,724)	1,083
Equity and other contracts	9	59	—	(13)	55
Total derivative assets not designated as hedging	16	8,449	—	(5,939)	2,526
Total trading assets	1,931	11,043	—	(5,939)	7,035
Other assets:					
Derivative assets designated as hedging:					
Interest rate	—	23	—	—	23
Foreign exchange	—	266	—	—	266
Total derivative assets designated as hedging	—	289	—	—	289
Other assets (d)	68	170	—	—	238
Assets measured at NAV (d)					215
Subtotal assets of operations at fair value	28,688	70,622	—	(5,939)	93,586
Percentage of assets of operations prior to netting	29%	71%	—%		
Assets of consolidated investment management funds	210	253	—	—	463
Total assets	\$ 28,898	\$ 70,875	\$ —	\$ (5,939)	\$ 94,049
Percentage of total assets prior to netting	29%	71%	—%		

Notes to Consolidated Financial Statements (continued)

Liabilities measured at fair value on a recurring basis at Dec. 31, 2018 <i>(dollars in millions)</i>	Level 1	Level 2	Level 3	Netting (a)	Total carrying value
Trading liabilities:					
Debt instruments	\$ 1,006	\$ 118	\$ —	\$ —	\$ 1,124
Equity instruments	75	—	—	—	75
Derivative liabilities not designated as hedging:					
Interest rate	12	3,104	—	(2,508)	608
Foreign exchange	—	5,215	—	(3,626)	1,589
Equity and other contracts	1	118	—	(36)	83
Total derivative liabilities not designated as hedging	13	8,437	—	(6,170)	2,280
Total trading liabilities	1,094	8,555	—	(6,170)	3,479
Long-term debt (c)	—	371	—	—	371
Other liabilities – derivative liabilities designated as hedging:					
Interest rate	—	74	—	—	74
Foreign exchange	—	14	—	—	14
Total other liabilities – derivative liabilities designated as hedging	—	88	—	—	88
Subtotal liabilities of operations at fair value	1,094	9,014	—	(6,170)	3,938
Percentage of liabilities of operations prior to netting	11%	89%	—%		
Liabilities of consolidated investment management funds	2	—	—	—	2
Total liabilities	\$ 1,096	\$ 9,014	\$ —	\$ (6,170)	\$ 3,940
Percentage of total liabilities prior to netting	11%	89%	—%		

(a) ASC 815, *Derivatives and Hedging*, permits the netting of derivative receivables and derivative payables under legally enforceable master netting agreements and permits the netting of cash collateral. Netting is applicable to derivatives not designated as hedging instruments included in trading assets or trading liabilities and derivatives designated as hedging instruments included in other assets or other liabilities. Netting is allocated to the derivative products based on the net fair value of each product.

(b) Includes \$832 million in Level 2 that was included in the former Grantor Trust.

(c) Includes certain interests in securitizations.

(d) Includes seed capital, private equity investments and other assets.

Notes to Consolidated Financial Statements (continued)

Details of certain available-for-sale securities measured at fair value on a recurring basis	Dec. 31, 2019						Dec. 31, 2018				
	Total carrying value	Ratings (a)				Total carrying value	Ratings (a)				
		(b)	AAA/ AA-	A+/ A-	BBB+/ BBB-		BB+ and lower	(b)	AAA/ AA-	A+/ A-	BBB+/ BBB-
<i>(dollars in millions)</i>											
Non-agency RMBS (c), originated in:											
2007-2019	\$ 464	55%	1%	—%	44%	\$ 315	15%	2%	3%	80%	
2006	291	—	21	—	79	363	—	19	—	81	
2005	305	5	2	8	85	396	9	1	7	83	
2004 and earlier	173	22	24	4	50	251	16	24	11	49	
Total non-agency RMBS	\$ 1,233	25%	9%	3%	63%	\$ 1,325	9%	11%	5%	75%	
Non-agency commercial MBS originated in:											
2009-2019	\$ 2,178	98%	2%	—%	—%	\$ 1,464	96%	4%	—%	—%	
Foreign covered bonds:											
Canada	\$ 1,798	100%	—%	—%	—%	\$ 1,524	100%	—%	—%	—%	
UK	984	100	—	—	—	529	100	—	—	—	
Australia	431	100	—	—	—	333	100	—	—	—	
Germany	357	100	—	—	—	—	—	—	—	—	
Norway	287	100	—	—	—	150	100	—	—	—	
Other	340	100	—	—	—	342	100	—	—	—	
Total foreign covered bonds	\$ 4,197	100%	—%	—%	—%	\$ 2,878	100%	—%	—%	—%	
Sovereign debt/sovereign guaranteed:											
UK	\$ 3,318	100%	—%	—%	—%	\$ 2,153	100%	—%	—%	—%	
Germany	1,997	100	—	—	—	1,826	100	—	—	—	
Spain	1,453	—	6	94	—	1,365	—	—	100	—	
France	1,272	100	—	—	—	1,548	100	—	—	—	
Italy	1,260	—	—	100	—	939	—	—	100	—	
Netherlands	791	100	—	—	—	875	100	—	—	—	
Singapore	742	100	—	—	—	165	100	—	—	—	
Hong Kong	411	100	—	—	—	450	100	—	—	—	
Ireland	301	—	100	—	—	625	—	100	—	—	
Other (d)	1,101	62	26	—	12	804	87	—	—	13	
Total sovereign debt/sovereign guaranteed	\$ 12,646	73%	5%	21%	1%	\$ 10,750	72%	6%	21%	1%	
Foreign government agencies:											
Germany	\$ 1,131	100%	—%	—%	—%	\$ 401	100%	—%	—%	—%	
Netherlands	678	100	—	—	—	461	100	—	—	—	
Finland	245	100	—	—	—	185	100	—	—	—	
Other	589	78	22	—	—	114	100	—	—	—	
Total foreign government agencies	\$ 2,643	95%	5%	—%	—%	\$ 1,161	100%	—%	—%	—%	

(a) Represents ratings by S&P or the equivalent.

(b) At Dec. 31, 2019 and Dec. 31, 2018, sovereign debt/sovereign guaranteed securities were included in Level 1 and Level 2 in the valuation hierarchy. All other assets in the table are Level 2 assets in the valuation hierarchy.

(c) Includes \$640 million at Dec. 31, 2019 and \$832 million at Dec. 31, 2018 that were included in the former Grantor Trust.

(d) Includes non-investment grade sovereign debt/sovereign guaranteed securities related to Brazil of \$134 million at Dec. 31, 2019 and \$107 million at Dec. 31, 2018.

Assets and liabilities measured at fair value on a nonrecurring basis

carried at cost with upward or downward adjustments.

Under certain circumstances, we make adjustments to the fair value of our assets, liabilities and unfunded lending-related commitments although they are not measured at fair value on an ongoing basis.

The following table presents the financial instruments carried on the consolidated balance sheet by caption and level in the fair value hierarchy as of Dec. 31, 2019 and Dec. 31, 2018.

Examples would be the recording of an impairment of an asset and non-readily marketable equity securities

Assets measured at fair value on a nonrecurring basis (in millions)	Dec. 31, 2019				Dec. 31, 2018			
	Level 1	Level 2	Level 3	Total carrying value	Level 1	Level 2	Level 3	Total carrying value
Loans (a)	\$ —	\$ 58	\$ —	\$ 58	\$ —	\$ 64	\$ 4	\$ 68
Other assets (b)	—	64	—	64	—	57	—	57
Total assets at fair value on a nonrecurring basis	\$ —	\$ 122	\$ —	\$ 122	\$ —	\$ 121	\$ 4	\$ 125

- (a) The fair value of these loans decreased \$1 million in both 2019 and 2018, based on the fair value of the underlying collateral, as required by guidance in ASC 310, *Receivables*, with an offset to the allowance for credit losses.
- (b) Includes non-readily marketable equity securities carried at cost with upward or downward adjustments and other assets received in satisfaction of debt.

Estimated fair value of financial instruments

The following tables present the estimated fair value and the carrying amount of financial instruments not carried at fair value on the consolidated balance sheet at Dec. 31, 2019 and Dec. 31, 2018, by caption on the consolidated balance sheet and by the valuation hierarchy.

Summary of financial instruments (in millions)	Dec. 31, 2019				
	Level 1	Level 2	Level 3	Total estimated fair value	Carrying amount
Assets:					
Interest-bearing deposits with the Federal Reserve and other central banks	\$ —	\$ 95,042	\$ —	\$ 95,042	\$ 95,042
Interest-bearing deposits with banks	—	14,832	—	14,832	14,811
Federal funds sold and securities purchased under resale agreements	—	30,182	—	30,182	30,182
Securities held-to-maturity	4,630	30,175	—	34,805	34,483
Loans (a)	—	54,194	—	54,194	53,718
Other financial assets	4,830	1,233	—	6,063	6,063
Total	\$ 9,460	\$ 225,658	\$ —	\$ 235,118	\$ 234,299
Liabilities:					
Noninterest-bearing deposits	\$ —	\$ 57,630	\$ —	\$ 57,630	\$ 57,630
Interest-bearing deposits	—	200,846	—	200,846	201,836
Federal funds purchased and securities sold under repurchase agreements	—	11,401	—	11,401	11,401
Payables to customers and broker-dealers	—	18,758	—	18,758	18,758
Commercial paper	—	3,959	—	3,959	3,959
Borrowings	—	917	—	917	917
Long-term debt	—	27,858	—	27,858	27,114
Total	\$ —	\$ 321,369	\$ —	\$ 321,369	\$ 321,615

- (a) Does not include the leasing portfolio.

