

Northern Trust Corporation

Pillar 3 Regulatory Disclosures

As of and for the three months ended March 31, 2023



Northern Trust Corporation

PILLAR 3 REGULATORY DISCLOSURES

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Introduction

Northern Trust Corporation (the “Corporation”) is a leading provider of wealth management, asset servicing, asset management and banking solutions to corporations, institutions, families and individuals. The Corporation focuses on managing and servicing client assets through its two client-focused reporting segments: Asset Servicing and Wealth Management. Asset management and related services are provided to Asset Servicing and Wealth Management clients primarily by the Asset Management business. The Corporation conducts business through various U.S. and non-U.S. subsidiaries, including through its principal subsidiary, The Northern Trust Company (the “Bank”). As of March 31, 2023, the Corporation had consolidated total assets of \$151.1 billion and stockholders’ equity of \$11.6 billion.

The Corporation is a bank holding company that has elected to be a financial holding company under the Bank Holding Company Act of 1956, as amended. Consequently, the Corporation and its business activities throughout the world are subject to the supervision, examination, and regulation of the Board of Governors of the Federal Reserve System (the “Federal Reserve”). The Federal Reserve has established risk-based and leverage capital guidelines for bank holding companies, including the Corporation. As discussed below, on July 2, 2013, the Federal Reserve issued final rules implementing a strengthened set of capital requirements, known as Basel III, in the United States.

The Basel Capital Framework, as described below, requires disclosures based on the third pillar of Basel III (“Pillar 3”). The purpose of Pillar 3 disclosures is to provide information on banking institutions’ regulatory capital and risk management practices. This report is designed to satisfy these requirements and should be read in conjunction with the Corporation’s Quarterly Report on Form 10-Q as of and for the three months ended March 31, 2023 (the “First Quarter 2023 Form 10-Q”) and the Corporation’s Annual Report on Form 10-K as of and for the year ended December 31, 2022 (the “2022 Annual Report”).

Except where the context otherwise requires, when we use the terms “Northern Trust,” “we,” “us,” and “our,” we mean Northern Trust Corporation and its subsidiaries on a consolidated basis. The basis of consolidation used for regulatory reporting is consistent with that used under U.S. generally accepted accounting principles (“GAAP”).

- Refer to Note 1, starting on page 33, within the Corporation’s First Quarter 2023 Form 10-Q and Note 1, starting on page 93, within the Corporation’s 2022 Annual Report for further information on the basis of presentation of the Corporation’s financial statements.

Measures of exposures and other metrics disclosed in this report may not be based on GAAP, may not be directly comparable to measures reported in our First Quarter 2023 Form 10-Q or 2022 Annual Report and may not be comparable to similar measures used by other companies. These disclosures are not required to be, and have not been, audited by our independent auditors. Our historical filings with the U.S. Securities and Exchange Commission (the “SEC”) and other regulatory disclosure documents are located in the Investor Relations section of our website at www.northerntrust.com.

Forward-Looking Statements

This document may include statements which constitute “forward-looking statements” within the meaning of the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Forward-looking statements are identified typically by words or phrases such as “believe,” “expect,” “anticipate,” “intend,” “estimate,” “project,” “likely,” “plan,” “goal,” “target,” “strategy,” and similar expressions or future or conditional verbs such as “may,” “will,” “should,” “would,” and “could.” Forward-looking statements include statements, other than those related to historical facts, that relate to Northern Trust’s financial results and outlook; capital adequacy; dividend policy and share repurchase program; credit quality including allowance levels; anticipated expense levels; contingent liabilities; acquisitions; strategies; market and industry trends; and expectations regarding the impact of legislation. These statements are based on Northern Trust’s current beliefs and expectations of future events or future results, and involve risks and uncertainties that are difficult to predict and subject to change. These statements are also based on assumptions about many important factors, including the factors discussed in Northern Trust’s most recent annual report on Form 10-K and other filings with the U.S. Securities and Exchange Commission, all of which are available on Northern Trust’s website. We caution you not to place undue reliance on any forward-looking statement as actual results may differ materially from those expressed or implied by forward-looking statements. Northern Trust assumes no obligation to update its forward-looking statements.

Basel Capital Framework

On September 12, 2010, the Group of Governors and Heads of Supervision, the oversight body of the International Basel Committee on Banking Supervision, announced agreement on the calibration and phase-in arrangements for the Basel III capital requirements. On July 2, 2013, the Federal Reserve issued final rules implementing Basel III capital requirements in the United States. The U.S. implementation of Basel III, among other things: (1) increased the minimum capital thresholds for banking organizations and tightened the standards for what qualifies as capital; (2) introduced a new common equity Tier 1 capital measure; and (3) presented two methodologies for calculating risk-weighted assets, a standardized approach and an advanced approach. For large and internationally active banks and bank holding companies, including the Bank and the Corporation, Basel III became effective on January 1, 2014, although certain requirements continue to be phased in.

The Basel capital framework seeks the alignment of capital requirements with the underlying risks a bank faces and consists of the following three complementary “pillars” designed to reinforce the safety and soundness of the financial system.

Pillar 1 — Minimum Capital Requirements

Pillar 1 provides a framework for calculating minimum regulatory capital requirements. Pillar 1 consists of three risk types: credit risk, operational risk and market risk.

Pillar 2 — Supervisory Review

Pillar 2 addresses the need for banks to consider all material risks and determine the level of capital required to remain solvent during extreme circumstances and requires banks to have sound internal capital adequacy assessment processes. The internal capital adequacy assessment process includes setting objectives for capital that are consistent with the bank’s risk profile and the control environment in which it operates.

Pillar 3 — Risk Disclosure and Market Discipline

Pillar 3 requires qualitative and quantitative descriptions of capital structure, capital adequacy, internal control processes, risk management and the nature of underlying risks. The purpose of Pillar 3 disclosures is to provide public information on banking institutions’ regulatory capital and risk management practices.

Capital Structure

Regulatory Capital

Under a provision of the Dodd-Frank Wall Street Reform and Consumer Protection Act, Northern Trust is subject to a capital floor that is based on the Basel standardized approach. We are, therefore, required to calculate our risk-based capital ratios under both the standardized and advanced approaches, and we are subject to the more stringent of the risk-based capital ratios as calculated under the standardized approach and the advanced approach in the assessment of our capital adequacy under the prompt corrective action framework. The Corporation's capital ratios as of March 31, 2023, are shown in the following table.

Table 1: Northern Trust Corporation Capital Ratios

(\$ In Millions)	As of March 31, 2023	
	Basel Standardized	Basel Advanced
Regulatory Capital		
Common Equity Tier 1 Capital	\$ 9,875	\$ 9,875
Tier 1 Capital	10,731	10,731
Total Capital	12,589	12,378
Assets		
Risk-Weighted Assets	\$ 87,227	\$ 84,457
Average Adjusted Total Assets	147,160	147,160
Supplementary Leverage Exposure	N/A	129,158
Capital Ratios		
Common Equity Tier 1 Capital	11.3 %	11.7 %
Tier 1 Capital	12.3 %	12.7 %
Total Capital	14.4 %	14.7 %
Tier 1 Leverage	7.3 %	7.3 %
Supplementary Leverage ^(a)	N/A	8.3 %

(a) Refer to the Supplementary Leverage section commencing on page 9 for details on rule changes implemented during the second quarter of 2020 impacting the calculation of the supplementary leverage ratio.

The Common Equity Tier 1 Capital ratio is defined as Common Equity Tier 1 Capital divided by risk-weighted assets; the Tier 1 Capital ratio is defined as Tier 1 Capital divided by risk-weighted assets; and the Total Capital ratio is defined as Total Capital divided by risk-weighted assets. The Tier 1 Leverage ratio is defined as Tier 1 Capital divided by average adjusted total assets (which includes adjustments for goodwill and identifiable intangible assets). The Supplementary Leverage ratio is defined as Tier 1 Capital divided by supplementary leverage exposure.

Northern Trust is required to maintain minimum ratios of capital to risk-weighted assets and adjusted quarterly average assets, the current ratios of which are as shown in the following table.

Table 2: Capital Requirements

As of March 31, 2023					
	Northern Trust Corporation		The Northern Trust Company		
	Well-Capitalized Ratios	Minimum Capital Ratios	Well-Capitalized Ratios	Minimum Capital Ratios	Capital Ratios
Capital Ratios					
Common Equity Tier 1 Capital	N/A	4.5 %	6.5 %		4.5 %
Tier 1 Capital	6.0 %	6.0 %	8.0 %		6.0 %
Total Capital	10.0 %	8.0 %	10.0 %		8.0 %
Tier 1 Leverage	N/A	4.0 %	5.0 %		4.0 %
Supplementary Leverage	N/A	3.0 %	3.0 %		3.0 %

Effective January 1, 2016, the Basel III capital requirements established a capital conservation buffer and a countercyclical capital buffer above the regulatory minimum capital ratio requirements. The capital conservation buffer is designed to absorb losses during economic stress and applies to all banking organizations. Northern Trust must maintain capital ratios in excess of the minimum capital requirements, as expanded by these buffers, in order to avoid limitations on capital distributions, including dividend payments, as well as on certain discretionary bonus payments to executive officers.

On March 4, 2020, the Federal Reserve issued a final rule that simplified its capital and stress testing frameworks and effectively incorporated the capital conservation buffer into a new stress capital buffer (“SCB”) requirement for the Basel standardized approach. The SCB requirement for each subject financial institution is based upon the results of certain supervisory stress tests conducted in conjunction with the Federal Reserve’s annual Comprehensive Capital Analysis and Review (“CCAR”) exercise. Based upon these results, Northern Trust’s SCB requirement was set at 2.5%, effective October 1, 2020, and resulted in an effective Common Equity Tier 1 Capital ratio minimum requirement of 7.0% inclusive of this buffer. The 2022 CCAR exercise, published by the Federal Reserve on June 23, 2022, resulted in Northern Trust’s SCB requirement of 2.5% remaining in effect for the 2022 Capital Plan cycle, beginning on October 1, 2022, with the effective Common Equity Tier 1 Capital ratio minimum requirement of 7.0% inclusive of this buffer, each of which was unchanged from 2021.

