UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2022

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from ________ to ________

Commission file number: 001-38855

Nasdaq, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**52-1165937**
(State or Other Jurisdiction of Incorporation or Organization)	**(I.R.S. Employer Identification No.)**

151 W. 42nd Street, New York, New York 10036

(Address of Principal Executive Offices) (Zip Code)

Registrant's telephone number, including area code: +1 212 401 8700

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.01 par value per share	**NDAQ**	**The Nasdaq Stock Market**
0.900% Senior Notes due 2033	**NDAQ33**	**The Nasdaq Stock Market**
0.875% Senior Notes due 2030	**NDAQ30**	**The Nasdaq Stock Market**
1.75% Senior Notes due 2029	**NDAQ29**	**The Nasdaq Stock Market**

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
Emerging growth company	☐		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of June 30, 2022, the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was approximately $17.2 billion (this amount represents approximately 341.3 million shares of Nasdaq, Inc.'s common stock based on the last reported sales price of $50.53 of the common stock on The Nasdaq Stock Market on such date).

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date.

Class	Outstanding at February 13, 2023
Common Stock, $0.01 par value per share	489,002,956 shares

Documents Incorporated by Reference: Certain portions of the Definitive Proxy Statement for the 2023 Annual Meeting of Shareholders are incorporated by reference into Part III of this Form 10-K.

About this Form 10-K

Throughout this Form 10-K, unless otherwise specified:

- “Nasdaq,” “we,” “us” and “our” refer to Nasdaq, Inc.
- “Nasdaq Baltic” refers to collectively, Nasdaq Tallinn AS, Nasdaq Riga, AS, and AB Nasdaq Vilnius.
- “Nasdaq BX” refers to the cash equity exchange operated by Nasdaq BX, Inc.
- “Nasdaq BX Options” refers to the options exchange operated by Nasdaq BX, Inc.
- “Nasdaq Clearing” refers to the clearing operations conducted by Nasdaq Clearing AB.
- “Nasdaq CXC” and “Nasdaq CX2” refer to the Canadian cash equity trading books operated by Nasdaq CXC Limited.
- “Nasdaq First North” refers to our alternative marketplaces for smaller companies and growth companies in the Nordic and Baltic regions.
- “Nasdaq GEMX” refers to the options exchange operated by Nasdaq GEMX, LLC.
- “Nasdaq ISE” refers to the options exchange operated by Nasdaq ISE, LLC.
- “Nasdaq MRX” refers to the options exchange operated by Nasdaq MRX, LLC.
- “Nasdaq Nordic” refers to collectively, Nasdaq Clearing AB, Nasdaq Stockholm AB, Nasdaq Copenhagen A/S, Nasdaq Helsinki Ltd, and Nasdaq Iceland hf.
- “Nasdaq PHLX” refers to the options exchange operated by Nasdaq PHLX LLC.
- “Nasdaq PSX” refers to the cash equity exchange operated by Nasdaq PHLX LLC.
- “The Nasdaq Options Market” refers to the options exchange operated by The Nasdaq Stock Market LLC.
- “The Nasdaq Stock Market” refers to the cash equity exchange and listing venue operated by The Nasdaq Stock Market LLC.

Nasdaq also provides as a tool for the reader the following list of abbreviations and acronyms that are used throughout this Annual Report on Form 10-K.

2020 Credit Facility: $1.25 billion senior unsecured revolving credit facility, which was replaced by the 2022 Credit Facility in December 2022

2022 Credit Facility: $1.25 billion senior unsecured revolving credit facility, which matures on December 16, 2027

2022 Notes: $600 million aggregate principal amount of 0.445% senior unsecured notes; repaid in full, at maturity, in December 2022

2024 Notes: $500 million aggregate principal amount of 4.25% senior unsecured notes, repaid in full and terminated in March 2022

2026 Notes: $500 million aggregate principal amount of 3.85% senior unsecured notes due June 30, 2026

2029 Notes: €600 million aggregate principal amount of 1.75% senior unsecured notes due March 28, 2029

2030 Notes: €600 million aggregate principal amount of 0.875% senior unsecured notes due February 13, 2030

2031 Notes: $650 million aggregate principal amount of 1.650% senior unsecured notes due January 15, 2031

2033 Notes: €615 million aggregate principal amount of 0.900% senior unsecured notes due July 30, 2033

2040 Notes: $650 million aggregate principal amount of 2.500% senior unsecured notes due December 21, 2040

2050 Notes: $500 million aggregate principal amount of 3.25% senior unsecured notes due April 28, 2050

2052 Notes: $500 million aggregate principal amount of 3.950% senior unsecured notes due March 7, 2052

ARR: Annualized Recurring Revenue

ASC: Accounting Standards Codification

ASU: Accounting Standards Update

ASU 2016-13: Measurement of Credit Losses on Financial Instruments

ASR: Accelerated Share Repurchase

ATS: Alternative Trading System

AUM: Assets Under Management

AWS: Amazon Web Services

CAT: A market-wide consolidated audit trail established under an SEC approved plan by Nasdaq and other exchanges

CCP: Central Counterparty

CFTC: U.S. Commodity Futures Trading Commission

EMIR: European Market Infrastructure Regulation

Equity Plan: Nasdaq Equity Incentive Plan

ESG: Environmental, Social and Governance

ESPP: Nasdaq Employee Stock Purchase Plan

ETF: Exchange Traded Fund

ETP: Exchange Traded Product

Exchange Act: Securities Exchange Act of 1934, as amended

FASB: Financial Accounting Standards Board

FICC: Fixed Income and Commodities Trading and Clearing

FINRA: Financial Industry Regulatory Authority

FRAML: Fraud Detection & Anti-Money Laundering

IPO: Initial Public Offering

MiFID II: Update to the Markets in Financial Instruments Directive

MiFIR: Markets in Financial Instruments Regulation

MTF: Multilateral Trading Facility

NFF: Nasdaq Financial Framework; Nasdaq's end-to-end technology solutions for market infrastructure operators, buy-side firms, sell-side firms and other non-financial markets

NPM: The NASDAQ Private Market, LLC

NSCC: National Securities Clearing Corporation

OCC: The Options Clearing Corporation

OTC: Over-the-Counter

Proxy Statement: Nasdaq's Definitive Proxy Statement for the 2023 Annual Meeting of Shareholders

PSU: Performance Share Unit

Regulation NMS: Regulation National Market System

Regulation SCI: Regulation Systems Compliance and Integrity

SaaS: Software as a Service

SEC: U.S. Securities and Exchange Commission

SERP: Supplemental Executive Retirement Plan

SFSA: Swedish Financial Supervisory Authority

SOFR: Secured Overnight Financing Rate

S&P: Standard & Poor’s

S&P 500: S&P 500 Stock Index

SPAC: Special Purpose Acquisition Company

SRO: Self-regulatory Organization

SSMA: Swedish Securities Markets Act 2007:528

TSR: Total Shareholder Return

U.S. GAAP: U.S. Generally Accepted Accounting Principles

U.S. Tape plans: U.S. cash equity and U.S. options industry data

UTP: Unlisted Trading Privileges

UTP Plan: Joint SRO Plan Governing the Collection, Consolidation, and Dissemination of Quotation and Transaction Information for Nasdaq-Listed Securities Traded on Exchanges on a UTP Basis

NASDAQ, the NASDAQ logos, and other brand, service or product names or marks referred to in this report are trademarks or service marks, registered or otherwise, of Nasdaq, Inc. and/or its subsidiaries. FINRA and Trade Reporting Facility are registered trademarks of FINRA.

This Annual Report on Form 10-K includes market share and industry data that we obtained from industry publications and surveys, reports of governmental agencies and internal company surveys. Industry publications and surveys generally state that the information they contain has been obtained from sources believed to be reliable, but we cannot assure you that this information is accurate or complete. We have not independently verified any of the data from third-party sources nor have we ascertained the underlying economic assumptions relied upon therein. Statements as to our market position are based on the most currently available market data. For market comparison purposes, The Nasdaq Stock Market data in this Annual Report on Form 10-K for IPOs and new listings of equity securities (including issuers that switched from other listings venues, closed-end funds and ETPs) is based on data generated internally by us; therefore, the data may not be comparable to other publicly-available IPO data. Data in this Annual Report on Form 10-K for IPOs and new listings of equity securities on the Nasdaq Nordic and Nasdaq Baltic exchanges and Nasdaq First North also is based on data generated internally by us. IPOs and new listings data is presented as of period end. While we are not aware of any misstatements regarding industry data presented herein, our estimates involve risks and uncertainties and are subject to change based on various factors, including those discussed in the “Item 1A. Risk Factors” section in this Annual Report on Form 10-K.

Nasdaq intends to use its website, ir.nasdaq.com, as a means for disclosing material non-public information and for complying with SEC Regulation FD and other disclosure obligations.

Forward-Looking Statements

The SEC encourages companies to disclose forward-looking information so that investors can better understand a company's future prospects and make informed investment decisions. This Annual Report on Form 10-K contains these types of statements. Words such as "may," "will," "could," "should," "anticipates," "envisions," "estimates," "expects," "projects," "intends," "plans," "believes" and words or terms of similar substance used in connection with any discussion of future expectations as to industry and regulatory developments or business initiatives and strategies, future operating results or financial performance, and other future developments are intended to identify forward-looking statements. These include, among others, statements relating to:

- *our strategic direction, including changes to our corporate structure;*
- *the integration of acquired businesses, including accounting decisions relating thereto;*
- *the scope, nature or impact of acquisitions, divestitures, investments, joint ventures or other transactional activities;*
- *the effective dates for, and expected benefits of, ongoing initiatives, including transactional activities and other strategic, restructuring, technology, ESG, de-leveraging and capital return initiatives;*
- *our products and services;*
- *the impact of pricing changes;*
- *tax matters;*
- *the cost and availability of liquidity and capital; and*
- *any litigation, or any regulatory or government investigation or action, to which we are or could become a party or which may affect us and any potential settlements of litigation, regulatory or governmental investigations or actions, including with respect to our CFTC investigation.*

Forward-looking statements involve risks and uncertainties. Factors that could cause actual results to differ materially from those contemplated by the forward-looking statements include, among others, the following:

- *our operating results may be lower than expected;*
- *our ability to successfully integrate acquired businesses or divest sold businesses or assets, including the fact that any integration or transition may be more difficult, time consuming or costly than expected, and we may be unable to realize synergies from business combinations, acquisitions, divestitures or other transactional activities;*
- *loss of significant trading and clearing volumes or values, fees, market share, listed companies, market data customers or other customers;*
- *our ability to develop and grow our non-trading businesses, including our technology, analytics, ESG and anti-financial crime offerings;*
- *our ability to keep up with rapid technological advances and adequately address cybersecurity risks;*
- *economic, political and market conditions and fluctuations, including inflation, interest rate and foreign currency risk inherent in U.S. and international operations, and geopolitical instability;*
- *the performance and reliability of our technology and technology of third parties on which we rely;*
- *any significant systems failures or errors in our operational processes;*
- *our ability to continue to generate cash and manage our indebtedness; and*
- *adverse changes that may occur in the litigation or regulatory areas, or in the securities markets generally, or increased regulatory oversight domestically or internationally.*

Most of these factors are difficult to predict accurately and are generally beyond our control. You should consider the uncertainty and any risk related to forward-looking statements that we make. These risk factors are discussed under the caption "Item 1A. Risk Factors" in this Annual Report on Form 10-K. You are cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date of this report. You should carefully read this entire Annual Report on Form 10-K, including "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" and the consolidated financial statements and the related notes. Except as required by the federal securities laws, we undertake no obligation to update any forward-looking statement, release publicly any revisions to any forward-looking statements or report the occurrence of unanticipated events. For any forward-looking statements contained in any document, we claim the protection of the safe harbor for forward-looking statements contained in the Private Securities Litigation Reform Act of 1995.

PART I

Item 1. Business

Overview

Nasdaq is a global technology company serving the capital markets and other industries. Our diverse offerings of data, analytics, software and services enable clients to optimize and execute their business vision with confidence.

We manage, operate and provide our products and services in three business segments: Market Platforms, Capital Access Platforms and Anti-Financial Crime.

History

Nasdaq was founded in 1971 as a wholly-owned subsidiary of FINRA. Beginning in 2000, FINRA restructured and broadened ownership in Nasdaq by selling shares to FINRA members, investment companies and issuers listed on The Nasdaq Stock Market. In connection with this restructuring, FINRA fully divested its ownership of Nasdaq in 2006, and The Nasdaq Stock Market became an independent registered national securities exchange in 2007.

In February 2008, Nasdaq and OMX AB combined their businesses, and we changed our corporate name to The NASDAQ OMX Group, Inc. This transformational combination resulted in the expansion of our business from a U.S.-based exchange operator to a global exchange company offering technology that powers our own exchanges and markets as well as many other marketplaces around the world. We operated as the NASDAQ OMX Group until we rebranded our business as Nasdaq, Inc. in 2015.

Growth Strategy

To enable success in the evolving global financial system, we have established our purpose, vision, and value proposition together with a focused growth strategy:

Our Purpose: We advance economic progress for all.

Our Vision: We will be the trusted fabric of the world's financial system.

Our Value Proposition: We deliver world-leading platforms that improve the liquidity, transparency and integrity of the global economy.

Our Strategy: In 2017, we set a new strategic direction focused on maximizing the resources, people and capital allocated to our largest growth opportunities. These opportunities, which include anti-financial crime and marketplace technology solutions, workflow for investment managers and asset owners as well as insight solutions, constituted large and growing opportunities where we felt our strengths in technology, analytics and capital markets expertise, combined with our expansive client network, positioned us to meet our clients' evolving needs.

In 2022, we announced a new organizational structure which aligns our businesses more closely with the foundational shifts that are driving the evolution of the global financial system. In order to amplify our strategy, we aligned the Company more closely with evolving client needs. As a result, we have identified three new reporting segments, Market Platforms, Capital Access Platforms and Anti-Financial Crime, which align to our new divisional structure.

By aligning our business segments against these secular trends, we aim to deliver more for our clients and increase growth across our key pillars of liquidity, transparency and integrity:

- *Liquidity:* Within our Market Platforms division, we continue to modernize markets by utilizing technology to maximize the liquidity of the global economy. New technologies, including cloud, blockchain, machine learning and artificial intelligence, present significant opportunities to further enhance market resiliency and scalability and make markets even more accessible. We believe that these technologies will enable more opportunities for market participants and new asset classes to be integrated across markets globally. We brought our markets and market-related technology businesses together, aligning complementary capabilities to capture the potential these technologies can unlock in our industry. By utilizing the division's position at the center of markets, we believe that Market Platforms will be at the forefront of the financial system's evolution and will play a critical role in advancing the modernization of markets across geographies and asset classes.
- *Transparency*: Our Capital Access Platforms division is uniquely placed to help clients navigate the increasing complexity of the evolving financial system through access to capital and transparency which enables economic growth. With over 10,000 corporate clients and 5,000 clients across the investment management ecosystem, Nasdaq is a trusted partner to aid the corporate and investment communities in making more informed decisions. Leveraging the insights and capabilities across our listings, advisory, data, index, and analytics teams, we believe that Capital Access Platforms will serve as a bridge between the investor and corporate communities, focused on enhancing the client experience by providing efficient routes to capital, delivering more holistic, actionable insights and intelligence, modernizing workflows, and navigating the climate and ESG landscape.

- *Integrity:* Our Anti-Financial Crime division combines Nasdaq's fraud detection, anti-money laundering, and surveillance businesses. This division remains focused on capturing the growth associated with protecting the integrity of the financial system and fighting financial crime. The division will continue its focus on delivering a world-class platform, leveraging the power of the cloud and machine learning across asset classes, to the full spectrum of banks and brokers, including the emerging ecosystem of financial technology, or FinTech, companies and digital banks.

Products and Services

Market Platforms

Our Market Platforms segment delivers world leading platforms that improve the liquidity, transparency and integrity of the global economy by architecting and operating the world's best markets.

Our Market Platforms segment includes our Trading Services and Marketplace Technology businesses.

Trading Services

We provide trading services in North America and Europe. In the U.S., we operate six options exchanges: Nasdaq PHLX, The Nasdaq Options Market, Nasdaq BX Options, Nasdaq ISE, Nasdaq GEMX and Nasdaq MRX. These exchanges facilitate the trading of equity, ETF, index and foreign currency options. Our combined options market share in 2022 represented the largest share of the U.S. market for multi-listed equity options. Our options trading platforms provide trading opportunities to retail investors, algorithmic trading firms and market makers, who tend to prefer electronic trading, and institutional investors, who typically require high touch services to execute their trades, which are often performed on our trading floor in Philadelphia.

We also operate three cash equity exchanges: The Nasdaq Stock Market, Nasdaq BX and Nasdaq PSX. Our U.S. cash equity exchanges offer trading of both Nasdaq-listed and non-Nasdaq-listed securities. The Nasdaq Stock Market is the largest single venue of liquidity for trading U.S.-listed cash equities. Market participants include market makers, broker-dealers, ATSs, institutional investors, and registered securities exchanges.

Trading Services also includes revenues from U.S. Tape plans. The plan administrators sell quotation and last sale information for all transactions, whether traded on The Nasdaq Stock Market or other exchanges, to market participants and to data distributors, who then provide the information to subscribers. After deducting costs, the plan administrators distribute the tape revenues to the respective plan participants based on a formula required by Regulation NMS that takes into account both trading and quoting activity.

In Canada, we operate an exchange with three independent markets for the trading of Canadian-listed securities: Nasdaq Canada CXC, Nasdaq Canada CX2 and Nasdaq Canada CXD.

In 2022, we began migrating our North American markets to the AWS cloud-computing platform in a phased approach as part of a partnership to build the foundation of new capital markets. During the fourth quarter, we successfully completed the migration of Nasdaq MRX to the cloud. We believe the shift to cloud-based markets will provide our exchanges with more security, greater reliability, better scalability and the ability to quickly power up computing resources. This will, in turn, enable Nasdaq to provide its clients access to cloud-based capabilities, including virtual connectivity services, market analytics and machine learning, at a lower cost.

In Europe, we operate exchanges in Tallinn (Estonia), Riga (Latvia) and Vilnius (Lithuania) as Nasdaq Baltic and exchanges in Stockholm (Sweden), Copenhagen (Denmark), Helsinki (Finland), and Reykjavik (Iceland) together with the clearing operations of Nasdaq Clearing, as Nasdaq Nordic.

Collectively, the Nasdaq Nordic and Nasdaq Baltic exchanges offer trading in cash equities, depository receipts, warrants, convertibles, rights, fund units and ETFs, as well as trading and clearing of derivatives and clearing of resale and repurchase agreements. Our platform allows the exchanges to share the same trading system, which enables efficient cross-border trading and settlement, cross-exchange membership and a single source for Nordic data products. Settlement and registration of cash equity trading takes place in Sweden, Finland, and Denmark via the local central securities depositories. In addition, Nasdaq owns a central securities depository that provides notary, settlement, central maintenance and other services in the Baltic countries and Iceland.

In Europe, Nasdaq Nordic offers trading in derivatives, such as stock options and futures and index options and futures. Nasdaq Clearing offers central counterparty clearing services for stock options and futures and index options and futures.

Nasdaq Fixed Income, or NFI, provides a wide range of products and services, such as trading and clearing, for fixed income products in Sweden, Denmark, Finland, Iceland, Estonia, Lithuania and Latvia. Nasdaq is the largest bond listing venue in the Nordics, with more than 5,600 listed retail and institutional bonds. In addition, Nasdaq Nordic facilitates the trading and clearing of Nordic fixed income derivatives in a unique market structure. Buyers and sellers agree to trades in fixed income derivatives through bilateral negotiations and then report those trades to Nasdaq Clearing. Nasdaq Clearing offers central counterparty clearing services for fixed-income options and futures and interest rate swaps. Nasdaq Clearing also operates a clearing service for the resale and repurchase agreement market.

In June 2021, we sold our U.S. Fixed Income business, which included an electronic platform for the trading of U.S. Treasuries.

Nasdaq Commodities is the brand name for Nasdaq's European commodity-related products and services such as trading and clearing. Nasdaq Commodities' offerings include derivatives in power, natural gas and carbon emission markets, seafood and electricity certificates. These products are listed on Nasdaq Oslo ASA, except for seafood, which is listed on Fish Pool, a third-party platform.

Nasdaq Oslo ASA is the commodity derivatives exchange for European products. All trades with Nasdaq Oslo ASA are subject to clearing with Nasdaq Clearing, which offers central counterparty clearing services for commodities options and futures.

We also own a majority stake in Puro.earth, a Finnish-based leading platform for carbon removal. Puro.earth offers engineered carbon removal instruments that are verified and tradable through an open, online platform. Puro.earth's marketplace capabilities add to our suite of ESG-focused technologies and workflow solutions and give our clients further resources to successfully achieve their ESG objectives.

In addition to our trading and clearing services business and our carbon market offering, in September 2022, we announced our planned launch of a new digital assets business to power the digital asset ecosystem. The launch underpins Nasdaq's ambition to advance and help facilitate broader institutional participation in digital assets by providing trusted and institutional-grade solutions, focused on enhanced custody, liquidity and integrity. Nasdaq Digital Assets will initially develop an advanced custody solution. Nasdaq's offering is subject to regulatory approval in applicable jurisdictions. Additionally, we expanded our anti-financial crime technology with new coverage for the cryptocurrency ecosystem, including a comprehensive suite of crypto-specific fraud detection capabilities discussed below in "Anti-Financial Crime."

Marketplace Technology

Marketplace Technology comprises our trade management services and market technology businesses.

Our trade management services business provides market participants with a wide variety of alternatives for connecting to and accessing our markets for a fee. Our marketplaces may be accessed via a number of different protocols used for quoting, order entry, trade reporting and connectivity to various data feeds. We launched WorkX in 2021, an upgraded version of Nasdaq ACT Workstation, a web-based, front-end interface that allows market participants to view data, utilize risk management tools, and submit and review trade reports. WorkX enables a seamless workflow and enhanced trade intelligence. All Workstation users were migrated to WorkX in 2022. In addition, we offer a variety of add-on compliance tools to help market participants comply with regulatory requirements.

We provide colocation services to market participants, whereby we offer firms cabinet space and power to house their own equipment and servers within our data centers. Additionally, we offer a number of wireless connectivity offerings between select data centers using millimeter wave and microwave technology.

We completed the previously announced wind-down of our broker services operations business during 2022. This business primarily offered technology and customized securities administration solutions to financial participants in the Nordic market. Such services and solutions primarily consisted of flexible back-office systems, which allowed customers to efficiently manage safekeeping, settlement and corporate actions and reporting, and included connectivity to exchanges and central securities depositories.

Our market technology business is a leading global technology solutions provider and partner to exchanges, clearing organizations, central securities depositories, regulators, banks, brokers, buy-side firms and corporate businesses, and powers over 120 market infrastructure operators and new market clients in more than 55 countries. Our solutions can handle a wide array of assets, including but not limited to cash equities, equity derivatives, currencies, various interest-bearing securities, commodities, energy products and digital currencies. Our solutions can also be used in the creation of new asset classes by non-capital markets customers, including those in insurance liabilities securitization, cryptocurrencies and sports wagering, as discussed further below.

Nasdaq's market technology is utilized by leading markets in the U.S., Europe and Asia as well as emerging markets in the Middle East, Latin America, and Africa.

During 2022, we continued to build out our SaaS business portfolio by extending and migrating our current offerings to SaaS, where we added 11 new SaaS customers. Our market technology business has evolved from its origins serving the capital markets, as we have leveraged NFF, our flexible and modular architecture technology that provides next generation capital markets capabilities in an open and agile environment, to develop our SaaS platform and offerings. We expect to continue to expand adoption of this SaaS model by our clients in the future.

For market infrastructure operators, which include exchanges, regulators, clearinghouses and central securities depositories, we provide and deliver mission-critical solutions across the trade lifecycle via NFF, which is designed to cover all aspects of a market operator's needs, from trading and clearing to risk management, market surveillance, index development, data, management, testing and quality assurance.

Recently, we have seen a growing demand for our products and services outside of the traditional capital markets. Our market technology business currently offers its services to several digital assets exchanges, commercial real estate markets, the reinsurance market and sports wagering operators. Our Marketplace Services Platform provides next-generation marketplace capabilities spanning the transaction lifecycle to facilitate the exchange of assets, services and information across various types of market ecosystems and machine-to-machine transactions. The Marketplace Services Platform is targeted at new markets and enables end-to-end marketplace implementation without the resources required for on-premise solutions.

Numerous market technology projects involve complex delivery management and systems integration. Through our integration services, we can assume responsibility for projects that involve migration to a new system and the establishment of entirely new marketplaces. We also offer operation and support for the applications, systems platforms, networks and other components included in an information technology solution, as well as advisory services. Our successful Nasdaq MRX migration to the cloud, discussed above, created a blueprint for our Marketplace Technology clients that will be used to demonstrate, guide and migrate their markets to the cloud, as well as for our own future market migrations.

Capital Access Platforms

Our Capital Access Platforms segment delivers liquidity, transparency and integrity to the corporate issuer and investment community by empowering our clients to effectively navigate the capital markets, achieve their sustainability goals, and drive governance excellence. As we operate in the center of the capital markets ecosystem, we are able to serve as a bridge between investors and corporates focused on enhancing the client experience by providing efficient routes to capital, delivering more holistic, actionable insights and intelligence, modernizing workflows, and navigating the climate and ESG landscape. We offer a suite of products to assist companies in managing corporate governance standards, discussed below in Workflow & Insights.

Our Capital Access Platforms segment includes our Data & Listing Services, Index and Workflow & Insights businesses.

Data & Listing Services

Our U.S. and European data products enhance transparency of market activity within our exchanges and provide critical information to professional and non-professional investors globally. Our Data business sells and distributes historical and real-time market data to sell-side customers, the institutional investing community, retail online brokers, proprietary trading firms, and other venues, as well as internet portals and data distributors.

We collect, process, and create information and earn revenues as a distributor of our own, as well as select third-party, content. We provide varying levels of quote and trade information to market participants and to data distributors who in turn provide subscriptions for this information. Our systems enable distributors to gain access to our market depth, fund valuation, order imbalances, market sentiment and other analytical data.

We distribute this proprietary market information to both market participants and non-participants through a number of proprietary products, including Nasdaq TotalView, our flagship market depth quote product. TotalView shows subscribers quotes, orders and total anonymous interest at every displayed price level in The Nasdaq Stock Market for Nasdaq-listed securities and critical data for the opening, closing, halt and IPO crosses. We offer TotalView products for our Nasdaq BX, Nasdaq PSX and Nordic markets. We also offer Nordic Equity TotalView, Nordic Derivatives TotalView and Nordic Fixed Income TotalView for Nordic markets.

We operate several other proprietary services and data products to provide market information, including Nasdaq Basic, a low cost alternative to the industry Level 1 feed and Nasdaq Canada Basic, a low cost alternative to other high priced data feeds. We also provide various other data, including data relating to our U.S. equities and options exchanges and Nordic equities, derivatives, fixed income, futures and commodities.

Additionally, our Nasdaq Cloud Data Service provides a flexible and efficient method of delivery for real-time exchange data and other financial information. Data is made available through a suite of application programming interfaces, or APIs, allowing for the integration of data from disparate sources and a reduction in time to market for customer-designed applications. The API is highly scalable and can support the delivery of real-time exchange data.

We operate a variety of listing platforms around the world to provide multiple global capital raising solutions for public companies. Companies listed on our markets represent a diverse array of industries including, among others, healthcare, consumer products, telecommunication services, information technology, financial services, industrials and energy. Our main listing markets are The Nasdaq Stock Market and the Nasdaq Nordic and Nasdaq Baltic exchanges.

Companies seeking to list securities on The Nasdaq Stock Market may do so on one of the three market tiers: The Nasdaq Global Select Market, The Nasdaq Global Market, or The Nasdaq Capital Market. To qualify, companies must meet minimum listing requirements, including specified financial and corporate governance criteria. Once listed, companies must maintain rigorous listing and corporate governance standards.

As of December 31, 2022, a total of 4,230 companies listed securities on The Nasdaq Stock Market, with 1,566 listings on The Nasdaq Global Select Market, 1,298 on The Nasdaq Global Market and 1,366 on The Nasdaq Capital Market.

We seek new listings from companies conducting IPOs, including SPACs, and direct listings as well as companies looking to switch from alternative exchanges. The 2022 new listings were comprised of the following:

IPOs	161
Switches from the New York Stock Exchange LLC, or NYSE, and the NYSE American LLC, or NYSE American	14
Upgrades from OTC	46
ETPs and Other Listings	145
Total	366

The Nasdaq Stock Market IPO win rates:	
2022 total	89 %
Operating companies	92 %
SPACs	86 %

During 2022, we had 14 new listings resulting from companies switching their listings from NYSE or NYSE American to join The Nasdaq Stock Market. Together with companies that transferred additional securities to The Nasdaq Stock Market during 2022, an aggregate of $36 billion in global equity market capitalization switched to The Nasdaq Stock Market.

We also offer listings on the exchanges that comprise Nasdaq Nordic and Nasdaq Baltic. For smaller companies and growth companies, we offer access to the financial markets through the Nasdaq First North alternative marketplaces. As of December 31, 2022, a total of 1,251 companies listed securities on our Nordic and Baltic exchanges.

Our European listing customers include companies, funds and governments. Customers issue securities in the form of cash equities, depository receipts, warrants, ETPs, convertibles, rights, options, bonds or fixed-income related products. In 2022, a total of 63 new companies listed on our Nordic and Baltic exchanges. In addition, 12 companies upgraded their listings from Nasdaq First North to Nasdaq Main Market.

Index

Our Index business develops and licenses Nasdaq-branded indexes and financial products. License fees for our trademark licenses vary by product based on a percentage of underlying assets, dollar value of a product issuance, number of products or number of contracts traded. We also license cash-settled options, futures and options on futures on our indexes.

As of December 31, 2022, 379 ETPs listed on 26 exchanges in over 20 countries tracked a Nasdaq index and accounted for $315 billion in AUM. This includes approximately $85 billion in ETP AUM, or 27% of the total AUM that tracked our smart beta indexes during this same time period. Our flagship index, the Nasdaq-100 Index, includes the top 100 non-financial companies listed on The Nasdaq Stock Market, and is tracked by more than 100 ETPs worldwide, and had nearly $200 billion in assets tracking the index as of December 31, 2022.

We provide index data products based on Nasdaq indexes. Index data products include our Global Index Data Service, which delivers real-time index values throughout the trading day, and Global Index Watch/Global Index File Delivery Service, which delivers daily as well as historical weightings and components data, corporate actions and a breadth of additional data for the indexes that we operate.

Nasdaq Dorsey Wright, or NDW, provides passive indexing and smart beta strategies to support the financial advisor community, as well as systematic relative strength strategies to manage separately and unified managed accounts. NDW strengthens Nasdaq’s position as a leading smart beta index provider in the U.S.

Workflow & Insights

Our Workflow & Insights business includes our analytics and corporate solutions businesses.

Our analytics business provides asset managers, investment consultants and institutional asset owners with information and analytics to make data-driven investment decisions, deploy their resources more productively, and provide liquidity solutions for private funds. Through our eVestment and Solovis solutions, we provide a suite of cloud-based solutions that help institutional investors and consultants conduct pre-investment due diligence, and monitor their portfolios post-investment. The eVestment platform also enables asset managers to efficiently distribute information about their firms and funds to asset owners and consultants worldwide.