Summary of financial instruments (in millions)	Dec. 31, 2018				
	Level 1	Level 2	Level 3	Total estimated fair value	Carrying amount
Assets:					
Interest-bearing deposits with the Federal Reserve and other central banks	\$ —	\$ 67,988	\$ —	\$ 67,988	\$ 67,988
Interest-bearing deposits with banks	—	14,168	—	14,168	14,148
Federal funds sold and securities purchased under resale agreements	—	46,795	—	46,795	46,795
Securities held-to-maturity	5,512	27,790	—	33,302	33,982
Loans (a)	—	55,142	—	55,142	55,161
Other financial assets	5,864	1,383	—	7,247	7,247
Total	\$ 11,376	\$ 213,266	\$ —	\$ 224,642	\$ 225,321
Liabilities:					
Noninterest-bearing deposits	\$ —	\$ 70,783	\$ —	\$ 70,783	\$ 70,783
Interest-bearing deposits	—	165,914	—	165,914	167,995
Federal funds purchased and securities sold under repurchase agreements	—	14,243	—	14,243	14,243
Payables to customers and broker-dealers	—	19,731	—	19,731	19,731
Commercial paper	—	1,939	—	1,939	1,939
Borrowings	—	3,584	—	3,584	3,584
Long-term debt	—	28,347	—	28,347	28,792
Total	\$ —	\$ 304,541	\$ —	\$ 304,541	\$ 307,067

(a) Does not include the leasing portfolio.

Note 21—Fair value option

We elected fair value as an alternative measurement for selected financial assets and liabilities that are not otherwise required to be measured at fair value, including the assets and liabilities of consolidated investment management funds and certain long-term debt. The following table presents the assets and liabilities of consolidated investment management funds, at fair value.

Assets and liabilities of consolidated investment management funds, at fair value (in millions)	Dec. 31,	
	2019	2018
Assets of consolidated investment management funds:		
Trading assets	\$ 229	\$ 243
Other assets	16	220
Total assets of consolidated investment management funds	\$ 245	\$ 463
Liabilities of consolidated investment management funds:		
Other liabilities	1	2
Total liabilities of consolidated investment management funds	\$ 1	\$ 2

BNY Mellon values the assets and liabilities of its consolidated investment management funds using quoted prices for identical assets or liabilities in active markets or observable inputs such as quoted

prices for similar assets or liabilities. Quoted prices for either identical or similar assets or liabilities in inactive markets may also be used. Accordingly, fair value best reflects the interests BNY Mellon holds in the economic performance of the consolidated investment management funds. Changes in the value of the assets and liabilities are recorded in the consolidated income statement as investment income of consolidated investment management funds and in the interest of investment management fund note holders, respectively.

We have elected the fair value option on \$240 million of long-term debt. The fair value of this long-term debt was \$387 million at Dec. 31, 2019 and \$371 million at Dec. 31, 2018. The long-term debt is valued using observable market inputs and is included in Level 2 of the valuation hierarchy.

The following table presents the changes in fair value of long-term debt recorded in foreign exchange and other trading revenue in the consolidated income statement.

Change in fair value of long-term debt (a) (in millions)	Year ended Dec. 31,		
	2019	2018	2017
Foreign exchange and other trading revenue	\$ (16)	\$ (4)	\$ (4)

(a) The changes in fair value are approximately offset by an economic hedge included in foreign exchange and other trading revenue.

Note 22—Commitments and contingent liabilities

Off-balance sheet arrangements

In the normal course of business, various commitments and contingent liabilities are outstanding that are not reflected in the accompanying consolidated balance sheets.

Our significant trading and off-balance sheet risks are securities, foreign currency and interest rate risk management products, commercial lending commitments, letters of credit and securities lending indemnifications. We assume these risks to reduce interest rate and foreign currency risks, to provide customers with the ability to meet credit and liquidity needs and to hedge foreign currency and interest rate risks. These items involve, to varying degrees, credit, foreign currency and interest rate risks not recognized on the balance sheet. Our off-balance sheet risks are managed and monitored in manners similar to those used for on-balance sheet risks.

The following table presents a summary of our off-balance sheet credit risks.

Off-balance sheet credit risks (in millions)	Dec. 31,	
	2019	2018
Lending commitments	\$ 49,119	\$ 50,631
Standby letters of credit (“SBLC”) (a)	2,298	2,817
Commercial letters of credit	74	165
Securities lending indemnifications (b)(c)	408,378	401,504

(a) Net of participations totaling \$146 million at Dec. 31, 2019 and \$163 million at Dec. 31, 2018.

(b) Excludes the indemnification for securities for which BNY Mellon acts as an agent on behalf of CIBC Mellon clients, which totaled \$57 billion at Dec. 31, 2019 and \$56 billion at Dec. 31, 2018.

(c) Includes cash collateral, invested in indemnified repurchase agreements, held by us as securities lending agent of \$37 billion at Dec. 31, 2019 and \$35 billion at Dec. 31, 2018.

The total potential loss on undrawn lending commitments, standby and commercial letters of credit, and securities lending indemnifications is equal to the total notional amount if drawn upon, which does not consider the value of any collateral.

Since many of the lending commitments are expected to expire without being drawn upon, the total amount does not necessarily represent future cash requirements. A summary of lending commitment maturities is as follows: \$31.0 billion in less than one

year, \$17.8 billion in one to five years and \$288 million over five years.

SBLCs principally support obligations of corporate clients and were collateralized with cash and securities of \$184 million at Dec. 31, 2019 and \$223 million at Dec. 31, 2018. At Dec. 31, 2019, \$1.6 billion of the SBLCs will expire within one year, \$723 million in one to five years and \$3 million over five years.

We must recognize, at the inception of an SBLC and foreign and other guarantees, a liability for the fair value of the obligation undertaken in issuing the guarantee. The fair value of the liability, which was recorded with a corresponding asset in other assets, was estimated as the present value of contractual customer fees. The estimated liability for losses related to SBLCs and foreign and other guarantees, if any, is included in the allowance for lending-related commitments.

Payment/performance risk of SBLCs is monitored using both historical performance and internal ratings criteria. BNY Mellon’s historical experience is that SBLCs typically expire without being funded. SBLCs below investment grade are monitored closely for payment/performance risk. The table below shows SBLCs by investment grade:

Standby letters of credit	Dec. 31,	
	2019	2018
Investment grade	90%	89%
Non-investment grade	10%	11%

A commercial letter of credit is normally a short-term instrument used to finance a commercial contract for the shipment of goods from a seller to a buyer. Although the commercial letter of credit is contingent upon the satisfaction of specified conditions, it represents a credit exposure if the buyer defaults on the underlying transaction. As a result, the total contractual amounts do not necessarily represent future cash requirements. Commercial letters of credit totaled \$74 million at Dec. 31, 2019 and \$165 million at Dec. 31, 2018.

We expect many of the lending commitments and letters of credit to expire without the need to advance any cash. The revenue associated with guarantees frequently depends on the credit rating of the obligor and the structure of the transaction, including

collateral, if any. The allowance for lending-related commitments was \$94 million at Dec. 31, 2019 and \$106 million at Dec. 31, 2018.

A securities lending transaction is a fully collateralized transaction in which the owner of a security agrees to lend the security (typically through an agent, in our case, The Bank of New York Mellon), to a borrower, usually a broker-dealer or bank, on an open, overnight or term basis, under the terms of a prearranged contract.

We typically lend securities with indemnification against borrower default. We generally require the borrower to provide collateral with a minimum value of 102% of the fair value of the securities borrowed, which is monitored on a daily basis, thus reducing credit risk. Market risk can also arise in securities lending transactions. These risks are controlled through policies limiting the level of risk that can be undertaken. Securities lending transactions are generally entered into only with highly rated counterparties. Securities lending indemnifications were secured by collateral of \$428 billion at Dec. 31, 2019 and \$420 billion at Dec. 31, 2018.

CIBC Mellon, a joint venture between BNY Mellon and the Canadian Imperial Bank of Commerce (“CIBC”), engages in securities lending activities. CIBC Mellon, BNY Mellon and CIBC jointly and severally indemnify securities lenders against specific types of borrower default. At Dec. 31, 2019 and Dec. 31, 2018, \$57 billion and \$56 billion, respectively, of borrowings at CIBC Mellon, for which BNY Mellon acts as agent on behalf of CIBC Mellon clients, were secured by collateral of \$61 billion and \$59 billion, respectively. If, upon a default, a borrower’s collateral was not sufficient to cover its related obligations, certain losses related to the indemnification could be covered by the indemnitors.

Unsettled repurchase and reverse repurchase agreements

In the normal course of business, we enter into repurchase agreements and reverse repurchase agreements that settle at a future date. In repurchase agreements, BNY Mellon receives cash from and provides securities as collateral to a counterparty at settlement. In reverse repurchase agreements, BNY Mellon advances cash to and receives securities as collateral from the counterparty at settlement. These transactions are recorded on the consolidated balance

sheet on settlement date. At Dec. 31, 2019, we had no unsettled repurchase agreements and \$8.3 billion of unsettled reverse repurchase agreements which all settled the following business day.

Industry concentrations

We have significant industry concentrations related to credit exposure at Dec. 31, 2019. The tables below present our credit exposure in the financial institutions and commercial portfolios.

Financial institutions portfolio exposure (in billions)	Dec. 31, 2019		
	Loans	Unfunded commitments	Total exposure
Securities industry	\$ 2.9	\$ 23.4	\$ 26.3
Banks	7.4	1.1	8.5
Asset managers	1.3	6.4	7.7
Insurance	—	2.7	2.7
Government	0.1	0.3	0.4
Other	0.8	0.5	1.3
Total	\$ 12.5	\$ 34.4	\$ 46.9

Commercial portfolio exposure (in billions)	Dec. 31, 2019		
	Loans	Unfunded commitments	Total exposure
Manufacturing	\$ 0.9	\$ 4.2	\$ 5.1
Services and other	0.6	3.7	4.3
Energy and utilities	0.3	3.7	4.0
Media and telecom	—	1.0	1.0
Total	\$ 1.8	\$ 12.6	\$ 14.4

Major concentrations in securities lending are primarily to broker-dealers and are generally collateralized with cash and/or securities.