The countercyclical capital buffer is currently set to zero by the Federal Reserve and other U.S. federal banking agencies.

The aggregate capital conservation buffer rates applicable to Northern Trust are reflected in the table below.

Table 3: Prescribed Regulatory Capital Buffers

As of March 31, 2023				
	Northern Trust Corporation		The Northern Trust Company	
	Basel Approaches			
	Standardized	Advanced	Standardized	Advanced
Capital Conservation Buffer	N/A	2.5%	2.5%	2.5%
Stress Capital Buffer	2.5%	N/A	N/A	N/A
Total Capital Conservation Buffer	2.5%	2.5%	2.5%	2.5%
Countercyclical Capital Buffer	—%	—%	—%	—%

Northern Trust is not subject to any limitation on capital distributions related to the capital conservation and countercyclical capital buffers as its capital ratios exceed all minimum capital requirements, including requirements as expanded by the capital conservation buffer and the countercyclical capital buffer. Capital distributions for institutions that do not exceed these ratio requirements would be limited to between 0% and 60% of total eligible retained income.

At March 31, 2023, eligible retained income, defined as the greater of net income for the preceding four calendar quarters net of any capital distributions not reflected within net income or the average net income over the preceding four calendar quarters, was \$513.3 million and \$1.3 billion for Northern Trust Corporation and The Northern Trust Company, respectively.

For regulatory purposes, Northern Trust's capital is classified into Common Equity Tier 1 Capital, Tier 1 Capital and Tier 2 Capital.

The table below presents the components of the Corporation's regulatory capital as defined under Basel III as of March 31, 2023.

Table 4: Components of Regulatory Capital

(\$ In Millions)	As of March 31, 2023	
	Basel Standardized	Basel Advanced
Regulatory Capital		
Common Stock and Related Surplus, net of Treasury Stock	\$ (1,889)	\$ (1,889)
Retained Earnings	13,958	13,958
Accumulated Other Comprehensive Income	(1,366)	(1,366)
Common Stockholders' Equity	\$ 10,703	\$ 10,703
Adjustments for:		
Goodwill and Other Intangible Assets (Net of deferred tax liability)	(722)	(722)
Other	(106)	(106)
Common Equity Tier 1 Capital	\$ 9,875	\$ 9,875
Preferred Stock	885	885
Other	(29)	(29)
Tier 1 Capital	\$ 10,731	\$ 10,731
Long-Term Debt ^(a)	1,647	1,647
Floating Rate Capital Securities	—	—
Allowance for Credit Losses	211	—
Other	—	—
Total Capital	\$ 12,589	\$ 12,378

(a) Long-term debt instruments that qualify for inclusion in Tier 2 capital are reduced by 20% of the original amount during the last five years of their tenor.

- Refer to Note 13, starting on page 133, Note 14, starting on page 134, and Note 15, starting on page 136, to the consolidated financial statements included within the Corporation's 2022 Annual Report for the terms and conditions of the main features of all regulatory capital instruments.

Risk-Weighted Assets

The following table presents Northern Trust's risk-weighted assets by exposure type calculated under Basel III methodologies using the U.S. capital rules' risk weighting as of March 31, 2023.

Table 5: Risk-Weighted Assets

(\$ In Millions)	As of March 31, 2023	
	Basel Standardized	Basel Advanced
Wholesale Exposures	\$ 73,471	\$ 55,857
Securitization Exposures	1,264	1,340
Equity Exposures	2,335	2,475
Other Assets	10,087	6,086
Credit Valuation Adjustment ^(a)	N/A	913
Total Credit Risk-Weighted Assets	\$ 87,157	\$ 66,671
Operational Risk-Weighted Assets ^(b)	N/A	\$ 17,716
Market Risk-Weighted Assets	\$ 70	\$ 70
Total Risk-Weighted Assets	\$ 87,227	\$ 84,457

(a) The credit valuation adjustment is included only in the Basel III Advanced calculations.

(b) Operational risk-weighted assets are included only in the Basel III Advanced calculations and are the result of the Advanced Measurement Approach ("AMA"), which is described in the Operational Risk section.

For credit risk, the Basel III Standardized risk-weighted assets reflect prescribed regulatory risk-weights, while the Basel III Advanced risk-weighted assets reflect the results of the Advanced Internal Ratings Based approach ("AIRB"), which is described in the Credit Risk section. The Basel III approach includes capital requirements for credit risk, market risk, and in the case of the Basel III Advanced approach, operational risk. Operational risk is further discussed in the Operational Risk section. Market risk-weighted assets are calculated based on the final Market Risk Rule approved by the Federal Reserve in June 2012, and are identical for both the standardized and advanced approaches. Market risk is further discussed in the Market Risk section. Risk-weighted assets as calculated under the advanced approaches may show variability over time due to changes in data, methodology, models, regulatory guidance or other items.

Supplementary Leverage Ratio

The Supplementary Leverage ratio is defined as Tier 1 Capital divided by supplementary leverage exposure. The tables below present the components of the Corporation's Supplementary Leverage ratio ("SLR") as of March 31, 2023. Line items reflecting components of SLR that are not relevant to the Corporation have been omitted.

The Federal Reserve and other U.S. federal banking agencies adopted a final rule (the "Custodial Bank Deduction"), effective April 1, 2020, that established a deduction for central bank deposits from the total leverage exposures of custodial banking organizations, including Northern Trust, equal to the lesser of (i) the total amount of funds the custodial banking organization and its consolidated subsidiaries have on deposit at qualifying central banks and (ii) the total amount of client funds on deposit at the custodial banking organization that are linked to fiduciary or custodial and safekeeping accounts. As a result, Northern Trust is permitted to exclude certain central bank deposits from leverage exposure used in the SLR calculation.

Table 6: Summary Comparison of Accounting Assets and Total Leverage Exposure

(\$ In Millions)		As of March 31, 2023	
Line No.			
1	Total Consolidated Assets	\$	151,108
4	Adjustment for Derivatives Exposures		3,905
5	Adjustment for Repo-Style Transactions		22
6	Adjustment for Off-Balance-Sheet Exposures		14,741
7.a.	Adjustment for Custodial Bank Deduction		(36,670)
7.b.	Other Adjustments		(857)
7.c.	Adjustments for Frequency Calculations ^(a)		(3,091)
8	Total Leverage Exposures	\$	129,158

(a) In accordance with the applicable regulation, total consolidated assets are reported as quarter-end balances. Other line items in Table 6 are reported as average balances for the quarter measured on a daily averaging basis. To account for this timing difference, a frequency adjustment has been included.

Table 7: Supplementary Leverage Ratio

(\$ In Millions)		As of March 31, 2023	
Line No.			
On-Balance-Sheet Exposures			
1	On-Balance-Sheet Assets ^(a)	\$	145,759
2.a.	LESS: Custodial Bank Deduction ^(b)		(36,670)
2.b.	LESS: Other Amounts Deducted from Tier 1 Capital		(857)
3	Total On-Balance-Sheet Exposures ^(a)	\$	108,232
Derivative Exposures			
4	Replacement Cost for Derivative Exposures, net of cash variation margin		1,474
5	Add-on Amounts for Potential Future Exposure ("PFE") for Derivative Exposures		3,643
11	Total Derivative Exposures	\$	5,117
Repo-Style Transactions			
12	On-Balance-Sheet Assets for Repo-Style Transactions		1,046
14	Counterparty Credit Risk for All Repo-Style Transactions		22
16	Total Exposures for Repo-Style Transactions	\$	1,068
Other Off-Balance-Sheet Exposures			
17	Off-Balance-Sheet Exposures at Gross Notional Amounts		32,944
18	LESS: Adjustments for Conversion to Credit Equivalent Amounts		(18,203)
19	Total Off-Balance-Sheet Exposures	\$	14,741
Capital and Total Leverage Exposure			
20	Tier 1 Capital	\$	10,731
21	Total Leverage Exposure	\$	129,158
Supplementary Leverage Ratio			
22	Supplementary Leverage Ratio		8.3%

(a) Excluding on-balance-sheet assets for repo-style transactions and derivative exposures, but including cash collateral received

(b) As contemplated by 12 CFR 217.10

The Northern Trust Company

The Bank is an Illinois banking corporation headquartered in Chicago, Illinois, and, as discussed above, is our principal subsidiary. Founded in 1889, the Bank conducts its business through its U.S. operations and its various U.S. and non-U.S. branches and subsidiaries. At March 31, 2023, the Bank had consolidated assets of \$150.6 billion and equity capital of \$11.4 billion.

It is expected that the Bank will continue to be the major source of the Corporation's consolidated assets, revenues and net income in the foreseeable future.

The Bank's capital ratios as of March 31, 2023, are shown in the following table.

Table 8: The Northern Trust Company Capital Ratios

The Northern Trust Company As of March 31, 2023		
	Basel Standardized	Basel Advanced
Capital Ratios		
Common Equity Tier 1 Capital	12.3 %	12.9 %
Tier 1 Capital	12.3 %	12.9 %
Total Capital	14.2 %	14.6 %
Tier 1 Leverage	7.3 %	7.3 %
Supplementary Leverage ^(a)	N/A	8.3 %

(a) Refer to the Supplementary Leverage section commencing on page 9 for details on rule changes implemented during the second quarter of 2020 impacting the calculation of the supplementary leverage ratio.