Through the Solovis platform, endowments, foundations, pensions and family offices transform how they collect and aggregate investment data, analyze portfolio performance, model and predict future outcomes, and share meaningful portfolio insights with key stakeholders. The Nasdaq Fund Network and Nasdaq Data Link are additional platforms in our suite of investment data analytics offerings and data management tools. Nasdaq Fund Network gathers and distributes daily net asset values from over 35,000 funds and other investment vehicles across North America. We have extended Nasdaq Fund Network to support the distribution of collective investment trusts, hedge funds, managed accounts, separate accounts and demand deposit accounts. Nasdaq Data Link strengthens our position as a leading source for financial, economic, and alternative datasets. For investment management firms, investment banks and other investors, the platform powers data-driven decision-making for users across the globe via universal APIs, and provides for highly efficient data discovery and delivery.

Our corporate solutions business serves both public and private companies and organizations through our Investor Relations Intelligence, Governance Solutions and ESG Solutions products. Our public company clients can be companies listed on our exchanges or other U.S. and global exchanges. Our private company clients include a diverse group of organizations ranging from family-owned companies, government organizations, law firms, privately held entities, and various non-profit organizations to hospitals and healthcare systems. We help organizations enhance their ability to understand and expand their global shareholder base, improve corporate governance, and navigate the evolving ESG landscape through our suite of advanced technology, analytics, and consulting services. We also advise clients on a range of governance and sustainability-related issues.

Our Investor Relations Intelligence offerings include a global team of expert consultants that deliver advisory services including Equity Surveillance & Shareholder Analysis, Investor Engagement and Perception Studies, as well as an industry-leading platform, Nasdaq IR Insight®, to investor relations professionals and executive teams. These solutions allow investor relations officers and executives to better manage their investor relations programs, understand their investor base, target new investors, manage meetings and consume key data such as investor profiles, equity research, consensus estimates and news.

Through our Governance Solutions products, we provide a global technology offering and consulting services that streamline the meeting process for board of directors and executive leadership teams and enable them to accelerate decision making and strengthen governance. Our solutions help protect sensitive data and facilitate productive collaboration, which enables board members and teams to work faster and more effectively.

Our ESG Solutions includes our ESG Advisory practice and our ESG software offering. Our ESG Advisory practice helps companies analyze, assess and action best practices to attract long-term capital. Our ESG Software offering includes OneReport, a SaaS solution, that helps organizations navigate corporate responsibility frameworks, manage information capture and response process, and deliver ESG data to ratings agencies and other stakeholders. In June 2022, we acquired Metrio Software Inc., or Metrio, a cloud-based solution that helps firms manage ESG data, perform greenhouse gas emissions calculations and accounting, and optimize granular data collection, report publication and dashboarding against targets. Both solutions support audit and assurance requirements.

Anti-Financial Crime

Our Anti-Financial Crime segment delivers leading platforms that improve the integrity and transparency of the financial world by providing SaaS solutions for fraud detection, anti-money laundering, and trade and market surveillance.

The financial services industry has seen a growing demand for products and services focused on anti-financial crime. Our FRAML solution provides a cloud-based platform to help detect, investigate, and report money laundering and financial fraud to more than 2,300 financial institutions in North America.

Our surveillance solutions include a SaaS platform designed for banks, brokers and other market participants to assist in complying with market rules, regulations and internal market surveillance policies and serves more than 170 clients. We also provide a solution to regulators and exchanges with a robust platform to manage cross-market, cross-asset and multi-venue surveillance. This offering powers surveillance for more than 50 exchanges and 15 regulators.

In 2022, we expanded our anti-financial crime technology with new capabilities and coverage for the digital assets ecosystem, allowing us to play a central role in combating the rising threat of fraud, money laundering and market manipulation across the digital assets landscape.

Enablers, Differentiators and Competition

Technology

Technology plays a key role in ensuring the growth, reliability and regulation of financial markets. We have established a technology risk program to evaluate the resiliency of critical systems, including risks associated with cybersecurity. This program is focused on identifying areas for improvement in systems, and implementing changes and upgrades to technology and processes to minimize future risk. We have continued our focus on improving the security of our technology with an emphasis on employee awareness through training, targeted phishing education campaigns, and new tool deployment for our securities operations team. See "Item 1A. Risk Factors," in this Annual Report on Form 10-K for further discussion.

Nasdaq's shift to utilizing and deploying cloud infrastructure continued during 2022. In the fourth quarter of 2022, we migrated Nasdaq MRX to the cloud, which is the first exchange moved to an exclusively cloud-enabled infrastructure and the first exchange solely in the cloud of any regulated public market in the world. We believe that migrating our exchanges to the cloud, through our partnership with AWS, our preferred cloud provider, will result in improved performance and increased flexibility for our customers. We expect to move additional North American markets to the cloud with AWS during the next several years. The shift to cloud-based markets will enable Nasdaq to provide its clients access to cloud-based capabilities, including virtual connectivity services, market analytics and machine learning, at a lower cost. We also expect to leverage the cloud-based infrastructure for our market technology clients, assisting such clients in developing their own platforms and customizing their offerings for their local, rapidly changing industry dynamics.

To facilitate the exchange migration to AWS, Nasdaq will also leverage its Fusion technology platform. Fusion positions Nasdaq's North American and European markets to manage, operate and deploy a common platform that can be used across our nine Nasdaq derivative markets, while enabling our markets for cloud deployment.

We continue to utilize NFF for delivering end-to-end solutions to market infrastructure operators, buy-side firms, sell-side firms and other non-financial markets in addition to also supporting Nasdaq's own internal trading systems. The framework consists of a single operational core platform that ties together Nasdaq's portfolio of functionality across the trade lifecycle, in an open framework whereby exchanges, clearinghouses, central securities depositories, and other entities can easily integrate Nasdaq's business applications with each other, as well as other third-party solutions. In addition to being able to integrate a broad range of business functions, NFF enables end users to leverage recent technology developments.

Competitive Strengths

We are a global, client-focused technology company with expertise in markets. We deploy robust technology capabilities and have developed a leading anti-financial crime and corporate and investor franchise. Our business segments complement each other and we believe that our strong competitive position in large, high-growth markets positions us for sustained growth.

A Unique Value Proposition

We operate leading platforms that can improve the liquidity, transparency, and integrity of the global economy, allowing us to:

- Develop efficient and reliable technologies to facilitate and protect the financial system across asset classes;
- Empower our clients to effectively navigate the capital markets, achieve their sustainability goals, and maintain corporate governance excellence; and
- Provide data, tools and insights that drive sound decision making.

Technological Strength

The strength and resiliency of our technology, enhanced by our Marketplace Technology business, in meeting the advancing demands of our global customer base is vital to the continued success of our business and distinguishes us from our competitors.

<u>A Focus on Client Needs Across the Global Financial Ecosystem</u>

We strive to serve a diverse range of clients that participate across the global financial ecosystem, including:

- **Brokers and Traders** - Helping brokers and traders to confidently plan, optimize and execute their business vision.
- **Market Participants** - Providing market participants with access to liquidity and enabling them to efficiently consume, monitor, analyze, and capitalize on real-time market changes.
- **Listed Companies** - Enabling companies to access capital markets effectively and manage stakeholders.
- **Investors and Asset Managers** - Offering products and services to assist investors and asset managers in optimizing their portfolios and offerings.
- **Market Infrastructure Operators** - Assisting market infrastructure operators in increasing efficiency, meeting customer needs, and growing revenue.
- **Banks and Financial Institutions** - Providing safety and integrity through a suite of trade surveillance and cloud-native anti-financial crime solutions.

Competition

Market Platforms

We face intense competition in North America and Europe for our Trading Services businesses. We seek to provide market participants with greater functionality, trading system stability and performance, high levels of customer service, and efficient pricing. In both North America and Europe, our competitors include other exchange operators, operators of non-exchange trading systems and banks and brokerages that operate their own internal trading pools and platforms.

In the U.S., our options markets compete with exchanges operated by Cboe Global Markets, Inc., or Cboe, Miami International Holdings, Inc., or MIAX, Intercontinental Exchange, Inc., or ICE, and BOX Options Market. In cash equities in the U.S., we compete with exchanges operated by Cboe, ICE, MIAX, The Investors Exchange, Members Exchange and Long Term Stock Exchange. We also face competition from ATSs, known as “dark pools,” and other less-heavily regulated broker-owned trade facilitation systems, as well as from other types of OTC trading. In Canada, our cash equities exchange competes with exchanges such as the Toronto Stock Exchange, or TSX, and other marketplaces.

Our U.S. Tape plans earn revenue from consolidated data products which are distributed by SEC-mandated consolidators (one for Nasdaq-listed stocks and another for NYSE and other-listed stocks) that share the revenue among the exchanges that contribute data. The consolidated data business is under competitive pressure from other securities exchanges that trade Nasdaq-listed securities. In addition, The Nasdaq Stock Market similarly competes for the tape fees from the sale of information on securities listed on other markets.

In Europe, our cash equities markets compete with exchanges such as Euronext N.V., Deutsche Börse AG, London Stock Exchange Group plc, or LSE, and many MTFs such as Cboe, Turquoise and Aquis. Our competitors in the trading and clearing of options and futures on European equities include Eurex, Cboe, ICE Futures Europe and London Clearing House, or LCH. In addition, in equities markets in Europe, we face competition from other broker-owned systems, dark pools, Systematic Internalizers, or SIs, and other types of OTC trading. Competition among exchanges for trading European equity derivatives tends to occur where there is competition in the trading of the underlying equities. In addition to exchange-based competition, we face competition from OTC derivative markets.

The implementation of MiFID II and MiFIR has resulted in further competitive pressure on our European trading business. SIs are attracting a significant share of electronically matched volume and compete aggressively for the trading of equity securities listed on our Nordic exchanges. Different bilateral trading systems pursuing block business also remain active in Europe. Regulators are continuously monitoring the market structure and have, in a series of consultations, asked for input regarding suggested changes to MiFID II.

Our European fixed income and commodities productsand services are subject to competitive pressure from European exchanges and clearinghouses.

Our Marketplace Technology business includes our trade management services and market technology businesses. Our trade management services business competes with other exchange operators, extranet providers, and data center providers.

Traditionally, exchanges and exchange-related businesses would internally develop technology, sometimes aided by consultants. However, this model has gradually changed as many operators have recognized the cost-savings made possible by buying technology from third parties. As a result, two types of competitors have emerged in our market technology business: exchange operators and technology providers unaffiliated with exchanges. These organizations make available a range of off-the-shelf technology, including trading, clearing, settlement, depository and information dissemination, and offer customization and operation expertise. Market conditions in market technology are evolving rapidly, which makes continuous investment and innovation a necessity. Our partnership with AWS enables us to compete with other companies that are developing cloud-based exchanges and market technology offerings.

Capital Access Platforms

Our Data business includes proprietary data products. Proprietary data products are made up exclusively of data derived from each exchange’s systems. Competition in the data business is intense and is influenced by rapidly changing technology and the creation of new product and service offerings.

The sale of our proprietary data products is under competitive threat globally from alternative exchanges and trading venues that offer similar products. Our data business competes with other exchanges and third-party vendors to provide information to market participants. Examples of our competitors in proprietary data products are ICE, Cboe, TSX, and Dow Jones & Company.

Our Listing Services business in both the U.S. and Europe provides a means of facilitating capital formation through public capital markets. There are competing ways of raising capital, and we seek to demonstrate the benefits of listing shares on our exchange. Our primary competitor for larger company stock share listings in the U.S. is NYSE. The Nasdaq Stock Market competes with local and international markets located outside the U.S. for listings of equity securities of both U.S. and non-U.S. companies that choose to list (or dual-list) outside of their home country. For example, The Nasdaq Stock Market competes for listings with exchanges in Europe and Asia, such as LSE and The Stock Exchange of Hong Kong Limited. Additionally, we face competition from private equity firms that may elect to keep their portfolio companies as private companies.

The Listings Services business in Europe is characterized by a large number of exchanges competing for new or secondary listings. Each country has one or more national exchanges, which are often the first choice of companies in each respective country. For those considering an alternative, competing European exchanges that frequently attract many listings from outside their respective home countries include LSE, Euronext N.V. and Deutsche Börse AG. In addition to the larger exchanges, companies seeking capital or liquidity from public capital markets are able to raise capital without a regulated market listing and can consider trading their shares on smaller markets and quoting facilities.

Our Index business offers Nasdaq-branded indexes and financial products and faces competition from providers of various competing financial indexes. For example, there are a number of indexes that aim to track the technology sector and thereby compete with the Nasdaq-100 Index and the Nasdaq Composite Index. We face competition from investment banks, dedicated index providers, markets and other product developers, including S&P Dow Jones Indices, MSCI and FTSE Russell.

Workflow & Insights includes our analytics and corporate solutions businesses. Our analytics business faces competition from a broad array of data and analytics suppliers, both established firms and small start-ups. Our primary competitors are Morningstar, FactSet and any number of smaller firms along with start-up data providers and aggregators. Our analytics business offerings compete with other analytics providers, including Addepar and Caissa.

Our corporate solutions business faces competition that can be varied and fragmented. For our Investor Relations Intelligence solutions, there are many regional competitors and relatively few global providers. Other exchange operators are partnering with firms that have capabilities in this area and seeking to acquire relevant assets in order to provide investor relations services to customers alongside listing services. Our ESG Solutions, including Nasdaq OneReport, Metrio and ESG Advisory, are positioned in evolving markets with competitors offering multiple point solutions providing software, data or consulting services. The competitive landscape for our Governance Solutions products varies by customer segment and geography. Most competitors offer SaaS solutions that are supported by a data centered strategy, while certain firms offer specialized services that focus on a single niche segment. Customers frequently seek single-source providers that are able to address a broad range of needs within a single platform.

Anti-Financial Crime

For our Anti-Financial Crime segment, which includes solutions for fraud detection, anti-money laundering or AML and trade and market surveillance, competitors include core banking solution providers ranging from small to large independent solution providers, FinTech start-ups and in-house custom builds. We compete against enterprise solution providers and point solutions for clients with larger AUM. Competitors also include companies that serve multiple industries in addition to financial services with generalized solutions, such as business intelligence tools, data integrators, investigation platforms and software covering the boarder compliance lifecycle. Recently, there has been an increase of FinTech start-ups shifting into the surveillance, fraud detection and AML space offering highly-specialized solutions for advanced data analytics, artificial intelligence and machine learning technology. The anti-financial crime and surveillance offerings compete on a number of factors, including but not limited to, increased workflow efficiency, quality of the data, quality of alerts and pricing.

Our surveillance and anti-financial crime offerings must demonstrate the ability to decrease false-positives and provide in-depth views into potential abuses and risks that stem from those cases. These offerings help firms reduce both the reputational and regulatory risk as well as the complexity in efforts to keep markets and financial institutions safe.

Intellectual Property

We believe that our intellectual property assets are important for maintaining the competitive differentiation of our products, systems, software and services, enhancing our ability to access technology of third parties and maximizing our return on research and development investments.

To support our business objectives and benefit from our investments in research and development, we actively create and maintain a wide array of intellectual property assets, including patents and patent applications related to our innovations, products and services; trademarks related to our brands, products and services; copyrights in software and creative content; trade secrets; and through other intellectual property rights, licenses of various kinds and contractual provisions. We enter into confidentiality and invention assignment agreements with our employees and contractors, and utilize non-disclosure agreements with third parties with whom we conduct business in order to secure and protect our proprietary rights and to limit access to, and disclosure of, our proprietary information.

We own, or have licensed, rights to trade names, trademarks, domain names and service marks that we use in conjunction with our operations and services. We have registered many of our most important trademarks in the U.S. and in foreign countries. For example, our primary “Nasdaq” mark is a registered trademark that we actively seek to protect in the U.S. and in over 50 other countries worldwide.

Over time, we have accumulated a robust portfolio of issued patents in the U.S. and in many other jurisdictions across the world. We currently hold rights to patents relating to certain aspects of our products, systems, software and services, but we primarily rely on the innovative skills, technical competence and marketing abilities of our personnel. No single patent is in itself core to the operations of Nasdaq or any of its principal business areas.

Corporate Venture Program

We operate a corporate venture program to make minority investments primarily in emerging growth FinTech companies that are strategically relevant to, and aligned with, Nasdaq. Investments are made through the venture program to further our research and development efforts and accelerate the path to commercial viability. We expect that capital invested will continue to be modest and will not have a material impact on our consolidated financial statements, existing capital return or deployment priorities. Since its inception in 2017, our venture program has grown in size and has invested in companies covering various sectors, including data, analytics and workflow, digital assets, market infrastructure, anti-financial crime, new marketplaces, enabling technologies and ESG. As of December 31, 2022, our investments, which include equity and debt investments, were valued at $180 million.

Environmental, Social and Governance Matters

Nasdaq is committed to further advancing our longer-term ESG strategy, advocacy and oversight. We continue to engage with internal and external stakeholders at all levels on ESG matters. During 2022, we deepened our corporate and community ESG efforts, including furthering our commitment to greater sustainability and climate change awareness.

The Nominating & ESG Committee has formal responsibility and oversight for ESG policies and programs and receives regular reporting on key ESG matters and initiatives. Our Corporate ESG Steering Committee serves as the central coordinating body for our ESG strategy; it is co-chaired by executive leaders and comprised of geographically diverse representatives from multiple business units.

We continued to be committed to carbon neutrality, and for the fifth consecutive year, achieved that goal across all business operations through the purchase of green power, carbon offsets, and renewable energy certificates. We were named to the Dow Jones Sustainability North America Index for the seventh consecutive year and received recognition from the Bloomberg Gender-Equity Index and The Human Rights Campaign's Corporate Equality Index. In addition, Nasdaq's ESG scores improved across multiple rating agencies during 2022, including four significant sustainability rating upgrades:

- MSCI: a two-tier rating increase to "AA," from our "BBB" rating in the prior year, placing Nasdaq in MSCI's "Leaders" category.
- CDP: a score improvement to an "A" from the prior year's "B", earning us a place on CDP's "A List" for climate disclosures and actions.
- EcoVadis: status upgrade to "Gold Medal," a recognition reserved for the top 5% of all rated companies, as compared to our "Silver Medal" status in the prior year.
- 2022 S&P Corporate Sustainability Assessment (CSA): a score of 60, representing an 20% year-over-year score increase, placing Nasdaq in the 95th percentile of our industry group.

In 2022, Nasdaq also continued to be a signatory to the United Nations Global Compact and the United Nations Principles of Responsible Investment and became a signatory to the World Economic Forum Stakeholder Capitalism Metrics.

While our business operations account for a comparatively small environmental impact, we focus our environmental efforts on several key areas, including the way we use energy resources, manage our workspaces, engage our value chain and conduct business travel. Through these efforts, we seek to lessen the environmental impact of our organization by reducing atmospheric carbon emissions and managing water and waste associated with business operations. Nasdaq has approved near-term and long-term science-based emissions reduction targets with the Science Based Targets initiative, or SBTi. In 2022, the SBTi verified Nasdaq's 2050 net-zero science-based target.

Nasdaq has obtained the LEED Platinum certification for our New York headquarters office in Times Square, which complements the LEED Gold certification for our 10th Floor Client Experience Center, our space for client events in our New York headquarters. We also achieved LEED Gold certifications for our new Greensboro, North Carolina office and existing office locations in Copenhagen, Reykjavik, San Francisco, Stockholm, Umeå, Vilnius and Washington, D.C. We continue to look for additional opportunities to transition to green offices across the globe as part of our strategy to reduce office operation-related emissions.

We help companies of all ESG maturity levels through our robust combination of technology, tools, data, insights and capital market solutions. During 2022, we maintained, and continued to expand, our portfolio of ESG services and solutions for our clients and stakeholders, including:

- the Nasdaq ESG Advisory Program, which pairs companies with ESG consulting expertise to help them analyze, assess and enact ESG program best practices with the goals of attracting long-term capital and enhancing value;
- the Nasdaq OneReport platform, which helps clients streamline the data gathering process under various frameworks for sustainability reporting and provides data to ratings agencies;

- the Metrio platform, which provides tools to address corporate issuers' expanding ESG data collection, analytics, and reporting needs;
- the Nasdaq Sustainable Bond Network, which connects issuers and investors in sustainable, green and social bonds, and provides access to detailed information and impact data, allowing investors to make more informed decisions;
- the Nasdaq ESG Data Hub, which connects investors with expert led ESG data sets from leading providers across a wide spectrum of areas, including gender diversity, carbon emissions and climate risk, providing detailed and tangible intelligence on companies' ESG profiles;
- the Nasdaq ESG Data Portal, which now includes ESG-related data from more than 630 Nordic companies;
- the Nasdaq ESG Footprint, a tool that helps both institutional and retail investors analyze the impact of their portfolios;
- the eVestment ESG Questionnaire, which provides a standard approach to ESG reporting thereby allowing for greater transparency into how ESG strategies work, providing deeper ESG data for allocator consumption, and enabling asset managers to better articulate their approach to ESG; and
- Puro.earth, a leading marketplace for carbon removal, which we believe will address the growing demand for carbon removal by corporations, as well as enable new carbon removal methodologies as technologies evolve.

In 2022, we requested our existing leading suppliers by spend to attest to our updated Supplier Code of Ethics. The Supplier Code of Ethics, which is available on our website, encourages our suppliers and vendors to adopt sustainability and environmental practices in line with our published Environmental Practices Statement, to promote a diverse and inclusive workforce and to engage diverse-owned business in their supply chain. Additionally, our new suppliers are required to attest to the Supplier Code of Ethics in connection with the commencement of their engagement.

Effective August 8, 2022, Nasdaq's new listing rule requires companies listed on our U.S. exchange to publicly disclose consistent, transparent diversity statistics regarding their board of directors using a standardized template. Companies are also required to choose whether to meet recommended board diversity objectives or disclose their reasons for not doing so under new listing rules effective in 2023, 2025 and 2026 (depending on the company's listing tier and board size). The diversity rules are currently being challenged by two advocacy groups in the U.S. Court of Appeals for the Fifth Circuit.

For more information regarding our ESG efforts in 2022, both internally and externally, please see the section entitled "Human Capital Management" below and our Proxy Statement.

Regulation

We are subject to extensive regulation in the U.S., Canada and Europe.

U.S. Regulation

U.S. federal securities laws establish a system of cooperative regulation of securities markets, market participants and listed companies. SROs conduct the day-to-day administration and regulation of the nation's securities markets under the close supervision of, and subject to extensive regulation, oversight and enforcement by, the SEC. SROs, such as national securities exchanges, are registered with the SEC.

This regulatory framework applies to our U.S. business in the following ways:

National Securities Exchanges. SROs in the securities industry are an essential component of the regulatory scheme of the Exchange Act responsible for providing fair and orderly markets and protecting investors. The Exchange Act and the rules thereunder, as well as each SRO's own rules, impose many regulatory and operational responsibilities on SROs, including the day-to-day responsibilities for market and broker-dealer oversight. Moreover, an SRO is responsible for enforcing compliance by its members, and persons associated with its members, with the provisions of the Exchange Act, the rules and regulations thereunder, and the rules of the SRO, including rules and regulations governing the business conduct of its members.

Nasdaq currently operates three cash equity, six options markets and one corporate bond market in the U.S. We operate The Nasdaq Stock Market, The Nasdaq Options Market and the Corporate Bond Market pursuant to The Nasdaq Stock Market's SRO license; Nasdaq BX and Nasdaq BX Options pursuant to Nasdaq BX's SRO license; Nasdaq PSX and Nasdaq PHLX pursuant to Nasdaq PHLX's SRO license; and Nasdaq ISE, Nasdaq GEMX and Nasdaq MRX, each of which operates an options market under its own SRO license. As SROs, each entity has separate rules pertaining to its broker-dealer members and listed companies, as applicable. Broker-dealers that choose to become members of our exchanges are subject to the rules of those exchanges.

All of our U.S. national securities exchanges are subject to SEC oversight, as prescribed by the Exchange Act, including periodic and special examinations by the SEC. Our exchanges also are potentially subject to regulatory or legal action by the SEC at any time in connection with alleged regulatory violations. We have been subject to a number of routine reviews and inspections by the SEC or external auditors in the ordinary course, and we have been and may in the future be subject to SEC enforcement proceedings. To the extent such actions or reviews and inspections result in regulatory or other changes, we may be required to modify the manner in which we conduct our business, which may adversely affect our business, operating results and financial condition.

Section 19 of the Exchange Act provides that our exchanges must submit to the SEC proposed changes to any of the SROs' rules, practices and procedures, including revisions to provisions of our certificate of incorporation and by-laws that constitute SRO rules. The SEC will typically publish such proposed changes for public comment, after which the SEC may approve or disapprove the proposal, as it deems appropriate. SEC approval requires a finding by the SEC that the proposal is consistent with the requirements of the Exchange Act and the rules and regulations thereunder. Pursuant to the requirements of the Exchange Act, our exchanges must file with the SEC, among other things, all proposals to change their pricing structure.

Nasdaq conducts real-time market monitoring, certain equity surveillance not involving cross-market activity, most options surveillance, rulemaking, enforcement and membership functions through our Nasdaq Regulation department. We review suspicious trading behavior discovered by our regulatory staff, and depending on the nature of the activity, may refer the activity to FINRA for further investigation. Pursuant to regulatory services agreements between FINRA and our SROs, FINRA provides certain regulatory services to our markets, including some regulation of trading activity and surveillance and investigative functions. In 2019, Nasdaq received SEC approval to reclaim from FINRA the responsibility and opportunity to bring enforcement actions against member firms for violating certain Nasdaq exchange rules governing conduct on the Nasdaq exchanges. Our SROs retain ultimate regulatory responsibility for all regulatory activities performed under regulatory agreements by FINRA, and for fulfilling all regulatory obligations for which FINRA does not have responsibility under the regulatory services agreements.

In addition to its other SRO responsibilities, The Nasdaq Stock Market, as a listing market, also is responsible for overseeing each listed company's compliance with The Nasdaq Stock Market's financial and corporate governance standards. Our listing qualifications department evaluates applications submitted by issuers seeking to list their securities on The Nasdaq Stock Market to determine whether the quantitative and qualitative listing standards have been satisfied. Once securities are listed, the listing qualifications department monitors each issuer's on-going compliance with The Nasdaq Stock Market's continued listing standards.

Broker-dealer regulation. Nasdaq's broker-dealer subsidiaries are subject to regulation by the SEC, the SROs and various state securities regulators. Nasdaq operates three broker-dealers: Nasdaq Execution Services, LLC, NFSTX, LLC, and Nasdaq Capital Markets Advisory LLC. Each broker-dealer is registered with the SEC, a member of FINRA and registered in the U.S. states and territories required by the operation of its business. In addition, we own a minority interest in NPM Securities.

Nasdaq Execution Services operates as our routing broker for sending orders from Nasdaq's U.S. cash equity and options exchanges to other venues for execution. NFSTX is a registered ATS and acts as an intermediary to facilitate secondary transactions in certain funds (both registered or not registered under the Investment Company Act of 1940), business development companies, certain closed-end funds and private real estate investment funds. Nasdaq Capital Markets Advisory acts as a third-party advisor to privately-held or publicly-traded companies during IPOs and various other offerings.

The SEC, FINRA and SROs adopt, and require strict compliance with, rules and regulations applicable to broker-dealers. The SEC, SROs and state securities commissions may conduct administrative proceedings which can result in censures, fines, the issuance of cease-and-desist orders or the suspension or expulsion of a broker-dealer, its officers or employees. The SEC and state regulators may also institute proceedings against broker-dealers seeking an injunction or other sanction. All broker-dealers have an SRO that is assigned by the SEC as the broker-dealer's Designated Examining Authority. The Designated Examining Authority is responsible for examining a broker-dealer for compliance with the SEC's financial responsibility rules. FINRA is the current Designated Examining Authority for each of our broker-dealer subsidiaries.

Our registered broker-dealers are subject to regulatory requirements intended to ensure their general financial soundness and liquidity, which require that they comply with certain minimum capital requirements. As of December 31, 2022, each of our broker-dealers were in compliance with all of the applicable capital requirements.

Regulatory contractual relationships with FINRA. Our SROs have signed a series of regulatory service agreements covering the services FINRA provides to the respective SROs. Under these agreements, FINRA personnel act as our agents in performing the regulatory functions outlined above, and FINRA bills us a fee for these services. These agreements have enabled us to reduce our headcount while ensuring that the markets for which we are responsible are properly regulated. However, we have reduced the scope of services provided by FINRA under these regulatory services agreements and are performing certain of those regulatory functions directly. In addition, our SROs retain ultimate regulatory responsibility for all regulatory activities performed under these agreements by FINRA.

Exchange Act Rule 17d-2 permits SROs to enter into agreements, commonly called Rule 17d-2 agreements, approved by the SEC with respect to enforcement of common rules relating to common members. Our SROs have entered into several such agreements under which FINRA assumes regulatory responsibility for specifics covered by the agreement, including:

- agreements with FINRA covering the enforcement of common rules, the majority of which relate to the regulation of common members of our SROs and FINRA;

- joint industry agreements with FINRA covering responsibility for enforcement of insider trading rules;
- joint industry agreement with FINRA covering enforcement of rules related to cash equity sales practices and certain other non-market related rules; and
- joint industry agreement covering enforcement of rules related to options sales practices.

Regulation NMS and Options Intermarket Linkage Plan. We are subject to Regulation NMS for our cash equity markets, and our options markets have joined the Options Intermarket Linkage Plan. These are designed to facilitate the routing of orders among exchanges to create a national market system as mandated by the Exchange Act. One of the principal purposes of a national market system is to assure that brokers may execute investors' orders at the best market price. Both Regulation NMS and the Options Intermarket Linkage Plan require that exchanges avoid trade-throughs, locking or crossing of markets and provide market participants with electronic access to the best prices among the markets for the applicable cash equity or options order.

In addition, Regulation NMS requires that every national securities exchange on which an NMS stock is traded and every national securities association act jointly pursuant to one or more national market system plans to disseminate consolidated information, including a national best bid and national best offer, on quotations for transactions in NMS stocks, and that such plan or plans provide for the dissemination of all consolidated information for an individual NMS stock through a single plan processor.

The UTP Plan was filed with and approved by the SEC as a national market system plan in accordance with the Exchange Act and Regulation NMS to provide for the collection, consolidation and dissemination of such information for Nasdaq-listed securities. The Nasdaq Stock Market serves as the processor for the UTP Plan pursuant to a contract for a two-year term through October 2023. The Nasdaq Stock Market also serves as the administrator for the UTP Plan. To fulfill its obligations as the processor, The Nasdaq Stock Market has designed, implemented, maintained, and operated a data processing and communications system, hardware, software and communications infrastructure to provide processing for the UTP Plan. As the administrator, The Nasdaq Stock Market manages the distribution of market data, the collection of the resulting market data revenue, and the dissemination of that revenue to plan members in accordance with the terms of the UTP Plan and of Regulation NMS.

In May 2020, the SEC adopted an order to require changes to the governance of securities information processors. In June 2020, we and several other exchanges petitioned the U.S. Court of Appeals for the District of Columbia Circuit, or the Court of Appeals, to review the SEC's governance order. In July 2022, the Court of Appeals vacated portions of the governance order that would have provided voting rights to persons other than SROs. At this time, the SEC has not directed implementation of the remaining portions of the governance order, but may do so in the future.