Exposure for certain administrative errors

In connection with certain offshore tax-exempt funds that we manage, we were potentially liable to the funds for certain administrative errors. The errors related to the resident status of such funds, which exposed the Company to a tax liability related to the funds’ earnings. In 2019, we reduced the previously established reserves for this exposure based on recent discussions and agreement with the tax authorities.

Sponsored Member Repo Program

BNY Mellon is a sponsoring member in the Fixed Income Clearing Corporation (“FICC”) sponsored member program, where we submit eligible overnight repurchase and reverse repurchase transactions in

U.S. Treasury securities (“Sponsored Member Transactions”) between BNY Mellon and our sponsored member clients for novation and clearing through FICC pursuant to the FICC Government Securities Division rulebook (the “FICC Rules”). We also guarantee to FICC the prompt and full payment and performance of our sponsored member clients’ respective obligations under the FICC Rules in connection with such clients’ Sponsored Member Transactions. We minimize our credit exposure under this guaranty by obtaining a security interest in our sponsored member clients’ collateral and rights under Sponsored Member Transactions. See “Offsetting assets and liabilities” in Note 23 for additional information on our repurchase and reverse repurchase agreements.

Indemnification arrangements

We have provided standard representations for underwriting agreements, acquisition and divestiture agreements, sales of loans and commitments, and other similar types of arrangements and customary indemnification for claims and legal proceedings related to providing financial services that are not otherwise included above. Insurance has been purchased to mitigate certain of these risks. Generally, there are no stated or notional amounts included in these indemnifications and the contingencies triggering the obligation for indemnification are not expected to occur. Furthermore, often counterparties to these transactions provide us with comparable indemnifications. We are unable to develop an estimate of the maximum payout under these indemnifications for several reasons. In addition to the lack of a stated or notional amount in a majority of such indemnifications, we are unable to predict the nature of events that would trigger indemnification or the level of indemnification for a certain event. We believe, however, that the possibility that we will have to make any material payments for these indemnifications is remote. At Dec. 31, 2019 and Dec. 31, 2018, we have not recorded any material liabilities under these arrangements.

Clearing and settlement exchanges

We are a noncontrolling equity investor in, and/or member of, several industry clearing or settlement exchanges through which foreign exchange, securities, derivatives or other transactions settle. Certain of these industry clearing and settlement

exchanges require their members to guarantee their obligations and liabilities and/or to provide liquidity support in the event other members do not honor their obligations. We believe the likelihood that a clearing or settlement exchange (of which we are a member) would become insolvent is remote. Additionally, certain settlement exchanges have implemented loss allocation policies that enable the exchange to allocate settlement losses to the members of the exchange. It is not possible to quantify such mark-to-market loss until the loss occurs. Any ancillary costs that occur as a result of any mark-to-market loss cannot be quantified. In addition, we also sponsor clients as members on clearing and settlement exchanges and guarantee their obligations. At Dec. 31, 2019 and Dec. 31, 2018, we have not recorded any material liabilities under these arrangements.

Legal proceedings

In the ordinary course of business, The Bank of New York Mellon Corporation and its subsidiaries are routinely named as defendants in or made parties to pending and potential legal actions. We also are subject to governmental and regulatory examinations, information-gathering requests, investigations and proceedings (both formal and informal). Claims for significant monetary damages are often asserted in many of these legal actions, while claims for disgorgement, restitution, penalties and/or other remedial actions or sanctions may be sought in governmental and regulatory matters. It is inherently difficult to predict the eventual outcomes of such matters given their complexity and the particular facts and circumstances at issue in each of these matters. However, on the basis of our current knowledge and understanding, we do not believe that judgments, settlements or orders, if any, arising from these matters (either individually or in the aggregate, after giving effect to applicable reserves and insurance coverage) will have a material adverse effect on the consolidated financial position or liquidity of BNY Mellon, although they could have a material effect on our results of operations in a given period.

In view of the inherent unpredictability of outcomes in litigation and regulatory matters, particularly where (i) the damages sought are substantial or indeterminate, (ii) the proceedings are in the early stages, or (iii) the matters involve novel legal theories or a large number of parties, as a matter of course there is considerable uncertainty surrounding the timing or ultimate resolution of litigation and

regulatory matters, including a possible eventual loss, fine, penalty or business impact, if any, associated with each such matter. In accordance with applicable accounting guidance, we establish accruals for litigation and regulatory matters when those matters proceed to a stage where they present loss contingencies that are both probable and reasonably estimable. In such cases, there may be a possible exposure to loss in excess of any amounts accrued. We regularly monitor such matters for developments that could affect the amount of the accrual, and will adjust the accrual amount as appropriate. If the loss contingency in question is not both probable and reasonably estimable, we do not establish an accrual and the matter continues to be monitored for any developments that would make the loss contingency both probable and reasonably estimable. We believe that our accruals for legal proceedings are appropriate and, in the aggregate, are not material to the consolidated financial position of BNY Mellon, although future accruals could have a material effect on the results of operations in a given period. In addition, if we have the potential to recover a portion of an estimated loss from a third party, we record a receivable up to the amount of the accrual that is probable of recovery.

For certain of those matters described here for which a loss contingency may, in the future, be reasonably possible (whether in excess of a related accrued liability or where there is no accrued liability), BNY Mellon is currently unable to estimate a range of reasonably possible loss. For those matters described here where BNY Mellon is able to estimate a reasonably possible loss, the aggregate range of such reasonably possible loss is up to \$990 million in excess of the accrued liability (if any) related to those matters. We do not consider potential recoveries when estimating reasonably possible losses.

The following describes certain judicial, regulatory and arbitration proceedings involving BNY Mellon:

Mortgage-Securitization Trusts Proceedings

The Bank of New York Mellon has been named as a defendant in a number of legal actions brought by MBS investors alleging that the trustee has expansive duties under the governing agreements, including the duty to investigate and pursue breach of representation and warranty claims against other parties to the MBS transactions. Four actions commenced in August 2014, December 2014, December 2015, and February 2017 are pending in

New York federal court; one action commenced in November 2011 is pending in the Court of Appeals for the Tenth Circuit; and one action commenced in May 2016 is pending in New York state court.

Matters Related to R. Allen Stanford

In late December 2005, Pershing LLC (“Pershing”) became a clearing firm for Stanford Group Co. (“SGC”), a registered broker-dealer that was part of a group of entities ultimately controlled by R. Allen Stanford (“Stanford”). Stanford International Bank (“SIB”), also controlled by Stanford, issued certificates of deposit (“CDs”). Some investors allegedly wired funds from their SGC accounts to purchase CDs. In 2009, the Securities and Exchange Commission (“SEC”) charged Stanford with operating a Ponzi scheme in connection with the sale of CDs, and SGC was placed into receivership. Alleged purchasers of CDs have filed two putative class action proceedings against Pershing: one in November 2009 in Texas federal court, and one in May 2016 in New Jersey federal court. Thirteen lawsuits have been filed against Pershing in Louisiana, Florida and New Jersey federal courts in January 2010, January and February 2015, October 2015, and May 2016. The purchasers allege that Pershing, as SGC’s clearing firm, assisted Stanford in a fraudulent scheme and assert contractual, statutory and common law claims. In March 2019, a group of investors filed a putative class action against The Bank of New York Mellon in New Jersey federal court, making the same allegations as in the prior actions brought against Pershing. All of the cases that have been brought in federal court against Pershing and the case brought against The Bank of New York Mellon have been consolidated in Texas federal court for discovery purposes. On Dec. 19, 2019, the Court of Appeals for the Fifth Circuit affirmed the dismissal of six individual federal lawsuits brought under Florida law, which will also apply to four other similarly situated cases. Financial Industry Regulatory Authority, Inc. (“FINRA”) arbitration proceedings also have been initiated by alleged purchasers asserting similar claims.

Brazilian Postalis Litigation

BNY Mellon Servicos Financeiros DTVM S.A. (“DTVM”), a subsidiary that provides asset services in Brazil, acts as administrator for certain investment funds in which a public pension fund for postal workers called Postalis-Instituto de Seguridade Social dos Correios e Telégrafos (“Postalis”) invested. On Aug. 22, 2014, Postalis sued DTVM in Rio de

Janeiro, Brazil for losses related to a Postalis fund for which DTVM is administrator. Postalis alleges that DTVM failed to properly perform duties, including to conduct due diligence of and exert control over the manager. On March 12, 2015, Postalis filed a lawsuit in Rio de Janeiro against DTVM and BNY Mellon Administração de Ativos Ltda. (“Ativos”) alleging failure to properly perform duties relating to another fund of which DTVM is administrator and Ativos is manager. On Dec. 14, 2015, Associação dos Profissionais dos Correios (“ADCAP”), a Brazilian postal workers association, filed a lawsuit in São Paulo against DTVM and other defendants alleging that DTVM improperly contributed to Postalis investment losses. On March 20, 2017, the lawsuit was dismissed without prejudice, and ADCAP has appealed that decision. On Dec. 17, 2015, Postalis filed three lawsuits in Rio de Janeiro against DTVM and Ativos alleging failure to properly perform duties with respect to investments in several other funds. On Feb. 4, 2016, Postalis filed a lawsuit in Brasília against DTVM, Ativos and BNY Mellon Alocação de Patrimônio Ltda., an investment management subsidiary, alleging failure to properly perform duties and liability for losses with respect to investments in various funds of which the defendants were administrator and/or manager. On Jan. 16, 2018, the Brazilian Federal Prosecution Service (“MPF”) filed a civil lawsuit in São Paulo against DTVM alleging liability for Postalis losses based on alleged failures to properly perform certain duties as administrator to certain funds in which Postalis invested or as controller of Postalis’s own investment portfolio. On April 18, 2018, the court dismissed the lawsuit without prejudice, and the MPF has appealed that decision. In addition, the Tribunal de Contas da União, an administrative tribunal, has initiated two proceedings with the purpose of determining liability for losses to two investment funds administered by DTVM in which Postalis was the exclusive investor. On Oct. 4, 2019, Postalis and another pension fund filed a request for arbitration in São Paulo against DTVM and Ativos alleging liability for losses to an investment fund for which DTVM was administrator and Ativos was manager. On Oct. 25, 2019, Postalis filed a lawsuit in Rio de Janeiro against DTVM and Ativos, alleging liability for losses in another fund for which DTVM was administrator and Ativos was manager.