The Corporation's subsidiary banks located outside the U.S. are also subject to regulatory capital requirements in the jurisdictions in which they operate. As of March 31, 2023, each of Northern Trust's subsidiaries, including the Bank, had capital ratios above their specified minimum requirements.

- Refer to Note 31, starting on page 162, to the consolidated financial statements included within the Corporation's 2022 Annual Report for a description of restrictions on transactions between the Corporation and its subsidiaries.

Capital Adequacy

One of Northern Trust's primary objectives is to maintain a strong capital position to merit the confidence of clients, counterparties, creditors, regulators and stockholders. A strong capital position helps Northern Trust execute its strategies and withstand unforeseen adverse developments.

In addition to the risk management organization and activities described below in the Risk Management Overview section, Northern Trust manages its capital on both a consolidated and legal entity basis. The Capital Committee is responsible for measuring and managing the Corporation's and Bank's capital ratios against levels set forth within the Capital Policy approved by the Capital Governance Committee of the Board of Directors.

Senior management, with oversight from the Capital Governance Committee of the Board of Directors and the full Board of Directors, is responsible for capital management and planning. Northern Trust's capital adequacy assessment process, overseen by the Capital Committee, provides the framework for evaluating the adequacy of capital levels against capital requirements for both the current and projected periods given its risk profile and business growth objectives. The capital adequacy assessment process contains three main components:

- assessing required capital needs for risks that can be reliably quantified;
- understanding the sensitivity of Northern Trust's earnings, balance sheet, risk-weighted assets and capital ratios to current or potential changes in Northern Trust's risk profile and/or economic conditions; and
- evaluating the potential impact of all material risks on Northern Trust's capital position, and its resulting ability to meet its capital management objectives under a wide range of scenarios, including severely stressful conditions.

The stress scenarios included in Northern Trust's capital adequacy assessments are developed with consideration given to Northern Trust's risk profile, key vulnerabilities, business activities and strategic plans, and can include both stressed macroeconomic conditions and idiosyncratic loss events. Northern Trust's capital adequacy assessments are approved by the Capital Governance Committee of the Board of Directors quarterly, support the annual Capital Plan and are coordinated closely with the liquidity risk management processes.

Risk Management Overview

Northern Trust employs an integrated risk management framework to enable a risk informed profile and support its business decisions and the execution of its corporate strategies. The framework provides a methodology to identify, manage, report and govern both internal and external risks to Northern Trust, and promotes a culture of risk awareness and good conduct across the organization. Northern Trust's risk culture encompasses the general awareness, attitude and conduct of employees with respect to risk and the management of risk across all lines of defense within the organization. Northern Trust cultivates a culture of effective risk management by defining and embedding risk management accountabilities in all employee performance expectations and provides training, development and performance rewards to reinforce this culture.

Northern Trust's risk management framework contains three inter-related elements, designed to support consistent enterprise risk identification, management and reporting: a comprehensive risk inventory, a static taxonomy of risk categories and a dynamic taxonomy of risk themes. The risk inventory is a detailed register of the risks inherently faced by Northern Trust. The risk categories and risk themes are classification systems used for classifying and managing the risk inventory and enabling different risk profile views. All identified risks inherent in Northern Trust's business activities are cataloged into the following risk categories: credit, operational, fiduciary, compliance, liquidity, market, and strategic risk. All material risks are also dynamically cataloged into various risk themes which are defined groupings that share common characteristics, focus on business outcomes and span across risk categories.

- Refer to page 72 of the Corporation's 2022 Annual Report for more information on Northern Trust's Risk Management processes.

Northern Trust implements its risk management framework through a "three lines of defense" operating model, embedding a robust risk management capability within its businesses. The model, used to communicate risk management expectations across the organization, contains three roles, each with a complementary level of risk management accountability. Within this operating model, Northern Trust's businesses are the first line of defense for protecting it against the risks inherent in its businesses and are supported by dedicated business risk management teams. The Risk Management function, the second line of defense, sets the direction for Northern Trust's risk management activities and provides aggregate risk oversight and reporting in support of risk governance. Audit Services, the third line of defense, provides independent assurance as to the effectiveness of the integrated risk framework.

Risk Governance and Oversight Overview

Risk governance is an integral aspect of corporate governance at Northern Trust, and includes clearly defined accountabilities, expectations, internal controls and processes for risk-based decision-making and escalation of issues. The following diagram provides a high-level overview of Northern Trust's risk governance structure, highlighting oversight by the Board of Directors and key risk-related committees.

Table 9: Risk Governance Structure

Northern Trust Corporation Board of Directors			
Audit Committee	Business Risk Committee - Cybersecurity Risk Oversight Subcommittee	Capital Governance Committee	Human Capital and Compensation Committee

Global Enterprise Risk Committee (GERC)							
Credit Risk Committee	Market & Liquidity Risk Committee	Operational Risk Committee	Fiduciary Risk Committee	Compliance & Ethics Oversight Committee	Information Technology Risk Committee	Model Risk Oversight Committee	Workforce Risk Committee

The Board of Directors provides oversight of risk management directly and through certain of its committees: the Audit Committee, the Business Risk Committee, the Capital Governance Committee and the Human Capital and Compensation Committee. The Board of Directors annually approves Northern Trust’s Risk Management Framework and Corporate Risk Appetite Statement.

- The Audit Committee provides oversight with respect to financial reporting and legal risk.
- The Business Risk Committee assumes primary responsibility and oversight with respect to the credit risk, operational risk, fiduciary risk, compliance risk, market risk, liquidity risk, strategic risk and associated risk themes. The Cybersecurity Risk Oversight Subcommittee is a subcommittee of the Business Risk Committee and assists the Business Risk Committee in discharging its duties with respect to the risks related to cybersecurity inherent in Northern Trust's businesses.
- The Human Capital and Compensation Committee oversees the development and operation of Northern Trust’s incentive compensation program. The Committee annually reviews management’s assessment of the effectiveness of the design and performance of Northern Trust’s incentive compensation arrangements and practices in providing incentives that are consistent with Northern Trust’s safety, soundness, and culture. This assessment includes an evaluation of whether Northern Trust’s incentive compensation arrangements and practices discourage inappropriate risk-taking behavior by participants.
- The Capital Governance Committee assists the Board of Directors in discharging its oversight duties with respect to capital management and resolution planning activities. Among other responsibilities, the Capital Governance Committee oversees Northern Trust’s capital management assessments, forecasting, and stress testing processes and activities, including the annual CCAR exercise, and challenges management, as appropriate, on various elements of such processes and activities. Accordingly, the Capital Governance Committee provides oversight with respect to Northern Trust’s linkage of material risks to the capital adequacy assessment process.

The Chief Risk Officer (“CRO”) oversees Northern Trust’s management of risk and compliance, promotes risk awareness and fosters a proactive risk management environment wherein risks

inherent in the business strategy are identified, understood, appropriately monitored and mitigated. The CRO reports directly to the Business Risk Committee and the Corporation's Chief Executive Officer. The CRO regularly advises the Business Risk Committee and reports to the Committee at least quarterly on risk exposures, risk management deficiencies and emerging risks. In accordance with the risk management framework, the CRO, Chief Compliance and Ethics Officer, Head of Financial Risk & Chief Credit Officer, Head of Non-Financial Risk & Chief Operational Risk Officer, Chief Information Risk Officer, Chief Economist & Head of Strategic Risk and Risk Analytics, Chief Administrative Officer, Business Unit and Regional Chief Risk Officers, Chief Financial Officer, Head of Capital, Resolution and Management Reporting, Planning and Analysis, General Counsel, Chief Human Resources Officer and Head of Corporate Sustainability, Inclusion and Social Impact, meet as the Global Enterprise Risk Committee ("GERC") to provide executive management oversight and guidance with respect to the management of the categories of risk and risk themes within Northern Trust. The Chief Audit Executive, or his or her designee, also attends GERC meetings as a non-voting member. Among other risk management responsibilities, GERC receives reports, escalations or recommendations from senior risk committees that are responsible for the management of risk, and from time to time may delegate responsibility to such committees for risk issues. Senior risk committees include:

- The Credit Risk Committee ("CRC") establishes and monitors credit-related policies and practices throughout Northern Trust and promotes their uniform application.
- The Market & Liquidity Risk Committee ("MLRC") oversees activities relating to the management of market and liquidity risks by facilitating a focused review of market and liquidity risk exposures and providing rigorous challenge of related policies, key assumptions, and practices.
- The Operational Risk Committee ("ORC") provides independent oversight and is responsible for setting the operational risk-related policies and developing and implementing the operational risk management framework and programs that support coordination of operational risk activities.
- The Fiduciary Risk Committee ("FRC") is responsible for establishing and reviewing the fiduciary risk policies and establishing the fiduciary risk framework, governance and programs that support the coordination of fiduciary risk activities.
- The Compliance & Ethics Oversight Committee ("CEOC") provides oversight and direction with respect to compliance policies, implementation of the compliance and ethics program, and the coordination of regulatory compliance initiatives across the Corporation.
- The Information Technology Risk Committee ("ITRC") provides oversight and direction with respect to information security, technology and cyber risk. The committee is responsible for recommending the policies related to, and overseeing development and implementation of the risk management framework, standards and processes supporting coordination and governance of, information security, technology and cyber risk management activities.

- The Model Risk Oversight Committee (“MROC”) is responsible for providing management attention, direction, and oversight of the model risk management framework and model risk within Northern Trust.
- The Workforce Risk Committee (“WRC”) is responsible for assessing workforce risk and monitoring initiatives associated with workforce risk management.

In addition to the aforementioned committees, Northern Trust establishes business and regional risk committees that also report into GERC. For more detail on risk practices at Northern Trust, see the relevant discussions on pages 18, 29 and 33.