In December 2020, the SEC adopted a rule to modify the infrastructure for the collection, consolidation and dissemination of market data for exchange-listed national market stocks, or NMS data. The rule changes include, among other things, requiring exchanges to add more "core data" to the securities information processors, including partial depth-of-book, certain odd-lot quotations/transactions, auction, regulatory, and administrative data; eliminating central, official consolidators of tape plans and enabling multiple competing consolidators to register to aggregate and disseminate core data; and authorizing persons to purchase and aggregate core data directly from the exchanges for their own use. In May 2022, the Court of Appeals rejected a challenge to the rule brought by Nasdaq and several other exchanges. In September 2022, the SEC disapproved fees proposed by Nasdaq and other exchanges to implement the rule but did not direct exchanges to take further action to implement the rule. Accordingly, a schedule for implementing the rule has not been imposed by the SEC, and we are not certain of the timing, or the impact, of these new rules on our business or role as a securities information processor.

Regulation SCI. Regulation SCI is a set of rules designed to strengthen the technology infrastructure of the U.S. securities markets. Regulation SCI applies to national securities exchanges, operators of certain ATSs, market data information providers and clearing agencies, subjecting these entities to extensive compliance obligations, with the goals of reducing the occurrence of technical issues that disrupt the securities markets and improving recovery time when disruptions occur. We implemented an inter-disciplinary program to ensure compliance with Regulation SCI. We have also created Regulation SCI policies and procedures, updated internal policies and procedures, and developed an information technology governance program to ensure compliance.

Regulation of Registered Investment Advisor Subsidiary. Our subsidiary NDW is an investment advisor registered with the SEC under the Investment Advisors Act of 1940. In this capacity, NDW is subject to oversight and inspections by the SEC. Among other things, registered investment advisors like NDW must comply with certain disclosure obligations, advertising and fee restrictions and requirements relating to client suitability and custody of funds and securities. Registered investment advisors are also subject to anti-fraud provisions under both federal and state law.

CFTC Regulation. The Dodd-Frank Wall Street Reform and Consumer Protection Act resulted in increased CFTC regulation of our use of certain regulated derivatives products, as well as the operations of some of our subsidiaries outside the U.S. and their customers.

Canadian Regulation

Regulation of Nasdaq Canada is performed by the Canadian Securities Administrators, an umbrella organization of Canada's provincial and territorial securities regulators. As a recognized exchange in Ontario, Nasdaq Canada must comply with the terms and conditions of its exchange recognition order. While exempt from exchange recognition in each jurisdiction in Canada other than Ontario where Nasdaq Canada carries on business, Nasdaq must also comply with the terms and conditions of an exemption order granted by the other jurisdictions in order to maintain its exemptive status. Oversight of the exchange is performed by Nasdaq Canada's lead regulator, the Ontario Securities Commission.

Nasdaq Canada is subject to several national marketplace related instruments which set out requirements for marketplace operations, trading rules and managing electronic trading risk. Exchange terms and conditions include but are not limited to, requirements for governance, regulation, rules and rulemaking, fair access, conflict management and financial viability.

European Regulation

Regulation of our markets in the European Union and the European Economic Area focuses on matters relating to financial services, listing and trading of securities, clearing and settlement of securities and commodities, as well as issues related to market abuse.

In July 2016, the European Union's Market Abuse Regulation, which is intended to prevent market abuse, entered into force. MiFID II and MiFIR entered into force in January 2018 and primarily affect our European trading businesses. Many of the provisions of MiFID II and MiFIR are implemented through technical standards drafted by the European Securities and Markets Authority and approved by the European Commission. In addition, in 2016, the European Union adopted legislation on governance and control of the production and use of benchmark indexes. The Benchmark Regulation applies in the European Union from early 2018. However, due to transitional clauses in the Benchmark Regulation, Nasdaq as a benchmark provider, did not need to be in compliance with the Benchmark Regulation until January 1, 2020 in relation to benchmarks provided by Nasdaq's European subsidiaries, or until January 1, 2026, in relation to benchmarks provided by non-European Nasdaq entities. As the regulatory environment continues to evolve and related opportunities arise, we intend to continue developing our products and services to ensure that the exchanges and clearinghouse that comprise Nasdaq Nordic and Nasdaq Baltic maintain favorable liquidity and offer fair and efficient trading.

In addition, proposed rules under MiFID II and MiFIR rules are expected to include provisions for the establishment of a European consolidated tape of pre- and/or post-trade data. These rules may affect our ability to offer market data products in the same manner as we currently provide such offerings.

The entities that operate trading venues in the Nordic and Baltic countries are each subject to local regulations. As a result, we have a strong local presence in each jurisdiction in which we operate regulated businesses. The regulated entities have decision-making power and can adopt policies and procedures and retain resources to manage all operations subject to their license. In Sweden, general supervision of the Nasdaq Stockholm exchange is carried out by the SFSA, while Nasdaq Clearing's role as CCP in the clearing of derivatives is supervised by the SFSA and overseen by the Swedish central bank (Riksbanken). Additionally, as a function of the Swedish two-tier supervisory model, certain surveillance of the exchange market is carried out by the Nasdaq Stockholm exchange, through its surveillance function.

Nasdaq Stockholm's exchange activities are regulated primarily by the SSMA, which implements MiFID II into Swedish law and which sets up basic requirements regarding the board of the exchange and its share capital, and which also outlines the conditions on which exchange licenses are issued. The SSMA also provides that any changes to the exchange's articles of association following initial registration must be approved by the SFSA. Nasdaq Clearing holds the license as a CCP under EMIR.

With respect to ongoing operations, the SSMA requires exchanges to conduct their activities in an honest, fair and professional manner, and in such a way as to maintain public confidence in the securities markets. When operating a regulated market, an exchange must apply the principles of free access (i.e., that each person which meets the requirements established by law and by the exchange may participate in trading), neutrality (i.e., that the exchange's rules for the regulated market are applied in a consistent manner to all those who participate in trading) and transparency (i.e., that the participants must be given prompt, simultaneous and correct information concerning trading and that the general public must be given the opportunity to access this information). Additionally, the exchange operator must identify and manage the risks that may arise in its operations, use secure technical systems and identify and handle the conflicts of interest that may arise between the exchange or its owners' interests and the interest in safeguarding effective risk management and secure technical systems. Similar requirements are set up by EMIR in relation to clearing operations.

The SSMA also contains the framework for both the SFSA's supervisory work in relation to exchanges and clearinghouses and the surveillance to be carried out by the exchanges themselves. The latter includes the requirement that an exchange should have "an independent surveillance function with sufficient resources and powers to meet the exchange's obligations." That requires the exchange to, among other things, supervise trading and price information, compliance with laws, regulations and good market practice, participant compliance with trading participation rules, financial instrument compliance with relevant listing rules and the extent to which issuers meet their obligation to submit regular financial information to relevant authorities.

The regulatory environment in the other Nordic and Baltic countries in which a Nasdaq entity has a trading venue is broadly similar to the regulatory environment in Sweden. Since 2005, there has been cooperation between the supervisory authorities in Sweden, Iceland, Denmark and Finland, which looks to safeguard effective and comprehensive supervision of the exchanges comprising Nasdaq Nordic and the systems operated by it, and to ensure a common supervisory approach. In 2019, the supervisory authority in Norway joined this cooperation.

Nasdaq owns a central securities depository known as Nasdaq CSD SE (Societas Europaea)¸ that provides notary, settlement, central maintenance and other services in the Baltic countries and in Iceland. Nasdaq CSD SE is licensed under the European Central Securities Depositories Regulation and is supervised by the respective regulatory institutions.

We operate a licensed exchange, Nasdaq Oslo ASA, in Norway that trades and lists commodity derivatives. Although Norway is not a member of the EU, as a result of the European Economic Area, or EEA, agreement (entered into between the EU and European Free Trade Association) the regulatory environment is broadly similar to what applies in EU member states. In addition, in January 2019 new legislation entered into force in Norway mirroring the provisions of MiFID II and MIFIR. As a result, the regulatory environment in Norway is similar to Sweden. The Financial Supervisory Authority of Norway supervises the Norwegian exchange on an autonomous basis and the Norwegian exchange also has a separate market surveillance function overseen by the Financial Supervisory Authority.

Confidence in capital markets is paramount for trading to function properly. Nasdaq Nordic carries out market surveillance through an independent unit that is separate from the business operations. The surveillance work is conceptually organized into two functions: one for the review and admission of listing applications and surveillance activities related to issuers (issuer surveillance) and one for surveillance of trading (trading surveillance). The real-time trading surveillance for the Finnish, Icelandic, Danish and Swedish markets has been centralized in Stockholm. In addition, there are designated personnel who carry out surveillance activities at Nasdaq Oslo and the three Baltic exchanges. In Finland, Sweden and Estonia, decisions to list new companies on the main market are made by listing committees that have external members in addition to members from each respective exchange and in the other countries the decision is made either by the respective president of the exchange or by the executive board.

If there is suspicion that a listed company or member has acted in breach of exchange regulations, the matter is handled by the respective surveillance department. Serious breaches are considered by the respective disciplinary committee in Denmark, Finland, Iceland, Sweden and Norway. Suspected insider trading is reported to the appropriate authorities in the respective country.

In the United Kingdom, The Nasdaq Stock Market, Nasdaq Oslo ASA, Nasdaq Stockholm AB, Nasdaq Copenhagen A/S, and Nasdaq Helsinki Ltd are each subject to regulation by the Financial Conduct Authority as "Recognised Overseas Investment Exchanges." Nasdaq Clearing is registered as a recognized third country CCP with the Bank of England under the temporary recognition regime. The registration became effective on December 31, 2020, and lasts for four years. We have submitted our application for permanent recognition.

Human Capital Management

Nasdaq has continued to strengthen our commitment to, and investment in, attracting, retaining, developing and motivating our employees during 2022.

In 2022, we introduced the Nasdaq Culture Book, which consolidates and explains Nasdaq's culture, including Nasdaq's vision and purpose; our values; and behavioral attributes that we believe successful employees at Nasdaq share. We believe that being clear and descriptive regarding our culture energizes and helps align employees, and also enables us to allow prospective employment candidates to better understand the organization they are considering joining.

We also continued to bolster our efforts to create a diverse and inclusive work environment of equal opportunity, where employees feel respected and valued for their contributions, and where Nasdaq and its employees have opportunities to make positive contributions to our local communities. See "Diversity, Equity and Inclusion" below for further discussion of these efforts.

As of December 31, 2022, Nasdaq had 6,377 full and part-time employees, including employees of non-wholly owned consolidated subsidiaries.

Employee Safety

We are committed to ensuring the safety and well-being of our employees and stakeholders, and complying with local government regulations in the areas in which we operate. Our employees may work from our offices or work from home, with most of our employees continuing to utilize a hybrid work schedule of both working in an office and remotely during each week.

Talent Management and Development

We continued to increase our efforts in attracting and retaining our employees. Nasdaq seeks to hire world-class, innovative, and diverse talent across the globe.

Our internal employee engagement score, based on our biannual employee engagement surveys, increased year-over-year from 2021. Our workforce voluntary attrition rate during 2022 was approximately 11%, which was comparable to 2021.

Our Talent Attraction Team focused on strategic marketing and branding to position Nasdaq as a leading employer of choice for talent in our industry, helping to increase our pool of top candidates for open positions, particularly diverse candidates. We ran targeted attraction campaigns in our major markets using (with permission) local employee stories and photos, and partnered with diverse talent organizations, such as the National Society of Black Engineers, AfroTech, the Society of Women Engineers, Women in Technology, Grace Hopper and the Society of Hispanic Professional Engineers to help improve brand awareness of Nasdaq and attract a higher number of diverse candidates compared to 2021.

During 2022, we launched a year-long series called the Manager Forum, facilitated by our CEO and other senior and mid-career leaders, to engage managers in sustained leadership development, alongside our existing formal leadership development curriculum.

We also launched a new artificial intelligence-driven career development platform called the Career Hub that matches employees, based on their career aspirations, to internal training, potential mentors, short-term projects and full-time internal roles. This helped us increase our career satisfaction scores in our biannual employee engagement survey and supported employee retention.

We have invested in professional development for our employees, including offering access to more than 26,000 professional development programs; providing tuition assistance to employees enrolled in degree-granting academic programs; holding internal career fairs and career development programs; connecting employees to our formal mentoring programs and providing one-on-one professional coaching opportunities. We welcomed 156 interns to Nasdaq during 2022.

To reward our employees at various stages of their tenure with Nasdaq, we continued our anniversary recognition program that includes Nasdaq-branded merchandise, and, for major milestones, recognition on our Nasdaq Tower in Times Square. Additionally, our peer-to-peer employee recognition program rewards employees and highlights recognized employees on our internal social media channels, further amplifying the recognition.

Diversity, Equity and Inclusion

At Nasdaq, three pillars guide our diversity, equity and inclusion efforts: *Workforce, Workplace and Marketplace*. *Workforce* seeks to ensure that our employee population is representative of the communities in which we operate. *Workplace* seeks to create a positive, equitable workplace experience for all employees of Nasdaq, and *Marketplace* aims to positively influence our peers in the capital market ecosystem, and to invest in our local communities in which we operate.

Nasdaq sponsors eleven employee-led internal affinity networks. These networks include more than 2,400 employee members, representing 37% of our employees and contractors. Nasdaq's Employee Networks support the diverse communities that comprise our workforce, including Black, Asian American, Hispanic, LGBTQ+, female, disabled, veteran, and parent/caregiver communities. Nasdaq's Employee Networks provide both formal and informal development programs and guidance for their members. The networks benefit the entire Nasdaq workforce through educational events, guest speakers, and volunteering opportunities.

Nasdaq regularly and proactively reviews and monitors diversity data across its businesses, including workforce composition, talent pipeline, and sentiment by business unit. In 2022, we offered two diversity trainings, "Conscious Inclusion" and "Inclusive Leadership," for non-managers and managers, respectively. All of our executives completed this course, increasing understanding of diversity and equity priorities at the highest level. We also added customized developmental programs for underrepresented talent, including executive mentoring and accelerated leadership development programs. In 2022, we launched a high-potential leadership program for our female employees to enhance their skills and increase advancement opportunities.

We continue to seek to improve our diversity metrics, both through development of our internal talent pool and by focusing on interviewing diverse candidates externally for new employment opportunities. During our annual executive succession planning exercise with our Board of Directors, we realized a 26% increase, as compared to 2021, in the diversity of our senior executive succession candidates (considering gender, race and LGBTQ+ status) due to a focus by our senior executives on identifying and cultivating talent deeper in their organizations. As a signatory to the Parity Pledge, we fulfilled our commitment to interview female candidates for all externally advertised roles at the Vice President level and above.

Additionally, Nasdaq has been named to the Human Rights Campaign Corporate Equality Index, Coqual Black Equity Index, and several Seramount indexes, including 100 Best Companies and Best Companies for Dads. We were also named to the Bloomberg Gender Equality Index again in 2022.

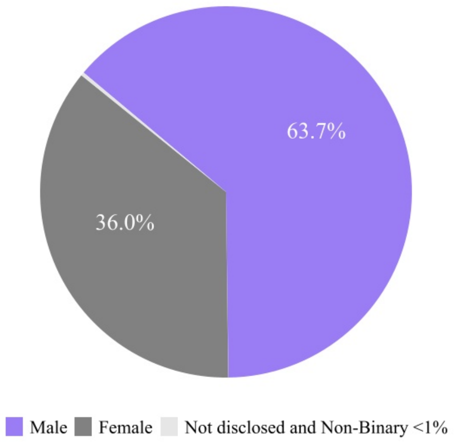
Workplace Demographics

During 2022, we continued our progress to increase the diversity of our global workforce. Our global female employee base increased from 2021 and has grown each year since 2019, and in the United States, our minority employee base also grew, continuing a trend since 2019. Nasdaq has increased our underrepresented minority representation in the U.S., which includes Black/African American, Hispanic/Latino, Multiracial, Native American, Native Hawaiian, and Pacific Islander employees, from 14.9% in 2019 to 16.8% in 2022.

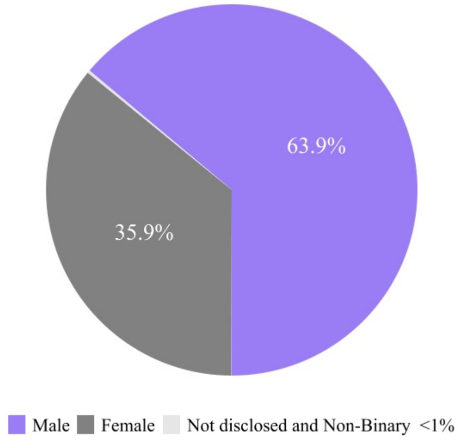
Gender and Ethnicity Performance Data as of December 31, 2022 and 2021

***Gender*:**

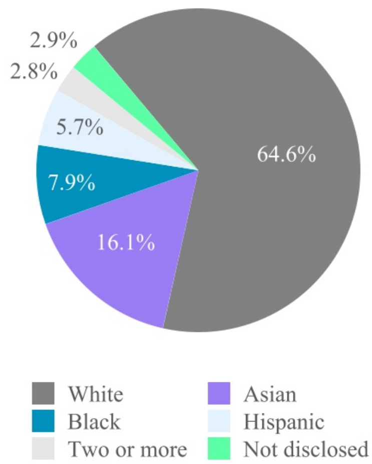
2022



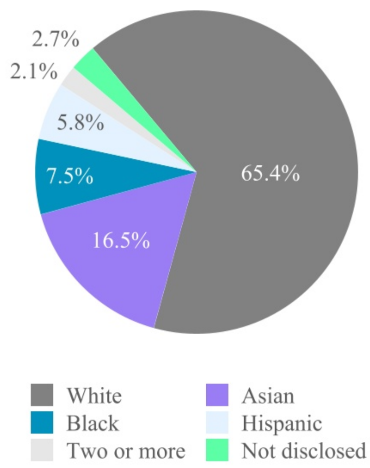
2021



Race and Ethnicity (U.S. only) in 2022*



Race and Ethnicity (U.S. only) in 2021*



* In the charts above, not disclosed percentage includes employees that have chosen not to disclose and race and ethnicities that are less than 0.3%.

In 2022, we conducted a pay equity analysis, which supplements our annual multifaceted compensation review program, successfully concluding that review in the second quarter of the year. Our pay equity analysis for 2023 has already begun as part of the annual compensation review program to be completed in the same cycle next year.

Finally, to increase transparency of our workforce, Nasdaq publishes statistics on the composition of its own global workforce by gender, and of its U.S. workforce by gender, race and ethnicity, in our U.S. EEO-1 report and our Sustainability Report, which are available on our website.

Compensation and Benefits

Our Total Rewards compensation program is designed to attract, retain, and empower employees to successfully execute our growth strategy. Our comprehensive Total Rewards program reflects our commitment to protecting our employees' health, well-being and financial security.

Our talented employees are our greatest asset, and we offer competitive compensation to attract and retain the best employees. Our pay-for-performance compensation programs includes market-competitive base salaries, annual bonuses or sales commissions, and equity grants. The majority of our employees are granted annual, long-term equity awards, enabling them to be owners of the company, committed to our long-term success and aligning their interests with the short-term and long-term interests of our shareholders.

Our Total Rewards program extends beyond compensation, offering a suite of programs, benefits, perquisites and resources to support employee priorities. In addition to cash and equity compensation, we also offer employee benefits such as health (medical, dental, vision and telehealth) insurance, fertility benefits, paid time off, paid parental leave, adoption assistance, an employee stock purchase plan, student loan repayment benefits, charitable contribution matching and a U.S. 401(k) plan with company matching. In response to the pandemic we introduced, and have continued to offer, additional benefits to support our employees, including caregiver support, back-up childcare, "flex days" (extra time off in addition to vacation), and hybrid work schedules, allowing our employees to focus on mental well-being.

Community Involvement

We are committed to creating lasting, positive change within our Company and the communities we serve. Our employees take pride in being active in our communities. Through our Nasdaq GoodWorks Corporate Responsibility Program, we have committed to supporting the communities in which we live and work by providing eligible full and part-time employees two paid days off per year to volunteer. We also match charitable donations of all Nasdaq employees and contractors up to $1,000, or more in certain circumstances, per calendar year. In 2022, Nasdaq employees raised over $1 million including donations and matches, supporting almost 650 charities worldwide.

Nasdaq's "Purpose" comprises our philanthropic, community outreach, entrepreneurial support and employee volunteerism programs, all designed to leverage our unique place at the center of capital creation, markets, and technology and drive stronger economies, more equitable opportunities and contribute to a more sustainable world.

During 2022, Nasdaq held two Purpose roundtables, which convened corporate peers from companies at the forefront of these issues, sharing insights on the importance of purpose in their organization, and how it is embedded and communicated within their company and among stakeholders to drive impact.

Nasdaq also held its second annual "Purpose Week" to further champion economic progress for all, which included a series of company-wide webinars, volunteer opportunities, an innovation challenge and other events involving and recognizing company employees. In addition to those events, we launched a set of digital campaigns, accompanied by virtual conversations, spotlighting several of the Nasdaq Foundation's community partners. These discussions explored topics such as creating a stronger investor identity for underrepresented communities and innovative approaches needed to tackle investor identity as one of the overlooked barriers to partaking in the capital markets.

The mission of the Nasdaq Foundation is focused on two primary goals: reimagining investor engagement to equip under-represented communities with the financial knowledge to share in the wealth that markets create; and leveraging our investment in the Nasdaq Entrepreneurial Center alongside new strategic partnerships with organizations that can help build a deeper, data-led understanding of where the challenges are greatest, what existing efforts could be amplified, and how the Nasdaq Foundation can make new and distinctive contributions.

During 2022, the Nasdaq Foundation provided 14 grants to organizations that seek to fulfill that mission. These grants were awarded to, among others, Black Girl Ventures, an ecosystem of Black/Brown woman-identifying leaders, assisting them through the early-stages of entrepreneurship; Change Labs, a community-led organization providing access to capital and resources to the next generation of Native American change makers; and Hispanic Access Foundation, which provides financial and investment training to Spanish-speaking Latinos.

Nasdaq Website and Availability of SEC Filings

We file periodic reports, proxy statements and other information with the SEC. The SEC maintains a website that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The address of that site is www.sec.gov.

Our website is http://ir.nasdaq.com. Information on our website is not a part of this Form 10-K. We make available free of charge on our website, or provide a link to, our Forms 10-K, Forms 10-Q and Forms 8-K and any amendments to these documents, that are filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. To access these filings, go to our website and click on “Financials” then click on “SEC Filings.”

Item 1A. Risk Factors

The risks and uncertainties described below are not the only ones facing us. Additional risks and uncertainties not presently known to us or that we currently believe to be immaterial may also adversely affect our business. If any of the following risks actually occur, our business, financial condition, or operating results could be adversely affected.

RISKS RELATED TO OUR BUSINESS AND INDUSTRY

Economic conditions and market factors, which are beyond our control, may adversely affect our business and financial condition.

Our business performance is impacted by a number of factors, including general economic conditions, current or expected inflation, interest rate fluctuations, market volatility, changes in investment patterns and priorities, pandemics (such as COVID-19) and other factors that are generally beyond our control. To the extent that global or national economic conditions weaken and result in slower growth or recessions, our business may be negatively impacted. Adverse market conditions could reduce customer demand for our services and the ability of our customers, lenders and other counterparties to meet their obligations to us. Poor economic conditions may result in a reduction in the demand for our products and services, including our market technology, FRAML solutions, data, indexes and corporate solutions, or could result in a decline in the number of IPOs, reduced trading volumes or values and deterioration of the economic welfare of our listed companies, which could cause an increase in delistings.

Trading volumes and values are driven primarily by general market conditions and declines in trading volumes or values may affect our market share and impact our pricing. In addition, our Market Platforms businesses receive revenues from a relatively small number of customers concentrated in the financial industry, so any event that impacts one or more customers or the financial industry in general could impact our revenues.

The number of listings on our markets is primarily influenced by factors such as investor demand, the global economy, available sources of financing, and tax and regulatory policies. Adverse conditions may jeopardize the ability of our listed companies to comply with the continued listing requirements of our exchanges, or reduce the number of issuers launching IPOs, including SPACs, and direct listings. The number of IPOs on our exchanges decreased in 2022 and the number of delistings increased compared to 2021.

Our Capital Access Platforms revenues may be significantly affected by global economic conditions. Professional subscriptions to our data products are at risk if staff reductions occur in financial services companies or if our customers consolidate, which could result in significant reductions in our professional user revenue or expose us to increased risks relating to dependence on a smaller number of customers. In addition, adverse market conditions may cause reductions in the number of non-professional investors with investments in the market and in ETP AUM tracking Nasdaq indexes as well as trading in futures linked to Nasdaq indexes.

There may be less demand for our corporate solutions, market technology and FRAML products and services if global economic conditions remain weak. Our customers historically reduce purchases of new services and technology when growth rates decline, thereby diminishing our opportunities to sell new products and services or upgrade existing products and services.

Additionally, during a global economic downturn, or periods of economic, political or regulatory uncertainty, our sales cycle may become longer or more unpredictable due to customer budget constraints or unplanned administrative delays to approve purchases

A reduction in trading volumes or values, market share of trading, the number of our listed companies, or demand for market technology or Capital Access Platforms products and services due to economic conditions or other market factors could adversely affect our business, financial condition and operating results.

The industries we operate in are highly competitive.

We face significant competition in our Market Platforms, Capital Access Platforms and Anti-Financial Crime businesses from other market participants. We face intense competition from other exchanges and markets for market share of trading activity and listings. This competition includes both product and price competition.

The liberalization and globalization of world markets has resulted in greater mobility of capital, greater international participation in local markets and more competition. As a result, both in the U.S. and in other countries, the competition among exchanges and other execution venues has become more intense. Marketplaces in both Europe and the U.S. have also merged to achieve greater economies of scale and scope.

Regulatory changes also have facilitated the entry of new participants in the European Union that compete with our European markets. The regulatory environment, both in the U.S. and in Europe, is structured to maintain this environment of intense competition. In addition, a high proportion of business in the securities markets is becoming concentrated in a smaller number of institutions and our revenue may therefore become concentrated in a smaller number of customers.

We also compete globally with other regulated exchanges and markets, ATSs, MTFs and other traditional and non-traditional execution venues. Some of these competitors also are our customers. In addition, competitors recently have launched new exchanges in the U.S., including an exchange established by a group of our customers. Competitors may develop market trading platforms that are more competitive than ours. Competitors may leverage data more effectively or enter into strategic partnerships, mergers or acquisitions that could make their trading, listings, clearing, data or technology businesses more competitive than ours.

We face intense price competition in all areas of our business. In particular, the trading industry is characterized by price competition. We have in the past lowered prices, and in the U.S., increased rebates for trade executions to attempt to gain or maintain market share. These strategies have not always been successful and have at times hurt operating performance. Additionally, we have also been, and may once again be, required to adjust pricing to respond to actions by competitors and new entrants, or due to new SEC regulations, which could adversely impact operating results. We also compete with respect to the pricing of data products and with respect to products for pre-trade book data and for post-trade last sale data.

If we are unable to compete successfully in the industries in which we do business, our business, financial condition and operating results will be adversely affected.

System limitations or failures could harm our business.

Our businesses depend on the integrity and performance of the technology, computer and communications systems supporting them. If new systems fail to operate as intended or our existing systems cannot expand to cope with increased demand or otherwise fail to perform, we could experience unanticipated disruptions in service, slower response times and delays in the introduction of new products and services. We could experience a systems failure due to human error by our employees, contractors or vendors, electrical or telecommunications failures or disruptions, hardware or software failures or defects, cyberattacks, sabotage or similar unexpected events. These consequences could result in service outages, lower trading volumes or values, financial losses, decreased customer satisfaction, litigation and regulatory sanctions. Our markets and the markets that rely on our technology have experienced systems failures and delays in the past and could experience future systems failures and delays.

Although we currently maintain and expect to maintain multiple computer facilities, and leverage third party cloud providers, that are designed to provide redundancy and back-up to reduce the risk of system disruptions and have facilities in place that are expected to maintain service during a system disruption, such systems and facilities may prove inadequate. If trading volumes increase unexpectedly or other unanticipated events occur, we may need to expand and upgrade our technology, transaction processing systems and network infrastructure. We do not know whether we will be able to accurately project the rate, timing or cost of any volume increases, or expand and upgrade our systems and infrastructure to accommodate any increases in a timely manner.

While we have programs in place to identify and minimize our exposure to vulnerabilities and work in collaboration with the technology industry to share corrective measures with our business partners, we cannot guarantee that such events will not occur in the future. Any system issue that causes an interruption in services, decreases the responsiveness of our services or otherwise affects our services could impair our reputation, damage our brand name and negatively impact our business, financial condition and operating results.

We must continue to introduce new products, initiatives and enhancements to maintain our competitive position.

We intend to launch new products and initiatives and continue to explore and pursue opportunities to strengthen our business and grow our company. We may spend substantial time and money developing new products, such as our digital assets offering, initiatives and enhancements to existing products. If these products and initiatives are not successful or their launches are delayed, including for regulatory uncertainty related to our digital assets offering, we may not be able to offset their costs, which could have an adverse effect on our business, financial condition and operating results.

In our technology operations, we have invested substantial amounts in the development of system platforms, the rollout of our platforms and the adoption of new technologies, including cloud-based infrastructure for certain of our offerings. Although investments are carefully planned, there can be no assurance that the demand for such platforms or technologies will justify the related investments. If we fail to generate adequate revenue from planned system platforms or the adoption of new technologies, or if we fail to do so within the envisioned timeframe, it could have an adverse effect on our results of operations and financial condition. In addition, clients may delay purchases in anticipation of new products or enhancements. We may allocate significant amounts of cash and other resources to product technologies or business models for which market demand is lower than anticipated. In addition, the introduction of new products by competitors, the emergence of new industry standards or the development of entirely new technologies to replace existing product offerings could render our existing or future products obsolete.

A decline in trading and clearing volumes or values or market share will decrease our trading and clearing revenues.

Trading and clearing volumes and values are directly affected by economic, political and market conditions, broad trends in business and finance, unforeseen market closures or other disruptions in trading, the level and volatility of interest rates, inflation, changes in price levels of securities and the overall level of investor confidence. Beginning in 2020, trading and clearing volumes and values across our markets have fluctuated significantly depending on market conditions and other factors beyond our control. Because a significant percentage of our revenues is tied directly to the volume or value of securities traded and cleared on our markets, it is likely that a general decline in trading and clearing volumes or values would lower revenues and may adversely affect our operating results if we are unable to offset falling volumes or values through pricing changes. Declines in trading and clearing volumes or values may also impact our market share or pricing structures and adversely affect our business and financial condition.

If our total market share in securities decreases relative to our competitors, our venues may be viewed as less attractive sources of liquidity. If our exchanges are perceived to be less liquid, then our business, financial condition and operating results could be adversely affected.

Since some of our exchanges offer clearing services in addition to trading services, a decline in market share of trading could lead to a decline in clearing and depository revenues. Declines in market share also could result in issuers viewing the value of a listing on our exchanges as less attractive, thereby adversely affecting our listing business. Finally, declines in market share of Nasdaq-listed securities, or recently adopted SEC rules and regulations, could lower The Nasdaq Stock Market's share of tape pool revenues under the consolidated data plans, thereby reducing the revenues of our U.S. Tape plans business.

Our role in the global marketplace positions us at greater risk for a cyberattack.

Our systems and operations are vulnerable to damage or interruption from security breaches. As a result of our adoption of a hybrid work environment, we have a broader and more distributed network footprint and increased reliance on the home networks of employees, and such remote work may cause heightened cybersecurity and operational risks. Some of these threats include attacks from foreign governments, hacktivists, insiders and criminal organizations. Foreign governments may seek to obtain a foothold in U.S. critical infrastructure, hacktivists may seek to deploy denial of service attacks to bring attention to their cause, insiders may pose a risk of human error or malicious activity and criminal organizations may seek to profit from stolen data. Computer malware, such as viruses and worms, also continue to be a threat with ransomware increasingly being used by criminals to extort money. Given our position in the global securities industry, we may be more likely than other companies to be a direct target, or an indirect casualty, of such events.