Brazilian Silverado Litigation

DTVM acts as administrator for the Fundo de Investimento em Direitos Creditórios Multisetorial

Silverado Maximum (“Silverado Maximum Fund”), which invests in commercial credit receivables. On June 2, 2016, the Silverado Maximum Fund sued DTVM in its capacity as administrator, along with Deutsche Bank S.A. - Banco Alemão in its capacity as custodian and Silverado Gestão e Investimentos Ltda. in its capacity as investment manager. The Fund alleges that each of the defendants failed to fulfill its respective duty, and caused losses to the Fund for which the defendants are jointly and severally liable.

German Tax Matters

German authorities are investigating past “cum/ex” trading, which involved the purchase of equity securities on or shortly before the dividend date, but settled after that date, potentially resulting in an unwarranted refund of withholding tax. German authorities have taken the view that past cum/ex trading may have resulted in tax avoidance or evasion. European subsidiaries of BNY Mellon have been informed by German authorities about investigations into potential cum/ex trading by certain third-party investment funds, where one of the subsidiaries had acquired entities that served as depositary and/or fund manager for those third-party investment funds. We have received information requests from the authorities relating to pre-acquisition activity and are cooperating fully with those requests. We have not received any tax demand concerning cum/ex trading. In addition, in August 2019, the District Court of Bonn ordered that one of these subsidiaries be joined as a secondary party in connection with the prosecution of unrelated third parties. Trial commenced in September 2019. In connection with the acquisition of the subject entities, we obtained an indemnity for liabilities from the sellers that we intend to pursue as necessary.

Note 23—Derivative instruments

We use derivatives to manage exposure to market risk, including interest rate risk, equity price risk and foreign currency risk, as well as credit risk. Our trading activities are focused on acting as a market-maker for our customers and facilitating customer trades in compliance with the Volcker Rule.

The notional amounts for derivative financial instruments express the dollar volume of the transactions; however, credit risk is much smaller. We perform credit reviews and enter into netting agreements and collateral arrangements to minimize

the credit risk of derivative financial instruments. We enter into offsetting positions to reduce exposure to foreign currency, interest rate and equity price risk.

Use of derivative financial instruments involves reliance on counterparties. Failure of a counterparty to honor its obligation under a derivative contract is a risk we assume whenever we engage in a derivative contract. There were no counterparty default losses recorded in 2019.

Hedging derivatives

We utilize interest rate swap agreements to manage our exposure to interest rate fluctuations. We enter into fair value hedges as an interest rate risk management strategy to reduce fair value variability by converting certain fixed rate interest payments associated with available-for-sale securities and long-term debt to floating interest rates. We also utilize interest rate swaps and forward exchange contracts as cash flow hedges to manage our exposure to interest and foreign exchange rate changes.

The available-for-sale securities hedged consist of U.S. Treasury bonds, agency and non-agency commercial MBS, sovereign debt, corporate bonds and covered bonds. At Dec. 31, 2019, \$13.7 billion par value of available-for-sale securities were hedged with interest rate swaps designated as fair value hedges that had notional values of \$13.7 billion.

The fixed rate long-term debt instruments hedged generally have original maturities of five to 30 years. In fair value hedging relationships, debt is hedged with “receive fixed rate, pay variable rate” swaps. At Dec. 31, 2019, \$14.7 billion par value of debt was hedged with interest rate swaps designated as fair value hedges that had notional values of \$14.7 billion.

In addition, we utilize forward foreign exchange contracts as hedges to mitigate foreign exchange exposures. We use forward foreign exchange contracts as cash flow hedges to convert certain forecasted non-U.S. dollar revenue and expenses into U.S. dollars. We use forward foreign exchange contracts with maturities of 18 months or less as cash

flow hedges to hedge our foreign exchange exposure to currencies such as Indian rupee, British pound, Hong Kong dollar, Singapore dollar and Polish zloty revenue and expense transactions in entities that have the U.S. dollar as their functional currency. As of Dec. 31, 2019, the hedged forecasted foreign currency transactions and designated forward foreign exchange contract hedges were \$388 million (notional), with a pre-tax gain of \$5 million recorded in accumulated OCI. Approximately \$4 million of this gain will be reclassified to earnings over the next 12 months.

We also utilize forward foreign exchange contracts as fair value hedges of the foreign exchange risk associated with available-for-sale securities. Forward points are designated as an excluded component and amortized into earnings over the hedge period. The unamortized derivative value associated with the excluded component is recognized in accumulated OCI. At Dec. 31, 2019, \$142 million par value of available-for-sale securities were hedged with foreign currency forward contracts that had a notional value of \$142 million.

Forward foreign exchange contracts are also used to hedge the value of our net investments in foreign subsidiaries. These forward foreign exchange contracts have maturities of less than one year. The derivatives employed are designated as hedges of changes in value of our foreign investments due to exchange rates. The change in fair market value of these forward foreign exchange contracts is reported within foreign currency translation adjustments in shareholders' equity, net of tax. At Dec. 31, 2019, forward foreign exchange contracts with notional amounts totaling \$7.9 billion were designated as net investment hedges.

In addition to forward foreign exchange contracts, we also designate non-derivative financial instruments as hedges of our net investments in foreign subsidiaries. Those non-derivative financial instruments designated as hedges of our net investments in foreign subsidiaries were all long-term liabilities of BNY Mellon and, at Dec. 31, 2019, had a combined U.S. dollar equivalent carrying value of \$172 million.

The following table presents the pre-tax gains (losses) related to our fair value and cash flow hedging activities recognized in the consolidated income statement.

Income statement impact of fair value and cash flow hedges <i>(in millions)</i>	Location of gains (losses)	Year ended Dec. 31,		
		2019	2018	2017
Interest rate fair value hedges of available-for-sale securities				
Derivative	Interest revenue	\$ (795)	\$ 284	\$ 82
Hedged item	Interest revenue	788	(273)	(97)
Interest rate fair value hedges of long-term debt				
Derivative	Interest expense	486	(328)	(197)
Hedged item	Interest expense	(483)	330	190
Foreign exchange fair value hedges of available-for-sale securities				
Derivative (a)	Other revenue	9	(2)	—
Hedged item	Other revenue	(8)	2	—
Cash flow hedge of interest rate risk				
Gain reclassified from OCI into income	Interest expense	7	—	—
Cash flow hedges of forecasted FX exposures				
Gain reclassified from OCI into income	Trading revenue	—	—	2
Gain reclassified from OCI into income	Other revenue	—	2	8
Gain (loss) reclassified from OCI into income	Staff expense	3	(4)	10
Gain (loss) recognized in the consolidated income statement due to fair value and cash flow hedging relationships		\$ 7	\$ 11	\$ (2)

(a) Includes a gain of \$2 million in 2019 and a (loss) of \$(1) million in 2018 associated with the amortization of the excluded component. At Dec. 31, 2019 and Dec. 31, 2018, the remaining accumulated OCI balance associated with the excluded component was de minimis.

The following table presents the impact of hedging derivatives used in net investment hedging relationships.

Impact of derivative instruments used in net investment hedging relationships <i>(in millions)</i>	Gain or (loss) recognized in accumulated OCI on derivatives			Location of gain or (loss) reclassified from accumulated OCI into income	Gain or (loss) reclassified from accumulated OCI into income		
	Year ended Dec. 31,				Year ended Dec. 31,		
	2019	2018	2017		2019	2018	2017
Derivatives in net investment hedging relationships							
FX contracts	\$ (19)	\$ 535	\$ (625)	Net interest revenue	\$ —	\$ —	\$ —

The following table presents information on the hedged items in fair value hedging relationships.

Hedged items in fair value hedging relationships <i>(in millions)</i>	Carrying amount of hedged asset or liability		Hedge accounting basis adjustment increase (decrease) (a)	
	Dec. 31,		Dec. 31,	
	2019	2018	2019	2018
Available-for-sale securities (b)(c)	\$ 13,792	\$ 19,201	\$ 687	\$ (125)
Long-term debt	\$ 13,945	\$ 16,147	\$ 116	\$ (453)

(a) Includes \$53 million and \$- million of basis adjustment increases on discontinued hedges associated with available-for-sale securities at Dec. 31, 2019 and Dec. 31, 2018, respectively, and \$200 million and \$284 million of basis adjustment decreases on discontinued hedges associated with long-term debt at Dec. 31, 2019 and Dec. 31, 2018, respectively.