Risk Assessment, Appetite and Reporting Processes

As part of the integrated risk framework, Northern Trust has established key risk identification and risk management processes, embedded within its businesses to enable a risk-informed profile that supports its business decisions and the execution of its corporate strategies. Northern Trust’s risk assessment process consists of a series of programs across the first and second lines of defense that identify, measure, manage, and report risks in line with risk appetite and guidelines.

Northern Trust defines its risk appetite as the aggregate level and types of risk the Board of Directors and senior management are willing to assume to achieve the Corporation’s strategic objectives and business plan, consistent with prudent management of risk and applicable capital, liquidity, and other regulatory requirements. It includes consideration of the likelihood and impact of risks, using both monetary loss and non-financial measures across risk themes to monitor against tolerance thresholds and guideline levels that trigger escalation to risk committees, senior management, and the Board of Directors or committees thereof, as appropriate.

Systems

Risk data and technology form the infrastructure that enables the successful execution of risk management processes. Data quality principles (such as accuracy, consistency and integrity) are an integral element of Northern Trust’s risk measurement and management process, ensuring quality, control and protection of the risk data and systems at both corporate and business levels.

Independent Review and Verification

Risk Control

Risk Control is an internal, independent review function within the Risk Management function. Risk Control is managed by the Head of Risk Control and is comprised of Model Risk Management, Credit Review and Global Compliance Testing groups, each with its own risk focus and oversight. Model Risk Management is responsible for the implementation and management of the enterprise-wide model risk framework and independently validating new models and reviewing and re-validating existing models. Credit Review provides an independent, ongoing assessment of credit exposure and related credit risk management processes across Northern Trust. Lastly, Global Compliance Testing evaluates the effectiveness of procedures and controls designed to comply with relevant laws and regulations, as well as corresponding Northern Trust policies governing regulatory compliance activities. The Business Risk Committee has oversight responsibility with respect to Risk Control generally as well as each of these groups.

Audit Services

Audit Services is an independent control function that assesses and validates controls within Northern Trust's risk management framework. Audit Services is managed by the Chief Audit Executive with oversight from the Audit Committee. Audit Services tests the overall adequacy and effectiveness of the system of internal controls associated with the framework on an ongoing basis and reports the results of these audits directly to the Audit Committee. Audit Services includes professionals with a broad range of audit and industry experience, including risk management expertise. The Chief Audit Executive reports directly to the Audit Committee and administratively reports to the Corporation's Chief Executive Officer and is a non-voting member of GERC.

Credit Risk

Credit risk is the risk to interest income or principal from the failure of a borrower, issuer, or counterparty to perform on an obligation. Credit risk is inherent in many of Northern Trust's activities. A significant component of credit risk relates to loans, leases, securities, and wholesale counterparty-related exposures, such as over-the counter ("OTC") derivatives and repo-style transactions.

Credit Risk Disclosures – General Qualitative

Credit Risk Framework and Governance

The Credit Risk Committee ("CRC") is the most senior credit committee at Northern Trust, with responsibility for establishing, approving, and monitoring credit-related policies and programs throughout the Bank. The Chief Credit Officer reports directly to the CRO, chairs the CRC, and heads the Credit Risk Management function at Northern Trust.

The Credit Risk Management function is the focal point of the Credit Risk Framework and, while independent of the business units that manage client relationships, it works closely with them to achieve the goal of assuring proactive management of credit risk. To monitor and control credit risk, the Credit Risk Management function maintains a framework that consists of policies, standards, and programs designed to promote a prudent credit culture and monitors adherence to those internal policies, standards, and programs, as well as external regulations. Independent oversight and review of the credit risk framework also is provided by Risk Control.

The Credit Risk Framework stipulates authority levels for approval of the extension of credit. Individual credit authority for commercial and personal loans is limited to specified amounts and maturities. Credit requests exceeding policies or standards because of amount, maturity rating, or other conditions are referred to the relevant Group Credit Approval Committee. Credit decisions involving requests in excess of Group Credit Approval Committee limits require the approval of the Senior Credit Committee.

The Capital Markets Credit Committee has sole authority for the approval, modification, or renewal of credit exposure limits to all wholesale market counterparties. The Senior Credit Committee and Capital Markets Credit Committee are both direct sub-committees of the CRC. The Treasury Credit Committee provides similar approval for investments in assets subject to credit risk, such as bonds and equities.

Loans and Leases and Allowance for Credit Losses

- Refer to Note 5, starting on page 43, and Note 6, starting on page 50, to the consolidated financial statements within the Corporation's First Quarter 2023 Form 10-Q and Refer to Note 6, starting on page 118, and Note 7, starting on page 124 within the Corporation's 2022 Annual Report for loans and leases and allowance for credit losses qualitative information

Credit Risk Disclosures – General Quantitative

Northern Trust’s exposure to credit risk generally takes the form of loans, leases, securities and wholesale counterparty-related exposures, such as OTC derivatives and repo-style transactions. Northern Trust’s entire credit risk portfolio is included within the following Basel III credit categories: wholesale exposures, securitization exposures and equity holdings. All Basel III credit exposures that could otherwise qualify for retail treatment, such as personal loans and mortgages, are treated as wholesale exposures. Northern Trust has determined that applying wholesale treatment, i.e., individually risk-rating each exposure rather than scoring a homogeneous pool, is consistent with the Bank’s underwriting approach, whereby each exposure is individually evaluated.

Loans and Leases and Allowance for Credit Losses

- Refer to Note 5, starting on page 43, and Note 6, starting on page 50, to the consolidated financial statements within the Corporation’s First Quarter 2023 Form 10-Q or quantitative information regarding loans and leases, allowance for credit losses and net recoveries (charge-offs).

Credit Exposures by Geography and Industry

The following tables provide Northern Trust’s total credit exposures by regulatory reporting category and geographic distribution as of, and on an average basis for, the three months ended March 31, 2023. Distribution is based on geographic location of the contracting Northern Trust entity.

Table 10: Credit Exposures by Geography

(\$ In Millions)		As of March 31, 2023		
Credit Exposures	Americas	Europe, Middle East and Africa	Asia-Pacific	Total
Loans, net of Unearned Income and Allowance	\$ 39,935	\$ 2,097	\$ 178	\$ 42,210
Loan Commitments	31,756	1,140	—	32,896
Balances Due from Depository Institutions	27,807	15,903	2,464	46,174
Securities	37,100	9,985	1,815	48,900
Trading Assets	410	217	67	694
Total	\$ 137,008	\$ 29,342	\$ 4,524	\$ 170,874

(\$ In Millions)		Averages for the three months ended March 31, 2023		
Credit Exposures	Americas	Europe, Middle East and Africa	Asia-Pacific	Total
Loans, net of Unearned Income and Allowance	\$ 39,348	\$ 2,408	\$ 42	\$ 41,798
Loan Commitments	32,941	1,126	—	34,067
Balances Due from Depository Institutions	26,426	15,624	1,238	43,288
Securities	37,352	10,521	1,924	49,797
Trading Assets	630	180	154	964
Total	\$ 136,697	\$ 29,859	\$ 3,358	\$ 169,914

The following table provides Northern Trust's credit exposures by industry and exposure type with the associated contractual maturity as of March 31, 2023.

Table 11: Credit Exposures by Industry, Exposure Type and Contractual Maturity

(\$ In Millions)	As of March 31, 2023			
	Up to 1 Year	1 to 5 Years	Over 5 Years	Total
Commercial Exposures				
Commercial and Institutional				
Finance and Insurance	\$ 8,006	\$ 4,648	\$ 4	\$ 12,658
Holding Companies	27	6	12	45
Manufacturing	900	7,004	3	7,907
Mining	70	445	17	532
Public Administration	50	17	—	67
Retail Trade	466	894	26	1,386
Services	3,319	6,918	594	10,831
Transportation and Warehousing	11	496	20	527
Utilities	45	1,222	5	1,272
Wholesale Trade	252	996	27	1,275
Other Commercial	262	327	59	648
Total Commercial and Institutional	\$ 13,408	\$ 22,973	\$ 767	\$ 37,148
Commercial Real Estate	725	3,423	1,365	5,513
Lease Financing, net	—	—	—	—
Non-U.S.	5,207	1,211	61	6,479
Other	822	—	—	822
Total Commercial	\$ 20,162	\$ 27,607	\$ 2,193	\$ 49,962
Personal Exposures				
Residential Real Estate	269	780	6,145	7,194
Private Client	11,980	5,616	266	17,862
Other	88	—	—	88
Total Personal	\$ 12,337	\$ 6,396	\$ 6,411	\$ 25,144
Total Commercial and Personal	\$ 32,499	\$ 34,003	\$ 8,604	\$ 75,106
Balances Due from Depository Institutions	46,169	5	—	46,174
Securities	5,148	17,313	26,439	48,900
Trading Assets	694	—	—	694
Total Exposures	\$ 84,510	\$ 51,321	\$ 35,043	\$ 170,874

- Refer to page 77 of the Corporation's 2022 Annual Report for information on undrawn commitments by industry sectors.

Advanced Internal Ratings Based ("AIRB") Approach for Credit Risk

Internal Rating System Overview

The credit risk framework covers a number of different measurements of credit risk at Northern Trust, including risk-weighted assets, the allowance for credit losses, and stress tests using various macroeconomic scenarios, such as the internal capital adequacy approval program and CCAR.

An integral component of credit risk measurement is Northern Trust's internal risk rating system. Northern Trust's internal risk rating system enables identification, measurement, approval and monitoring of the Corporation's credit risk. Northern Trust uses the AIRB approach to calculate regulatory capital using regulatory formulas and exposure level risk information from Northern Trust's internal rating system. Calculations include entity-specific information about the obligor's or counterparty's probability of default ("PD") and exposure-specific information about loss given default ("LGD"), exposure at default ("EAD"), and maturity. Northern Trust's internal risk rating system is intended to rank its credit risk without any direct linkage to external credit ratings.