While we continue to employ and invest additional resources to monitor our systems and protect our infrastructure, these measures may prove insufficient depending upon the attack or threat posed. Any system issue, whether as a result of an intentional breach, collateral damage from a new virus or a non-malicious act, or due to a cybersecurity breach of a customer that results in a loss of our data or compromises our systems or those of our other customers utilizing the same products, could damage our reputation and result in: a loss of customers; disrupted customer relationships; the loss of our intellectual property or sensitive data; lower trading volumes or values, incur significant liabilities or otherwise have a negative impact on our business, our products and services, financial condition and operating results. Further, cybersecurity incidents that impact our vendors and other third parties that support our organization and industry could directly or indirectly impact us. There can be no assurance we will be able to identify and mitigate every incident involving cybersecurity attacks, breaches or incidents. A system breach may go undetected for an extended period of time.

Expanded cybersecurity regulations, and increased cybersecurity infrastructure and compliance costs, may adversely impact our results of operations.

As cybersecurity threats continue to increase in frequency and sophistication, and as the domestic and international regulatory and compliance structure related to information and cybersecurity; data privacy and data usage; and our digital assets offering, becomes increasingly complex and exacting, we may be required to devote significant additional resources to strengthen our cybersecurity capabilities, and to identify and remediate any security vulnerabilities. Compliance with laws and regulations concerning cybersecurity, data privacy and data usage could result in significant expense, and any failure to comply could result in proceedings against us by regulatory authorities or other third parties. Additional costs for bolstering cybersecurity capabilities, and increased cybersecurity and data privacy compliance costs, could adversely impact our business, financial condition and operating results. Additionally, our clients increasingly demand rigorous contractual, certification and audit provisions regarding cybersecurity, data protection and data usage, which may also increase our overall compliance burden and costs in meeting such obligations.

The success of our business depends on our ability to keep up with rapid technological and other competitive changes affecting our industry. Specifically, we must complete development of, successfully implement and maintain platforms that have the functionality, performance, capacity, reliability and speed required by our business and our regulators, as well as by our customers.

The markets in which we compete are characterized by rapidly changing technology, evolving industry and regulatory standards, frequent enhancements to existing products and services, the adoption of new services and products and changing customer demands. We are reliant on our customers that purchase our on-premise solutions to maintain a certain level of network infrastructure for our products to operate and to allow for our support of those products, and there is no assurance that a customer will implement such measures. We may not be able to keep up with rapid technological and other competitive changes affecting our industry. For example, we must continue to enhance our platforms to remain competitive as well as to address our regulatory responsibilities, and our business will be negatively affected if our platforms or the technology solutions we sell to our customers fail to function as expected. If we are unable to develop our platforms to include other products and markets, or if our platforms do not have the required functionality, performance, capacity, reliability and speed required by our business and our regulators, as well as by our customers, we may not be able to compete successfully. Further, our failure to anticipate or respond adequately to changes in technology and customer preferences or any significant delays in product development efforts, could have a material adverse effect on our business, financial condition and operating results.

Failure to attract and retain key personnel may adversely affect our ability to conduct our business.

Our future success depends, in large part, upon our ability to attract and retain highly qualified and skilled professional personnel that can learn and embrace new technologies. In the current tight labor market, we have intensified our efforts to recruit and retain talent. Competition for key personnel in the various localities and business segments in which we operate is intense. We have, and may continue to, experience higher compensation costs to retain personnel, and hire new talent, that may not be offset by improved productivity, higher revenues or increased sales. Our ability to attract and retain key personnel, in particular senior officers or technology personnel, including from companies that we acquire, will be dependent on a number of factors, including prevailing market conditions, office/remote working arrangements and compensation and benefit packages offered by companies competing for the same talent. There is no guarantee that we will have the continued service of key employees who we rely upon to execute our business strategy and identify and pursue strategic opportunities and initiatives. In particular, we may have to incur costs to replace senior officers or other key employees who leave, and our ability to execute our business strategy could be impaired if we are unable to replace such persons in a timely manner or at all.

Our clearinghouse operations expose us to risks, including credit or liquidity risks that may include defaults by clearing members, or insufficiencies in margins or default funds.

We are subject to risks relating to our operation of a clearinghouse, including counterparty and liquidity risks, risk of defaults by clearing members and risks associated with adequacy of the customer margin and of default funds. Our clearinghouse operations expose us to counterparties with differing risk profiles. We may be adversely impacted by the financial distress or failure of a clearing member, which may cause us negative financial impact, reputational harm or regulatory consequences, including litigation or regulatory enforcement actions.

In September 2018, a member of the Nasdaq Clearing commodities market defaulted due to an inability to post sufficient collateral to cover increased margin requirements for the positions of the relevant member. For further discussion of the default, see Note 15, “Clearing Operations,” to the consolidated financial statements. There are no assurances that similar defaults will not occur again, which could result in losses. To the extent that our regulatory capital and risk management policies are not adequate to manage future financial and operational risks in our clearinghouse, we may experience adverse consequences to our operating results or ability to conduct our business.

We are exposed to credit risk from third parties, including customers, counterparties and clearing agents.

We are exposed to credit risk from third parties, including customers, counterparties and clearing agents. These parties may default on their obligations to us due to bankruptcy, lack of liquidity, operational failure or other reasons.

We clear a range of equity-related and fixed-income-related derivative products, commodities and resale and repurchase agreements. We assume the counterparty risk for all transactions that are cleared through Nasdaq Clearing on our markets and guarantee that our cleared contracts will be honored. We enforce minimum financial and operational criteria for membership eligibility, require members and investors to provide collateral, and maintain established risk policies and procedures to ensure that the counterparty risks are properly monitored and proactively managed; however, none of these measures provides absolute assurance against experiencing financial losses from defaults by our counterparties on their obligations. No guarantee can be given that the collateral provided will at all times be sufficient. Although we maintain clearing capital resources to serve as an additional layer of protection to help ensure that we are able to meet our obligations, these resources also may not be sufficient.

We also have credit risk related to transaction and subscription-based revenues that are billed to customers on a monthly or quarterly basis, in arrears.

Credit losses such as those described above could adversely affect our consolidated financial position and results of operations.

Technology issues relating to our role as exclusive processor for Nasdaq-listed stocks could affect our business.

Nasdaq, as technology provider to the UTP Operating Committee, has implemented measures to enhance the resiliency of the existing processor system. Nasdaq transferred the processor technology platform to our INET platform and this migration further enhanced the resiliency of the processor systems. We further improved the systems' resiliency by adding the UTP SnapShot service. However, if future outages occur or the processor systems fail to function properly while we are operating the systems, it could have an adverse effect on our business, reputation and financial condition.

Stagnation or decline in the listings market could have an adverse effect on our revenues.

The market for listings is dependent on the prosperity of companies and the availability of risk capital. A stagnation or decline in the number of new listings, or an increase in the number of delistings, on The Nasdaq Stock Market and the Nasdaq Nordic and Nasdaq Baltic exchanges could cause a decrease in revenues for future years. Furthermore, new listings from IPOs, including SPACs, decreased in 2022. A prolonged decrease in the number of listings, or failure of existing SPACs to successfully complete transactions with target companies and dissolve, could negatively impact the growth of our revenues. Our Corporate Solutions business is also impacted by declines in the listings market or increases in acquisitions activity as there may be fewer publicly-traded customers that need our products.

RISKS RELATED TO TRANSACTIONAL ACTIVITIES AND STRATEGIC RELATIONSHIPS

We may not be able to successfully integrate acquired businesses, which may result in an inability to realize the anticipated benefits of our acquisitions.

We must rationalize, coordinate and integrate the operations of our acquired businesses. This process involves complex technological, operational and personnel-related challenges, which are time-consuming and expensive and may disrupt our business. The difficulties, costs and delays that could be encountered may include:

- difficulties, costs or complications in combining the companies' operations, including technology platforms, which could lead to us not achieving the synergies we anticipate or customers not renewing their contracts with us as we migrate platforms;
- incompatibility of systems and operating methods;
- reliance on, or provision of, transition services;
- inability to use capital assets efficiently to develop the business of the combined company;
- difficulties of complying with government-imposed regulations in the U.S. and abroad, which may be conflicting;
- resolving possible inconsistencies in standards, controls, procedures and policies, business cultures and compensation structures;
- the diversion of management's attention from ongoing business concerns and other strategic opportunities;
- difficulties in operating businesses we have not operated before;
- difficulties of integrating multiple acquired businesses simultaneously;
- the retention of key employees and management;

- the implementation of disclosure controls, internal controls and financial reporting systems at non-U.S. subsidiaries to enable us to comply with U.S. GAAP and U.S. securities laws and regulations, including the Sarbanes-Oxley Act of 2002, required as a result of our status as a reporting company under the Exchange Act;
- the coordination of geographically separate organizations;
- the coordination and consolidation of ongoing and future research and development efforts;
- possible tax costs or inefficiencies associated with integrating the operations of a combined company;
- pre-tax restructuring and revenue investment costs;
- the retention of strategic partners and attracting new strategic partners; and
- negative impacts on employee morale and performance as a result of job changes and reassignments.

Foreign acquisitions involve risks in addition to those mentioned above, including those related to integration of operations across different cultures and languages, our ability to enforce contracts in various jurisdictions, currency risks and the particular economic, political and regulatory risks associated with specific countries. We may not be able to address these risks successfully, or at all, without incurring significant costs, delays or other operating problems that could disrupt our business and have a material adverse effect on our financial condition.

For these reasons, we may not achieve the anticipated financial and strategic benefits from our acquisitions and strategic initiatives. Any actual cost savings and synergies may be lower than we expect and may take a longer time to achieve than we anticipate, and we may fail to realize the anticipated benefits of acquisitions.

We rely on third parties to perform certain functions, and our business could be adversely affected if these third parties fail to perform as expected or experience service interruptions affecting our operations.

We rely on third parties for regulatory, data center, cloud, data storage and processing, data content, clearing and other services. Interruptions or delays in services from our third-party data center hosting facilities or cloud computing platform providers could impair the delivery of our services and harm our business. To the extent that any of our vendors or other third-party service providers experiences difficulties or a significant disruption, breach or outage, materially changes their business relationship with us or is unable for any reason to perform their obligations, our business or our reputation may be materially adversely affected. Our access to cloud service provider infrastructure could be limited by a number of events, including technical or infrastructure failures, natural disasters or cybersecurity attacks. As we continue to grow our SaaS businesses, our dependency on the continuing operation and availability of these cloud service providers increases. If our cloud services from third party providers are unavailable to us for any reason, or there are cloud service disruptions or a delay or inability to access our exchanges, platforms or certain of our cloud products or features, such unavailability or delays may adversely affect our clients, which could significantly impact our reputation, operations, business, and financial results.

For example, in 2022, we began to migrate our North American markets to AWS in a phased approach, starting with Nasdaq MRX in December 2022. AWS operates a platform that we use to provide services to our clients, and therefore we are vulnerable to service outages on the AWS platform that affect Nasdaq workloads running or stored in the AWS environment. If AWS does not deliver our system requirements on time, fails to provide maintenance and support to our specifications or a migration experiences integration challenges, the successful migration of our exchanges to the AWS cloud platform may be significantly delayed, which may adversely affect our reputation and financial results.

We also rely on members of our trading community to maintain markets and add liquidity. To the extent that any of our largest members experience difficulties, materially change their business relationship with us or are unable for any reason to perform market making activities, our business or our reputation may be materially adversely affected.

We may be required to recognize impairments of our goodwill, intangible assets or other long-lived assets in the future.

Our business acquisitions typically result in the recording of goodwill and intangible assets, and the recorded values of those assets may become impaired in the future. As of December 31, 2022, goodwill totaled $8.1 billion and intangible assets, net of accumulated amortization, totaled $2.6 billion. The determination of the value of such goodwill and intangible assets requires management to make estimates and assumptions that affect our consolidated financial statements.

We assess goodwill and intangible assets, as well as other long-lived assets, including equity method investments, equity securities, and property and equipment, for potential impairment on an annual basis or more frequently if indicators of impairment arise. We estimate the fair value of such assets by assessing many factors, including historical performance and projected cash flows. Considerable management judgment is necessary to project future cash flows and evaluate the impact of expected operating and macroeconomic changes on these cash flows. The estimates and assumptions we use are consistent with our internal planning process. However, there are inherent uncertainties in these estimates.

There were no impairment charges recorded relating to goodwill and indefinite-lived intangible assets and there were no material impairment charges recorded relating to other long-lived assets in 2022, 2021 and 2020.

We may experience future events that may result in asset impairments. Future disruptions to our business, prolonged economic weakness, due to pandemics or otherwise, or significant declines in operating results at any of our reporting units or businesses, may result in impairment charges to goodwill, intangible assets or other long-lived assets. A significant impairment charge in the future could have a material adverse effect on our operating results.

Acquisitions, divestments, investments, joint ventures and other transactional activities may require significant resources and/or result in significant unanticipated losses, costs or liabilities.

Over the past several years, acquisitions have been significant factors in our growth. We have divested businesses and may continue to divest additional businesses or assets in the future. Although we cannot predict our transactional activities, we believe that additional acquisitions, divestments, investments, joint ventures and other transactional activities will be important to our strategy. Such transactions may be material in size and scope. Other potential purchasers of assets in our industry may have greater financial resources than we have. Therefore, we cannot be sure that we will be able to complete future transactions on terms favorable to us.

We also invest in early-stage companies through our Nasdaq Ventures program and hold minority interests in other entities. Given the size of these investments, we do not have operational control of these entities and may have limited visibility into risk management practices. Thus, we may be subject to additional capital requirements in certain circumstances and financial and reputational risks if there are operational failures.

We may finance future transactions by issuing additional equity and/or debt. The issuance of additional equity in connection with any such transaction could be substantially dilutive to existing shareholders. In addition, the announcement or implementation of future transactions by us or others could have a material effect on the price of our common stock. The issuance of additional debt could increase our leverage substantially. We could face financial risks associated with incurring additional debt, particularly if the debt results in significant incremental leverage. Additional debt may reduce our liquidity, curtail our access to financing markets, impact our standing with credit rating agencies and increase the cash flow required for debt service. Any incremental debt incurred to finance a transaction could also place significant constraints on the operation of our business.

Furthermore, any future transactions could entail a number of additional risks, including:

- the inability to maintain key pre-transaction business relationships;
- increased operating costs;
- the inability to meet our target for return on invested capital;
- increased debt obligations, which may adversely affect our targeted debt ratios;
- risks to the continued achievement of our strategic direction;
- risks associated with divesting employees, customers or vendors when divesting businesses or assets;
- declines in the value of investments;
- exposure to unanticipated liabilities, including after a transaction is completed;
- incurred but unreported claims for an acquired company;
- difficulties in realizing projected efficiencies, synergies and cost savings; and
- changes in our credit rating and financing costs.

Charges to earnings resulting from acquisitions, integrations and restructuring costs may materially adversely affect the market value of our common stock.

In accordance with U.S. GAAP, we account for the completion of our acquisitions using the acquisition method of accounting. We allocate the total estimated purchase price to net tangible and identifiable intangible assets based on their fair values as of the date of completion of the acquisition and record the excess of the purchase price over those fair values as goodwill. Our financial results, including earnings per share, could be adversely affected by a number of financial adjustments including the following:

- we may incur additional amortization expense over the estimated useful lives of certain of the intangible assets acquired in connection with acquisitions during such estimated useful lives;
- we may have additional depreciation expense as a result of recording acquired tangible assets at fair value, in accordance with U.S. GAAP, as compared to book value as recorded;
- to the extent the value of goodwill or intangible assets becomes impaired, we may be required to incur material charges relating to the impairment of those assets;
- we may incur additional costs from integrating our acquisitions. The success of our acquisitions depends, in part, on our ability to integrate these businesses into our existing operations and realize anticipated cost savings, revenue synergies and growth opportunities; and
- we may incur restructuring costs in connection with the reorganization of any of our businesses.

RISKS RELATED TO LEGAL AND REGULATORY MATTERS

We operate in a highly regulated industry and may be subject to censures, fines and enforcement proceedings if we fail to comply with regulatory obligations that can be ambiguous and can change unexpectedly.

We operate in a highly regulated industry and are subject to extensive regulation in the U.S., Europe and Canada. The securities trading industry is subject to significant regulatory oversight and could be subject to increased governmental and public scrutiny in the future that can change in response to global conditions and events, or due to changes in trading patterns, such as due to the recent volatility involving the trading of certain stocks.

Our ability to comply with complex and changing regulation is largely dependent on our establishment and maintenance of compliance, audit and reporting systems that can quickly adapt and respond, as well as our ability to attract and retain qualified compliance and other risk management personnel. There is no assurance that our policies and procedures will always be effective or that we will always be successful in monitoring or evaluating the risks to which we are or may be exposed.

Our regulated markets are subject to audits, investigations, administrative proceedings and enforcement actions relating to compliance with applicable rules and regulations. Regulators have broad powers to impose fines, penalties or censure, issue cease-and-desist orders, prohibit operations, revoke licenses or registrations and impose other sanctions on our exchanges, broker-dealers, central securities depositories, clearinghouse and markets for violations of applicable requirements.

In the future, we could be subject to regulatory investigations or enforcement proceedings that could result in substantial sanctions, including revocation of our operating licenses. Any such investigations or proceedings, whether successful or unsuccessful, could result in substantial costs, the diversion of resources, including management time, and potential harm to our reputation, which could have a material adverse effect on our business, results of operations or financial condition. In addition, our exchanges could be required to modify or restructure their regulatory functions in response to any changes in the regulatory environment, or they may be required to rely on third parties to perform regulatory and oversight functions, each of which may require us to incur substantial expenses and may harm our reputation if our regulatory services are deemed inadequate.

The regulatory framework under which we operate and new regulatory requirements or new interpretations of existing regulatory requirements could require substantial time and resources for compliance, which could make it difficult and costly for us to operate our business.

Under current U.S. federal securities laws, changes in the rules and operations of our securities markets, including our pricing structure, must be reviewed and in many cases explicitly approved by the SEC. The SEC may approve, disapprove, or recommend changes to proposals that we submit. In addition, the SEC may delay either the approval process or the initiation of the public comment process. Favorable SEC rulings and interpretations can be challenged in and reversed by federal courts of appeals, reducing or eliminating the value of such prior interpretations. Any delay in approving changes, or the altering of any proposed change, could have an adverse effect on our business, financial condition and operating results.

We must compete not only with ATSs that are not subject to the same SEC approval process but also with other exchanges that may have lower regulation and surveillance costs than us. There is a risk that trading will shift to exchanges that charge lower fees because, among other reasons, they spend significantly less on regulation.

In 2016, the SEC approved a plan for Nasdaq and other exchanges to establish a CAT, to improve regulators' ability to monitor trading activity. In addition to increased regulatory obligations, implementation of a consolidated audit trail has resulted in significant additional expenditures, including to implement the new technology to meet any of the plan's requirements. Creating the CAT has required the development and implementation of complex and costly technology. This development effort has been funded by the SROs (including Nasdaq) in exchange for promissory notes that Nasdaq expects to be repaid at such time that the SEC approves the assessment of fees for the funding of the CAT. The SEC could determine not to approve the assessment of such fees in which case some or all of the promissory notes would not be repaid. As of December 31, 2022, we have accrued a net receivable of $85 million in connection with our portion of expenses related to the CAT implementation. In addition, the ongoing failure to timely launch or properly operate such technology exposes Nasdaq and other exchanges to SEC fines.

In addition, our registered broker-dealer subsidiaries are subject to regulation by the SEC, FINRA and other SROs. These subsidiaries are subject to regulatory requirements intended to ensure their general financial soundness and liquidity, which require that they comply with certain minimum capital requirements. The SEC and FINRA impose rules that require notification when a broker-dealer's net capital falls below certain predefined criteria, dictate the ratio of debt to equity in the regulatory capital composition of a broker-dealer and constrain the ability of a broker-dealer to expand its business under certain circumstances. Additionally, the SEC's Uniform Net Capital Rule and FINRA rules impose certain requirements that may have the effect of prohibiting a broker-dealer from distributing or withdrawing capital and requiring prior notice to the SEC and FINRA for certain withdrawals of capital. Any failure to comply with these broker-dealer regulations could have a material adverse effect on the operation of our business, financial condition and operating results.

Our non-U.S. business is subject to regulatory oversight in all the countries in which we operate regulated businesses, such as exchanges, clearinghouses or central securities depositories. In these countries, we have received authorization from the relevant authorities to conduct our regulated business activities. The authorities may issue regulatory fines or may ultimately revoke our authorizations if we do not suitably carry out our regulated business activities. The authorities are also entitled to request that we adopt measures in order to ensure that we continue to fulfill the authorities' requirements. Additionally, we are subject to the obligations under the Benchmark Regulation ((EU) 2016/1011), compliance with which could be costly or cause a change in our business practices.

Certain of our customers operate in a highly regulated industry. Regulatory authorities could impose regulatory changes that could impact the ability of our customers to use our exchanges. The loss of a significant number of customers or a reduction in trading activity on any of our exchanges as a result of such changes could have a material adverse effect on our business, financial condition and operating results.

Regulatory changes and changes in market structure and proprietary data could have a material adverse effect on our business.

Regulatory changes adopted by the SEC or other regulators of our markets, and regulatory changes that our markets may adopt in fulfillment of their regulatory obligations, could materially affect our business operations. In recent years, there has been increased regulatory and governmental focus on issues affecting the securities markets, including market structure, technological oversight and fees for proprietary market data, connectivity and transactions. The SEC, FINRA and the national securities exchanges have introduced several initiatives to ensure the oversight, integrity and resilience of markets. In December 2022, the SEC proposed significant rule changes that, if adopted in their current form, would substantially alter how stocks are traded in the United States. While we and other market participants have the opportunity to submit comments on the proposal, and we will adjust our business model in accordance with any new SEC regulations implemented, these changes regarding trading may negatively impact our business and revenue.

With respect to our regulated businesses, our business model can be severely impacted by policy decisions. In May 2020, the SEC adopted an order to require changes to the governance of securities information processors. In December 2020, the SEC adopted a rule to modify the infrastructure for the collection, consolidation and dissemination of market data for exchange-listed national market stocks. In 2022, the U.S. Court of Appeals for District of Columbia Circuit vacated portions of the governance order but upheld the remainder of the SEC's 2022 actions. If the remaining aspects of the order and rule are fully implemented, they may adversely affect our revenues. The timing for the implementation is currently unknown, and we believe they may take two or more years to fully implement.

If the remaining aspects of the order and rule are ultimately implemented as set forth in their adopting releases, demand for certain of our proprietary tape share data products may be reduced, or we may have to reduce our pricing to compete with other entrants into the market for consolidated data. Our opponents in some markets are larger and better funded and, if successful in influencing certain policies, may successfully advocate for positions that adversely impact our business. These regulatory changes could impose significant costs, including litigation costs, and other obligations on the operation of our exchanges and processor systems and have other impacts on our business.

In Canada, all new marketplace fees and changes to existing fees, including trading and market data fees, must be filed with and approved by the Ontario Securities Commission. The Canadian Securities Administrators adopted a Data Fees Methodology that restricts the total amount of fees that can be charged for professional uses by all marketplaces to a reference benchmark. Currently, all marketplaces are subject to annual reviews of their market data fees tying market data revenues to pre- and post- trade market share metrics. Permitted fee ranges are based on an interim domestic benchmark that is subject to change to an international benchmark, which could lower the permitted fees charged by marketplaces, which could adversely impact our revenues.

Our European exchanges currently offer market data products to customers on a non-discriminatory and reasonable commercial basis. The MiFID II/MiFIR rules entail that the price for regulated market data such as pre- and post-trade data shall be based on cost plus a reasonable margin. However, these terms are not clearly defined. There is a risk that a different interpretation of these terms may influence the fees for European market data products adversely. In addition, any future actions by European Union institutions could affect our ability to offer market data products in the same manner as today, thereby causing an adverse effect on our market data revenues.

We are subject to litigation risks and other liabilities.

Many aspects of our business potentially involve substantial liability risks. Although under current law we are immune from private suits arising from conduct within our regulatory authority and from acts and forbearances incident to the exercise of our regulatory authority, this immunity only covers certain of our activities in the U.S., and we could be exposed to liability under national and local laws, court decisions and rules and regulations promulgated by regulatory agencies.

We face risks related to compliance with economic sanctions (including those administered by the U.S. Office of Foreign Assets Control), export controls, corruption (including the U.S. Foreign Corrupt Practices Act) and money laundering. While we maintain compliance programs to prevent and detect potential violations, such programs cannot completely eliminate the risk of non-compliance. Because anti-financial crime management solutions comprises one of our primary business offerings, a significant compliance event involving one of these areas could more negatively impact our business than a comparable business without this service offering.

Liability could also result from disputes over the terms of a trade, claims that a system failure or delay cost a customer money, claims we entered into an unauthorized transaction or claims that we provided materially false or misleading statements in connection with a securities transaction. As we intend to defend any such litigation actively, significant legal expenses could be incurred. Although we carry insurance that may limit our risk of damages in some cases, we still may sustain uncovered losses or losses in excess of available insurance that would affect our business, financial condition and results of operations.

We have self-regulatory obligations and also operate for-profit businesses, and these two roles may create conflicts of interest.

We have obligations to regulate and monitor activities on our markets and ensure compliance with applicable law and the rules of our markets by market participants and listed companies. In the U.S., some have expressed concern about potential conflicts of interest of "for-profit" markets performing the regulatory functions of an SRO. We perform regulatory functions and bear regulatory responsibility related to our listed companies and our markets. Any failure by us to diligently and fairly regulate our markets or to otherwise fulfill our regulatory obligations could significantly harm our reputation, prompt SEC scrutiny and adversely affect our business and reputation.

Our Nordic and Baltic exchanges monitor trading and compliance with listing standards in accordance with the European Union's Market Abuse Regulation and other applicable laws. Any failure to diligently and fairly regulate the Nordic and Baltic exchanges could significantly harm our reputation, prompt scrutiny from regulators and adversely affect our business and reputation.

Laws and regulations regarding security and safeguarding of our systems and services, protection of sensitive customer data and the handling of personal data and information may affect our services or result in increased costs, legal claims or fines against us.

Our business operates certain systems that may be considered "critical infrastructure" under certain regulations and licenses or sells certain systems or services to customers that are used by customers to fulfill certain core business requirements or process certain sensitive data. In response to recent events involving cybersecurity breaches, including ransomware attacks, regulatory authorities are engaging in rulemaking to heighten cybersecurity requirements and obligations to notify authorities and/or take other action in response to a suspected incident. Such regulations may impact the requirements and cost of delivery for impacted systems and services and, in the event of an incident, increase the cost and complexity of our response and the potential financial and reputation impact from fines or private litigation. New regulations may also impact customer decision making and conditions on contracting for our services.

Our businesses and internal operations rely on the processing of data in many jurisdictions and the movement of data, including personal data, across national borders. Legal and contractual requirements relating to the processing, including, but not limited to, collection, storage, handling, use, disclosure, transfer and security, of personal data continue to evolve and regulatory scrutiny and customer requirements in this area are increasing around the world. Significant uncertainty exists as privacy and data protection laws may be interpreted and applied differently across jurisdictions and may create inconsistent or conflicting requirements with privacy and other laws to which we are subject.

Laws and regulations such as the European Union and United Kingdom General Data Protection Regulation, or GDPR, the California Privacy Rights Act, or CPRA, and other comparable laws and regulations adopted globally and within the United States and Canada can apply to our processing of their residents' personal data by Nasdaq legal entities regardless of the location of such entities; such laws may also require our customers located in such jurisdictions to contractually obligate Nasdaq to comply.

In addition to directly applying to certain Nasdaq business activities, these laws and industry-specific regulations, such as the Health Insurance Portability and Accountability Act (HIPAA) and the Gramm Leach Bliley Act, impact many of our customers, which may affect their decisions to purchase our services. Under certain laws and regulations, as a supplier to such customers, regulators may engage in direct enforcement actions or seek to impose liability on Nasdaq if we do not comply with them. Our efforts to comply with privacy and data protection laws may entail substantial expenses, may divert resources from other initiatives and projects, and could impact the services that we offer. The enactment of more restrictive laws, rules or regulations, future enforcement actions or investigations, or the creation of new rights to pursue damages could impact us through increased costs or restrictions on our business, and noncompliance could result in regulatory penalties and significant legal liability.

Changes in tax laws, regulations or policies could have a material adverse effect on our financial results.

Like other corporations, we are subject to taxes at the federal, state and local levels, as well as in non-U.S. jurisdictions. Changes in tax laws, regulations or policies could result in us having to pay higher taxes, which may reduce our net income, or could adversely affect our ability to continue our capital allocation program or effect strategic transactions in a tax-favorable manner. In addition, such changes, including federal or state financial transaction taxes, may increase the cost of our offerings or services, which may cause our clients to reduce their use of our services.

In addition, some of our subsidiaries are subject to tax in the jurisdictions in which they are organized or operate. In computing our tax obligation in these jurisdictions, we take various tax positions. We cannot ensure that upon review of these positions, the applicable authorities will agree with our positions. A successful challenge by a tax authority could result in additional taxes imposed on our clients or our subsidiaries.

RISKS RELATED TO LIQUIDITY AND CAPITAL RESOURCES

A downgrade of our credit rating could increase the cost of our funding from the capital markets.

Our debt is currently rated investment grade by two of the major rating agencies. These rating agencies regularly evaluate us, and their ratings of our long-term debt and commercial paper are based on a number of factors, including our financial strength and corporate development activity, as well as factors not entirely within our control, including conditions affecting our industry generally. There can be no assurance that we will maintain our current ratings. Our failure to maintain such ratings could reduce or eliminate our ability to issue commercial paper and adversely affect the cost and other terms upon which we are able to obtain funding and increase our cost of capital. A reduction in credit ratings would also result in increases in the cost of our commercial paper and other outstanding debt as the interest rate on the outstanding amounts under our credit facilities and our senior notes fluctuates based on our credit ratings.

Our leverage limits our financial flexibility, increases our exposure to weakening economic conditions and may adversely affect our ability to obtain additional financing.

Our indebtedness as of December 31, 2022 was $5.4 billion. We may borrow additional amounts by utilizing available liquidity under our existing credit facilities, issuing additional debt securities or issuing short-term, unsecured commercial paper notes through our commercial paper program.

Our leverage and reliance on the capital markets could:

- reduce funds available to us for operations and general corporate purposes or for capital expenditures as a result of the dedication of a substantial portion of our consolidated cash flow from operations to the payment of principal and interest on our indebtedness;
- increase our exposure to a continued downturn in general economic conditions;
- place us at a competitive disadvantage compared with our competitors with less debt;
- affect our ability to obtain additional financing in the future for refinancing indebtedness, acquisitions, working capital, capital expenditures or other purposes; and
- increase our cost of debt and reduce or eliminate our ability to issue commercial paper.

In addition, we must comply with the covenants in our credit facilities. Among other things, these covenants restrict our ability to effect certain fundamental transactions, dispose of certain assets, incur additional indebtedness and grant liens on assets. Failure to meet any of the covenant terms of our credit facilities could result in an event of default. If an event of default occurs, and we are unable to receive a waiver of default, our lenders may increase our borrowing costs, restrict our ability to obtain additional borrowings and accelerate repayment of all amounts outstanding.