(b) Excludes hedged items where only foreign currency risk is the designated hedged risk, as the basis adjustments related to foreign currency hedges will not reverse through the consolidated income statement in future periods. The carrying amount excluded for available-for-sale securities was \$142 million at Dec. 31, 2019 and \$148 million at Dec. 31, 2018.

(c) Carrying amount represents the amortized cost.

The following table summarizes the notional amount and carrying values of our total derivative portfolio at Dec. 31, 2019 and Dec. 31, 2018.

Impact of derivative instruments on the balance sheet	Notional value		Asset derivatives fair value		Liability derivatives fair value	
	Dec. 31,		Dec. 31,		Dec. 31,	
	2019	2018	2019	2018	2019	2018
<i>(in millions)</i>						
Derivatives designated as hedging instruments: (a)(b)						
Interest rate contracts	\$ 28,365	\$ 35,890	\$ —	\$ 23	\$ 350	\$ 74
Foreign exchange contracts	8,390	6,330	21	266	257	14
Total derivatives designated as hedging instruments			\$ 21	\$ 289	\$ 607	\$ 88
Derivatives not designated as hedging instruments: (b)(c)						
Interest rate contracts	\$ 306,790	\$ 248,534	\$ 3,690	\$ 3,590	\$ 3,250	\$ 3,116
Foreign exchange contracts	848,961	831,730	5,331	4,807	5,340	5,215
Equity contracts	3,189	927	19	68	5	118
Credit contracts	165	150	—	—	4	1
Total derivatives not designated as hedging instruments			\$ 9,040	\$ 8,465	\$ 8,599	\$ 8,450
Total derivatives fair value (d)			\$ 9,061	\$ 8,754	\$ 9,206	\$ 8,538
Effect of master netting agreements (e)			(5,819)	(5,939)	(5,415)	(6,170)
Fair value after effect of master netting agreements			\$ 3,242	\$ 2,815	\$ 3,791	\$ 2,368

- (a) The fair value of asset derivatives and liability derivatives designated as hedging instruments is recorded as other assets and other liabilities, respectively, on the consolidated balance sheet.
- (b) For derivative transactions settled at clearing organizations, cash collateral exchanged is deemed a settlement of the derivative each day. The settlement reduces the gross fair value of derivative assets and liabilities and a corresponding decrease in the effect of master netting agreements, with no impact to the consolidated balance sheet.
- (c) The fair value of asset derivatives and liability derivatives not designated as hedging instruments is recorded as trading assets and trading liabilities, respectively, on the consolidated balance sheet.
- (d) Fair values are on a gross basis, before consideration of master netting agreements, as required by ASC 815, Derivatives and Hedging.
- (e) Effect of master netting agreements includes cash collateral received and paid of \$1,022 million and \$618 million, respectively, at Dec. 31, 2019, and \$809 million and \$1,040 million, respectively, at Dec. 31, 2018.

Trading activities (including trading derivatives)

Our trading activities are focused on acting as a market-maker for our customers, facilitating customer trades and risk mitigating economic hedging in compliance with the Volcker Rule. The change in the fair value of the derivatives utilized in our trading activities is recorded in foreign exchange and other trading revenue on the consolidated income statement.

The following table presents our foreign exchange and other trading revenue.

Foreign exchange and other trading revenue	Year ended Dec. 31,		
	2019	2018	2017
<i>(in millions)</i>			
Foreign exchange	\$ 577	\$ 663	\$ 638
Other trading revenue	77	69	30
Total foreign exchange and other trading revenue	\$ 654	\$ 732	\$ 668

Foreign exchange revenue includes income from purchasing and selling foreign currencies and currency forwards, futures and options. Other trading

revenue reflects results from trading in cash instruments including fixed income and equity securities and non-foreign exchange derivatives.

We also use derivative financial instruments as risk mitigating economic hedges, which are not formally designated as accounting hedges. This includes hedging the foreign currency, interest rate or market risks inherent in some of our balance sheet exposures, such as seed capital investments and deposits, as well as certain investment management fee revenue streams. We also use total return swaps to economically hedge obligations arising from the Company's deferred compensation plan whereby the participants defer compensation and earn a return linked to the performance of investments they select. The gains or losses on these total return swaps are recorded in staff expense on the consolidated income statement and were a gain of \$36 million in 2019, a loss of \$20 million in 2018 and a gain of \$26 million in 2017.

We manage trading risk through a system of position limits, a value-at-risk ("VaR") methodology based on historical simulation and other market sensitivity measures. Risk is monitored and reported to senior

management by a separate unit, independent from trading, on a daily basis. Based on certain assumptions, the VaR methodology is designed to capture the potential overnight pre-tax dollar loss from adverse changes in fair values of all trading positions. The calculation assumes a one-day holding period, utilizes a 99% confidence level and incorporates non-linear product characteristics. The VaR model is one of several statistical models used to develop economic capital results, which are allocated to lines of business for computing risk-adjusted performance.

VaR methodology does not evaluate risk attributable to extraordinary financial, economic or other occurrences. As a result, the risk assessment process includes a number of stress scenarios based upon the risk factors in the portfolio and management's assessment of market conditions. Additional stress scenarios based upon historical market events are also performed. Stress tests may incorporate the impact of reduced market liquidity and the breakdown of historically observed correlations and extreme scenarios. VaR and other statistical measures, stress testing and sensitivity analysis are incorporated in other risk management materials.

Counterparty credit risk and collateral

We assess credit risk of our counterparties through regular examination of their financial statements, confidential communication with the management of those counterparties and regular monitoring of publicly available credit rating information. This and other information is used to develop proprietary credit rating metrics used to assess credit quality.

Collateral requirements are determined after a comprehensive review of the credit quality of each counterparty. Collateral is generally held or pledged in the form of cash and/or highly liquid government securities. Collateral requirements are monitored and adjusted daily.

Additional disclosures concerning derivative financial instruments are provided in Note 20.

Disclosure of contingent features in OTC derivative instruments

Certain OTC derivative contracts and/or collateral agreements contain credit-risk contingent features triggered upon a rating downgrade in which the counterparty has the right to request additional

collateral or the right to terminate the contracts in a net liability position.

The following table shows the aggregate fair value of OTC derivative contracts in net liability positions that contained credit-risk contingent features and the value of collateral that has been posted.

<i>(in millions)</i>	Dec. 31,	
	2019	2018
Aggregate fair value of OTC derivatives in net liability positions (a)	\$ 3,442	\$ 2,877
Collateral posted	\$ 3,671	\$ 2,801

(a) Before consideration of cash collateral.

The aggregate fair value of OTC derivative contracts containing credit-risk contingent features can fluctuate from quarter to quarter due to changes in market conditions, composition of counterparty trades, new business or changes to the contingent features.

The Bank of New York Mellon, our largest banking subsidiary, enters into the substantial majority of our OTC derivative contracts and/or collateral agreements. As such, the contingent features may be triggered if The Bank of New York Mellon's long-term issuer rating was downgraded.

The following table shows the fair value of contracts falling under early termination provisions that were in net liability positions for three key ratings triggers.

Potential close-out exposures (fair value) (a)		
<i>(in millions)</i>	Dec. 31,	
	2019	2018
If The Bank of New York Mellon's rating changed to: (b)		
A3/A-	\$ 56	\$ 15
Baa2/BBB	\$ 608	\$ 116
Ba1/BB+	\$ 2,084	\$ 1,041

(a) The amounts represent potential total close-out values if The Bank of New York Mellon's long-term issuer rating were to immediately drop to the indicated levels, and do not reflect collateral posted.

(b) Represents rating by Moody's/S&P.

If The Bank of New York Mellon's debt rating had fallen below investment grade on Dec. 31, 2019 and Dec. 31, 2018, existing collateral arrangements would have required us to post additional collateral of \$63 million and \$100 million, respectively.

Offsetting assets and liabilities

The following tables present derivative and financial instruments and their related offsets. There were no derivative instruments or financial instruments subject to a legally enforceable netting agreement for which we are not currently netting.

Offsetting of derivative assets and financial assets at Dec. 31, 2019

<i>(in millions)</i>	Gross assets recognized	Gross amounts offset in the balance sheet (a)	Net assets recognized in the balance sheet	Gross amounts not offset in the balance sheet		Net amount
				Financial instruments	Cash collateral received	
Derivatives subject to netting arrangements:						
Interest rate contracts	\$ 2,394	\$ 1,792	\$ 602	\$ 207	\$ —	\$ 395
Foreign exchange contracts	4,861	4,021	840	44	—	796
Equity and other contracts	9	6	3	—	—	3
Total derivatives subject to netting arrangements	7,264	5,819	1,445	251	—	1,194
Total derivatives not subject to netting arrangements	1,797	—	1,797	—	—	1,797
Total derivatives	9,061	5,819	3,242	251	—	2,991
Reverse repurchase agreements	112,355	93,794 (b)	18,561	18,554	—	7
Securities borrowing	11,621	—	11,621	11,278	—	343
Total	\$ 133,037	\$ 99,613	\$ 33,424	\$ 30,083	\$ —	\$ 3,341

(a) Includes the effect of netting agreements and net cash collateral received. The offset related to the OTC derivatives was allocated to the various types of derivatives based on the net positions.

(b) Offsetting of reverse repurchase agreements relates to our involvement in the FICC, where we settle government securities transactions on a net basis for payment and delivery through the Fedwire system.