Obligors are assigned PDs after consideration of both quantitative and qualitative factors. Although the criteria vary, the objective is for assigned PDs to be consistent in the measurement and ranking of risk. LGD and EAD are assigned based on obligor, product, collateral and instrument characteristics.

Risk ratings are assigned at the time a counterparty or an obligation is approved, renewed, or amended. Risk ratings are reviewed annually or when new information relevant to the rating is received. Risk ratings are utilized for credit underwriting, management reporting, and the calculation of regulatory capital.

The Credit Risk Management function is responsible for the ongoing oversight of each model that supports the internal risk rating system. Independent model governance and oversight is further supported by the activities of Risk Control as described further in Independent Review and Verification within the Risk Management Overview section.

PD, EAD and LGD Estimation

Northern Trust has developed internal estimates of PD, EAD and LGD, as defined below:

Probability of default (PD) – defined as the empirically based best estimate of the long-run average one-year default rate for the rating grade assigned to an obligor, capturing the average default experience for obligors in the rating grade over a mix of economic conditions sufficient to provide a reasonable estimate.

Exposure at default (EAD) – defined across various exposures types as:

- On-balance-sheet (other than OTC derivative, repo-style transactions or eligible margin loans) – the carrying value, less any allocated transfer risk reserve (and for available for sale debt securities, less unrealized gains, plus unrealized losses).

- Off-balance-sheet (other than OTC derivative, repo-style transactions or eligible margin loans) – the best estimate of net additions to outstanding amounts owed that are likely to occur over a one-year horizon, assuming the exposure was to go into default. For anything other than a loan commitment, line of credit, trade-related letter of credit or transaction-related contingency, EAD is the notional amount.
- OTC derivative, repo-style transaction or eligible margin loan – as defined by Section 32 of the final rule adopted to implement Basel III in the United States.

Loss given default (LGD) – defined as the greater of:

- An empirically based best estimate of long-run default-weighted average economic loss per dollar of EAD that would be incurred if an obligor were to default within a one-year horizon over a mix of economic conditions; or
- An empirically based best estimate of the economic loss per dollar of EAD that would be incurred if an obligor were to default within a one-year horizon during a period of economic downturn.

PD, EAD and LGD parameter values are estimated using quantitative analysis of internal and external data, informed by a qualitative assessment based on business subject matter expertise. The parameter estimation (quantification) process is conducted in four phases: (1) research and exploratory data analysis; (2) detailed data analytics and modeling; (3) qualitative assessment of results and recommendations; and (4) formal review and approval.

Data used for estimation and validation of PD, EAD and LGD parameters comes from three sources:

- Internal credit defaults and recoveries experienced by Northern Trust;
- External credit default and recovery data for comparative benchmark data (not directly combined with internal default history); and
- Industry studies and academic works related to credit risk and defaults.

Control Mechanisms

Independent oversight and review of the internal risk rating system is provided by Audit Services and Risk Control as described in Independent Review and Verification within the Risk Management Overview section.

The following table provides a distribution of EAD, Risk-Weighted Assets, Weighted Average PD, Weighted Average LGD, Weighted Average Risk-Weights and Unfunded Commitments by PD ranges as of March 31, 2023.

Table 12: Probability of Default Ranges

(\$ In Millions)		As of March 31, 2023					
	PD Range	EAD Amount	Risk Weighted Assets Amount ^(a)	Weighted Average PD	Weighted Average LGD	Weighted Average Risk-Weight	Unfunded Commitments
Wholesale	0% to <0.15%	\$ 96,693	\$ 7,093	0.04 %	26.56 %	7.34 %	\$ 7,937 ^(b)
	0.15% to <0.50%	52,333	20,016	0.23 %	44.89 %	38.25 %	19,461
	0.50% to <1.35%	10,499	8,125	0.78 %	40.18 %	77.39 %	2,626
	1.35% to <10.00%	16,348	16,358	2.60 %	36.17 %	100.06 %	2,842
	10.00% to <100%	279	591	18.65 %	41.59 %	211.83 %	29
	<100%	513	513	100.00 %	49.22 %	100.00 %	1
Total	0.0% to <100.0%	\$176,665	\$ 52,696	0.70 %	33.78 %	29.83 %	\$ 32,896

(a) Represents unscaled risk-weighted assets.

(b) Includes unfunded commitments without a specific PD range.

Counterparty Credit Risk of OTC Derivative Contracts, Repo-Style Transactions and Eligible Margin Loans

Counterparty credit risk for Northern Trust primarily arises from a variety of funding, treasury, trading, and custody-related activities, including trading OTC foreign exchange and interest rate derivatives, indemnified securities lending transactions, and sponsored repurchase and reverse repurchase transactions. Credit exposure to counterparties is managed by use of a framework for setting limits by product type and exposure tenor.

Reporting and Measurement

To calculate exposure, Northern Trust treats repurchase agreements, reverse repurchase agreements, indemnified securities lending, and sponsored repurchase and reverse repurchase transactions as repo-style transactions. Foreign exchange exposures and interest rate derivatives are treated as OTC derivatives. The EAD measurement methodology for each eligible type of counterparty credit exposure, including the use of netting and collateral as risk mitigants, is determined based on regulatory requirements.

Repo-style Transactions

The Collateral Haircut Approach with standard supervisory haircuts is used to determine EAD for repo-style transactions (repurchase agreements, reverse repurchase agreements, indemnified securities financing, indemnified securities lending and indemnified repurchase transactions) whereby the net fair value of all exposure less all collateral for each counterparty netting set is adjusted by standard supervisory "haircuts" applied at the instrument level to account for market and/or foreign exchange price volatility. For certain U.S.-based counterparties, indemnified securities lending exposures are netted across principal lenders when aggregating exposures for the counterparty. Similarly, for sponsored repurchase and

reverse repurchase transactions, exposures are netted at the centrally cleared counterparty level. As netting is not applicable for non-U.S.-based counterparties, those exposures are estimated for individual principal client lenders with activity to the given counterparty. Indemnified repo transactions are estimated at the principal client lender level and totaled for the counterparty as well.

OTC Derivatives

Beginning in 2022, the Standardized Approach for Counterparty Credit Risk (“SA-CCR”) replaced the Current Exposure Method (“CEM”) for calculating EAD for OTC derivatives. Exposure amounts are computed as per the SA-CCR regulation, recognizing the benefit of eligible netting and collateral arrangements where applicable.

Credit Limits

Credit exposure to counterparties is managed by use of a framework for setting limits by product type and exposure tenor.

Collateral Arrangements

To calculate a counterparty’s net credit risk position, repo-style transactions, OTC derivative transactions, and associated collateral positions are revalued on a daily basis.

Eligible collateral types are documented by a Credit Support Annex (“CSA”) to an International Swaps and Derivatives Association (“ISDA”) Master Agreement and are controlled under policies aimed at ensuring the collateral agreed to be taken exhibits characteristics such as price transparency, price stability, liquidity, enforceability, independence and eligibility for regulatory purposes.

Collateral for Repo-Style Transactions

Northern Trust accepts the following as collateral for the repo-style transactions below:

Repurchase Agreements and Reverse Repurchase Agreements

- Cash;
- U.S. government and U.S. agency securities;
- U.S. government sponsored entity (“GSE”) and GSE-guaranteed securities;
- Australian government securities;
- Investment grade commercial paper and corporate bonds; and
- Equities included in major indices, subject to stipulated diversification parameters.

Securities Lending Transactions

- Cash;
- Sovereign debt (includes debt issued by governments of highly-rated Organization for Economic Co-operation and Development (“OECD”) countries and corporate debt guaranteed by select highly-rated OECD governments that meet additional pre-agreed guidelines); and

- Equities included in major indices, subject to stipulated diversification thresholds.

Based on its nominal loss experience to date, Northern Trust does not currently employ a credit risk valuation adjustment to incorporate creditworthiness within its estimate of the fair value of OTC derivative transactions. Any realized credit loss associated with OTC derivatives or repo-style transactions would be accounted for as a reduction of current earnings.

Wrong-way Risk

Wrong-way risk occurs when the exposure to a particular counterparty is positively correlated with the PD of the counterparty itself or where there is an adverse correlation between a counterparty's PD and the mark-to-market value of the underlying transaction.

Northern Trust uses a range of tools to identify, control and monitor wrong-way risk. These include: the requirement to obtain prior approval before undertaking wrong-way risk transactions outside agreed-upon guidelines; exception reporting; collateral exclusion requirements; sovereign and issuer credit quality requirements for collateral accepted in repo-style transactions; approval of loan/collateral combinations based on historical quantitative correlation analysis; multi-factor stress testing scenarios to identify vulnerabilities and manage exposures against stressed exposure tolerances; and exposure reporting. Country limits and diversification parameters applicable to foreign exchange and credit default swap transactions, respectively, also limit wrong-way risk.

Potential Collateral Requirements

Certain ISDA agreements require a counterparty to post additional collateral in the event of a downgrade of such counterparty's credit rating. Accordingly, Northern Trust regularly monitors its position with regard to counterparty credit rating downgrades.

The following table describes Northern Trust's counterparty exposures by exposure type as of March 31, 2023.

Table 13: Counterparty Credit Risk by Exposure Type

<i>(\$ In Millions)</i>	As of March 31, 2023	
Derivative Contracts EAD	\$	4,748
Repo-Style Transactions EAD	\$	14,174
Repo-Style Transactions Net Exposure		
Gross notional exposure	\$	196,206
Cash and securities collateral		201,842
Net exposure	\$	(5,636)

- Refer to Note 3, starting on page 34, and Note 21, starting on page 67, to the consolidated financial statements within the Corporation's First Quarter 2023 Form 10-Q for derivative contract exposure information.