We will need to invest in our operations to maintain and grow our business and to integrate acquisitions, and we may need additional funds, which may not be readily available.

We depend on the availability of adequate capital to maintain and develop our business. Although we believe that we can meet our current capital requirements from internally generated funds, cash on hand and borrowings under our revolving credit facility and commercial paper program, if the capital and credit markets experience volatility, access to capital or credit may not be available on terms acceptable to us or at all. Rising interest rates could adversely affect our ability to pursue new financing opportunities, and it may be more expensive for us to issue new debt securities. Limited access to capital or credit in the future could have an impact on our ability to refinance debt, maintain our credit rating, meet our regulatory capital requirements, engage in strategic initiatives, make acquisitions or strategic investments in other companies, pay dividends, repurchase our stock or react to changing economic and business conditions. If we are unable to fund our capital or credit requirements, it could have an adverse effect on our business, financial condition and operating results.

In addition to our debt obligations, we will need to continue to invest in our operations for the foreseeable future to integrate acquired businesses and to fund new initiatives. If we do not achieve the expected operating results, we will need to reallocate our cash resources. This may include borrowing additional funds to service debt payments, which may impair our ability to make investments in our business or to integrate acquired businesses.

If we need to raise funds through issuing additional equity, our equity holders will suffer dilution. If we need to raise funds through incurring additional debt, we may become subject to covenants more restrictive than those contained in our credit facilities, the indentures governing our notes and our other debt instruments. Furthermore, if adverse economic conditions occur, we could experience decreased revenues from our operations which could affect our ability to satisfy financial and other restrictive covenants to which we are subject under our existing indebtedness.

RISKS RELATED TO INTELLECTUAL PROPERTY AND BRAND REPUTATION

Damage to our reputation or brand name could have a material adverse effect on our businesses.

One of our competitive strengths is our strong reputation and brand name. Various issues may give rise to reputational risk, including issues relating to:

- our ability to maintain the security of our data and systems;
- the quality and reliability of our technology platforms and systems;
- the ability to fulfill our regulatory obligations;
- the ability to execute our business plan, key initiatives or new business ventures and the ability to keep up with changing customer demand;
- the representation of our business in the media;
- the accuracy of our financial statements, other financial and statistical information or ESG-related disclosures;
- the accuracy of our financial guidance or other information provided to our investors;
- the quality of our corporate governance structure;
- the quality of our products, including the reliability of our transaction-based, Corporate Services and marketplace technology products, the accuracy of the quote and trade information provided by our Data & Listing Services business and the accuracy of calculations used by our Indexes business for indexes and unit investment trusts;
- the quality of our disclosure controls or internal controls over financial reporting, including any failures in supervision;
- extreme price volatility on our markets;
- any negative publicity surrounding our listed companies or our listing rules;
- any negative publicity surrounding the use of our products and/or services by our customers, including in connection with emerging asset classes such as crypto assets; and
- any misconduct, fraudulent activity or theft by our employees or other persons formerly or currently associated with us.

Although we monitor developments, including social media, for areas of potential risk to our brand and reputation, negative publicity or misrepresentations by third parties, particularly on social media, may adversely impact our credibility as a leader in the global capital markets and as a source for data and analytics. This may have an adverse effect on our brands, business and operating results. Damage to our reputation could cause some issuers not to list their securities on our exchanges or switch to a different exchange. Reputational damage may also reduce trading volumes or values on our exchanges or cause us to lose customers in our Data & Listing Services, Index, Workflow & Insights or Marketplace Technology businesses. This, in turn, may have a material adverse effect on our business, financial condition and operating results.

Failure to meet customer expectations or deadlines for the implementation of our products could result in negative publicity, losses and reduced sales, each of which may harm our reputation, business and results of operations.

We generally mutually agree with our customers on the duration, budget and costs associated with the implementation of certain of our products, particularly our market technology large-scale market infrastructure projects. Various factors may cause implementations to be delayed, inefficient or otherwise unsuccessful, including due to unforeseen project complexities, our deployment of insufficient resources or other external factors. The effects of a failure to meet an implementation schedule could include monetary credits for current or future service engagements, a reduction in fees for the project, or the expenditure of additional expenses to mitigate such delays. In addition, time-consuming implementations may also increase the personnel we must allocate to such customer, thereby increasing our costs and diverting attention from other projects. Unsuccessful, lengthy, or costly customer implementation projects could result in claims from customers, decreased customer satisfaction, harm to our reputation, and opportunities for competitors to displace us, each of which could have an adverse effect on our reputation, business and results of operations.

Our reputation or business could be negatively impacted by ESG matters and our reporting of such matters.

We communicate certain ESG-related initiatives, goals, and/or commitments regarding environmental matters, diversity, vendors and suppliers and other matters in our annual Sustainability Report, Task Force on Climate-related Financial Disclosures, or TCFD, Report, on our website, in our filings with the SEC, and elsewhere. These initiatives, goals, or commitments could be difficult to achieve and costly to implement. For example, in November 2022, we announced our commitment to achieve net-zero for Scope 3 greenhouse gas emissions by 2050, the achievement of which relies, in large part, on the accuracy of our estimates and assumptions, on the engagement of our value chain to reduce emissions and set their net-zero targets, and procuring renewable energy for our real estate and data center portfolios. We could fail to achieve, or be perceived to fail to achieve, this or other ESG-related initiatives, goals, or commitments. In addition, we could be criticized for the timing, scope or nature of these initiatives, goals, or commitments, or for any revisions to them. We could be subject to litigation or regulatory enforcement actions regarding the accuracy, adequacy, or completeness of our ESG-related disclosures. Our actual or perceived failure to achieve our ESG-related initiatives, goals, or commitments could negatively impact our reputation or otherwise materially harm our business.

Failure to protect our intellectual property rights, or allegations that we have infringed on the intellectual property rights of others, could harm our brand-building efforts and ability to compete effectively.

To protect our intellectual property rights, we rely on a combination of trademark laws, copyright laws, patent laws, trade secret protection, confidentiality agreements and other contractual arrangements with our affiliates, clients, strategic partners, employees and others. However, the efforts we have taken to protect our intellectual property and proprietary rights might not be sufficient, or effective, at stopping unauthorized use of those rights. We may be unable to detect the unauthorized use of, or take appropriate steps to enforce, our intellectual property rights.

We have registered, or applied to register, our trademarks in the United States and in over 50 foreign jurisdictions and have pending U.S. and foreign applications for other trademarks. We also maintain copyright protection for software products and pursue patent protection for inventions developed by us. We hold a number of patents, patent applications and licenses in the United States and other foreign jurisdictions. However, effective trademark, copyright, patent and trade secret protection might not be available or cost-effective in every country in which our services and products are offered. Moreover, changes in patent law, such as changes in the law regarding patentable subject matter, could also impact our ability to obtain patent protection for our innovations. There is also a risk that the scope of protection under our patents may not be sufficient in some cases, or that existing patents may be deemed invalid or unenforceable. Failure to protect our intellectual property adequately could harm our brand and affect our ability to compete effectively. Further, defending our intellectual property rights could result in the expenditure of significant financial and managerial resources.

Third parties may assert intellectual property rights claims against us, which may be costly to defend, could require the payment of damages and could limit our ability to use certain technologies, trademarks or other intellectual property. Any intellectual property claims, with or without merit, could be expensive to litigate or settle and could divert management resources and attention. Successful challenges against us could require us to modify or discontinue our use of technology or business processes where such use is found to infringe or violate the rights of others, or require us to purchase licenses from third parties, any of which could adversely affect our business, financial condition and operating results.

GENERAL RISK FACTORS

We are a holding company that depends on cash flow from our subsidiaries to meet our obligations, and any restrictions on our subsidiaries' ability to pay dividends or make other payments to us may have a material adverse effect on our results of operations and financial condition.

As a holding company, we require dividends and other payments from our subsidiaries to meet cash requirements. Minimum capital requirements mandated by regulatory authorities having jurisdiction over some of our regulated subsidiaries indirectly restrict the amount of dividends that can be paid upstream.

In addition, unremitted earnings of certain subsidiaries outside of the U.S. are used to finance our international operations and are considered to be indefinitely reinvested.

If our subsidiaries are unable to pay dividends and make other payments to us when needed, or if regulators or counterparties require us to increase capital deployed in certain of our regulated subsidiaries, we may be unable to satisfy our obligations, which would have a material adverse effect on our business, financial condition and operating results.

We may experience fluctuations in our operating results, which may adversely affect the market price of our common stock.

Our industry is risky and unpredictable and is directly affected by many national and international factors beyond our control, including:

- economic, political and geopolitical market conditions;
- natural disasters, terrorism, pandemics, war or other catastrophes;
- broad trends in finance and technology;
- changes in price levels and volatility in the stock markets;
- the level and volatility of interest rates;
- volatility in commodity markets, including the energy markets;
- inflation;
- changes in government monetary or tax policy;
- the imposition of governmental economic sanctions on countries in which we do business or where we plan to expand our business; and
- the perceived attractiveness of the U.S. or European capital markets.

Any one of these factors could have a material adverse effect on our business, financial condition and operating results by causing a substantial decline in the financial services markets and reducing trading volumes or values.

Additionally, since borrowings under our credit facilities bear interest at variable rates and commercial paper is issued at prevailing interest rates, any increase in interest rates on debt that we have not fixed using interest rate hedges will increase our interest expense, reduce our cash flow or increase the cost of future borrowings or refinancings. Other than variable rate debt, we believe our business has relatively large fixed costs and low variable costs, which magnifies the impact of revenue fluctuations on our operating results. As a result, a decline in our revenue may lead to a relatively larger impact on operating results. A substantial portion of our operating expenses is related to personnel costs, regulation and corporate overhead, none of which can be adjusted quickly and some of which cannot be adjusted at all. Our operating expense levels are based on our expectations for future revenue. If actual revenue is below management's expectations, or if our expenses increase before revenues do, both revenues less transaction-based expenses and operating results would be materially and adversely affected. Because of these factors, it is possible that our operating results or other operating metrics may fail to meet the expectations of stock market analysts and investors. If this happens, the market price of our common stock may be adversely affected.

Our operational processes are subject to the risk of error, which may result in financial loss or reputational damage.

We have instituted extensive controls to reduce the risk of error inherent in our operations; however, such risk cannot completely be eliminated. Our businesses are highly dependent on our ability to process and report, on a daily basis, a large number of transactions across numerous and diverse markets. Some of our operations require complex processes, and the introduction of new products or services or changes in processes or reporting due to regulatory requirements may result in an increased risk of errors for a period after implementation. Additionally, the likelihood of such errors or vulnerabilities is heightened as we acquire new products from third parties, whether as a result of acquisitions or otherwise.

Data, other content or information that we distribute may contain errors or be delayed, causing reputational harm. Use of our products and services as part of the investment process creates the risk that clients, or the parties whose assets are managed by our clients, may pursue claims against us in the event of such delay or error. Even with a favorable outcome, significant litigation against us might unduly burden management, personnel, financial and other resources.

In addition, the sophisticated software we sell to our customers may contain undetected errors or vulnerabilities, some of which may be discovered only after delivery, or could fail to perform its intended purpose. Because our clients depend on our solutions for critical business functions, any service interruptions, failures or other issues may result in lost or delayed market acceptance and lost sales, or negative customer experiences that could damage our reputation, resulting in the loss of customers, loss of revenues and liability for damages, which may adversely affect our business, operating results and financial condition.

Climate change may have a long-term adverse impact on our business, and climate change disclosure requirements may reduce demand for listings on our exchanges.

While we seek to mitigate our business risks associated with climate change by establishing robust environmental and sustainability programs, there are inherent climate related risks wherever our business is conducted. There is an increased focus from our regulators, investors, clients, employees, and other stakeholders concerning corporate citizenship and sustainability matters. Access to clean water and reliable energy in the communities where we conduct our business, whether for our offices, data centers, vendors, clients or other stakeholders, is a priority. For example, changes in weather where we operate may increase the costs of powering and cooling our data centers or the facilities that we use to operate our exchanges and clearinghouses, develop our products or provide cloud-based services. Climate related events, including extreme weather events and their impact on the critical infrastructure in the United States and elsewhere, have the potential to disrupt our business or the business of our clients; cause increased volatility in commodity markets in which Nasdaq Clearing operates as a clearinghouse, which may result in Nasdaq Clearing holding insufficient collateral for such volatility; lead to an increase in costs of raw materials, which may adversely affect certain of our listed companies operating in certain sectors and create adverse market conditions, including trading volatility beyond historical levels, any of which could adversely affect our business, reputation, financial condition and operating results. Additionally, if the SEC or other federal regulatory agencies impose comprehensive reporting obligations regarding climate change on public companies, there may be a decrease in new listings or an increase in delistings of our listed companies, which may adversely affect our business, financial condition and operating results. Such new regulations, whether in the U.S. or in other countries in which we operate, could also cause us to incur additional compliance and reporting costs.

Our businesses operate in various international markets, including certain emerging markets that are subject to greater political, economic and social uncertainties than developed countries.

Our businesses operate in various international markets, including but not limited to Northern Europe, the Baltics, the Middle East, Africa and Asia, and our non-U.S. operations are subject to the risk inherent in the international environment. Political, economic or social events or developments in one or more of our non-U.S. locations could adversely affect our operations and financial results. Some locations, such as Lithuania, India and the Philippines, have economies that may be subject to greater political, economic and social uncertainties than countries with more developed institutional structures, which may increase our operational risk.

Unforeseen or catastrophic events could interrupt our critical business functions. In addition, our U.S. and European businesses are heavily concentrated in particular areas and may be adversely affected by events in those areas.

We may incur losses as a result of unforeseen or catastrophic events, such as terrorist attacks, natural disasters, pandemics (such as COVID-19), extreme weather, fire, power loss, telecommunications failures, human error, theft, sabotage and vandalism. Given our position in the global capital markets, we may be more likely than other companies to be a target for malicious disruption activities.

In addition, our U.S. and European business operations are heavily concentrated in the east coast of the U.S., and Stockholm, Sweden, respectively. Any event that impacts either of those geographic areas could potentially affect our ability to operate our businesses.

We have disaster recovery and business continuity plans and capabilities for critical systems and business functions to mitigate the risk of an interruption. Any interruption in our critical business functions or systems could negatively impact our financial condition and operating results. Additionally, some colocation customers may lack adequate disaster recovery solutions to avoid loss of trade flow from a sustained interruption of our critical systems.

Because we have operations in numerous countries, we are exposed to currency risk.

We have operations in the U.S., the Nordic and Baltic countries, Canada, the United Kingdom, Australia and many other foreign countries. We therefore have significant exposure to exchange rate movements between the Euro, Swedish Krona, the Canadian dollar and other foreign currencies against the U.S. dollar. Significant inflation or disproportionate changes in foreign exchange rates with respect to one or more of these currencies could occur as a result of general economic conditions, acts of war or terrorism, changes in governmental monetary or tax policy, changes in local interest rates or other factors. These exchange rate differences will affect the translation of our non-U.S. results of operations, interest expense and financial condition into U.S. dollars as part of the preparation of our consolidated financial statements.

If our risk management methods are not effective, our business, reputation and financial results may be adversely affected.

We utilize widely-accepted methods to identify, assess, monitor and manage our risks, including oversight of risk management by Nasdaq’s Global Risk Management Committee, which is comprised of senior executives and has the responsibility for regularly reviewing risks and referring significant risks to the board of directors or specific board committees. Local risk management committees in our international offices provide local risk oversight and escalation to local boards, as appropriate. Certain risk management methods require subjective evaluation of dynamic information regarding markets, customers or other matters. That variable information may not in all cases be accurate, complete, up-to-date or properly evaluated. If we do not successfully identify, assess, monitor or manage the risks to which we are exposed, our business, reputation, financial condition and operating results could be materially adversely affected.

Decisions to declare future dividends on our common stock will be at the discretion of our board of directors and there can be no guarantee that we will pay future dividends to our stockholders.

Our board of directors regularly declares quarterly cash dividend payments on our outstanding common stock. Future declarations of dividends and the establishment of future record and payment dates are subject to approval by Nasdaq’s board of directors. The board’s determination to declare dividends will depend upon our profitability and financial condition, contractual restrictions, restrictions imposed by applicable law and other factors that the board deems relevant. Based on an evaluation of these factors, the board of directors may determine not to declare future dividends at all or to declare future dividends at a reduced amount. Accordingly, there can be no guarantee that we will pay future dividends to our stockholders.

Provisions of our certificate of incorporation, by-laws, exchange rules (including provisions included to address SEC concerns) and governing law restrict the ownership and voting of our common stock. In addition, such provisions could delay or prevent a change in control of us and entrench current management.

Our organizational documents place restrictions on the voting rights of certain stockholders. The holders of our common stock are entitled to one vote per share on all matters to be voted upon by the stockholders except that no person may exercise voting rights in respect of any shares in excess of 5% of the then outstanding shares of our common stock. Any change to the 5% voting limitation would require SEC approval.

In response to the SEC's concern about a concentration of our ownership, the rules of some of our exchange subsidiaries include a prohibition on any member or any person associated with a member of the exchange from beneficially owning more than 20% of our outstanding voting interests. SEC consent would be required before any investor could obtain more than a 20% voting interest in us. The rules of some of our exchange subsidiaries also require the SEC's approval of any business ventures with exchange members, subject to exceptions.

Our organizational documents contain provisions that may be deemed to have an anti-takeover effect and may delay, deter or prevent a change of control of us, such as a tender offer or takeover proposal that might result in a premium over the market price for our common stock. Additionally, certain of these provisions make it more difficult to bring about a change in the composition of our board of directors, which could result in entrenchment of current management.

Our certificate of incorporation and by-laws:

- do not permit stockholders to act by written consent;
- require certain advance notice for director nominations and actions to be taken at annual meetings; and
- authorize the issuance of undesignated preferred stock, or "blank check" preferred stock, which could be issued by our board of directors without stockholder approval.

Section 203 of the Delaware General Corporation Law imposes restrictions on mergers and other business combinations between us and any holder of 15% or more (or, in some cases, a holder who previously held 15% or more) of our common stock. In general, Delaware law prohibits a publicly held corporation from engaging in a "business combination" with an "interested stockholder" for three years after the stockholder becomes an interested stockholder, unless the corporation's board of directors and stockholders approve the business combination in a prescribed manner.

Finally, many of the European countries where we operate regulated entities require prior governmental approval before an investor acquires 10% or greater of our common stock.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

We conduct our business operations in leased facilities. We do not own any real property. Our U.S. headquarters are located in New York, New York, and our European headquarters are located in Stockholm, Sweden. We also lease space in multiple locations around the world, which are used for research and development, sales and support, and administrative activities, as well as for data centers and disaster preparedness facilities.

Generally, our properties are not allocated for use by a particular segment. Instead, most of our properties are used by two or more segments. We regularly monitor the facilities we occupy to ensure that they suit our needs, particularly as we have reopened all our global offices and our employees have transitioned to a hybrid work environment. We believe the facilities that we occupy are adequate for the purposes for which they are currently used and are well-maintained. See Note 16, "Leases," to the consolidated financial statements for further discussion.

Item 3. Legal Proceedings

For a description of our legal proceedings, if any, see "Legal and Regulatory Matters - Litigation," of Note 18, "Commitments, Contingencies and Guarantees," to the consolidated financial statements, which is incorporated herein by reference.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.

Market Information

Our common stock is listed on The Nasdaq Stock Market under the ticker symbol "NDAQ." As of February 13, 2023, we had approximately 209 holders of record of our common stock.

Issuer Purchases of Equity Securities

Share Repurchase Program

See "Share Repurchase Program," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our share repurchase program.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

The table below represents repurchases made by or on behalf of us or any "affiliated purchaser" of our common stock during the fiscal quarter ended December 31, 2022:

Period	(a) Total Number of Shares Purchased	(b) Average Price Paid Per Share	(c) Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	(d) Maximum Dollar Value of Shares that May Yet Be Purchased Under the Plans or Programs (in millions)
October 2022				
Share repurchase program	—	$ —	—	$ 293
Employee transactions	27,913	$ 59.76	N/A	N/A
November 2022				
Share repurchase program	—	$ —	—	$ 293
Employee transactions	231	$ 66.52	N/A	N/A
December 2022				
Share repurchase program	—	$ —	—	$ 650
Employee transactions	56,480	$ 61.76	N/A	N/A
Total Quarter Ended December 31, 2022				
Share repurchase program	—	$ —	—	$ 650
Employee transactions	84,624	$ 61.11	N/A	N/A

In the preceding table:

- N/A - Not applicable.
- See "Share Repurchase Program," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our share repurchase program.
- Employee transactions represents shares surrendered to us to satisfy tax withholding obligations arising from the vesting of restricted stock and PSUs previously issued to employees.

PERFORMANCE GRAPH

The following performance graph and related information shall not be deemed "filed" for purposes of Section 18 of the Exchange Act or incorporated by reference into any of our other filings under the Securities Act or the Exchange Act, except as shall be expressly set forth by specific reference in such filing.

The following graph compares the total return of our common stock to the Nasdaq Composite Index, the S&P 500 and a peer group selected by us, shown below, for the past five years:

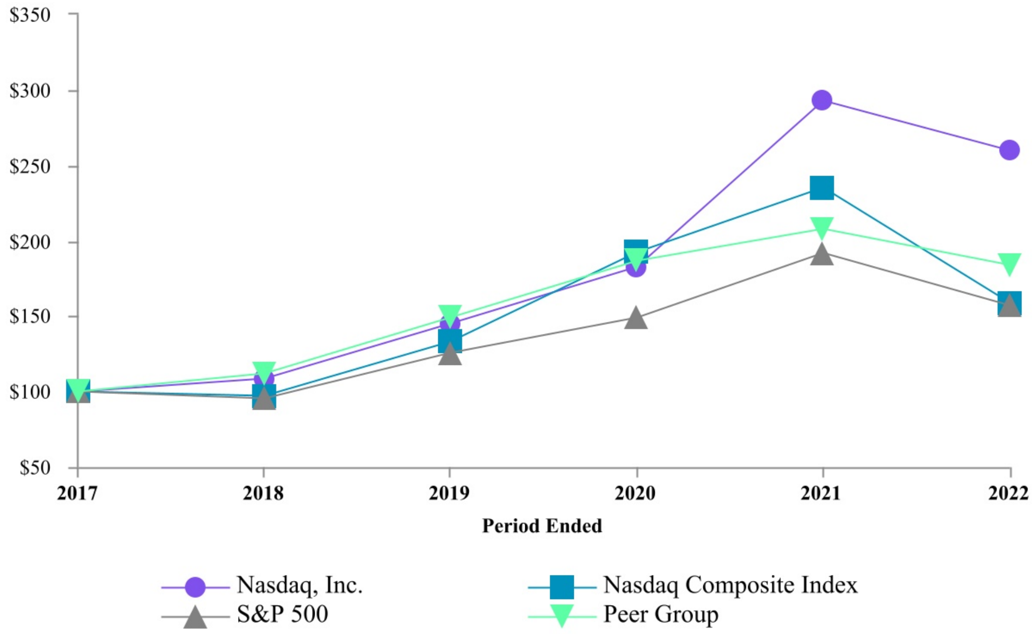
Peer Group

• ASX Limited	• Deutsche Börse AG	• LSE
• B3 S.A.	• Euronext N.V.	• Singapore Exchange Limited
• Bolsas Mexicana de Valores, S.A.B. de C.V.	• Hong Kong Exchanges and Clearing Limited	• TMX Group Limited
• Cboe	• ICE	
• CME Group Inc.	• Japan Exchange Group, Inc.	

The figures represented below assume an initial investment of $100 in the common stock or index at the closing price on December 31, 2017 and the reinvestment of all dividends.

COMPARISON OF 5 YEAR CUMULATIVE TOTAL RETURN*

Among Nasdaq, Inc., the Nasdaq Composite Index, the S&P 500, and a Peer Group



* $100 invested on 12/31/2017 in stock or index, including reinvestment of dividends.

	Fiscal Year Ended December 31,					
	2017	2018	2019	2020	2021	2022
Nasdaq, Inc.	$ 100	$ 108	$ 145	$ 183	$ 293	$ 260
Nasdaq Composite Index	100	97	133	192	235	159
S&P 500	100	96	126	149	192	157
Peer Group	100	112	149	186	208	184

Item 6. [Reserved]

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion and analysis of the financial condition and results of operations of Nasdaq should be read in conjunction with our consolidated financial statements and related notes included in this Form 10-K, as well as the discussion under "Item 1A. Risk Factors." For further discussion of our growth strategy, products and services, and competitive strengths, see "Item 1. Business." Unless stated otherwise, the comparisons presented in this discussion and analysis refer to the year-over-year comparison of changes in our financial condition and results of operations as of and for the fiscal years ended December 31, 2022 and December 31, 2021. Discussion of fiscal year 2021 items and the year-over year comparison of changes in our financial condition and results of operations as of and for the fiscal years ended December 31, 2021 and December 31, 2020 can be found in Part II, "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" of our Annual Report on Form 10-K for the fiscal year ended December 31, 2021, which was previously filed with the SEC on February 23, 2022, with the exception of certain discussions impacted by the new corporate structure.

Business Segments

In September 2022, we announced a new organizational structure which aligns our businesses more closely with the foundational shifts that are driving the evolution of the global financial system. The new corporate structure includes three business segments: Market Platforms, Capital Access Platforms and Anti-Financial Crime. All prior periods have been restated to conform to the current period presentation. See Note 1, "Organization and Nature of Operations," and Note 19, "Business Segments," to the consolidated financial statements for further discussion of our reportable segments and geographic data, as well as how management allocates resources, assesses performance and manages these businesses as three separate segments. See "Part I, Item 1. Business" for additional discussion on recent developments and highlights.

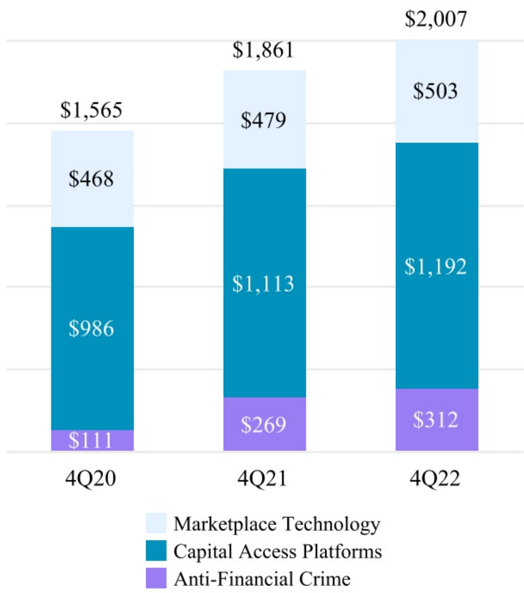
Nasdaq's Operating Results

The following tables summarize our financial performance for the year ended December 31, 2022 when compared to the same period in 2021 and for the year ended December 31, 2021 when compared to the same period in 2020. The comparability of our results of operations between reported periods is impacted by the acquisition of Verafin in February 2021. See "2021 Acquisition," of Note 4, "Acquisitions and Divestiture," to the consolidated financial statements for further discussion. For a detailed discussion of our results of operations, see "Segment Operating Results" below.

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions, except per share amounts)				
Revenues less transaction-based expenses	$ 3,582	$ 3,420	$ 2,903	4.7 %	17.8 %
Operating expenses	2,018	1,979	1,669	2.0 %	18.6 %
Operating income	1,564	1,441	1,234	8.5 %	16.8 %
Net income attributable to Nasdaq	$ 1,125	$ 1,187	$ 933	(5.2)%	27.2 %
Diluted earnings per share	$ 2.26	$ 2.35	$ 1.86	(3.8)%	26.3 %
Cash dividends declared per common share	$ 0.78	$ 0.70	$ 0.65	11.4 %	7.7 %

In countries with currencies other than the U.S. dollar, revenues and expenses are translated using monthly average exchange rates. Impacts on our revenues less transaction-based expenses and operating income associated with fluctuations in foreign currency are discussed in more detail under "Item 7A. Quantitative and Qualitative Disclosures about Market Risk."

The following chart summarizes our ARR (in millions):

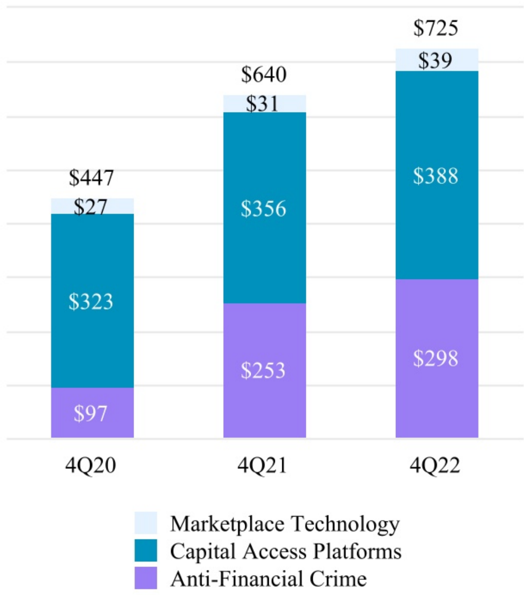


ARR for a given period is the annualized revenue derived from subscription contracts with a defined contract value. This excludes contracts that are not recurring, are one-time in nature, or where the contract value fluctuates based on defined metrics. Also excluded are contracts that are signed but not yet commenced. ARR is one of our key performance metrics to assess the health and trajectory of our recurring business. ARR does not have any standardized definition and is therefore unlikely to be comparable to similarly titled measures presented by other companies. ARR should be viewed independently of revenue and deferred revenue and is not intended to be combined with or to replace either of those items. ARR is not a forecast and the active contracts at the end of a reporting period used in calculating ARR may or may not be extended or renewed by our customers.

The ARR chart includes:

- Anti-Financial Crime support and SaaS subscription contracts
- Proprietary market data subscriptions and annual listing fees within our Data & Listing Services business, index data subscriptions and guaranteed minimum on futures contracts within our Index business and subscription contracts under our Workflow & Insights business.
- Market technology support and SaaS subscription contracts as well as trade management services contracts, excluding one-time service requests.