Offsetting of derivative assets and financial assets at Dec. 31, 2018

<i>(in millions)</i>	Gross assets recognized	Gross amounts offset in the balance sheet (a)	Net assets recognized in the balance sheet	Gross amounts not offset in the balance sheet		Net amount
				Financial instruments	Cash collateral received	
Derivatives subject to netting arrangements:						
Interest rate contracts	\$ 2,654	\$ 2,202	\$ 452	\$ 133	\$ —	\$ 319
Foreign exchange contracts	4,409	3,724	685	70	—	615
Equity and other contracts	38	13	25	—	—	25
Total derivatives subject to netting arrangements	7,101	5,939	1,162	203	—	959
Total derivatives not subject to netting arrangements	1,653	—	1,653	—	—	1,653
Total derivatives	8,754	5,939	2,815	203	—	2,612
Reverse repurchase agreements	112,245	76,040 (b)	36,205	36,205	—	—
Securities borrowing	10,588	—	10,588	10,286	—	302
Total	\$ 131,587	\$ 81,979	\$ 49,608	\$ 46,694	\$ —	\$ 2,914

(a) Includes the effect of netting agreements and net cash collateral received. The offset related to the OTC derivatives was allocated to the various types of derivatives based on the net positions.

(b) Offsetting of reverse repurchase agreements relates to our involvement in the FICC, where we settle government securities transactions on a net basis for payment and delivery through the Fedwire system.

Notes to Consolidated Financial Statements (continued)

Offsetting of derivative liabilities and financial liabilities at Dec. 31, 2019

<i>(in millions)</i>	Gross liabilities recognized	Gross amounts offset in the balance sheet	<i>(a)</i>	Net liabilities recognized in the balance sheet	Gross amounts not offset in the balance sheet		Net amount
					Financial instruments	Cash collateral pledged	
Derivatives subject to netting arrangements:							
Interest rate contracts	\$ 3,550	\$ 1,986		\$ 1,564	\$ 1,539	\$ —	\$ 25
Foreign exchange contracts	4,873	3,428		1,445	74	—	1,371
Equity and other contracts	5	1		4	2	—	2
Total derivatives subject to netting arrangements	8,428	5,415		3,013	1,615	—	1,398
Total derivatives not subject to netting arrangements	778	—		778	—	—	778
Total derivatives	9,206	5,415		3,791	1,615	—	2,176
Repurchase agreements	104,451	93,794	<i>(b)</i>	10,657	10,657	—	—
Securities lending	718	—		718	694	—	24
Total	\$ 114,375	\$ 99,209		\$ 15,166	\$ 12,966	\$ —	\$ 2,200

(a) Includes the effect of netting agreements and net cash collateral paid. The offset related to the OTC derivatives was allocated to the various types of derivatives based on the net positions.

(b) Offsetting of repurchase agreements relates to our involvement in the FICC, where we settle government securities transactions on a net basis for payment and delivery through the Fedwire system.

Offsetting of derivative liabilities and financial liabilities at Dec. 31, 2018

<i>(in millions)</i>	Gross liabilities recognized	Gross amounts offset in the balance sheet	<i>(a)</i>	Net liabilities recognized in the balance sheet	Gross amounts not offset in the balance sheet		Net amount
					Financial instruments	Cash collateral pledged	
Derivatives subject to netting arrangements:							
Interest rate contracts	\$ 3,144	\$ 2,508		\$ 636	\$ 547	\$ —	\$ 89
Foreign exchange contracts	4,747	3,626		1,121	187	—	934
Equity and other contracts	75	36		39	37	—	2
Total derivatives subject to netting arrangements	7,966	6,170		1,796	771	—	1,025
Total derivatives not subject to netting arrangements	572	—		572	—	—	572
Total derivatives	8,538	6,170		2,368	771	—	1,597
Repurchase agreements	84,665	76,040	<i>(b)</i>	8,625	8,625	—	—
Securities lending	997	—		997	937	—	60
Total	\$ 94,200	\$ 82,210		\$ 11,990	\$ 10,333	\$ —	\$ 1,657

(a) Includes the effect of netting agreements and net cash collateral paid. The offset related to the OTC derivatives was allocated to the various types of derivatives based on the net positions.

(b) Offsetting of repurchase agreements relates to our involvement in the FICC, where we settle government securities transactions on a net basis for payment and delivery through the Fedwire system.

Secured borrowings

The following table presents the contract value of repurchase agreements and securities lending transactions accounted for as secured borrowings by the type of collateral provided to counterparties.

Repurchase agreements and securities lending transactions accounted for as secured borrowings									
<i>(in millions)</i>	Dec. 31, 2019				Dec. 31, 2018				
	Remaining contractual maturity				Remaining contractual maturity				
	Overnight and continuous	Up to 30 days	30 days or more	Total	Overnight and continuous	Up to 30 days	30 days or more	Total	
Repurchase agreements:									
U.S. Treasury	\$ 94,788	\$ 10	\$ —	\$ 94,798	\$ 76,822	\$ —	\$ —	\$ 76,822	
U.S. government agencies	594	16	—	610	759	—	—	759	
Agency RMBS	4,234	774	—	5,008	3,184	—	4	3,188	
Corporate bonds	266	236	1,617	2,119	416	—	1,413	1,829	
Other debt securities	40	188	1,079	1,307	271	—	1,106	1,377	
Equity securities	31	99	479	609	163	—	527	690	
Total	\$ 99,953	\$ 1,323	\$ 3,175	\$ 104,451	\$ 81,615	\$ —	\$ 3,050	\$ 84,665	
Securities lending:									
U.S. government agencies	\$ 19	\$ —	\$ —	\$ 19	\$ 7	\$ —	\$ —	\$ 7	
Other debt securities	201	—	—	201	294	—	—	294	
Equity securities	498	—	—	498	696	—	—	696	
Total	\$ 718	\$ —	\$ —	\$ 718	\$ 997	\$ —	\$ —	\$ 997	
Total borrowings	\$ 100,671	\$ 1,323	\$ 3,175	\$ 105,169	\$ 82,612	\$ —	\$ 3,050	\$ 85,662	

BNY Mellon's repurchase agreements and securities lending transactions primarily encounter risk associated with liquidity. We are required to pledge collateral based on predetermined terms within the agreements. If we were to experience a decline in the fair value of the collateral pledged for these transactions, we could be required to provide additional collateral to the counterparty, therefore decreasing the amount of assets available for other liquidity needs that may arise. BNY Mellon also offers tri-party collateral agency services in the tri-party repo market where we are exposed to credit

risk. In order to mitigate this risk, we require dealers to fully secure intraday credit.

Note 24—Lines of business

We have an internal information system that produces performance data along product and service lines for our two principal businesses and the Other segment. The primary products and services and types of revenue for our principal businesses and a description of the Other segment are presented below.

Investment Services business

<i>Line of business</i>	<i>Primary products and services</i>	<i>Primary types of revenue</i>
Asset Servicing	Custody, accounting, ETF services, middle-office solutions, transfer agency, services for private equity and real estate funds, foreign exchange, securities lending, liquidity/lending services, prime brokerage and data analytics	- Asset servicing fees (includes securities lending revenue) - Foreign exchange revenue - Net interest revenue - Financing-related fees
Pershing	Clearing and custody, investment, wealth and retirement solutions, technology and enterprise data management, trading services and prime brokerage	- Clearing services fees - Net interest revenue
Issuer Services	Corporate Trust (trustee, administration and agency services and reporting and transparency) and Depositary Receipts (issuer services and support for brokers and investors)	- Issuer services fees - Net interest revenue - Foreign exchange revenue
Treasury Services	Integrated cash management solutions including payments, foreign exchange, liquidity management, receivables processing and payables management and trade finance and processing	- Treasury services fees - Net interest revenue
Clearance and Collateral Management	U.S. government clearing, global collateral management and tri-party repo	- Asset servicing fees - Net interest revenue

Investment Management business

<i>Line of business</i>	<i>Primary products and services</i>	<i>Primary types of revenue</i>
Asset Management	Diversified investment management strategies and distribution of investment products	- Investment management fees - Performance fees - Distribution and servicing fees
Wealth Management	Investment management, custody, wealth and estate planning and private banking services	- Investment management fees - Net interest revenue

Other segment

<i>Description</i>	<i>Primary types of revenue</i>
Includes leasing portfolio, corporate treasury activities, including our securities portfolio, derivatives and other trading activity, corporate and bank-owned life insurance, renewable energy investments and business exits	- Net interest revenue - Investment and other income - Net gain (loss) on securities - Other trading revenue

Business accounting principles

Our business data has been determined on an internal management basis of accounting, rather than the generally accepted accounting principles used for consolidated financial reporting. These measurement principles are designed so that reported results of the businesses will track their economic performance.

Business results are subject to reclassification when organizational changes are made. There were no significant organizational changes in 2019. The results are also subject to refinements in revenue and expense allocation methodologies, which are typically reflected on a prospective basis.

The accounting policies of the businesses are the same as those described in Note 1.

The results of our businesses are presented and analyzed on an internal management reporting basis.

- Revenue amounts reflect fee and other revenue generated by each business. Fee and other revenue transferred between businesses under revenue transfer agreements is included within other revenue in each business.
- Revenues and expenses associated with specific client bases are included in those businesses. For example, foreign exchange activity associated with clients using custody products is included in Investment Services.
- Net interest revenue is allocated to businesses based on the yields on the assets and liabilities generated by each business. We employ a funds transfer pricing system that matches funds with the specific assets and liabilities of each business based on their interest sensitivity and maturity characteristics.
- The provision for credit losses associated with the respective credit portfolios is reflected in each business segment.
- Incentives expense related to restricted stock is allocated to the businesses.
- Support and other indirect expenses, including services provided between segments that are not subject to a revenue transfer agreement, are allocated to businesses based on internally developed methodologies and reflected in noninterest expense.
- Recurring FDIC expense is allocated to the businesses based on average deposits generated within each business.
- Litigation expense is generally recorded in the business in which the charge occurs.
- Management of the securities portfolio is a shared service contained in the Other segment. As a result, gains and losses associated with the valuation of the securities portfolio are generally included in the Other segment.
- Client deposits serve as the primary funding source for our securities portfolio. We typically allocate all interest revenue to the businesses generating the deposits. Accordingly, accretion related to the portion of the securities portfolio restructured in 2009 has been included in the results of the businesses.
- Balance sheet assets and liabilities and their related income or expense are specifically assigned to each business. Businesses with a net liability position have been allocated assets.
- Goodwill and intangible assets are reflected within individual businesses.