In the quarter ended March 31, 2023, Northern Trust did not purchase or sell any credit derivatives.

Credit Risk Mitigation

Northern Trust considers cash flow to be the primary source of repayment for client-related credit exposures. However, Northern Trust employs several different types of credit risk mitigants to manage its overall credit risk in the event cash flow is not sufficient to repay a credit exposure. Northern Trust broadly groups its risk mitigation techniques into the following three primary categories:

Physical and Financial Collateral

One of Northern Trust's primary credit risk mitigation approaches is the requirement of collateral. Residential and commercial real estate exposures are typically secured by properly margined mortgages on the property. Various other types of physical and financial collateral are also accepted for certain commercial and personal loans, in line with Northern Trust's lending standards. In cases where loans to clients are secured by marketable securities, the daily values of the securities are monitored closely to ensure adherence to collateral coverage policies.

Netting

On-balance-sheet netting is employed where applicable for counterparties with master netting agreements. Netting is primarily related to foreign exchange transactions with major banks and institutional clients subject to eligible master netting agreements.

Guarantees

Personal and corporate guarantees are accepted, as warranted, to reduce risk of default, facilitate potential collection efforts, and protect Northern Trust's claims relative to other creditors.

Another important risk management practice is the avoidance of undue concentrations of exposure, such as in any single (or small number of related) obligor/counterparty, loan type, industry, geography, country or risk mitigant. Processes are in place to establish limits on certain concentrations and the monitoring of adherence to the limits.

Securitization Exposures

Northern Trust does not act as originator or sponsor for securitizations. In its investment portfolio, Northern Trust has purchased securities that meet the regulatory definition of a securitization. Northern Trust uses the Simplified Supervisory Formula Approach (“SSFA”) to calculate risk-weighted assets for securitizations. If the SSFA cannot be applied due to data limitations, a 1,250% risk-weight is applied to the exposure as required by guidelines in the Basel III Final Rule.

The following table describes Northern Trust’s securitization exposures as of March 31, 2023.

Table 14: Securitization Exposures

(\$ In Millions)		As of March 31, 2023	
	On-Balance Sheet	Off-Balance Sheet	
Asset-Backed Securities	\$ 4,417	\$	—
Mortgage-Backed Securities	1,837		—
Loan Exposures	—		—
Total	\$ 6,254	\$	—

The following table describes Northern Trust’s securitization exposures by risk-weight bands as of March 31, 2023.

Table 15: Securitization Exposures by Risk-Weight Bands

(\$ In Millions)			As of March 31, 2023			
	Risk-Weight Bands	Approach	Asset-Backed Securities	Mortgage-Backed Securities	Loan Exposures	
Securitizations	0% to <12%	SSFA	\$ —	\$ —	\$	—
	12% to <20%	SSFA	—	—		—
	20% to <50%	SSFA	4,417	1,837		—
	50% to <75%	SSFA	—	—		—
	75% to <100%	SSFA	—	—		—
	100% to <425%	SSFA	—	—		—
	425% to <1,250%	SSFA	—	—		—
	1,250 %	1,250 %	—	—		—
Total			\$ 4,417	\$ 1,837	\$	—

Independent Review and Verification

Independent oversight and review of the Credit Risk Framework is provided by Risk Control. Refer to Independent Review and Verification within the Risk Management Overview section for more information.

Equities Not Subject to the Market Risk Rule

Northern Trust's equity investments that are not subject to the Market Risk Rule are entered into in order to meet strategic business needs and for regulatory or contractual compliance purposes, rather than to generate capital gains.

The following table presents the carrying and fair values, and associated risk-weights, of Northern Trust's equity investments that are not subject to the Market Risk Rule as of March 31, 2023.

Table 16: Equities Not Subject to the Market Risk Rule

(\$ In Millions)		As of March 31, 2023	
		Carrying Value	Fair Value
Non-publicly Traded	\$	2,471	\$ 2,471
Publicly Traded		117	117
Total	\$	2,588	\$ 2,588

(\$ In Millions)		As of March 31, 2023		
Risk-Weights		Carrying Value	Risk-Weighted Asset Amount ^(a)	Capital Requirement
0%	\$	70	\$ —	\$ —
20%		399	80	6
100%		1,971	1,971	158
400%		—	—	—
1,250%		—	—	—
Simple Modified Look-Through Approach		31	258	21
Full Look-Through Approach		117	26	2
Total	\$	2,588	\$ 2,335	\$ 187

(a) Represents unscaled risk-weighted assets.

During the three months ended March 31, 2023, there were no realized gains or losses from sales or liquidations, no unrealized gains or losses recognized on the balance sheet but not through earnings, and no latent revaluation gains or losses.

Operational Risk

Operational risk is the risk of loss from inadequate or failed internal processes, human factors and systems, or from external events. Operational risk is inherent in each of Northern Trust's businesses and corporate functions and reflects the potential for inadequate information systems, operating problems, challenges related to reliance on third parties, product design and delivery difficulties, potential legal actions, or catastrophes to result in losses. This includes the potential that continuity of service and resilience may be impacted. Operational risk includes:

- execution, delivery and process management risk;
- risk resulting from business disruption and system failures;
- risk of damage to physical assets;
- risk resulting from clients, products and business practices;
- employment practice and workplace safety risk;
- internal fraud risk;
- external fraud risk;
- information technology and cybersecurity risk;
- compliance risk;
- fiduciary risk; and
- legal risk.

Under the Corporation's risk structure, information technology and cybersecurity, compliance, fiduciary and legal risks are governed and managed explicitly.

Northern Trust's operational risk management strategy is to:

- align the operational risk framework with evolving business and industry practice and with regulatory requirements;
- identify, assess and mitigate risks inherent in business strategies;
- promote risk awareness and foster a proactive risk management environment within each business; and
- report key topics and developments to senior governance bodies.

The goal of these activities is to keep the operational risk profile and losses within the Board-approved Corporate Risk Appetite Statement and guidelines.

Operational Risk Framework and Governance

Operational risk is identified, monitored, measured, managed and reported through the operational risk framework. The framework consists of risk management policies, programs and practices designed to promote a sound operational environment and maintain the Corporation's operational risk profile and losses within approved risk appetites and guidelines. The framework implements a structured approach to establishing and communicating operational risk management practices and responsibilities. This structured approach to measuring and managing operational risk addresses operational resilience which requires that Northern Trust minimize service disruptions and limit systemic impacts from adverse events as well as risk quantification. The framework is deployed consistently and globally across all businesses and

its objective is to identify and measure the factors that influence risk and drive action to maintain operational resilience and reduce future loss events. The Operational Risk Management function is responsible for defining the operational risk management framework implementation and application and providing independent oversight of the framework implementation and application across Northern Trust. It is the responsibility of each business and corporate shared service, where appropriate, to implement the enterprise-wide operational risk framework as well as business- and function-specific risk management programs to identify, monitor, measure, manage and report on operational risk and mitigate Northern Trust's exposure to service disruptions and loss.

Several key programs support the operational risk framework, including:

- Loss Event Data Program - a program that collects internal and external loss data for use in monitoring operational risk exposure, various business analyses and the Basel Advanced Measurement Approach ("AMA") capital quantification. Both internal and external loss data are used in the operational risk capital quantification. Thresholds drive analysis, action and escalation through Northern Trust's businesses and the Operational Risk Management function.
- Risk and Control Self-Assessment - a comprehensive, structured risk management process used by Northern Trust's businesses to identify, measure, monitor and mitigate operational risk exposures throughout the enterprise.
- Operational Risk Scenario Analysis - a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood of occurrence and the potential loss impact of plausible operational losses.
- Product and Process Risk Management Program - a program used for evaluating and managing risks associated with the introduction of new and modified noncredit products and services, significant changes to operating processes, and related significant loss events.
- Operational Resilience - a program that outlines the business service lifecycle assessment, designed to identify Northern Trust's most important business services, ensure the continuity of business service delivery and promote the ability to prevent, respond to, recover and learn from disruptions.
- Third Party Risk Management Program - a program that provides processes for evaluating, quantifying and qualifying appropriate risk assessment, measurement, monitoring and management of third and fourth parties (inclusive of external and internal, e.g., Northern Trust legal entity to legal entity relationships).
- Global Fraud Risk - a program designed to prevent, detect and respond to attempted or actual fraud impacting the bank and its clients globally.

- Data Management - a program that embeds data management and data governance related activities into Northern Trust processes in order to manage data risk.
- Data Privacy Program - a program that sets forth a consistent, global approach to compliance with all applicable laws, rules, and regulations relating to privacy and establishes overarching principles for the responsible use and protection of confidential information. The program is designed to guide Northern Trust to more effectively identify, assess, manage and mitigate privacy risks and privacy incidents.
- Information Security, Technology, and Cyber Risk Management - a program that sets forth a consistent, global approach to communicate risk management processes and controls addressing information security, including cyber threats, technology and related compliance risks to the organization.
- Operational Resiliency and Recovery Management Program - a program designed to protect life safety, minimize and manage the business impact and support the recovery of critical functions for clients following an incident.
- Physical Security - a program that provides for the life safety of Northern Trust partners, clients, and visitors worldwide.
- Insurance Management Program - a program designed to reduce the monetary impact of certain operational loss events through securing of appropriate insurance policy protection.

Model Risk Management is also part of the operational risk framework. Refer to Independent Review and Verification within the Risk Management Overview section for more information.

The ORC is responsible for overseeing the activities of Northern Trust related to the management of operational risk including establishing and maintaining the Corporate Operational Risk Policy and approving the operational risk framework and programs. This committee has the expanded role of coordinating operational risk issues related to information technology, cybersecurity, compliance and fiduciary risks. The purpose of this committee is to provide executive management's insight and guidance to the management of existing and emerging operational risks. This includes identification and assessment of evolving risk trends across the operational risk framework and how these can be best managed.