The following chart summarizes our quarterly annualized SaaS revenues for our Solutions Businesses, which are comprised of the Capital Access Platforms and Anti-Financial Crime segments and the Marketplace Technology business within the Market Platforms segment, for the three months ended December 31, 2022, 2021 and 2020 (in millions):



Segment Operating Results

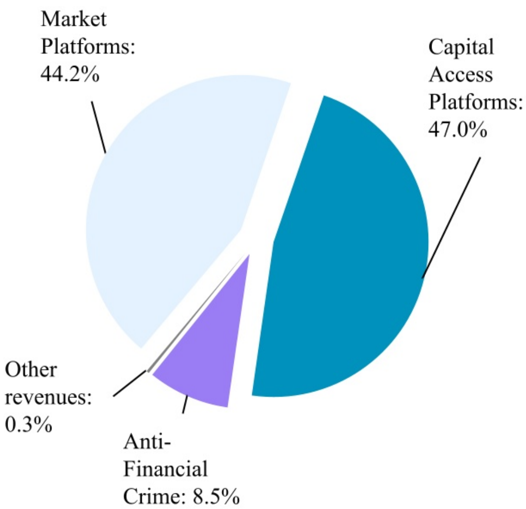
The following table presents our revenues by segment, transaction-based expenses for our Market Platforms segment and total revenues less transaction-based expenses:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Market Platforms	$ 4,225	$ 4,048	$ 4,179	4.4 %	(3.1)%
Capital Access Platforms	1,684	1,568	1,287	7.4 %	21.8 %
Anti-Financial Crime	306	231	116	32.5 %	99.1 %
Other revenues	11	39	43	(71.8)%	(9.3)%
Total revenues	6,226	5,886	5,625	5.8 %	4.6 %
Transaction rebates	(2,092)	(2,168)	(2,028)	(3.5)%	6.9 %
Brokerage, clearance and exchange fees	(552)	(298)	(694)	85.2 %	(57.1)%
Total revenues less transaction-based expenses	$ 3,582	$ 3,420	$ 2,903	4.7 %	17.8 %

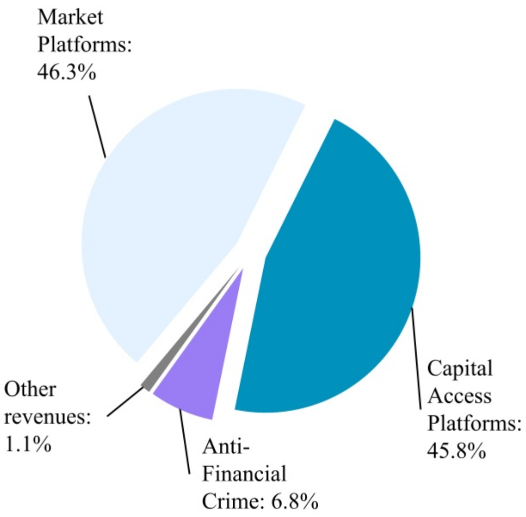
The following charts present our Market Platforms, Capital Access Platforms and Anti-Financial Crime segments as a percentage of our total revenues, less transaction-based expenses.

Percentage of Revenues Less Transaction-based Expenses by Segment for the:

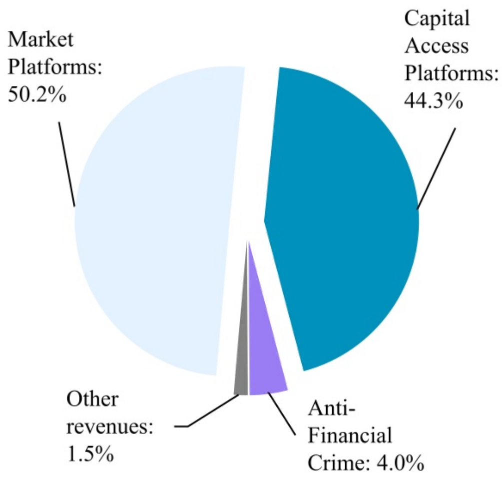
Year Ended December 31, 2022



Year Ended December 31, 2021



Year Ended December 31, 2020



MARKET PLATFORMS

The following tables present revenues from our Market Platforms segment:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Trading Services	$ 3,663	$ 3,503	$ 3,654	4.6 %	(4.1)%
Marketplace Technology	562	545	525	3.1 %	3.8 %
Total Market Platforms	$ 4,225	$ 4,048	$ 4,179	4.4 %	(3.1)%
Transaction-based expenses:					
Transaction rebates	(2,092)	(2,168)	(2,028)	(3.5)%	6.9 %
Brokerage, clearance and exchange fees	(552)	(298)	(694)	85.2 %	(57.1)%
Total Market Platforms, net	$ 1,581	$ 1,582	$ 1,457	(0.1)%	8.6 %

Trading Services

Our Trading Services business includes equity derivatives trading, cash equity trading, Nordic fixed income trading & clearing, U.S. Tape plans and other revenues. The following tables present net revenues by product from our Trading Services business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
U.S. Equity Derivative Trading	$ 371	$ 343	$ 287	8.2 %	19.5 %
Cash Equity Trading	397	429	381	(7.5)%	12.6 %
U.S. Tape plans	149	155	162	(3.9)%	(4.3)%
Other	102	110	102	(7.3)%	7.8 %
Trading Services, net	$ 1,019	$ 1,037	$ 932	(1.7)%	11.3 %

In the table above, Other includes Nordic fixed income trading & clearing, Nordic derivatives, Nordic commodities, and Canadian cash equities trading.

U.S. Equity Derivative Trading

The following tables present total revenues, transaction-based expenses, and total revenues less transaction-based expenses as well as key drivers from our U.S. Equity Derivative Trading business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
U.S. Equity Derivative Trading Revenues	$ 1,252	$ 1,367	$ 1,122	(8.4)%	21.8 %
Section 31 fees	89	32	69	178.1 %	(53.6)%
Transaction-based expenses:					
Transaction rebates	(878)	(1,018)	(828)	(13.8)%	22.9 %
Section 31 fees	(89)	(32)	(69)	178.1 %	(53.6)%
Brokerage and clearance fees	(3)	(6)	(7)	(50.0)%	(14.3)%
U.S. Equity derivative trading revenues, net	$ 371	$ 343	$ 287	8.2 %	19.5 %

Section 31 fees are recorded as equity derivative and cash equity derivative trading revenues with a corresponding amount recorded in transaction-based expenses. We are assessed these fees from the SEC and pass them through to our customers in the form of incremental fees. Pass-through fees can increase or decrease due to rate changes by the SEC, our percentage of the overall industry volumes processed on our systems, and differences in actual dollar value traded. The SEC implemented a fee increase in May 2022 and a decrease in February 2021. Since the amount recorded in revenues is equal to the amount recorded as Section 31 fees, there is no impact on our net revenues.

	Year Ended December 31,		
	2022	2021	2020
<u>*U.S. equity options*</u>			
Total industry average daily volume (in millions)	38.2	37.2	27.7
Nasdaq PHLX matched market share	11.6 %	12.4 %	12.7 %
The Nasdaq Options Market matched market share	8.0 %	8.1 %	9.8 %
Nasdaq BX Options matched market share	2.8 %	1.4 %	0.2 %
Nasdaq ISE Options matched market share	5.7 %	6.6 %	7.8 %
Nasdaq GEMX Options matched market share	2.3 %	4.3 %	5.6 %
Nasdaq MRX Options matched market share	1.6 %	1.6 %	0.7 %
Total matched market share executed on Nasdaq's exchanges	32.0 %	34.4 %	36.8 %

U.S. equity derivative trading revenues decreased in 2022 compared with 2021 primarily due to lower overall matched market share executed on Nasdaq's exchanges and lower gross capture rate, partially offset by higher industry trading volumes.

U.S. equity derivative trading revenues less transaction-based expenses increased in 2022 compared with 2021 primarily due to higher capture rates and higher industry trading volumes, and lower transaction rebates, partially offset by lower overall matched market share executed on Nasdaq's exchanges.

U.S. equity derivative trading and clearing revenues and U.S. equity derivative trading and clearing revenues less transaction-based expenses increased in 2021 compared with 2020 primarily due to higher U.S. industry trading volumes, partially offset by lower overall U.S. matched market share executed on Nasdaq's exchanges and a lower capture rate.

Transaction rebates, in which we credit a portion of the execution charge to the market participant, decreased in 2022 compared with 2021 primarily due to lower overall U.S. matched market share executed on Nasdaq's exchanges and lower rebate capture rate, partially offset by higher industry trading volumes. Transaction rebates increased in 2021 compared with 2020 primarily due to higher U.S. industry trading volumes, partially offset by lower overall U.S. matched market share executed on Nasdaq's exchanges and a lower rebate capture rate.

Cash Equity Trading Revenues

The following tables present total revenues, transaction-based expenses, and total revenues less transaction-based expenses as well as key drivers and other metrics from our Cash Equity trading business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Cash Equity Trading Revenues	$ 1,605	$ 1,578	$ 1,582	1.7 %	(0.3)%
Section 31 fees	436	229	586	90.4 %	(60.9)%
Transaction-based expenses:					
Transaction rebates	(1,184)	(1,118)	(1,169)	5.9 %	(4.4)%
Section 31 fees	(436)	(229)	(586)	90.4 %	(60.9)%
Brokerage and clearance fees	(24)	(31)	(32)	(22.6)%	(3.1)%
Cash equity trading revenues, net	$ 397	$ 429	$ 381	(7.5)%	12.6 %

See discussion in "U.S. Equity Derivative Trading" for an explanation of Section 31 fees and the period over period analysis.

	Year Ended December 31,		
	2022	2021	2020
Total U.S.-listed securities			
Total industry average daily share volume (in billions)	11.9	11.4	10.9
Matched share volume (in billions)	522.8	491.9	508.3
The Nasdaq Stock Market matched market share	16.2 %	15.8 %	16.8 %
Nasdaq BX matched market share	0.5 %	0.6 %	0.9 %
Nasdaq PSX matched market share	0.8 %	0.7 %	0.6 %
Total matched market share executed on Nasdaq’s exchanges	17.5 %	17.1 %	18.3 %
Market share reported to the FINRA/Nasdaq Trade Reporting Facility	35.2 %	34.9 %	31.8 %
Total market share	52.7 %	52.0 %	50.1 %
Nasdaq Nordic and Nasdaq Baltic securities			
Average daily number of equity trades executed on Nasdaq’s exchanges	908,813	1,036,523	933,822
Total average daily value of shares traded (in billions)	$ 5.4	$ 6.4	$ 5.6
Total market share executed on Nasdaq’s exchanges	71.5 %	76.9 %	78.1 %

In the tables above, total market shares includes transactions executed on The Nasdaq Stock Market’s, Nasdaq BX’s and Nasdaq PSX’s systems plus trades reported through the FINRA/Nasdaq Trade Reporting Facility.

Cash equity trading revenues increased in 2022 compared with 2021 primarily due to higher U.S. industry trading volumes and higher overall U.S. matched market share executed on Nasdaq's exchanges, partially offset by an unfavorable impact of changes in foreign exchange rates of $16 million, lower U.S. gross capture rate, lower European trading volumes and lower European market share executed on Nasdaq's exchanges.

Cash equity trading revenues less transaction-based expenses decreased in 2022 compared with 2021 primarily due to lower capture rate, the unfavorable impact of changes in foreign exchange rates of $16 million, lower European trading volumes and lower European market share executed on Nasdaq's exchanges, partially offset by higher U.S. industry trading volumes.

Cash equity trading revenues decreased in 2021 compared with 2020 primarily due to lower overall U.S. matched market share executed on Nasdaq's exchanges, partially offset by higher U.S. gross capture rates, higher U.S. industry trading volumes, higher European value traded and a favorable impact from changes in foreign exchange rates.

Cash equity trading revenues less transaction-based expenses increased in 2021 compared with 2020 primarily due to higher U.S. capture rates, higher U.S. industry trading volumes, higher European value traded and a favorable impact from changes in foreign exchange rates, partially offset by lower overall U.S. matched market share executed on Nasdaq's exchanges.

Transaction rebates increased in 2022 compared with 2021. For The Nasdaq Stock Market and Nasdaq PSX, we credit a portion of the per share execution charge to the market participant that provides the liquidity, and for Nasdaq BX, we credit a portion of the per share execution charge to the market participant that takes the liquidity. The increase was primarily due to higher U.S. industry volumes and higher U.S. matched market share executed on Nasdaq's exchanges, partially offset by lower rebate capture rate. Transaction rebates decreased in 2021 compared with 2020, primarily due to lower overall U.S. matched market share executed on Nasdaq's exchanges and a lower rebate capture rate, partially offset by higher U.S. industry trading volumes.

U.S. Tape Plans

The following tables present revenues from our U.S. Tape plans business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
U.S. Tape plans	$ 149	$ 155	$ 162	(3.9)%	(4.3)%

U.S. Tape plans revenues decreased in 2022 compared with in 2021 and 2021 compared with 2020 primarily due to lower market share and usage.

Other

Other includes Nordic fixed income trading and clearing, Nordic derivatives, Nordic commodities and Canadian cash equities trading. The following tables present revenue and key driver from our Other business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Other	$ 102	$ 110	$ 102	(7.3)%	7.8 %

In the table above, other includes transaction rebates of $30 million, $32 million and $31 million in 2022, 2021 and 2020 respectively.

	Year Ended December 31,		
	2022	2021	2020
Nasdaq Nordic and Nasdaq Baltic options and futures			
Total average daily volume of options and futures contracts	296,626	287,182	320,204

In the tables above, Nasdaq Nordic and Nasdaq Baltic total average daily volume of options and futures contracts include Finnish option contracts traded on Eurex for which Nasdaq and Eurex have a revenue sharing arrangement.

Other revenues decreased in 2022 compared with 2021 primarily due to the unfavorable impact of changes in foreign exchange rates of $14 million and lower commodities products revenues, partially offset by higher European trading volumes and higher collateral management services revenues. Other revenues increased in 2021 compared with 2020 primarily due to the favorable impact of changes in foreign exchange rates of $5 million, higher capture rate and higher European clearing products revenues, partially offset by lower European trading volumes.

Marketplace Technology

Marketplace Technology includes our trade management services and market technology businesses.

The following tables present revenues and key drivers from our Marketplace Technology business:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Marketplace Technology	$ 562	$ 545	$ 525	3.1 %	3.8 %

	As of or Three Months Ended December 31,		
	2022	2021	2020
	(in millions)		
ARR	$ 503	$ 479	$ 468
Quarterly annualized SaaS revenues	39	31	27
Order intake	$ 264	$ 304	$ 167

In the table above, order intake is for our market technology business and represents the total contract value of orders signed during the period.

Marketplace technology revenues increased in 2022 compared with 2021 and 2021 compared with 2020 primarily due to higher trade management services revenues associated with increased demand for connectivity services, partially offset by lower market technology revenues. The decrease in market technology revenues in 2022 was due to the successful completion of long-term contracts in 2021 and the unfavorable impact of changes in foreign exchange rates of $10 million, partially offset by growth in SaaS-based revenues. The decrease in market technology revenues in 2021 was primarily due to lower professional services revenues, partially offset by an increase in SaaS revenues.

CAPITAL ACCESS PLATFORMS

The following tables present revenues and key drivers from our Capital Access Platforms segment:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Data & Listing Services	$ 729	$ 680	$ 574	7.2 %	18.5 %
Index	486	459	324	5.9 %	41.7 %
Workflow & Insights	469	429	389	9.3 %	10.3 %
Total Capital Access Platforms	$ 1,684	$ 1,568	$ 1,287	7.4 %	21.8 %

	As of or Three Months Ended December 31,		
	2022	2021	2020
	(in millions)		
ARR	$ 1,192	$ 1,113	$ 986
Quarterly annualized SaaS revenues	$ 388	$ 356	$ 323

Data & Listing Services Revenues

The following tables present key drivers from our Data & Listing Services business:

	Year Ended December 31,		
	2022	2021	2020
IPOs			
The Nasdaq Stock Market	161	752	316
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic	38	174	45
Total new listings			
The Nasdaq Stock Market	366	1,000	454
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic	63	207	67
Number of listed companies			
The Nasdaq Stock Market	4,230	4,178	3,392
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic	1,251	1,235	1,071

In the tables above:

- The Nasdaq Stock Market new listings include IPOs, including issuers that switched from other listing venues and separately listed ETPs. For the years ended December 31, 2022, 2021 and 2020, IPOs included 74, 433 and 132 SPACs, respectively.
- Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic new listings include IPOs and represent companies listed on the Nasdaq Nordic and Nasdaq Baltic exchanges and companies on the alternative markets of Nasdaq First North.
- Number of total listed companies on The Nasdaq Stock Market for the years ended December 31, 2022, 2021 and 2020 included 528, 441 and 412 ETPs, respectively.
- Number of total listed companies on the exchanges that comprise Nasdaq Nordic and Nasdaq Baltic represents companies listed on these exchanges and companies on the alternative markets of Nasdaq First North.

Data & Listing Services revenues increased in 2022 compared with 2021 and 2021 compared with 2020. The increase in 2022 was primarily due to an increase in annual listing fees, due to an increase in the overall number of listed companies, and an increase in proprietary data revenues driven by higher international demand, partially offset by lower initial listings fees and the unfavorable impact of changes in foreign exchange rates of $21 million. The increase in 2021 was primarily due to an increase in annual and initial listing fees due to the increase in the overall number of listed companies and an increase in proprietary data revenues driven by higher international demand.

Index Revenues

The following tables present key drivers from our Index business:

	As of or Three Months Ended December 31,		
	2022	2021	2020
Number of licensed ETPs	379	362	339
TTM change in period end ETP AUM tracking Nasdaq indexes (in billions)			
Beginning balance	$ 424	$ 359	$ 233
Net (depreciation) appreciation	(142)	83	80
Net impact of ETP sponsor switches	(1)	(92)	—
Net inflows	34	74	46
Ending balance	$ 315	$ 424	$ 359
Quarterly average ETP AUM tracking Nasdaq indexes (in billions)	$ 326	$ 400	$ 334
Quarterly annualized SaaS revenues (in millions)	$ 220	$ 208	$ 179

In the table above, TTM represents trailing twelve months.

Index revenues increased in 2022 compared with 2021 and 2021 compared with 2020. The increase in 2022 was primarily due to higher licensing revenues from futures trading linked to the Nasdaq-100 Index, partially offset by lower AUM in ETPs linked to Nasdaq indexes. The increase in 2021 was primarily due to higher licensing revenues from higher average AUM in ETPs linked to Nasdaq indexes and higher licensing revenues from futures trading linked to the Nasdaq-100 Index.

Workflow & Insights Revenues

Workflow & Insights revenues increased in 2022 compared with 2021 and 2021 compared with 2020. The increase in both periods was due to an increase in both analytics and corporate solutions revenues. The increase in analytics revenues for both periods was primarily due to the growth in our eVestment and Solovis products driven by new sales, strong retention, and higher average revenue per client from expanded offerings. The increase in corporate solutions for both periods was due to higher adoption of our investor relations intelligence products as well as new ESG solutions, with ESG solutions being the primary driver of the increase in 2022.

ANTI-FINANCIAL CRIME

The following tables present revenues and key drivers from our Anti-Financial Crime segment:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Anti-Financial Crime	$ 306	$ 231	$ 116	32.5 %	99.1 %

	As of or Three Months Ended December 31,		
	2022	2021	2020
	(in millions)		
ARR	$ 312	$ 269	$ 111
Signed ARR	338	288	—
Quarterly annualized SaaS revenues	298	253	97

In the table above, signed ARR reflects ARR recognized as revenue in the current period as well as ARR for new contracts signed but not yet commenced. We began tracking signed ARR in 2021 following our acquisition of Verafin, and thus there is no available metric for 2020.

Anti-financial crime revenues increased in 2022 compared with 2021 primarily due to an increase in demand for fraud detection and anti-money laundering solutions and strong performance by our surveillance business in new sales to existing clients and new customer acquisitions. The increase was also driven by a $28 million purchase price adjustment on Verafin deferred revenue in 2021 and the inclusion of a full year of Verafin revenues in 2022. The increase in 2021 compared with 2020 was due to the inclusion of revenues from our acquisition of Verafin and growth in our surveillance solutions.

OTHER REVENUES

Other revenues include revenues related to our Nordic broker services business, for which we completed the wind-down in June 2022, as well as revenues associated with our U.S. Fixed Income business, which was sold in June 2021. Prior to the closing of the transaction, these revenues were included in our Market Platforms and Capital Access Platforms segments. See "2021 Divestiture," of Note 4, "Acquisitions and Divestiture," to the consolidated financial statements for further discussion of this divestiture. Additionally, for the years ended December 31, 2021 and 2020, other revenues include revenues associated with the NPM business which we contributed in July 2021 to a standalone, independent company, of which we own the largest minority interest, together with a consortium of third-party financial institutions. Prior to July 2021, these revenues were included in our Capital Access Platforms segment. For the twelve months ended December 31, 2022, other revenues also include a transitional services agreement associated with a divested business.

EXPENSES

Operating Expenses

The following table presents our operating expenses:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Compensation and benefits	$ 1,003	$ 938	$ 786	6.9 %	19.3 %
Professional and contract services	140	144	137	(2.8)%	5.1 %
Computer operations and data communications	207	186	151	11.3 %	23.2 %
Occupancy	104	109	107	(4.6)%	1.9 %
General, administrative and other	125	85	142	47.1 %	(40.1)%
Marketing and advertising	51	57	39	(10.5)%	46.2 %
Depreciation and amortization	258	278	202	(7.2)%	37.6 %
Regulatory	33	64	24	(48.4)%	166.7 %
Merger and strategic initiatives	82	87	33	(5.7)%	163.6 %
Restructuring charges	15	31	48	(51.6)%	(35.4)%
Total operating expenses	$ 2,018	$ 1,979	$ 1,669	2.0 %	18.6 %

The increase in compensation and benefits expense in 2022 compared with 2021 was primarily driven by continued investment in employees to drive growth and inflationary pressures, partially offset by a favorable impact from foreign exchange rates of $42 million.

Headcount, including employees of non-wholly owned consolidated subsidiaries, increased to 6,377 employees as of December 31, 2022 from 5,814 as of December 31, 2021 reflecting growth across each of our three segments.

Professional and contract services expense decreased in 2022 compared with 2021 primarily due to a favorable impact from foreign exchange rates and a decrease in legal fees, partially offset by an increase in consulting costs.

Computer operations and data communications expense increased in 2022 compared with 2021 primarily due to higher software costs and higher costs related to new cloud initiatives.

Occupancy expense decreased in 2022 compared with 2021 primarily due to a favorable impact from foreign exchange rates.

General, administrative and other expense increased in 2022 compared with 2021 primarily due to an accrual related to a legal matter and higher travel costs.

Marketing and advertising expense decreased in 2022 compared with 2021, reflecting lower IPO activity.

Depreciation and amortization expense decreased in 2022 compared with 2021 due to an impairment charge of $14 million in 2021 related to a finite-lived intangible asset for customer relationships associated with the wind down of a previous acquisition and a favorable impact from foreign exchange rates.

Regulatory expense decreased in 2022 compared with 2021 due to a charge in 2021 associated with an administrative fine issued by the SFSA. See "Nasdaq Commodities Clearing Default," of Note 15, "Clearing Operations," to the consolidated financial statements for further discussion of the SFSA administrative fine.

We have pursued various strategic initiatives and completed acquisitions and divestitures in recent years, which have resulted in expenses which would not have otherwise been incurred. These expenses generally include integration costs, as well as legal, due diligence and other third-party transaction costs and vary based on the size and frequency of the activities described above.

See Note 20, "Restructuring Charges," to the consolidated financial statements for further discussion of our 2022 divisional alignment program and 2019 restructuring plans and charges associated with these plans.

Non-operating Income and Expenses

The following table presents our non-operating income and expenses:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Interest income	$ 7	$ 1	$ 4	600.0 %	(75.0)%
Interest expense	(129)	(125)	(101)	3.2 %	23.8 %
Net interest expense	(122)	(124)	(97)	(1.6)%	27.8 %
Net gain on divestiture of business	—	84	—	(100.0)%	N/M
Other income	2	81	5	(97.5)%	1,520.0 %
Net income from unconsolidated investees	31	52	70	(40.4)%	(25.7)%
Total non-operating income (expenses)	$ (89)	$ 93	$ (22)	(195.7)%	(522.7)%

N/M Not meaningful.

The following table presents our interest expense:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Interest expense on debt	$ 120	$ 115	$ 93	4.3 %	23.7 %
Accretion of debt issuance costs and debt discount	7	7	6	— %	16.7 %
Other fees	2	3	2	(33.3)%	50.0 %
Interest expense	$ 129	$ 125	$ 101	3.2 %	23.8 %

Interest income increased in 2022 compared with 2021 primarily due to an increase in interest rates.

Interest expense increased in 2022 compared with 2021 primarily due to an increase in interest rates related to borrowings under our commercial paper program.

The net gain on divestiture of business in 2021 relates to the sale of our U.S. Fixed Income business, which was part of our FICC business within our Market Services segment. We recognized a pre-tax gain on the sale of $84 million, net of disposal costs. See "2021 Divestiture," of Note 4, "Acquisitions and Divestiture," to the consolidated financial statements for further discussion.

Other income decreased in 2022 compared with 2021 primarily due to gains from strategic investments related to our corporate venture program in the prior year.

Net income from unconsolidated investees decreased in 2022 compared with 2021 primarily due to a decrease in income recognized from our equity method investment in OCC. See “Equity Method Investments,” of Note 6, “Investments,” to the consolidated financial statements for further discussion.

Tax Matters

The following table presents our income tax provision and effective tax rate:

	Year Ended December 31,			Percentage Change	
	2022	2021	2020	2022 vs. 2021	2021 vs. 2020
	(in millions)				
Income tax provision	$ 352	$ 347	$ 279	1.4 %	24.4 %
Effective tax rate	23.9 %	22.6 %	23.0 %		

For further discussion of our tax matters, see Note 17, “Income Taxes,” to the consolidated financial statements.

NON-GAAP FINANCIAL MEASURES

In addition to disclosing results determined in accordance with U.S. GAAP, we also provide non-GAAP net income attributable to Nasdaq and non-GAAP diluted earnings per share. Management uses this non-GAAP information internally, along with U.S. GAAP information, in evaluating our performance and in making financial and operational decisions. We believe our presentation of these measures provides investors with greater transparency and supplemental data relating to our financial condition and results of operations. In addition, we believe the presentation of these measures is useful to investors for period-to-period comparisons of our ongoing operating performance.

These measures are not in accordance with, or an alternative to, U.S. GAAP, and may be different from non-GAAP measures used by other companies. In addition, other companies, including companies in our industry, may calculate such measures differently, which reduces their usefulness as comparative measures. Investors should not rely on any single financial measure when evaluating our business. This non-GAAP information should be considered as supplemental in nature and is not meant as a substitute for our operating results in accordance with U.S. GAAP. We recommend investors review the U.S. GAAP financial measures included in this Annual Report on Form 10-K, including our consolidated financial statements and the notes thereto. When viewed in conjunction with our U.S. GAAP results and the accompanying reconciliation, we believe these non-GAAP measures provide greater transparency and a more complete understanding of factors affecting our business than U.S. GAAP measures alone.

We understand that analysts and investors regularly rely on non-GAAP financial measures, such as non-GAAP net income attributable to Nasdaq and non-GAAP diluted earnings per share, to assess operating performance. We use non-GAAP net income attributable to Nasdaq and non-GAAP diluted earnings per share because they highlight trends more clearly in our business that may not otherwise be apparent when relying solely on U.S. GAAP financial measures, since these measures eliminate from our results specific financial items that have less bearing on our ongoing operating performance. We believe that excluding the following items from the non-GAAP net income attributable to Nasdaq provides a more meaningful analysis of Nasdaq’s ongoing operating performance and comparisons in Nasdaq’s performance between periods:

- *Amortization expense of acquired intangible assets:* We amortize intangible assets acquired in connection with various acquisitions. Intangible asset amortization expense can vary from period to period due to episodic acquisitions completed, rather than from our ongoing business operations. As such, if intangible asset amortization is included in performance measures, it is more difficult to assess the day-to-day operating performance of the businesses and the relative operating performance of the businesses between periods.

- *Merger and strategic initiatives expense:* We have pursued various strategic initiatives and completed acquisitions and divestitures in recent years that have resulted in expenses which would not have otherwise been incurred. The frequency and the amount of such expenses vary significantly based on the size, timing and complexity of the transaction. These expenses primarily include integration costs, as well as legal, due diligence and other third-party transaction costs.

- *Restructuring charges:* In 2022, following our September announcement to realign our segments and leadership, we initiated a divisional alignment program with a focus on realizing the full potential of this structure. In 2019, we initiated the transition of certain technology platforms to advance our strategic opportunities as a technology and analytics provider and continue the realignment of certain business areas. See Note 20, “Restructuring Charges,” to the consolidated financial statements for further discussion of our 2022 divisional alignment program as well as our 2019 restructuring plan, which was completed in June 2021.

- *Net income from unconsolidated investee:* Our income on our investment in OCC may vary significantly compared to prior periods due to the changes in OCC's capital management policy. See “Equity Method Investments,” of Note 6, “Investments,” to the consolidated financial statements for further discussion.

- *Other items:* We have excluded certain other charges or gains, including certain tax items, that are the result of other non-comparable events to measure operating performance. For the year ended December 31, 2022, other items include accruals related to a legal matter, included in general, administrative and other expense in our Consolidated Statements of Income and a regulatory matter offset by the release of $5 million in relation to the reduction of the administrative fine issued by the SFSA both recorded in regulatory expense in our Consolidated Statements of Income. For the years ended December 31, 2022 and 2021 other items also include a loss on extinguishment of debt, included in general, administrative and other expense in our Consolidated Statements of Income and net gains and losses from strategic investments entered into through our corporate venture program, included in other income in our Consolidated Statements of Income. For the year ended December 31, 2021, other items included a charge related to an administrative fine imposed by the SFSA. The 2022 and 2021 SFSA charges associated with the default that occurred in 2018, are included in regulatory expense in our Consolidated Statements of Income. See "Nasdaq Commodities Clearing Default," of Note 15, "Clearing Operations," to the consolidated financial statements for further discussion. For the year ended December 31, 2021, other items also included a net gain on divestiture of businesses, which represents our pre-tax net gain of $84 million on the sale of our U.S. Fixed Income business.
- *Significant tax items:* The non-GAAP adjustment to the income tax provision for the years ended December 31, 2022 and 2021 primarily includes the tax impact of each non-GAAP adjustment. In addition, for the year ended December 31, 2021, the non-GAAP adjustment to the income tax provision includes adjustments related to return-to-provision and a prior year tax benefit.

The following tables present reconciliations between U.S. GAAP net income attributable to Nasdaq and diluted earnings per share and non-GAAP net income attributable to Nasdaq and diluted earnings per share:

	Year Ended December 31,		
	2022	2021	2020
	(in millions, except per share amounts)		
U.S. GAAP net income attributable to Nasdaq	$ 1,125	$ 1,187	$ 933
Non-GAAP adjustments:			
Amortization expense of acquired intangible assets	153	170	103
Merger and strategic initiatives expense	82	87	33
Restructuring charges	15	31	48
Net income from unconsolidated investee	(29)	(52)	(70)
Regulatory matters	1	33	(6)
Provision for notes receivable	—	—	6
Extinguishment of debt	16	33	36
Net gain on divestiture of business	—	(84)	—
Charitable donations	—	—	17
Other	27	(71)	14
Total non-GAAP adjustments	265	147	181
Total non-GAAP tax adjustments	(66)	(61)	(83)
Total non-GAAP adjustments, net of tax	199	86	98
Non-GAAP net income attributable to Nasdaq	$ 1,324	$ 1,273	$ 1,031
U.S. GAAP effective tax rate	23.9 %	22.6 %	23.0 %
Total adjustments from non-GAAP tax rate	0.1 %	1.7 %	3.0 %
Non-GAAP effective tax rate	24.0 %	24.3 %	26.0 %
Weighted-average common shares outstanding for diluted earnings per share	497.9	505.1	500.7
U.S. GAAP diluted earnings per share	$ 2.26	$ 2.35	$ 1.86
Total adjustments from non-GAAP net income	0.40	0.17	0.20
Non-GAAP diluted earnings per share	$ 2.66	$ 2.52	$ 2.06

LIQUIDITY AND CAPITAL RESOURCES

Historically, we have funded our operating activities and met our commitments through cash generated by operations, augmented by the periodic issuance of debt. Currently, our cost and availability of funding remain healthy. We continue to prudently assess our capital deployment strategy through balancing acquisitions, internal investments, debt repayments, and shareholder return activity, including share repurchases and dividends.

In the near term, we expect that our operations and the availability under our revolving credit facility and commercial paper program will provide sufficient cash to fund our operating expenses, capital expenditures, debt repayments, any share repurchases and any dividends.