The following consolidating schedules present the contribution of our businesses to our overall profitability.

For the year ended Dec. 31, 2019 <i>(dollars in millions)</i>	Investment Services	Investment Management	Other	Consolidated
Total fee and other revenue	\$ 8,894	\$ 3,466 <i>(a)</i>	\$ 888	\$ 13,248 <i>(a)</i>
Net interest revenue (expense)	3,093	255	(160)	3,188
Total revenue	11,987	3,721 <i>(a)</i>	728	16,436 <i>(a)</i>
Provision for credit losses	(16)	(1)	(8)	(25)
Noninterest expense	8,049	2,643	208	10,900
Income before income taxes	\$ 3,954	\$ 1,079 <i>(a)</i>	\$ 528	\$ 5,561 <i>(a)</i>
Pre-tax operating margin <i>(b)</i>	33%	29%	N/M	34%
Average assets	\$ 267,135	\$ 30,697	\$ 48,123	\$ 345,955

(a) Total fee and other revenue includes net income from consolidated investment management funds of \$30 million, representing \$56 million of income and income attributable to noncontrolling interests of \$26 million. Total revenue and income before income taxes are net of noncontrolling interests of \$26 million.

(b) Income before income taxes divided by total revenue.

For the year ended Dec. 31, 2018 <i>(dollars in millions)</i>	Investment Services	Investment Management	Other	Consolidated
Total fee and other revenue	\$ 8,926	\$ 3,781 (a)	\$ 85	\$ 12,792 (a)
Net interest revenue (expense)	3,372	303	(64)	3,611
Total revenue	12,298	4,084 (a)	21	16,403 (a)
Provision for credit losses	1	3	(15)	(11)
Noninterest expense	8,058	2,818	334	11,210 (b)
Income (loss) before income taxes	\$ 4,239	\$ 1,263 (a)	\$ (298)	\$ 5,204 (a)(b)
Pre-tax operating margin (c)	34%	31%	N/M	32%
Average assets	\$ 262,747	\$ 31,446	\$ 49,581	\$ 343,774

- (a) Total fee and other revenue include a net loss from consolidated investment management funds of \$1 million, representing \$13 million of losses and a loss attributable to noncontrolling interests of \$12 million. Total revenue and income before income taxes are net of a loss attributable to noncontrolling interests of \$12 million.
- (b) Noninterest expense and income before income taxes include a loss attributable to noncontrolling interests of \$1 million related to other consolidated subsidiaries.
- (c) Income before income taxes divided by total revenue.

For the year ended Dec. 31, 2017 <i>(dollars in millions)</i>	Investment Services	Investment Management	Other	Consolidated
Total fee and other revenue	\$ 8,527	\$ 3,668 (a)	\$ 7	\$ 12,202 (a)
Net interest revenue (expense)	3,058	329	(79)	3,308
Total revenue (loss)	11,585	3,997 (a)	(72)	15,510 (a)
Provision for credit losses	(7)	2	(19)	(24)
Noninterest expense	7,747	2,854	347	10,948 (b)
Income (loss) before income taxes	\$ 3,845	\$ 1,141 (a)	\$ (400)	\$ 4,586 (a)(b)
Pre-tax operating margin (c)	33%	29%	N/M	30%
Average assets	\$ 254,646	\$ 31,450	\$ 57,752	\$ 343,848

- (a) Total fee and other revenue includes net income from consolidated investment management funds of \$37 million, representing \$70 million of income and income attributable to noncontrolling interests of \$33 million. Total revenue and income before income taxes are net of noncontrolling interests of \$33 million.
- (b) Noninterest expense and income before income taxes include a loss attributable to noncontrolling interest of \$9 million related to other consolidated subsidiaries.
- (c) Income before taxes divided by total revenue.

Note 25—International operations

International activity includes Investment Services and Investment Management fee revenue generating businesses, foreign exchange trading activity, loans and other revenue producing assets and transactions in which the customer is domiciled outside of the United States and/or the international activity is resident at an international entity. Due to the nature of our international and domestic activities, it is not possible to precisely distinguish our international operations between internationally and domestically

domiciled customers. As a result, it is necessary to make certain subjective assumptions such as:

- Income from international operations is determined after internal allocations for interest revenue, taxes, expenses and provision for credit losses.
- Expense charges to international operations include those directly incurred in connection with such activities, as well as an allocable share of general support and overhead charges.

Total assets, total revenue, income before income taxes and net income of our international operations are shown in the table below.

International operations (in millions)	International						Total
	Europe, the Middle East and Africa	Asia-Pacific region	Other	Total International	Total Domestic	Total	
2019							
Total assets at period end (a)	\$ 74,504 (b)	\$ 36,347	\$ 2,636	\$ 113,487	\$ 268,021	\$ 381,508	
Total revenue	3,833 (b)	1,161	737	5,731	10,731	16,462	
Income before income taxes	1,447	548	506	2,501	3,086	5,587	
Net income	1,116	423	390	1,929	2,538	4,467	
2018							
Total assets at period end (a)	\$ 74,982 (b)	\$ 23,199	\$ 1,483	\$ 99,664	\$ 263,209	\$ 362,873	
Total revenue	4,252 (b)	1,103	684	6,039	10,353	16,392	
Income before income taxes	1,694	564	455	2,713	2,479	5,192	
Net income	1,345	448	361	2,154	2,100	4,254	
2017							
Total assets at period end (a)	\$ 88,490 (b)	\$ 20,676	\$ 1,737	\$ 110,903	\$ 260,855	\$ 371,758	
Total revenue	3,982 (b)	997	610	5,589	9,954	15,543	
Income before income taxes	1,497	538	296	2,331	2,279	4,610	
Net income	1,186	426	234	1,846	2,268	4,114	

(a) Total assets include long-lived assets, which are not considered by management to be significant in relation to total assets. Long-lived assets are primarily located in the U.S.

(b) Includes assets of approximately \$30.8 billion, \$30.6 billion and \$32.9 billion and revenue of approximately \$2.6 billion, \$2.6 billion and \$2.4 billion in 2019, 2018 and 2017, respectively, of international operations domiciled in the UK, which is 8%, 8% and 9% of total assets and 16%, 16% and 15% of total revenue, respectively.

Note 26—Supplemental information to the Consolidated Statement of Cash Flows

Non-cash investing and financing transactions that, appropriately, are not reflected in the consolidated statement of cash flows are listed below.

Non-cash investing and financing transactions (in millions)	Year ended Dec. 31,		
	2019	2018	2017
Transfers from loans to other assets for other real estate owned	\$ 2	\$ 2	\$ 3
Change in assets of consolidated investment management funds	16	268	500
Change in liabilities of consolidated investment management funds	1	—	313
Change in nonredeemable noncontrolling interests of consolidated investment management funds	1	215	302
Securities purchased not settled	497	227	112
Securities sold not settled	—	187	587
Securities matured not settled	—	—	70
Available-for-sale securities transferred to trading assets	—	963	—
Held-to-maturity securities transferred to available-for-sale	—	1,087	74
Premises and equipment/capitalized software funded by finance lease obligations	14	26	347
Premises and equipment/operating lease obligations	1,754 (a)	—	—
Investment redemptions not settled	20	—	—

(a) Includes \$1,244 million related to the adoption of ASU 2016-02, Leases, and \$510 million related to new or modified leases.

To the Shareholders and Board of Directors
The Bank of New York Mellon Corporation:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of The Bank of New York Mellon Corporation and subsidiaries (BNY Mellon) as of December 31, 2019 and 2018, the related consolidated statements of income, comprehensive income, cash flows, and changes in equity for each of the years in the three-year period ended December 31, 2019, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of BNY Mellon as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the years in the three-year period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), BNY Mellon's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated February 27, 2020 expressed an unqualified opinion on the effectiveness of BNY Mellon's internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of BNY Mellon's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to BNY Mellon 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 audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audits 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. We believe that our audits provide a reasonable basis for our opinion.

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: (1) relate to accounts or disclosures that are material to the consolidated financial statements and (2) 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.

Assessment of the quantitative component of the allowance for loan losses and the allowance for lending-related commitments related to higher risk-rated credits and pass rated credits

As discussed in Notes 1 and 5 to the consolidated financial statements, BNY Mellon's allowance for loan losses, shown as a valuation allowance to loans, and the allowance for lending-related commitments recorded in other liabilities are referred to as BNY Mellon's allowance for credit losses (ACL). BNY Mellon utilizes a quantitative methodology and qualitative framework for determining the ACL. The quantitative component of the ACL consists of the following three elements: (1) an allowance for impaired credits of \$1 million or greater; (2) an allowance for higher risk-rated credits and pass rated credits; and (3) an allowance for residential mortgage loans. At December 31, 2019, BNY Mellon had an allowance for loan losses of \$122 million and an allowance for lending-related commitments of \$94 million.