Operational Risk Measurement

Northern Trust utilizes the AMA capital quantification process to estimate required capital for the Corporation and applicable U.S. banking subsidiaries. Northern Trust's AMA capital quantification process incorporates outputs from the Loss Event Data, Risk and Control Self-Assessment and Operational Risk Scenario Analysis programs to derive required capital. While internal loss data is the foundation for the capital quantification, external loss event data and qualitative risk and control self-assessments are also utilized to inform the creation of scenario analysis data employed in the capital quantification process. Business environment factor information is used to estimate loss frequency. The AMA capital quantification process uses a

Loss Distribution Approach methodology to combine frequency and severity distributions to arrive at an estimate of the potential aggregate loss at the 99.9th percentile of the aggregate loss distribution over a one-year time horizon.

The result of the AMA quantification process is the measure of operational risk-weighted assets as disclosed in Table 5.

Independent Review and Verification

Independent oversight and review of the AMA capital quantification process is provided by Model Risk Management within Risk Control. Refer to Independent Review and Verification within the Risk Management Overview section for more information.

Market Risk

There are two types of market risk, interest rate risk associated with the banking book and trading risk. Interest rate risk associated with the banking book is the potential for movements in interest rates to cause changes in net interest income and the market value of equity, including Accumulated Other Comprehensive Income (Loss) from the available for sale debt securities portfolio. Trading risk is the potential for movements in market variables such as foreign exchange and interest rates to cause changes in the value of trading positions.

Market Risk Framework and Governance

Northern Trust maintains a market risk framework consisting of risk management policies and practices to keep its risk profile within the Board-approved Corporate Risk Appetite Statement. All market risk activities are overseen by the Risk Management function, which is independent of the businesses undertaking the activities.

The Asset and Liability Management Policy, Policy on Dealer Trading Activities, and exposure limits for market risk are set by Board-level committees, and committee structures have been established to implement and monitor adherence to corporate policies, external regulations and established procedures. Limits are monitored based on measures such as sensitivity of net interest income (“NII”), sensitivity of market value of equity (“MVE”), and value-at-risk (“VaR”) across a range of time horizons.

Treasury, in the first line of defense, proposes market risk management strategies and is responsible for performing market risk management activities. The Asset and Liability Management Committee (“ALCO”) provides first-line management oversight and is responsible for approving strategies and activities within the risk appetite, monitoring risk metrics, overseeing balance sheet resources, overseeing the execution of strategies, and reviewing reporting such as cash flows, the liquidity coverage ratio and stress test results.

The Market and Liquidity Risk Management function, in the second line of defense, provides challenge to the first-line activities, evaluates compliance with regulatory requirements and process effectiveness, and escalates material items for corrective action. The MLRC provides second-line oversight and is responsible for reviewing market risk exposures, establishing and monitoring risk metrics, and approving key methodologies and assumptions that drive market risk measurement.

Interest Rate Risk

Interest Rate Risk Overview

Interest rate risk in the banking book is the potential for deterioration in Northern Trust's financial position (e.g. interest income, market value of equity, or capital) due to changes in interest rates. NII and MVE sensitivity are the primary metrics used for measurement and management of interest rate risk.

Changes in interest rates can have a positive or negative impact on NII depending on the positioning of assets, liabilities and off-balance-sheet instruments. Changes in interest rates also can impact the values of assets, liabilities and off-balance sheet positions, which directly impact the MVE. Higher interest rates may impact the fair value of available for sale debt securities which in turn affects Accumulated Other Comprehensive Income (Loss) that can impact regulatory capital ratios. To mitigate interest rate risk, the structure of the balance sheet is managed so that movements of interest rates on assets and liabilities (adjusted for hedges) are sufficiently correlated, which allows Northern Trust to manage its interest rate risk within its risk appetite.

There are four commonly recognized types of structural interest rate risk in the banking book.

- repricing risk, which arises from differences in the maturity and repricing terms of assets and liabilities;
- yield curve risk, which arises from changes in the shape of the yield curve;
- basis risk, which arises from imperfect correlation in the adjustment of the rates earned and paid on different financial instruments with otherwise similar repricing characteristics; and
- embedded optionality risk, which arises from client or counterparty behavior in response to interest rate changes.

Interest Rate Risk Analysis, Monitoring, and Reporting

Northern Trust uses two primary measurement techniques to manage interest rate risk: NII and MVE sensitivity. NII sensitivity provides management with a short-term view of the impact of interest rate changes on NII. MVE sensitivity provides management with a long-term view of interest rate changes on MVE based on the period-end balance sheet.

Northern Trust limits aggregate interest rate risk (as measured by the NII sensitivity and MVE sensitivity simulation techniques) to an acceptable level within the context of risk appetite. A variety of actions may be used to implement risk management strategies to modify interest rate risk including:

- purchase of investment securities;
- sale of investment securities that are classified as available for sale;
- issuance of senior notes and subordinated notes;
- collateralized borrowings from the Federal Home Loan Bank; and
- hedging with various types of derivative financial instruments.

NII Sensitivity

NII sensitivity measures the change in NII under various interest rate scenarios.

- Refer to page 85 within the Corporation's 2022 Annual Report for further information on Northern Trust's NII sensitivity and stress testing of interest rates.

The following table shows the estimated NII impact over the next twelve months of 100 and 200 basis point upward and 100 basis point ramp downward movements in interest rates relative to forward rates as of March 31, 2023 and March 31, 2022. A 200 basis point ramp downward movement in interest rate, relative to forward rate is also provided as of March 31, 2023. Each rate movement is assumed to occur gradually over a one-year period. Given the low level of interest rates at the time and assumed interest rate floors as rates approach zero, the 200 basis point ramp downward movement in interest rate relative to forward rate as of March 31, 2022 would not provide meaningful results and is therefore not provided.

Table 17: Net Interest Income Sensitivity

(\$ In Millions)	As of March 31, 2023	As of March 31, 2022
	Increase (Decrease)	Increase (Decrease)
Increase in Interest Rates above Market Implied Forward Rates	Estimated Impact on Next Twelve Months of Net Interest Income	
100 basis points	\$ 15	\$ 107
200 basis points	\$ 29	\$ 234
Decrease in Interest Rates below Market Implied Forward Rates		
100 basis points	\$ 1	\$ (154)
200 basis points	\$ 5	N/M

The NII sensitivity analysis does not incorporate certain management actions that may be used to mitigate adverse effects of actual interest rate movement. For that reason and others, the estimated impacts do not reflect the likely actual results but serve as estimates of interest rate risk. NII sensitivity is not comparable to actual results disclosed elsewhere or directly predictive of future values of other measures provided.

Market Value of Equity (“MVE”) Sensitivity

A second technique used to measure interest rate risk is MVE sensitivity, which measures the change in the MVE under various interest rate scenarios.

- Refer to page 86 within the Corporation’s 2022 Annual Report for further information on Northern Trust’s MVE sensitivity and stress testing of interest rates.

The following table shows the estimated impact on MVE of 100 and 200 basis point shocks up and a 100 and 200 basis point shock down from current market implied forward rates at March 31, 2023 and December 31, 2022. Each rate movement is assumed to occur gradually over a one-year period.

Table 18: Market Value of Equity Sensitivity

(\$ In Millions)	As of March 31, 2023	As of December 31, 2022
	Increase (Decrease)	Increase (Decrease)
Increase in Interest Rates above Market Implied Forward Rates		
	Estimated impact on Market Value of Equity	
100 basis points	\$ (569)	\$ (472)
200 basis points	\$ (1,143)	\$ (965)
Decrease in Interest Rates below Market Implied Forward Rates		
100 basis points	\$ 675	\$ 596
200 basis points	\$ 962	\$ 842

The MVE simulations do not incorporate certain management actions that may be used to mitigate adverse effects of actual interest rate movements. For that reason and others, the estimated impacts do not reflect the likely actual results but serve as estimates of interest rate risk. MVE sensitivity is not comparable to actual results disclosed elsewhere or directly predictive of future values of other measures provided.

Foreign Currency Risk

Foreign Currency Non-Trading Risk Overview

Northern Trust's balance sheet is exposed to non-trading foreign currency risk as a result of its holdings of non-U.S.-dollar-denominated assets and liabilities, investment in non-U.S. subsidiaries, and future non-U.S.-dollar-denominated revenue and expense. To manage currency exposures on the balance sheet, Northern Trust attempts to match its assets and liabilities by currency. If those currency offsets do not exist on the balance sheet, Northern Trust will use foreign exchange derivative contracts to mitigate its currency exposure. Foreign exchange contracts are also used to reduce Northern Trust's currency exposure to future non-U.S.-dollar-denominated revenue and expense.

Trading Risk

Trading risk arises from providing foreign exchange, securities brokerage and interest rate derivatives services to clients. Securities and derivatives activities are limited and their trading risks are *de minimis*.

Trading Risk Disclosures

Effective January 1, 2013, Northern Trust adopted revised risk-based capital guidelines for market risk commonly referred to as the “Market Risk Rule”, issued jointly by the Office of the Comptroller of the Currency, Board of Governors of the Federal Reserve System, and Federal Deposit Insurance Corporation. The Market Risk Rule requires Northern Trust to disclose publicly, for each material portfolio of covered positions, certain quantitative and qualitative information. Quantitative disclosures include period-end VaR based measures and Stressed Value-at-Risk (“SVaR”) based measures.

Qualitative disclosures include the composition of material covered portfolios, Northern Trust’s valuation policies, procedures and methodologies, and the characteristics of the internal models in use. All information provided below is at a consolidated Northern Trust level.