The value of various assets and liabilities, including cash and cash equivalents, receivables, accounts payable and accrued expenses, the current portion of long-term debt, and commercial paper, can fluctuate from month to month. Working capital (calculated as current assets less current liabilities) was $(231) million as of December 31, 2022, compared with $(449) million as of December 31, 2021, an increase of $218 million. The increase was primarily driven by a decrease in short-term debt and increases in cash and cash equivalents and receivables, net, partially offset by increases in Section 31 fees payable to the SEC and deferred revenue and decreases in other current assets and financial investments.

Principal factors that could affect the availability of our internally-generated funds include:

- deterioration of our revenues in any of our business segments;
- changes in regulatory and working capital requirements; and
- an increase in our expenses.

Principal factors that could affect our ability to obtain cash from external sources include:

- operating covenants contained in our credit facilities that limit our total borrowing capacity;
- credit rating downgrades, which could limit our access to additional debt;
- a significant decrease in the market price of our common stock; and
- volatility or disruption in the public debt and equity markets.

The following table summarizes our financial assets:

	December 31, 2022	December 31, 2021
	(in millions)	
Cash and cash equivalents	$ 502	$ 393
Financial investments	181	208
Total financial assets	$ 683	$ 601

Cash and Cash Equivalents

Cash and cash equivalents includes all non-restricted cash in banks and highly liquid investments with original maturities of 90 days or less at the time of purchase. The balance retained in cash and cash equivalents is a function of anticipated or possible short-term cash needs, prevailing interest rates, our investment policy, and alternative investment choices. As of December 31, 2022, our cash and cash equivalents of $502 million were primarily invested in bank deposits, money market funds and commercial paper. In the long-term, we may use both internally generated funds and external sources to satisfy our debt obligations and other long-term liabilities. Cash and cash equivalents as of December 31, 2022 increased $109 million from December 31, 2021.

Repatriation of Cash

Our cash and cash equivalents held outside of the U.S. in various foreign subsidiaries totaled $275 million as of December 31, 2022 and $266 million as of December 31, 2021. The remaining balance held in the U.S. totaled $227 million as of December 31, 2022 and $127 million as of December 31, 2021.

Unremitted earnings of certain subsidiaries outside of the U.S. are used to finance our international operations and are considered to be indefinitely reinvested.

Cash Flow Analysis

The following table summarizes the changes in cash flows:

	Year Ended December 31,		
	2022	2021	2020
Net cash provided by (used in):	(in millions)		
Operating activities	$ 1,706	$ 1,083	$ 1,252
Investing activities	49	(2,653)	(122)
Financing activities	1,036	1,418	1,910
Effect of exchange rate changes on cash and cash equivalents and restricted cash and cash equivalents	(1,293)	(331)	353
Net increase (decrease) in cash and cash equivalents and restricted cash and cash equivalents	1,498	(483)	3,393
Cash and cash equivalents, restricted cash and cash equivalents at beginning of period	5,496	5,979	2,586
Cash and cash equivalents, restricted cash and cash equivalents at end of period	$ 6,994	$ 5,496	$ 5,979
Reconciliation of Cash, Cash Equivalents and Restricted Cash and Cash Equivalents			
Cash and cash equivalents	$ 502	$ 393	$ 2,745
Restricted cash and cash equivalents	22	29	37
Restricted cash and cash equivalents (default funds and margin deposits)	6,470	5,074	3,197
Total	$ 6,994	$ 5,496	$ 5,979

We have adjusted the presentation of the 2020 opening and ending amounts of cash, cash equivalents, and restricted cash and cash equivalents in our consolidated statements of cash flows to include restricted cash and cash equivalents related to the default funds and margin deposits. See Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements for further discussion of this adjustment.

Net Cash Provided by Operating Activities

Net cash provided by operating activities primarily consists of net income adjusted for certain non-cash items such as: depreciation and amortization expense of property and equipment; amortization expense of acquired finite-lived intangible assets; expense associated with share-based compensation; deferred income taxes; expense associated with extinguishment of debt; net gain on divestiture of business; and net income from unconsolidated investees.

Net cash provided by operating activities is also impacted by the effects of changes in operating assets and liabilities such as: accounts receivable and deferred revenue which are impacted by the timing of customer billings and related collections from our customers; accounts payable and accrued expenses due to timing of payments; accrued personnel costs, which are impacted by employee performance targets and the timing of payments related to employee bonus incentives; and Section 31 fees payable to the SEC, which is impacted by the changes in SEC fee rates and the timing of collections from customers and payments to the SEC.

Net cash provided by operating activities increased $623 million for the year ended December 31, 2022 compared with the same period in 2021. The increase was primarily driven by Section 31 fees payable to the SEC due to higher SEC fee rates in 2022 and cash payments made in the second quarter of 2021 related to the acquisition of Verafin, including a tax obligation paid on behalf of Verafin of $221 million and a cash payment of $102 million, the release of which was subject to certain employment-related conditions following the closing of the acquisition of Verafin. During the fourth quarter of 2022, the remaining amount of the $102 million was accelerated and paid to the eligible former Verafin employees. The remaining change was primarily due to other fluctuations in our working capital.

Net Cash Provided by (Used in) Investing Activities

Net cash provided by investing activities for the year ended December 31, 2022 primarily related to net proceeds from sales and redemptions of investments related to default funds and margin deposits of $211 million and proceeds of $33 million from other investing activities, partially offset by purchases of property and equipment of $152 million and $41 million cash used for acquisitions, net of cash and cash equivalents acquired.

Net cash used in investing activities for the year ended December 31, 2021 primarily related to $2,430 million of cash used for acquisitions, net of cash and cash equivalents acquired, primarily $221 million of cash acquired that was utilized to satisfy an acquisition-related tax obligation on behalf of Verafin, $163 million of purchases of property and equipment, net purchases of investments related to default funds and margin deposits of $132 million, other investing activities of $87 million, and $31 million of net purchases of securities, partially offset by proceeds from the divestiture of a business, net of cash divested of $190 million.

Net Cash Provided by Financing Activities

Net cash provided by financing activities for the year ended December 31, 2022 primarily related to an increase in default funds and margin deposits of $2,440 million, proceeds of $541 million from the issuance of long-term-debt and proceeds of $238 million from the issuances of our commercial paper, net, partially offset by $1,097 million related to the repayment of our 2022 and 2024 Notes, $383 million of dividend payments to our shareholders, $325 million of repurchases of common stock pursuant to the ASR agreement and $308 million in other repurchases of common stock.

Net cash provided by financing activities for the year ended December 31, 2021 primarily related to an increase in default funds and margin deposits of $2,330 million, proceeds of $826 million from the issuances of long-term-debt and utilization of credit commitment and $420 million of proceeds from issuances of commercial paper, net, partially offset by repayment of borrowings under our credit commitment and debt obligations of $804 million, $475 million of repurchases pursuant to the ASR agreement, $468 million in other repurchases of common stock, $350 million of dividend payments to our shareholders and a $33 million payment for debt extinguishment costs.

See Note 4, "Acquisitions and Divestiture," to the consolidated financial statements for further discussion of our acquisitions and divestiture.

See Note 9, "Debt Obligations," to the consolidated financial statements for further discussion of our debt obligations.

See "ASR Agreement," "Share Repurchase Program," and "Cash Dividends on Common Stock," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our ASR agreement, share repurchase program and cash dividends paid on our common stock.

Financial Investments

Our financial investments totaled $181 million as of December 31, 2022 and $208 million as of December 31, 2021. Of these securities, $161 million as of December 31, 2022 and $162 million December 31, 2021, are assets primarily utilized to meet regulatory capital requirements, mainly for our clearing operations at Nasdaq Clearing. See Note 6, "Investments," to the consolidated financial statements for further discussion.

Regulatory Capital Requirements

Clearing Operations Regulatory Capital Requirements

We are required to maintain minimum levels of regulatory capital for the clearing operations of Nasdaq Clearing. The level of regulatory capital required to be maintained is dependent upon many factors, including market conditions and creditworthiness of the counterparty. As of December 31, 2022, our required regulatory capital of $125 million was comprised of highly rated European government debt securities that are included in financial investments in the Consolidated Balance Sheets.

Broker-Dealer Net Capital Requirements

Our broker-dealer subsidiaries, Nasdaq Execution Services, NFSTX, LLC, and Nasdaq Capital Markets Advisory, are subject to regulatory requirements intended to ensure their general financial soundness and liquidity. These requirements obligate these subsidiaries to comply with minimum net capital requirements. As of December 31, 2022, the combined required minimum net capital totaled $1 million and the combined excess capital totaled $18 million, substantially all of which is held in cash and cash equivalents in the Consolidated Balance Sheets. The required minimum net capital is included in restricted cash and cash equivalents in the Consolidated Balance Sheets.

Nordic and Baltic Exchange Regulatory Capital Requirements

The entities that operate trading venues in the Nordic and Baltic countries are each subject to local regulations and are required to maintain regulatory capital intended to ensure their general financial soundness and liquidity. As of December 31, 2022, our required regulatory capital of $34 million was primarily invested in European mortgage bonds and Icelandic government bonds that are included in financial investments in the Consolidated Balance Sheets and cash, which is included in restricted cash and cash equivalents in the Consolidated Balance Sheets.

Other Capital Requirements

We operate several other businesses, which are subject to local regulation and are required to maintain certain levels of regulatory capital. As of December 31, 2022, other required regulatory capital of $10 million, primarily related to Nasdaq Central Securities Depository, was primarily invested in European government debt securities that are included in financial investments in the Consolidated Balance Sheets and cash, which is included in restricted cash and cash equivalents in the Consolidated Balance Sheets.

Equity and dividends

Stock Split Effected in the Form of a Stock Dividend

On August 26, 2022, we effected a 3-for-1 stock split of the Company's common stock in the form of a stock dividend to shareholders of record as of August 12, 2022. The par value per share of our common stock remains $0.01 per share. All references made with respect to a number of shares or per share amounts throughout this Annual Report on Form 10-K have been retroactively adjusted to reflect the stock split.

Share Repurchase Program

See "Share Repurchase Program," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our share repurchase program.

ASR Agreement

See "ASR Agreement," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our ASR agreement.

Cash Dividends on Common Stock

The following table presents our quarterly cash dividends paid per common share on our outstanding common stock:

	2022	2021
First quarter	$ 0.18	$ 0.16
Second quarter	0.20	0.18
Third quarter	0.20	0.18
Fourth quarter	0.20	0.18
Total	$ 0.78	$ 0.70

See "Cash Dividends on Common Stock," of Note 12, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of the dividends.

Debt Obligations

The following table summarizes our debt obligations by contractual maturity:

	Maturity Date	December 31, 2022	December 31, 2021
		(in millions)	
Short-term debt:			
Commercial paper		$ 664	$ 420
2022 Notes	December 2022	—	598
2024 Notes	June 2024	—	499
Total short-term debt		$ 664	$ 1,517
Long-term debt - senior unsecured notes:			
2022 Credit Facility	December 2027	(5)	(4)
2026 Notes	June 2026	498	498
2029 Notes	March 2029	637	676
2030 Notes	February 2030	637	676
2031 Notes	January 2031	644	643
2033 Notes	July 2033	653	694
2040 Notes	December 2040	644	644
2050 Notes	April 2050	486	486
2052 Notes	March 2052	541	—
Total long-term debt		$ 4,735	$ 4,313
Total debt obligations		$ 5,399	$ 5,830

In the table above, the 2024 Notes were reclassified to short-term debt as of March 31, 2022, and were repaid in April 2022.

In December 2022, Nasdaq amended and restated the 2020 Credit Facility with a new maturity date of December 16, 2027. In addition to the 2022 Credit Facility, we also have other credit facilities primarily to support our Nasdaq Clearing operations in Europe, as well as to provide a cash pool credit line for one subsidiary. These credit facilities, which are available in multiple currencies, totaled $184 million as of December 31, 2022 and $212 million as of December 31, 2021 in available liquidity, none of which was utilized.

As of December 31, 2022, we were in compliance with the covenants of all of our debt obligations.

See Note 9, "Debt Obligations," to the consolidated financial statements for further discussion of our debt obligations.

Contractual Obligations and Contingent Commitments

Nasdaq has contractual obligations to make future payments under debt obligations by contract maturity, operating lease payments, and other obligations. The following table summarizes material cash requirements for known contractual and other obligations as of December 31, 2022, and the estimated timing thereof.

	Payments Due by Period				
(in millions)	Total	<1 year	1-3 years	3-5 years	5+ years
Debt obligation by contractual maturity	$ 7,188	$ 765	$ 224	$ 685	$ 5,514
Operating lease obligations	665	77	142	110	336
Purchase obligations	453	86	104	91	172
Total	$ 8,306	$ 928	$ 470	$ 886	$ 6,022

In the table above:

- Debt obligations by contractual maturity include both principal and interest obligations. As of December 31, 2022, an interest rate of 4.4% was used to compute the amount of the contractual obligations for interest on the 2022 Credit Facility. All other debt obligations were primarily calculated on a 365-day basis at the contractual fixed rate multiplied by the aggregate principal amount as of December 31, 2022. See Note 9, "Debt Obligations," to the consolidated financial statements for further discussion.
- Operating lease obligations represent our undiscounted operating lease liabilities as of December 31, 2022, as well as legally binding minimum lease payments for leases signed but not yet commenced. See Note 16, "Leases," to the consolidated financial statements for further discussion of our leases.
- Purchase obligations primarily represent minimum outstanding obligations due under software license agreements. The balance as of December 31, 2022 is primarily comprised of our multi-year AWS partnership contract, which replaces our previous shorter term contracts, including those with no minimum spend commitment, and is not expected to increase our overall spend footprint with AWS over the life of the contract, based on projected growth and expansion of our existing AWS-based solutions.

Off-Balance Sheet Arrangements

For discussion of off-balance sheet arrangements see:

- Note 15, "Clearing Operations," to the consolidated financial statements for further discussion of our non-cash default fund contributions and margin deposits received for clearing operations; and
- Note 18, "Commitments, Contingencies and Guarantees," to the consolidated financial statements for further discussion of:
  - Guarantees issued and credit facilities available;
  - Other guarantees;
  - Routing brokerage activities;
  - Legal and regulatory matters; and
  - Tax audits.

Quantitative and Qualitative Disclosures About Market Risk

As a result of our operating, investing and financing activities, we are exposed to market risks such as interest rate risk and foreign currency exchange rate risk. We are also exposed to credit risk as a result of our normal business activities.

We have implemented policies and procedures to measure, manage, monitor and report risk exposures, which are reviewed regularly by management and the board of directors. We identify risk exposures and monitor and manage such risks on a daily basis.

We perform sensitivity analyses to determine the effects of market risk exposures. We may use derivative instruments solely to hedge financial risks related to our financial positions or risks that are incurred during the normal course of business. We do not use derivative instruments for speculative purposes.

Interest Rate Risk

We are subject to the risk of fluctuating interest rates in the normal course of business. Our exposure to market risk for changes in interest rates relates primarily to our financial investments and debt obligations, which are discussed below.

Financial Investments

As of December 31, 2022, our investment portfolio was primarily comprised of highly rated European government debt securities, which pay a fixed rate of interest. These securities are subject to interest rate risk and the fair value of these securities will decrease if market interest rates increase. If market interest rates were to increase immediately and uniformly by a hypothetical 100 basis points from levels as of December 31, 2022, the fair value of this portfolio would decline by $3 million.

Debt Obligations

As of December 31, 2022, the majority of our debt obligations were fixed-rate obligations. Interest rates on certain tranches of notes are subject to adjustment to the extent our debt rating is downgraded below investment grade, as further discussed in Note 9, “Debt Obligations,” to the consolidated financial statements. While changes in interest rates will have no impact on the interest we pay on fixed-rate obligations, we are exposed to changes in interest rates as a result of the borrowings under our 2022 Credit Facility, as this facility has a variable interest rate. We are also exposed to changes in interest rates as a result of the amounts outstanding from the sale of commercial paper under our commercial paper program, which have variable interest rates. As of December 31, 2022, we had principal amounts outstanding of $664 million of commercial paper and no amounts outstanding under our 2022 Credit Facility. A hypothetical 100 basis points increase in interest rates on our outstanding commercial paper would increase our annual interest expense by approximately $7 million based on borrowings as of December 31, 2022.

We may utilize interest rate swap agreements to achieve a desired mix of variable and fixed rate debt.

Foreign Currency Exchange Rate Risk

We are subject to foreign currency exchange rate risk. Our primary transactional exposure to foreign currency denominated revenues less transaction-based expenses and operating income for the years ended December 31, 2022 and 2021 are presented in the following tables:

	Euro	Swedish Krona	Other Foreign Currencies	U.S. Dollar	Total
	(in millions, except currency rate)				
Year Ended December 31, 2022					
Average foreign currency rate to the U.S. dollar	1.054	0.099	#	N/A	N/A
Percentage of revenues less transaction-based expenses	6.2 %	5.1 %	4.1 %	84.6 %	100.0 %
Percentage of operating income	10.1 %	(2.8)%	(10.6)%	103.3 %	100.0 %
Impact of a 10% adverse currency fluctuation on revenues less transaction-based expenses	$ (22)	$ (18)	$ (15)	$ —	$ (55)
Impact of a 10% adverse currency fluctuation on operating income	$ (16)	$ (4)	$ (17)	$ —	$ (37)

	Euro	Swedish Krona	Other Foreign Currencies	U.S. Dollar	Total
	(in millions, except currency rate)				
Year Ended December 31, 2021					
Average foreign currency rate to the U.S. dollar	1.183	0.117	#	N/A	N/A
Percentage of revenues less transaction-based expenses	7.1 %	6.2 %	4.9 %	81.8 %	100.0 %
Percentage of operating income	10.4 %	(4.6)%	(9.1)%	103.3 %	100.0 %
Impact of a 10% adverse currency fluctuation on revenues less transaction-based expenses	$ (24)	$ (21)	$ (17)	$ —	$ (62)
Impact of a 10% adverse currency fluctuation on operating income	$ (15)	$ (7)	$ (13)	$ —	$ (35)

\# Represents multiple foreign currency rates.
N/A Not applicable.

Our investments in foreign subsidiaries are exposed to volatility in currency exchange rates through translation of the foreign subsidiaries' net assets or equity to U.S. dollars. Substantially all of our foreign subsidiaries operate in functional currencies other than the U.S. dollar. The financial statements of these subsidiaries are translated into U.S. dollars for consolidated reporting using a current rate of exchange, with net gains or losses recorded in accumulated other comprehensive loss within stockholders' equity in the Consolidated Balance Sheets.

Our primary exposure to net assets in foreign currencies as of December 31, 2022 is presented in the following table:

	Net Assets	Impact of a 10% Adverse Currency Fluctuation
	(in millions)	
Swedish Krona	$ 2,941	$ 294
British Pound	155	15
Norwegian Krone	150	15
Canadian Dollar	107	11
Australian Dollar	99	10
Euro	53	5

In the table above, Swedish Krona includes goodwill of $2,153 million and intangible assets, net of $495 million.

Credit Risk

Credit risk is the potential loss due to the default or deterioration in credit quality of customers or counterparties. We are exposed to credit risk from third parties, including customers, counterparties and clearing agents. These parties may default on their obligations to us due to bankruptcy, lack of liquidity, operational failure or other reasons. We limit our exposure to credit risk by evaluating the counterparties with which we make investments and execute agreements. For our investment portfolio, our objective is to invest in securities to preserve principal while maximizing yields, without significantly increasing risk. Credit risk associated with investments is minimized substantially by ensuring that these financial assets are placed with governments which have investment grade ratings, well-capitalized financial institutions and other creditworthy counterparties.

Our subsidiary, Nasdaq Execution Services, may be exposed to credit risk due to the default of trading counterparties in connection with the routing services it provides for our trading customers. System trades in cash equities routed to other market centers for members of our cash equity exchanges are routed by Nasdaq Execution Services for clearing to the NSCC. In this function, Nasdaq Execution Services is to be neutral by the end of the trading day, but may be exposed to intraday risk if a trade extends beyond the trading day and into the next day, thereby leaving Nasdaq Execution Services susceptible to counterparty risk in the period between accepting the trade and routing it to the clearinghouse. In this interim period, Nasdaq Execution Services is not novating like a clearing broker but instead is subject to the short-term risk of counterparty failure before the clearinghouse enters the transaction. Once the clearinghouse officially accepts the trade for novation, Nasdaq Execution Services is legally removed from trade execution risk. However, Nasdaq has membership obligations to NSCC independent of Nasdaq Execution Services' arrangements.

Pursuant to the rules of the NSCC and Nasdaq Execution Services' clearing agreement, Nasdaq Execution Services is liable for any losses incurred due to a counterparty or a clearing agent's failure to satisfy its contractual obligations, either by making payment or delivering securities. Adverse movements in the prices of securities that are subject to these transactions can increase our credit risk. However, we believe that the risk of material loss is limited, as Nasdaq Execution Services' customers are not permitted to trade on margin and NSCC rules limit counterparty risk on self-cleared transactions by establishing credit limits and capital deposit requirements for all brokers that clear with NSCC. Historically, Nasdaq Execution Services has never incurred a liability due to a customer's failure to satisfy its contractual obligations as counterparty to a system trade. Credit difficulties or insolvency, or the perceived possibility of credit difficulties or insolvency, of one or more larger or visible market participants could also result in market-wide credit difficulties or other market disruptions.

We have credit risk related to transaction and subscription-based revenues that are billed to customers on a monthly or quarterly basis, in arrears. Our potential exposure to credit losses on these transactions is represented by the receivable balances in our Consolidated Balance Sheets. We review and evaluate changes in the status of our counterparties' creditworthiness. Credit losses such as those described above could adversely affect our consolidated financial position and results of operations.

We also are exposed to credit risk through our clearing operations with Nasdaq Clearing. See Note 15, "Clearing Operations," to the consolidated financial statements for further discussion. Our clearinghouse holds material amounts of clearing member cash deposits, which are held or invested primarily to provide security of capital while minimizing credit, market and liquidity risks. While we seek to achieve a reasonable rate of return, we are primarily concerned with preservation of capital and managing the risks associated with these deposits. As the clearinghouse may pass on interest revenues (minus costs) to the members, this could include negative or reduced yield due to market conditions. The following is a summary of the risks associated with these deposits and how these risks are mitigated.

- *Credit Risk.* When the clearinghouse has the ability to hold cash collateral at a central bank, the clearinghouse utilizes its access to the central bank system to minimize credit risk exposures. When funds are not held at a central bank, we seek to substantially mitigate credit risk by ensuring that investments are primarily placed in large, highly rated financial institutions, highly rated government debt instruments and other creditworthy counterparties.

- *Liquidity Risk.* Liquidity risk is the risk a clearinghouse may not be able to meet its payment obligations in the right currency, in the right place and the right time. To mitigate this risk, the clearinghouse monitors liquidity requirements closely and maintains funds and assets in a manner which minimizes the risk of loss or delay in the access by the clearinghouse to such funds and assets. For example, holding funds with a central bank where possible or investing in highly liquid government debt instruments serves to reduce liquidity risks.
- *Interest Rate Risk.* Interest rate risk is the risk that interest rates rise causing the value of purchased securities to decline. If we were required to sell securities prior to maturity, and interest rates had risen, the sale of the securities might be made at a loss relative to the latest market price. Our clearinghouse seeks to manage this risk by making short term investments of members' cash deposits. In addition, the clearinghouse investment guidelines allow for direct purchases or repurchase agreements with short dated maturities of high quality sovereign debt (for example, European government and U.S. Treasury securities), central bank certificates and multilateral development bank debt instruments.
- *Security Issuer Risk.* Security issuer risk is the risk that an issuer of a security defaults on its payment when the security matures. This risk is mitigated by limiting allowable investments and collateral under reverse repurchase agreements to high quality sovereign, government agency or multilateral development bank debt instruments.

Critical Accounting Policies and Estimates

The preparation of financial statements and related disclosures in conformity with U.S. GAAP requires management to make judgments, assumptions, and estimates that affect the amounts reported in the consolidated financial statements and accompanying notes. Note 2, “Summary of Significant Accounting Policies,” to the consolidated financial statements describes the significant accounting policies and methods used in the preparation of the consolidated financial statements. The accounting policies described below are significantly affected by critical accounting estimates. Such accounting policies require significant judgments, assumptions, and estimates used in the preparation of the consolidated financial statements, and actual results could differ materially from the amounts reported based on these policies.

Revenue Recognition

<u>Market technology revenues</u>

As part of our market technology product offering, within our Marketplace Technology business, we enter into certain long-term contracts with customers to develop customized technology solutions, license the right to use software and provide support and other services to our customers which results in these contracts containing multiple performance obligations. We allocate the contract transaction price to each performance obligation using our best estimate of the standalone selling price of each distinct good or service in the contract. In instances where standalone selling price is not directly observable, such as when we do not sell the product or service separately, we determine the standalone selling price predominantly through an expected cost plus a margin approach.

We generally recognize revenue over time as our customers simultaneously receive and consume the benefits provided by our performance because our customer controls the asset for which we are creating, our performance does not create an asset with alternative use, and we have a right to payment for performance completed to date. For these services, we recognize revenue over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying our performance obligation. Incurred costs represent work performed, which corresponds with, and thereby depicts, the transfer of control to the customer.

Accounting for our long-term contracts requires judgment relative to assessing risks and their impact on the estimate of revenues and costs. Our estimates are impacted by factors such as the potential for schedule and technical issues, productivity and the complexity of work performed. Revenue and cost estimates for our long-term contracts are reviewed and reassessed at least quarterly. When adjustments in estimated total contract costs are required, any changes in the estimated revenues from prior estimates are recognized in the current period for the effect of such change. If estimates of total costs to be incurred on a contract exceed estimates of total revenues, a provision for the entire estimated loss on the contract is recorded in the period in which the loss is determined.

Due to the significance of judgment in the estimation process, as discussed above, changes in assumptions and estimates may adversely or positively affect financial performance in future periods.

For further discussion related to recognition of these revenues, see “Revenue From Contracts with Customers - Revenue Recognition - Marketplace Technology,” of Note 2, “Summary of Significant Accounting Policies,” to the consolidated financial statements.

Goodwill, Indefinite-Lived Intangible Assets and Related Impairment Testing

Assets acquired and liabilities assumed in connection with our acquisitions are recorded at their estimated fair values. Goodwill represents the excess of purchase price over the value assigned to the net assets, including identifiable intangible assets, of a business acquired. Goodwill is allocated to our reporting units based on the assignment of the fair values of each reporting unit of the acquired company. We recognize specifically identifiable intangibles, such as customer relationships, technology, exchange and clearing registrations, trade names and licenses when a specific right or contract is acquired. Goodwill and intangible assets deemed to have indefinite useful lives, primarily exchange and clearing registrations, are not amortized but instead are tested for impairment at least annually as of October 1 and more frequently whenever events or changes in circumstances indicate that the fair value of the asset may be less than its carrying amount, such as changes in the business climate, poor indicators of operating performance or the sale or disposition of a significant portion of a reporting unit.

In September 2022, we announced a new organizational structure which aligns our businesses more closely with the foundational shifts that are driving the evolution of the global financial system. Our four previous reportable segments, Market Services, Corporate Platforms, Investment Intelligence and Market Technology have been changed to align with our new corporate structure that includes three segments: Market Platforms, Capital Access Platforms and Anti-Financial Crime. Under ASC 350-20, "Intangibles Goodwill and Other," when a company reorganizes its reporting structure, an impairment test must be performed both before and after the change, and goodwill must be reassigned to reporting units. Accordingly, goodwill was reassigned based on relative fair value of each reporting unit.

We perform our goodwill impairment test at the reporting unit level. For 2022, we performed the goodwill impairment test under our previous organizational structure: Market Services segment, the two businesses comprising the Corporate Platforms segment: Listing Services and Corporate Solutions, the Investment Intelligence segment, and the Market Technology segment, which represented our five reporting units. We also performed the test under our current organization structure, which includes three reporting units: Market Platforms segment, Capital Access Platforms segment and Anti-Financial Crime segment.

When testing goodwill and indefinite-lived intangible assets for impairment, we have the option of first performing a qualitative assessment to determine whether it is more likely than not that the fair value of a reporting unit or indefinite-lived intangible asset is less than their respective carrying amounts as the basis to determine if it is necessary to perform a quantitative impairment test. If we choose not to complete a qualitative assessment, or if the initial assessment indicates that it is more likely than not that the carrying amount of a reporting unit or the carrying amount of an indefinite-lived intangible asset exceeds their respective estimated fair values, a quantitative test is required. Our decision to perform a qualitative impairment assessment in a given year is influenced by a number of factors, including but not limited to, the size of the reporting unit's goodwill, the significance of the excess of the reporting unit's estimated fair value or the indefinite-lived intangible asset's fair value over their respective carrying amounts at the last quantitative assessment date, and the amount of time in between quantitative fair value assessments.

In performing a quantitative impairment test, we compare the fair value of each reporting unit and indefinite-lived intangible asset with their respective carrying amounts. The fair value of each reporting unit is estimated using a combination of a discounted cash flow valuation, which incorporates assumptions regarding future growth rates, terminal values, and discount rates, as well as guideline public company valuations, which incorporates relevant trading multiples of comparable companies and other factors. The estimates and assumptions used consider historical performance and are consistent with the assumptions used in determining future profit plans for each reporting unit, which are approved by our board of directors. The fair value of indefinite-lived intangible assets is primarily determined on the basis of estimated discounted value, using the Greenfield Approach for exchange and clearing registrations and licenses, and the relief from royalty approach or excess earnings approach for trade names, both of which incorporate assumptions regarding future revenue projections and discount rates. If the carrying amounts of the reporting unit or the indefinite-lived intangible asset exceed their respective fair values, an impairment charge is recognized in an amount equal to the difference, limited to the total amount of goodwill allocated to that reporting unit or the total carrying value of the indefinite-lived intangible asset.

The following table presents the balances of goodwill for our reportable segments pre-segment realignment at the time of our 2022 annual impairment test:

	October 1, 2022 (in millions)
Market Technology	$ 2,122
Investment Intelligence	2,256
Corporate Platforms	471
Market Services	3,097
	$ 7,946

The following table presents the balances of goodwill for our reportable segments post segment realignment at the time of our 2022 annual impairment test. The carrying value of goodwill was reassigned to our new reportable segments based on a relative fair value allocation approach.

	October 1, 2022 (in millions)
Market Platforms	$ 2,819
Capital Access Platforms	4,122
Anti-Financial Crime	1,005
	$ 7,946

In 2022 and 2021, we elected to perform a quantitative impairment test for goodwill and indefinite-lived intangible assets. In conducting the quantitative assessment, we determined that the fair value of our goodwill for each of our reporting units and the fair value of our indefinite-lived intangible assets sufficiently exceed their respective carrying amounts. As a result, there were no goodwill or indefinite-lived intangible assets impairment charges recorded in any of those years.

Although we believe our estimates of fair value are reasonable, the determination of certain valuation inputs is subject to management's judgment. Changes in these inputs could materially affect the results of our impairment review. If our forecasts of cash flows or other key inputs are negatively revised in the future, the estimated fair value of each reporting unit and of our indefinite-lived intangible assets would be adversely impacted, potentially leading to an impairment in the future that could materially affect our operating results.

Subsequent to our annual impairment test, no indications of impairment were identified.