We identified the assessment of the quantitative component of the ACL related to higher risk-rated credits and pass rated credits as a critical audit matter because of the complexity and significant auditor judgment involved. Specifically, this assessment included an evaluation of the methodologies used to estimate the probability of default and loss given default, and their key factors and assumptions, including portfolio segmentation, look-back period, historical data (both internal and external proxy data, as applicable), and loss emergence period utilized; model design and performance; and credit risk-ratings.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over BNY Mellon's process to: develop and approve the methodologies, determine the key factors and assumptions, assess credit risk-ratings, compute, and approve the estimate in total. We assessed the methodologies and related model design and performance and evaluated the aforementioned key factors and assumptions. We performed a trend analysis for the most recent 3 years over the past due loans and nonperforming assets and investigated any fluctuations outside of certain thresholds. We involved credit risk professionals with specialized skills and knowledge who assisted in:

- evaluating BNY Mellon's methodology for compliance with U.S. generally accepted accounting principles, the credit exposure classifications, the model, and the factors and assumptions; and
- assessing the credit risk-ratings on a selection of credits.

Assessment of the identification and measurement of accruals for litigation and regulatory contingencies

As discussed in Note 22 to the consolidated financial statements, BNY Mellon establishes accruals for litigation and regulatory matters when those matters present loss contingencies that are both probable and reasonably estimable. BNY Mellon has disclosed that for those matters described where BNY Mellon is able to estimate reasonably possible losses, the aggregate range of such reasonably possible losses at December 31, 2019 is up to \$990 million in excess of the accrued liability (if any) related to those matters.

We identified the assessment of the identification and measurement of BNY Mellon's accruals for litigation and regulatory contingencies as a critical audit matter because of the measurement uncertainty and the subjective and complex auditor judgment required to evaluate the sufficiency of audit evidence obtained. Specifically, this assessment included the evaluation of the subjective estimates used to determine the range of possible exposure and the probability of the predicted outcome based on the particular facts and circumstances at issue in each of the matters.

The primary procedures we performed to address this critical audit matter included the following. We tested certain internal controls over BNY Mellon's process to identify, evaluate and measure accruals for litigation and regulatory contingencies and the reasonably possible losses. We performed inquiries of BNY Mellon to gain an understanding of any asserted or unasserted litigation, claims and assessments, and significant changes in individual accruals for litigation and regulatory contingencies. We performed inquiries of BNY Mellon's regulators and examined regulatory reports to gain an understanding of developments of regulatory activity and related matters that may result in the assessment of regulatory fines or penalties. We obtained and read letters received directly from BNY Mellon's external and internal legal counsel that described and evaluated BNY Mellon's probable or reasonably possible monetary exposure to legal proceedings. For cases that have settled, we performed back-testing analyses of BNY Mellon's litigation and regulatory contingency accruals recorded compared to amounts paid. We assessed the accrual for litigation and regulatory contingencies and evaluated the information included within the disclosures.

/s/ KPMG LLP

We have served as BNY Mellon's auditor since 2007.

New York, New York
February 27, 2020

Directors, Executive Committee and Other Executive Officers

Effective February 27, 2020

Directors

Linda Z. Cook

Partner and Managing Director of
EIG Global Energy Partners, an investment firm,
and Chief Executive Officer of Harbour
Energy, Ltd., an energy investment vehicle

Joseph J. Echevarria

Chairman
The Bank of New York Mellon Corporation
Retired Chief Executive Officer of
Deloitte LLP
Global provider of audit, consulting, financial
advisory, risk management, tax and related
services

Thomas P. (Todd) Gibbons

Interim Chief Executive Officer
The Bank of New York Mellon Corporation

Jeffrey A. Goldstein

Chairman, SpringHarbor Holding Company LLC,
a financial services advisor and investor; Advisor
Emeritus, Hellman & Friedman LLC, a private
equity firm; and Senior Advisor, Canapi Ventures,
a venture capital fund

Edmund F. (Ted) Kelly

Retired Chairman of
Liberty Mutual Group
Multi-line insurance company

Jennifer B. Morgan

Co-Chief Executive Officer
SAP SE
Global software company

Elizabeth E. Robinson

Retired Global Treasurer of
The Goldman Sachs Group, Inc.
Global financial services company

Samuel C. Scott III

Retired Chairman, President and
Chief Executive Officer of
Ingredion Incorporated (formerly Corn
Products International, Inc.)
Global ingredient solutions provider

Alfred W. (Al) Zollar

Executive Partner at
Siris Capital Group, LLC
Private equity firm

Executive Committee and Other Executive Officers

Jolen Anderson *

Global Head of Human Resources

Paul Camp

Chief Executive Officer, Treasury Services

James T. Crowley

Chief Executive Officer, Pershing

Bridget E. Engle *

Chief Information Officer

Thomas P. (Todd) Gibbons *

Interim Chief Executive Officer

Mitchell E. Harris *

Chief Executive Officer, Investment Management

Hani A. Kablawi *

Head of International and Chairman, Europe,
Middle East and Africa

Catherine Keating

Chief Executive Officer, Wealth Management

Senthil Kumar *

Chief Risk Officer

Kurtis R. Kurimsky *

Corporate Controller

Francis (Frank) La Salla *

Chief Executive Officer, Issuer Services

J. Kevin McCarthy *

General Counsel

Lester J. Owens *

Head of Operations

Roman Regelman *

Head of Asset Servicing and Digital

Brian Ruane

Chief Executive Officer, BNY Mellon
Government Securities Services Corp. and
Clearance & Collateral Management

Michael P. Santomassimo *

Chief Financial Officer

Akash A. Shah *

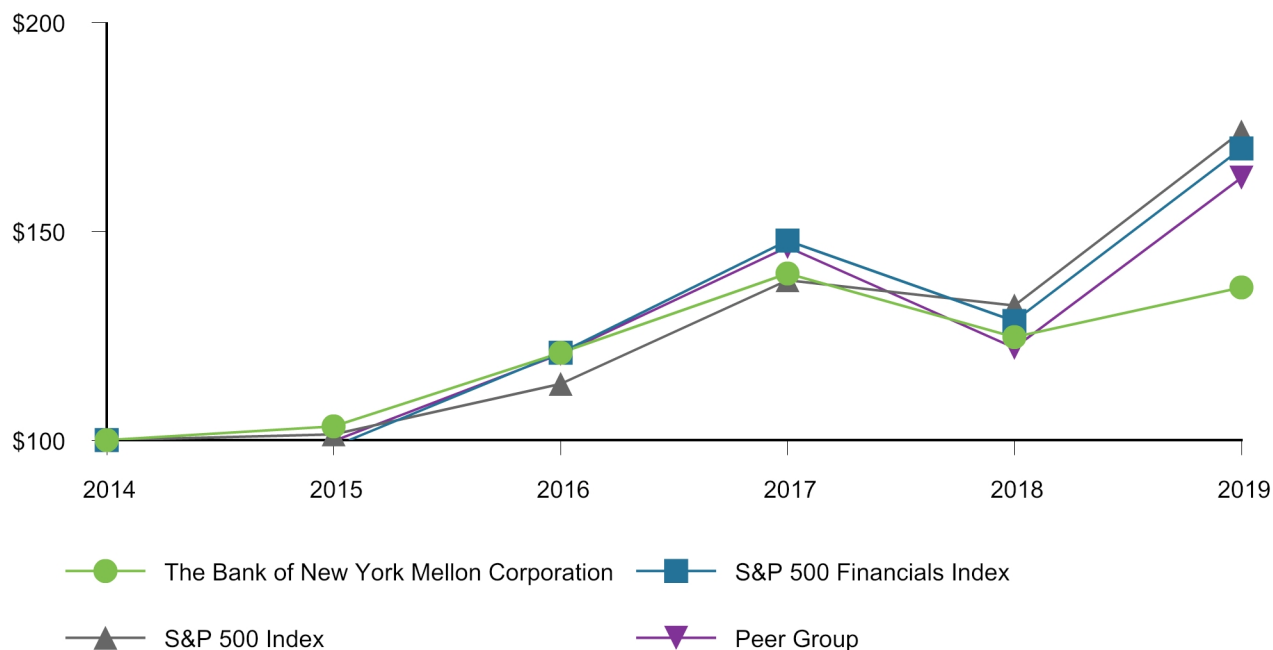
Head of Strategy and Global Client Management

James S. Wiener

Head of Balance Sheet and Capital Strategy

* Designated as an Executive Officer.

Cumulative Total Shareholder Return (5 Years)



Cumulative shareholder returns (a) (in dollars)	Dec. 31,					
	2014	2015	2016	2017	2018	2019
The Bank of New York Mellon Corporation	\$ 100.0	\$ 103.3	\$ 120.9	\$ 139.9	\$ 124.7	\$ 136.6
S&P 500 Financials Index	100.0	98.5	120.9	147.8	128.5	169.8
S&P 500 Index	100.0	101.4	113.5	138.3	132.2	173.9
Peer Group	100.0	99.8	120.7	146.2	122.1	162.8

(a) Returns are weighted by market capitalization at the beginning of the measurement period.

This graph shows The Bank of New York Mellon Corporation’s cumulative total shareholder returns over the five-year period from Dec. 31, 2014 to Dec. 31, 2019. Our peer group is composed of financial services companies which provide investment management and investment servicing. We also utilize the S&P 500 Financials Index as a benchmark against our performance. The graph shows the cumulative total returns for the same five-year period of the S&P 500 Financials Index, the S&P 500 Index as well as our peer group listed below. The comparison assumes a \$100 investment on Dec. 31, 2014 in The Bank of New York Mellon Corporation common stock, in the S&P 500 Financials Index, in the S&P 500 Index and in the peer group detailed below and assumes that all dividends were reinvested.

Peer Group

BlackRock, Inc.	Morgan Stanley	State Street Corporation
The Charles Schwab Corporation	Northern Trust Corporation	U.S. Bancorp
Franklin Resources, Inc.	The PNC Financial Services Group, Inc.	Wells Fargo & Company
JPMorgan Chase & Co.	Prudential Financial, Inc.	