Foreign Currency Trading Risk Overview

Northern Trust provides global foreign exchange (GFX) services to clients. Most of these services are provided in connection with Northern Trust’s global custody business. In the normal course of business Northern Trust also engages in trading of non-U.S. currencies for its own account. Both activities are considered trading activities.

Foreign currency trading positions exist when aggregate obligations to purchase and sell a currency other than the U.S. dollar do not offset each other in amount or offset each other over different time periods. The GFX trading portfolio at Northern Trust is composed of spot, forward, and non-deliverable forward currency transactions. For GFX, spot risk is driven primarily by foreign exchange rate (FX) risk, and forward risk is driven primarily by interest rate (IR) risk.

The portfolio holds no futures, options, or structured derivatives. As of March 31, 2023, approximately 99% of GFX contracts were to mature in less than 12 months, and the average maturity of outstanding contracts was approximately 49 days.

As of March 31, 2023, Northern Trust authorizes trading in 56 different currencies. In response to changes in liquidity, client demand, and the economic, political, and regulatory environment of each currency’s domicile, currencies may be dropped from or added to the tradable list and position limits may be revised.

Other Non-material Trading Activities

Market risk associated with other trading activities is immaterial. Northern Trust is party to interest rate derivative (IRD) contracts consisting mostly of interest rate swaps and swaptions entered into to meet clients’ interest rate risk management needs, but also including a small number of caps and floors. All IRD transactions are executed by Northern Trust’s Treasury department. When Northern Trust enters into client transactions, its practice is to mitigate the resulting market risk with offsetting interbank derivative transactions. For the IRD portfolio, the daily high, low, average, and quarter-end VaR and SVaR values were all less than \$250,000 for the quarter ended March 31, 2023.

Northern Trust’s broker-dealer subsidiary, Northern Trust Securities, Inc. (NTSI), maintains a portfolio of trading securities held for customer accommodation purposes and, beginning in

2022, invests excess cash balances in short-term investment vehicles. These activities averaged \$0.4 million for the quarter ended March 31, 2023.

Foreign Currency Risk Measurement

As part of its risk management activities, Northern Trust measures daily the risk of loss associated with all non-U.S. currency positions using a VaR model and applying the historical simulation methodology. This statistical model provides estimates, based on high confidence levels, of the potential loss in value that might be incurred if an adverse shift in non-U.S. currency exchange rates were to occur over a small number of days. The model incorporates foreign currency and interest rate volatilities and correlations in price movements among the currencies. VaR is computed for each trading desk and for the global portfolio.

VaR measures are computed in a vendor software application which reads foreign exchange positions from Northern Trust's trading systems each day. Data vendors provide foreign exchange rates and interest rates for all currencies. The Risk Management function monitors on a daily basis VaR model inputs and outputs for reasonableness.

Foreign Currency Risk Monitoring, Reporting and Analysis

Northern Trust monitors several variations of the GFX VaR measures to meet specific regulatory and internal management needs. Variations include different methodologies (historical simulation, Monte Carlo simulation and Taylor approximation), horizons of one day and ten days, confidence levels of 95% and 99%, subcomponent VaRs using only FX drivers and only IR drivers, and look-back periods of one year, two years, and four years. The alternative measures provide management with an array of corroborating metrics and alternative perspectives on Northern Trust's market risks.

Automated daily reports are produced and distributed to business managers and risk managers. The Risk Management function also reviews and reports several variations of the VaR measures in historical time series format to provide management with a historical perspective on risk.

VaR Reporting

The table below presents the levels of total regulatory VaR and its subcomponents for GFX for the three months ended March 31, 2023, and December 31, 2022, based on the historical simulation methodology, a 99% confidence level, a one-day horizon and equally-weighted volatility. The total VaR for GFX is typically less than the sum of its two subcomponents due to diversification benefits derived from the two subcomponents. The VaR component of required capital is based on 60-day moving averages of daily VaRs scaled to a ten-day horizon, multiplied by a regulatory factor ranging from 3.00 to 4.00, except when quarter-end ten-day VaR dominates.

Table 19: Global Foreign Currency Value at Risk

(\$ In Millions)	Total VaR (FX and IR Drivers)		FX VaR (FX Drivers only)		IR VaR (IR Drivers only)		VaR Component of Required Capital	
	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022
High	\$ 0.3	\$ 0.2	\$ 0.2	\$ 0.2	\$ 0.3	\$ 0.2	\$ 1.8	\$ 1.5
Low	0.1	0.1	—	—	0.1	—	1.4	1.1
Average	0.2	0.1	0.1	0.1	0.2	0.1	1.6	1.3
Quarter End	0.2	0.1	0.2	0.1	0.1	0.1	1.8	1.5

SVaR Reporting

The table below presents levels of SVaR for GFX based on the same assumptions and inputs as above but replaying the severe one-year financial crisis period of August 2008 to August 2009. The VaR and SVaR totals indicate the degree of risk inherent in non-U.S. currency positions during the most recent quarters; however, they are not predictive of expected gain or loss. Actual future gains or losses are dependent on market conditions and the amounts and tenors of future non-U.S. currency positions.

Table 20: Global Foreign Currency Stressed Value at Risk

(\$ In Millions)	Total SVaR (FX and IR Drivers)		FX SVaR (FX Drivers only)		IR SVaR (IR Drivers only)		SVaR Component of Required Capital	
	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022	March 31, 2023	December 31, 2022
High	\$ 0.6	\$ 0.6	\$ 0.5	\$ 0.4	\$ 0.5	\$ 0.4	\$ 3.7	\$ 3.9
Low	0.1	0.1	0.1	0.1	0.1	0.1	3.0	3.2
Average	0.3	0.3	0.3	0.3	0.2	0.2	3.3	3.6
Quarter End	0.5	0.3	0.3	0.3	0.3	0.1	3.7	3.2

During the most recent period presented, Northern Trust experienced no days of actual GFX trading loss in excess of the daily GFX VaR estimate. In addition to comparing actual gains or losses to VaR, Northern Trust also compares hypothetical gains or losses to VaR. Hypothetical gains or losses are computed by assuming the previous day's closing positions remain unchanged for the entire following day, updating market prices, and recomputing the portfolio's valuation. During the most recent period presented, Northern Trust experienced two days for which the computed hypothetical loss would have been greater than indicated by the GFX VaR-based estimate at the 99% confidence level.

Valuation Practices

Northern Trust updates interest rates and foreign exchange rates daily through automated data feeds from independent internal source systems and established data vendors providing observable market prices. Rates and prices are fed into pricing models which use standard methodologies to determine initial and theoretical mark-to-market valuations of positions. Those valuations serve as base market levels from which the VaR and stress test models calculate potential changes in values. Theoretical mark-to-market valuations prepared for risk management purposes may differ from valuations prepared in accordance with GAAP. Foreign exchange positions do not include any options that require valuation. Valuations of NTSI securities come directly from market pricing provided by the source system vendor.

Risk management and operations staff provide independent assessment of valuation inputs, processes and outputs for accuracy within approved thresholds and determine any valuation adjustments that may be required.

Stress Tests and Capital Adequacy

Northern Trust monitors stress test results on an ongoing basis to assess the potential for losses exceeding required capital and considers that information in assessing capital adequacy. Northern Trust runs a number of stress tests on the foreign exchange portfolio, including quadrupling volatility, measuring at an extreme number of standard deviations, stressing correlations to extremes, taking tail averages (expected shortfall), zero diversification benefit and zero correlation between spot and forward risks. Northern Trust runs daily a SVaR, which replays a severe one-year financial crisis period of August 2008 to August 2009. In assessing capital adequacy, Northern Trust considers, in particular, the results of stress tests run daily that reenact nine of the most severe historical events over a simulated ten-day period.

The capital adequacy assessment also considers risks that may not be captured fully in the VaR- based measure, such as concentration and liquidity risk under stressed market conditions.

Model Risk Management

Financial and risk modeling are used by Northern Trust to inform numerous decisions regarding risk management, as well as capital estimation, financial reporting and disclosure, valuation and pricing, and portfolio management. Model risk may result from decisions based on models that produce incorrect results or models that are used improperly. The Model Risk Management function is responsible for the implementation and management of the enterprise-wide model risk framework and independently validating new models and reviewing and re-validating existing models. Validations are documented and include an assessment of the conceptual soundness of the modeling approach, outcome analysis, applicability of use, model assumptions and limitations, development documentation, ongoing monitoring, and model controls. Oversight of Model Risk Management is provided by the Model Risk Oversight Committee.

Independent Review and Verification

Independent oversight and review of the Market Risk Framework is provided by Risk Control. Refer to Independent Review and Verification within the Risk Management Overview section for more information.

References to the Corporation's SEC Filings

The Corporation's SEC filings contain important information relative to this report. Specific references are listed below.

DISCLOSURE MAP

Pillar 3 Requirement	Description	Pillar 3 Report	Q1 2023 Form 10-Q	2022 Annual Report
		Disclosure Starts on Page Number		
Introduction	Basis of presentation	1	33	99
Capital Structure	Terms and conditions of capital instruments	7	133, 134, 135	
	Restrictions on transactions between the Corporation and its subsidiaries	11	7, 161	
Risk Management Overview	Risk management processes	13	72	
Credit Risk: General Disclosure	Loans and leases	18, 19	43	59, 101, 118
	Allowance for credit losses	18, 19	50	61, 102, 124
	Industries	20	77	
Counterparty Credit Risk of OTC Derivative Contracts, Repo-Style Transactions and Eligible Margin Loans	Derivative contract exposures	23, 24	34, 67	100, 153
Market Risk: Interest Rate	NII sensitivity	34	23	85
	MVE sensitivity	35	24	86
Market Risk: Foreign Currency	VaR	37, 38	25	87
	Other trading activities	37	87	