Other Long-Lived Assets and Related Impairment

We review our other long-lived assets, such as finite-lived intangible assets, property and equipment, and operating lease assets for potential impairment when there is evidence that events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. The carrying amount of an asset is not recoverable if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset. Fair value of finite-lived intangible assets and property and equipment is based on various valuation techniques. Any required impairment loss is measured as the amount by which the carrying amount of the asset exceeds its fair value and is recorded as a reduction in the carrying amount of the related asset and a charge to operating results.

There were no material finite-lived intangible assets impairment charges in 2022 and 2020. We recorded an impairment charge of $14 million in 2021 related to a finite-lived intangible asset for customer relationships associated with the wind down of a previous acquisition included in depreciation and amortization expense in the Consolidated Statements of Income.

We recorded pre-tax, non-cash property and equipment asset impairment charges of $8 million in 2022, $4 million in 2021 and $14 million in 2020. The asset impairment charges in 2022 and 2020 primarily related to capitalized software that was retired and are included in restructuring charges in the Consolidated Statements of Income. See Note 20, "Restructuring Charges," to the consolidated financial statements for a discussion of these plans.

No material impairments were recorded to reduce the carrying value of our other long-lived assets during 2022, 2021 or 2020.

Income Taxes

Estimates and judgments are required in the calculation of certain tax liabilities and in the determination of the recoverability of certain deferred tax assets, which arise from net operating loss carryforwards, tax credit carryforwards and temporary differences between the tax and financial statement recognition of revenues and expenses. Our deferred tax assets are reduced by a valuation allowance if it is more likely than not that some portion or all of the recorded deferred tax assets will not be realized in future periods. Management is required to determine whether a tax position is more likely than not to be sustained upon examination, including resolution of any related appeals or litigation processes, based on the technical merits of the position. Once it is determined that a position meets the recognition thresholds, the position is measured to determine the amount of benefit to be recognized in the consolidated financial statements.

In assessing the need for a valuation allowance, we consider all available evidence including past operating results, the existence of cumulative losses in the most recent fiscal years, estimates of future taxable income and the feasibility of tax planning strategies. In the event that we change our determination as to the amount of deferred tax assets that can be realized, we will adjust our valuation allowance with a corresponding impact to the provision for income taxes in the period in which such determination is made.

In addition, the calculation of our tax liabilities involves uncertainties in the application of tax regulations in the U.S. and other tax jurisdictions. We recognize potential liabilities for anticipated tax audit issues in such jurisdictions based on our estimate of whether, and the extent to which, additional taxes and interest may be due. While we believe that our tax liabilities reflect the probable outcome of identified tax uncertainties, it is reasonably possible that the ultimate resolution of any tax matter may be greater or less than the amount accrued. If events occur and the payment of these amounts ultimately proves unnecessary, the reversal of the liabilities would result in tax benefits being recognized in the period when we determine the liabilities are no longer necessary. If our estimate of tax liabilities proves to be less than the ultimate assessment, a further charge to expense would result.

Recent Accounting Pronouncements Not Yet Adopted

We have considered all recent accounting pronouncements and have concluded that no accounting pronouncements that have not yet been adopted would have a material impact on our financial position or results of operations.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Information about quantitative and qualitative disclosures about market risk is incorporated herein by reference from "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations - Quantitative and Qualitative Disclosures About Market Risk."

Item 8. Financial Statements and Supplementary Data

Nasdaq's consolidated financial statements, including Consolidated Balance Sheets as of December 31, 2022 and 2021, Consolidated Statements of Income for the years ended December 31, 2022, 2021 and 2020, Consolidated Statements of Comprehensive Income for the years ended December 31, 2022, 2021 and 2020, Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2022, 2021 and 2020, Consolidated Statements of Cash Flows for the years ended December 31, 2022, 2021 and 2020 and notes to our consolidated financial statements, together with a report thereon of Ernst & Young LLP, dated February 23, 2023, are attached hereto as pages F-1 through F-44 and incorporated by reference herein.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Disclosure controls and procedures. Nasdaq's management, with the participation of Nasdaq's Chief Executive Officer, and Executive Vice President and Chief Financial Officer, has evaluated the effectiveness of Nasdaq's disclosure controls and procedures (as defined in Rule 13a-15(e) and Rule 15d-15(e) under the Exchange Act) as of the end of the period covered by this report. Based upon that evaluation, Nasdaq's Chief Executive Officer and Executive Vice President and Chief Financial Officer, have concluded that, as of the end of such period, Nasdaq's disclosure controls and procedures are effective.

Changes in internal control over financial reporting. There have been no changes in Nasdaq's internal control over financial reporting (as defined in Rule 13a-15(f) and Rule 15d-15(f) under the Exchange Act) that occurred during the quarter ended December 31, 2022 that have materially affected, or are reasonably likely to materially affect, Nasdaq's internal control over financial reporting.

Management's Report on Internal Control Over Financial Reporting

Management is responsible for the preparation and integrity of the consolidated financial statements appearing in the reports that we file with the SEC. The consolidated financial statements were prepared in conformity with U.S. generally accepted accounting principles and include amounts based on management's estimates and judgments.

Management is also responsible for establishing and maintaining adequate internal control over Nasdaq's financial reporting. Although there are inherent limitations in the effectiveness of any system of internal control over financial reporting, we maintain a system of internal control that is designed to provide reasonable assurance as to the fair and reliable preparation and presentation of the consolidated financial statements, as well as to safeguard assets from unauthorized use or disposition that could have a material effect on the financial statements.

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) (2013 framework). This evaluation included review of the documentation of controls, evaluation of the design effectiveness of controls, testing of the operating effectiveness of controls and a conclusion on this evaluation. Based on its assessment, our management believes that, as of December 31, 2022, our internal control over financial reporting is effective.

Ernst & Young LLP, an independent registered public accounting firm, has issued an attestation report on Nasdaq's internal control over financial reporting, which is included herein.

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Nasdaq, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Nasdaq, Inc.'s internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control—Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Nasdaq, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2022, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2022 and 2021, the related consolidated statements of income, comprehensive income, changes in stockholders' equity and cash flows for each of the three years in the period ended December 31, 2022, and the related notes and our report dated February 23, 2023 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

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

/s/ *Ernst & Young LLP*

New York, New York
February 23, 2023

Item 9B. Other Information

None.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Information about Nasdaq's directors, as required by Item 401 of Regulation S-K, is incorporated by reference from the discussion under the caption "Director Nominees" in Nasdaq's Proxy Statement. Information about Nasdaq's executive officers, as required by Item 401 of Regulation S-K, is incorporated by reference from the discussion under the caption "Other Items-Executive Officers" in the Proxy Statement. Information about Section 16 reports, as required by Item 405 of Regulation S-K, is incorporated by reference from the discussion under the caption "Other Items-Delinquent Section 16(a) Reports" in the Proxy Statement. Information about Nasdaq's code of ethics, as required by Item 406 of Regulation S-K, is incorporated by reference from the discussion under the caption "Operating with Integrity" in the Proxy Statement. Information about Nasdaq's nomination procedures, Audit & Risk Committee and Audit & Risk Committee financial experts, as required by Items 407(c)(3), 407(d)(4) and 407(d)(5) of Regulation S-K, is incorporated by reference from the discussions under the headings "Director Nominees" and "Board Committees" in the Proxy Statement.

Item 11. Executive Compensation

Information about Nasdaq's director and executive compensation, as required by Items 402, 407(e)(4) and 407(e)(5) of Regulation S-K, is incorporated by reference from the discussions under the headings "Director Compensation" and "Executive Compensation" in the Proxy Statement.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

Information about security ownership of certain beneficial owners and management, as required by Item 403 of Regulation S-K, is incorporated by reference from the discussion under the heading "Other Items-Security Ownership of Certain Beneficial Owners and Management" in the Proxy Statement.

Equity Compensation Plan and ESPP Information

Nasdaq's Equity Plan provides for the issuance of our equity securities to all employees and directors as part of their compensation plan.

In addition, in jurisdictions where participation in the ESPP is permitted, all our employees are eligible. Employees may purchase shares of our common stock at a 15% discount to the lesser of the closing price of our common stock on (i) the first trading day of the offering period or (ii) the last trading day of the offering period. Offering periods under the ESPP are six months in duration. As of December 31, 2022, all our employees are eligible to participate.

The Equity Plan and the ESPP have been previously approved by our stockholders. The following table sets forth information regarding outstanding options and shares reserved for future issuance under all of Nasdaq's compensation plans as of December 31, 2022.

Plan Category	Number of shares to be issued upon exercise of outstanding options, warrants and rights(a)	Weighted-average exercise price of outstanding options, warrants and rights(b)	Number of shares remaining available for future issuance under equity compensation plans (excluding shares reflected in column(a))(c)
Equity compensation plans approved by stockholders	1,420,323	$ 41.79	38,534,312
Equity compensation plans not approved by stockholders	—	—	—
Total	1,420,323	$ 41.79	38,534,312

In the table above:

- The number of shares to be issued upon exercise of outstanding options, warrants and rights include only the number of shares to be issued upon exercise of outstanding options, warrants and rights. As of December 31, 2022, we also had 6,347,055 shares to be issued upon vesting of outstanding restricted stock and PSUs.
- The number of shares remaining available for future issuance under equity compensation plans (excluding shares reflected in column (a) includes 26,430,038 shares of common stock that may be awarded pursuant to the Equity Plan and (b) 12,104,274 shares of common stock that may be issued pursuant to the ESPP.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Information about certain relationships and related transactions, as required by Item 404 of Regulation S-K, is incorporated herein by reference from the discussion under the heading "Other Items-Certain Relationships and Related Transactions" in the Proxy Statement. Information about director independence, as required by Item 407(a) of Regulation S-K, is incorporated herein by reference from the discussion under the heading "Director Nominees" in the Proxy Statement.

Item 14. Principal Accountant Fees and Services

Information about principal accountant fees and services, as required by Item 9(e) of Schedule 14A, is incorporated herein by reference from the discussion under the heading "Audit & Risk Annual Evaluation and 2023 Selection of the Independent Auditor" in the Proxy Statement.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a)(1) Financial Statements

See "Index to Consolidated Financial Statements."

(a)(2) Financial Statement Schedules

All schedules are omitted because they are not applicable or the required information is included in the consolidated financial statements or notes.

(a)(3) Exhibits

Exhibit Number	
2.1	Share Purchase Agreement, dated as of November 18, 2020, by and among Osprey Acquisition Corporation, a wholly owned subsidiary of Nasdaq, Verafin Holdings Inc., certain shareholders of Verafin (the "Sellers"), and Shareholder Representative Services LLC, solely in its capacity as the representative of the Sellers (incorporated herein by reference to Exhibit 2.2 to the Annual Report on Form 10-K for the year ended December 31, 2020 filed on February 23, 2021).†
2.2	Amendment to Share Purchase Agreement, dated as of February 11, 2021, by and among Osprey Acquisition Corporation, a wholly owned subsidiary of Nasdaq, Verafin Holdings Inc., certain shareholders of Verafin (the "Sellers"), and Shareholder Representative Services LLC, solely in its capacity as the representative of the Sellers (incorporated herein by reference to Exhibit 2.3 to the Annual Report on Form 10-K for the year ended December 31, 2020 filed on February 23, 2021).
3.1	Amended and Restated Certificate of Incorporation of Nasdaq (incorporated herein by reference to Exhibit 3.1 to the Current Report on Form 8-K filed on January 28, 2014).
3.1.1	Certificate of Elimination of Nasdaq's Series A Convertible Preferred Stock (incorporated herein by reference to Exhibit 3.1.1 to the Current Report on Form 8-K filed on January 28, 2014).
3.1.2	Certificate of Amendment of Nasdaq's Amended and Restated Certificate of Incorporation (incorporated herein by reference to Exhibit 3.1 to the Current Report on Form 8-K filed on November 19, 2014).
3.1.3	Certificate of Amendment of Nasdaq's Amended and Restated Certificate of Incorporation (incorporated herein by reference to Exhibit 3.1 to the Current Report on Form 8-K filed on September 8, 2015).
3.1.4	Certificate of Amendment of Nasdaq's Amended and Restated Certificate of Incorporation (incorporated herein by reference to Exhibit 3.1 to the Current Report on Form 8-K filed on July 20, 2022).
3.2	Nasdaq's By-Laws (incorporated herein by reference to Exhibit 3.2 to the Current Report on Form 8-K filed on November 21, 2016).
4.1	Form of Common Stock certificate (incorporated herein by reference to Exhibit 4.1 to the Quarterly Report on Form 10-Q for the quarter ended September 30, 2015 filed on November 4, 2015).
4.2	Stockholders' Agreement, dated as of February 27, 2008, between Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) and Borse Dubai Limited (incorporated herein by reference to Exhibit 10.2 to the Current Report on Form 8-K filed on March 3, 2008).
4.2.1	First Amendment to Stockholders' Agreement, dated as of February 19, 2009, between Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) and Borse Dubai Limited (incorporated herein by reference to Exhibit 4.10.1 to the Annual Report on Form 10-K for the year ended December 31, 2008 filed on February 27, 2009).
4.3	Registration Rights Agreement, dated as of February 27, 2008, among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.), Borse Dubai Limited and Borse Dubai Nasdaq Share Trust (incorporated herein by reference to Exhibit 10.3 to the Current Report on Form 8-K filed on March 3, 2008).
4.3.1	First Amendment to Registration Rights Agreement, dated as of February 19, 2009, among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.), Borse Dubai Limited and Borse Dubai Nasdaq Share Trust (incorporated herein by reference to Exhibit 4.11.1 to the Annual Report on Form 10-K for the year ended December 31, 2008 filed on February 27, 2009).
4.4	Stockholders' Agreement, dated as of December 16, 2010, between Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) and Investor AB (incorporated herein by reference to Exhibit 4.12 to the Annual Report on Form 10-K for the year ended December 31, 2010 filed on February 24, 2011).
4.4.1	First Amendment to Nasdaq Stockholders' Agreement, dated as of December 14, 2022, between Nasdaq, Inc. and Investor AB (incorporated herein by reference to Exhibit 4.1 to the Current Report on Form 8-K filed on December 16, 2022).

4.5	Indenture, dated as of June 7, 2013, between Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.1 to the Current Report on Form 8-K filed on June 10, 2013).
4.6	First Supplemental Indenture, dated as of June 7, 2013, among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.), Wells Fargo Bank, National Association, as Trustee, Deutsche Bank AG, London Branch, as paying agent, and Deutsche Bank Luxembourg S.A., as registrar and transfer agent (incorporated herein by reference to Exhibit 4.2 to the Current Report on Form 8-K filed on June 10, 2013).
4.7	Second Supplemental Indenture, dated as of May 29, 2014, among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.1 to the Current Report on Form 8-K filed on May 30, 2014).
4.8	Third Supplemental Indenture, dated as of May 20, 2016, among Nasdaq, Inc., Wells Fargo Bank, National Association, as Trustee, and HSBC Bank USA, National Association, as paying agent and as registrar and transfer agent (incorporated herein by reference to the Current Report on Form 8-K filed on May 23, 2016).
4.9	Fifth Supplemental Indenture, dated as of September 22, 2017, among Nasdaq, Inc. and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.1 to the Current Report on Form 8-K filed on September 22, 2017).
4.10	Sixth Supplemental Indenture, dated as of April 1, 2019, among Nasdaq, Inc., Wells Fargo Bank, National Association, as Trustee, and HSBC Bank USA, National Association, as paying agent and as registrar and transfer agent (incorporated by reference to Exhibit 4.2 to the Form 8-A filed on April 1, 2019).
4.11	Seventh Supplemental Indenture, dated February 13, 2020, among Nasdaq, Inc., Wells Fargo Bank, National Association, as Trustee, and HSBC Bank USA, National Association, as paying agent and as registrar and transfer agent (incorporated herein by reference to Exhibit 4.2 to the Company's Form 8-A filed on February 13, 2020).
4.12	Eighth Supplemental Indenture, dated April 28, 2020, by and between Nasdaq, Inc. and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.2 to the Current Report on Form 8-K filed on April 28, 2020).
4.13	Ninth Supplemental Indenture, dated December 21, 2020, by and between Nasdaq, Inc. and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.2 to the Current Report on Form 8-K filed on December 21, 2020).
4.14	Tenth Supplemental Indenture, dated December 21, 2020, by and between Nasdaq, Inc. and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.3 to the Current Report on Form 8-K filed on December 21, 2020).
4.15	Eleventh Supplemental Indenture, dated December 21, 2020, by and between Nasdaq, Inc. and Wells Fargo Bank, National Association, as Trustee (incorporated herein by reference to Exhibit 4.4 to the Current Report on Form 8-K filed on December 21, 2020).
4.16	Twelfth Supplemental Indenture, dated July 30, 2021, by and among Nasdaq, Inc., Wells Fargo Bank, National Association, as Trustee and HSBC Bank USA, National Association, as registrar and transfer agent (incorporated by reference to Exhibit 4.2 to the Company's 8-A filed on July 30, 2021).
4.17	Thirteenth Supplemental Indenture, dated as of March 7, 2022, by and between Nasdaq, Inc. and Computershare Trust Company, N.A. (as successor to Wells Fargo Bank, National Association), as trustee (incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on March 7, 2022).
4.18	Description of Securities.
10.1	Amended and Restated Board Compensation Policy, effective on June 16, 2021 (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2021 filed on August 4, 2021).*
10.2	Nasdaq Executive Corporate Incentive Plan, effective as of January 1, 2015 (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on May 11, 2015).*
10.3	Nasdaq, Inc. Equity Incentive Plan (as amended and restated as of April 24, 2018) (incorporated herein by reference to Exhibit 10.1 to the Form S-8 filed on May 25, 2018).*
10.4	Form of Nasdaq Non-Qualified Stock Option Award Certificate (incorporated herein by reference to Exhibit 10.3 to the Annual Report on Form 10-K for the year ended December 31, 2010 filed on February 24, 2011).*
10.5	Form of Nasdaq Restricted Stock Unit Award Certificate (employees) (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2022 filed on August 3, 2022).*
10.6	Form of Nasdaq Restricted Stock Unit Award Certificate (directors) (incorporated herein by reference to Exhibit 10.2 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2022 filed on August 3, 2022).*

10.7	Form of Nasdaq One-Year Performance Share Unit Agreement (incorporated herein by reference to Exhibit 10.4 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
10.8	Form of Nasdaq Three-Year Performance Share Unit Agreement (incorporated herein by reference to Exhibit 10.3 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2022 filed on August 3, 2022).*
10.9	Form of Nasdaq Continuing Obligations Agreement (incorporated by reference to Exhibit 10.9 to the Company's Annual Report on Form 10-K for the year ended December 31, 2021 filed on February 23, 2022).
10.10	Amended and Restated Supplemental Executive Retirement Plan, dated as of December 17, 2008 (incorporated herein by reference to Exhibit 10.6 to the Annual Report on Form 10-K for the year ended December 31, 2008 filed on February 27, 2009).*
10.10.1	Amendment No. 1 to Amended and Restated Supplemental Executive Retirement Plan, effective as of December 31, 2008 (incorporated herein by reference to Exhibit 10.6.1 to the Annual Report on Form 10-K for the year ended December 31, 2008 filed on February 27, 2009).*
10.11	Nasdaq Supplemental Employer Retirement Contribution Plan, dated as of December 17, 2008 (incorporated herein by reference to Exhibit 10.7 to the Annual Report on Form 10-K for the year ended December 31, 2008 filed on February 27, 2009).*
10.12	Nasdaq, Inc. Deferred Compensation Plan (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on June 16, 2022).*
10.13	Nonqualified Stock Option Award Certificate to Adena T. Friedman from Nasdaq, Inc. in connection with grant made on January 3, 2017 (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended September 30, 2017 filed on November 7, 2017).*
10.14	Employment Agreement between Nasdaq and Adena Friedman, made and entered into on November 19, 2021 and effective as of January 1, 2022 (incorporated by reference to Exhibit 10.14 to the Company's Annual Report on Form 10-K for the year ended December 31, 2021 filed on February 23, 2022).*
10.15	Nonqualified Stock Option Award Certificate to Adena T. Friedman from Nasdaq, Inc. in connection with grant made on January 3, 2022 (incorporated by reference to Exhibit 10.15 to the Company's Annual Report on Form 10-K for the year ended December 31, 2021 filed on February 23, 2022).*
10.16	Employment Agreement by and between Nasdaq, Inc. and Bradley J. Peterson, dated October 1, 2020 (incorporated herein by reference to Exhibit 10.17 to the Annual Report on Form 10-K for the year ended December 31, 2020 filed on February 23, 2021).*
10.17	Employment Agreement by and between Nasdaq, Inc. and Bradley J. Peterson, dated June 22, 2022 (incorporated herein by reference to Exhibit 10.5 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2022 filed on August 3, 2022).
10.18	Employment Offer Letter by and between Nasdaq, Inc. and Michelle Daly (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on May 3, 2021).*
10.19	Nasdaq Change in Control Severance Plan for Executive Vice Presidents and Senior Vice Presidents, effective November 26, 2013, as amended December 6, 2022.*
10.20	Credit Agreement, dated as of December 21, 2020, among Nasdaq, Inc., the various lenders from time to time party thereto and, Bank of America, N.A., as administrative agent and issuing bank (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on December 21, 2020).
10.21	LIBOR Transition Amendment, dated as of October 19, 2021 by and among Nasdaq, Inc. and Bank of America, N.A., as administrative agent (incorporated herein by reference to Exhibit 10.23 to the Annual Report on Form 10-K for the year ended December 31, 2021 filed on February 23, 2022).
10.22	Amended and Restated Credit Agreement, dated as of December 16, 2022, among Nasdaq, Inc., the various lenders and issuing bank party thereto and Bank of America, N.A., as administrative agent (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on December 16, 2022).
10.23	Form of Commercial Paper Dealer Agreement between Nasdaq, Inc., as Issuer, and the Dealer party thereto (incorporated herein by reference to Exhibit 10.3 to the Current Report on Form 8-K filed on April 26, 2017).
10.24	Verafin Holdings Inc. Amended and Restated Management Incentive Plan*
10.25	Verafin Holdings Inc. Amended and Restated Management Incentive Plan Award Agreement, by and between Verafin Solutions ULC and Brendan Brothers, dated as of January 11, 2023*
10.26	Verafin Holdings Inc. Amended and Restated Management Incentive Plan Award Agreement, by and between Verafin Solutions ULC and Jamie King, dated as of October 18, 2022*
11	Statement regarding computation of per share earnings (incorporated herein by reference from Note 13 to the consolidated financial statements under Part II, Item 8 of this Form 10-K).

21.1	List of all subsidiaries.
23.1	Consent of Ernst & Young LLP.
24.1	Powers of Attorney.
31.1	Certification of Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 (“Sarbanes-Oxley”).
31.2	Certification of Executive Vice President and Chief Financial Officer pursuant to Section 302 of Sarbanes-Oxley.
32.1	Certifications Pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of Sarbanes-Oxley.
101	The following materials from the Nasdaq, Inc. Annual Report on Form 10-K for the year ended December 31, 2022, formatted in iXBRL (Inline eXtensible Business Reporting Language): (i) Consolidated Balance Sheets as of December 31, 2022 and December 31, 2021; (ii) Consolidated Statements of Income for the years ended December 31, 2022, 2021 and 2020 (iii) Consolidated Statements of Comprehensive Income for the years ended December 31, 2022, 2021 and 2020; (iv) Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2022, 2021 and 2020; (v) Consolidated Statements of Cash Flows for the years ended December 31, 2022, 2021 and 2020; and (vi) notes to consolidated financial statements.
104	Cover Page Interactive Data File, formatted in iXBRL and contained in Exhibit 101.

* Management contract or compensatory plan or arrangement.

† Schedules have been omitted pursuant to Item 601(b)(2) of Regulation S-K.

(b) Exhibits:

See Item 15(a)(3) above.

(c) Financial Statement Schedules:

All schedules are omitted because they are not applicable or the required information is included in the consolidated financial statements or notes.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on February 23, 2023.

Nasdaq, Inc.
(Registrant)

By:	/s/ Adena T. Friedman
Name:	**Adena T. Friedman**
Title:	**Chief Executive Officer**
Date:	February 23, 2023

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities indicated as of February 23, 2023.

By:	/s/ Adena T. Friedman
Name:	**Adena T. Friedman**
Title:	Chief Executive Officer and Chair of the Board

By:	/s/ Ann M. Dennison
Name:	**Ann M. Dennison**
Title:	Executive Vice President and Chief Financial Officer

By:	/s/ Michelle Daly
Name:	**Michelle Daly**
Title:	Senior Vice President, Controller and Principal Accounting Officer

By:	*
Name:	**Michael R. Splinter**
Title:	Director

By:	*
Name:	**Melissa M. Arnoldi**
Title:	Director

By:	*
Name:	**Charlene T. Begley**
Title:	Director

By:	*
Name:	**Steven D. Black**
Title:	Director

By:	*
Name:	**Essa Kazim**
Title:	Director

By:	*
Name:	**Thomas A. Kloet**
Title:	Director

By:	*
Name:	**John D. Rainey**
Title:	Director

By:	*
Name:	**Johan Torgeby**
Title:	Director

By:	*
Name:	**Toni Townes-Whitley**
Title:	Director

By:	*
Name:	**Alfred W. Zollar**
Title:	Director

* Pursuant to Power of Attorney

By:	/s/ John A. Zecca
Name:	**John A. Zecca**
Title:	**Attorney-in-Fact**

Nasdaq, Inc.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

The following consolidated financial statements of Nasdaq, Inc. and its subsidiaries are presented herein on the page indicated:

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of Nasdaq, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Nasdaq, Inc. (the Company) as of December 31, 2022 and 2021, the related consolidated statements of income, comprehensive income, changes in stockholders' equity and cash flows for each of the three years in the period ended December 31, 2022, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2022, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated February 23, 2023 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Market Technology Revenue Recognition

Description of the Matter

As described in Notes 2 and 3 to the consolidated financial statements, the Company enters into long-term market technology contracts with customers to develop customized technology solutions, license the right to use software, and provide support and other services which results in these contracts containing multiple performance obligations. The Company recognized $562 million of Marketplace Technology revenue for the year ended December 31, 2022. Of this amount, a portion relates to market technology contracts where the Company allocates the contract transaction price to each performance obligation using its best estimate of the standalone selling price of each distinct good or service in the respective market technology contract. In instances where standalone selling price is not directly observable, such as when a product or service is not sold separately, the Company determines the standalone selling price predominantly through an expected cost plus a margin approach. The Company recognizes revenue over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying the performance obligation. Revenue recognized subject to such estimation was $75 million for the year ended December 31, 2022.

Auditing the Company's calculation of the standalone selling price and timing of revenue recognition was complex and involved a high degree of subjective auditor judgment because of the significant management judgment required to develop the estimates. The standalone selling price is based on an estimate of total project costs, ongoing monitoring of completion of performance obligations and establishing margins for goods or services where a standalone selling price is not directly observable.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's processes with respect to estimates that impact the timing and measurement of revenue recognition. For example, we tested controls over the allocation of contract transaction price to performance obligations, including management's review of the estimated margin used when applying the cost plus an estimated margin to determine the standalone selling price. We also evaluated the design and tested the operating effectiveness of controls over the completeness and accuracy of the data utilized to measure the estimate and recognize the revenue in the appropriate period.

We performed substantive audit procedures that included, among other things, evaluating the significant assumptions and the accuracy and completeness of the underlying data used in management's calculation. Specifically, we inspected certain new customer agreements signed during the year, including change requests, and tested management's determination of the standalone selling price and its allocation to performance obligations in accordance with the cost plus a margin approach, including comparing the margin assumptions to actual margins earned on completed contracts. We also tested the accuracy of the revenue recognized in the current period by inspecting reports relating to the hours recorded on a project. We evaluated the adequacy of the Company's disclosures in Notes 2 and 3 to the consolidated financial statements related to market technology revenue recognition.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1986.

New York, New York
February 23, 2023

Nasdaq, Inc.
Consolidated Balance Sheets
(in millions, except share and par value amounts)

	December 31, 2022	December 31, 2021
Assets		
Current assets:		
Cash and cash equivalents	$ 502	$ 393
Restricted cash and cash equivalents	22	29
Default funds and margin deposits (including restricted cash and cash equivalents of $6,470 and $5,074, respectively)	7,021	5,911
Financial investments	181	208
Receivables, net	677	588
Other current assets	201	294
Total current assets	8,604	7,423
Property and equipment, net	532	509
Goodwill	8,099	8,433
Intangible assets, net	2,581	2,813
Operating lease assets	444	366
Other non-current assets	608	571
Total assets	$ 20,868	$ 20,115
Liabilities		
Current liabilities:		
Accounts payable and accrued expenses	$ 185	$ 185
Section 31 fees payable to SEC	243	62
Accrued personnel costs	243	252
Deferred revenue	357	329
Other current liabilities	122	115
Default funds and margin deposits	7,021	5,911
Short-term debt	664	1,018
Total current liabilities	8,835	7,872
Long-term debt	4,735	4,812
Deferred tax liabilities, net	456	406
Operating lease liabilities	452	386
Other non-current liabilities	226	234
Total liabilities	14,704	13,710
Commitments and contingencies		
Equity		
Nasdaq stockholders' equity:		
Common stock, $0.01 par value, 900,000,000 shares authorized, shares issued: 513,157,630 at December 31, 2022 and 520,256,817 at December 31, 2021; shares outstanding: 491,592,491 at December 31, 2022 and 500,038,905 at December 31, 2021	5	5
Additional paid-in capital	1,445	1,949
Common stock in treasury, at cost: 21,565,139 shares at December 31, 2022 and 20,217,912 shares at December 31, 2021	(515)	(437)
Accumulated other comprehensive loss	(1,991)	(1,587)
Retained earnings	7,207	6,465
Total Nasdaq stockholders' equity	6,151	6,395
Noncontrolling interests	13	10
Total equity	6,164	6,405
Total liabilities and equity	$ 20,868	$ 20,115

See accompanying notes to consolidated financial statements.

Nasdaq, Inc.
Consolidated Statements of Income
(in millions, except per share amounts)

	Year Ended December 31,		
	2022	2021	2020
Revenues:			
Market Platforms	$ 4,225	$ 4,048	$ 4,179
Capital Access Platforms	1,684	1,568	1,287
Anti-Financial Crime	306	231	116
Other revenues	11	39	43
Total revenues	6,226	5,886	5,625
Transaction-based expenses:			
Transaction rebates	(2,092)	(2,168)	(2,028)
Brokerage, clearance and exchange fees	(552)	(298)	(694)
Revenues less transaction-based expenses	3,582	3,420	2,903
Operating expenses:			
Compensation and benefits	1,003	938	786
Professional and contract services	140	144	137
Computer operations and data communications	207	186	151
Occupancy	104	109	107
General, administrative and other	125	85	142
Marketing and advertising	51	57	39
Depreciation and amortization	258	278	202
Regulatory	33	64	24
Merger and strategic initiatives	82	87	33
Restructuring charges	15	31	48
Total operating expenses	2,018	1,979	1,669
Operating income	1,564	1,441	1,234
Interest income	7	1	4
Interest expense	(129)	(125)	(101)
Net gain on divestiture of business	—	84	—
Other income	2	81	5
Net income from unconsolidated investees	31	52	70
Income before income taxes	1,475	1,534	1,212
Income tax provision	352	347	279
Net income	1,123	1,187	933
Net loss attributable to noncontrolling interests	2	—	—
Net income attributable to Nasdaq	$ 1,125	$ 1,187	$ 933
Per share information:			
Basic earnings per share	$ 2.28	$ 2.38	$ 1.89
Diluted earnings per share	$ 2.26	$ 2.35	$ 1.86
Cash dividends declared per common share	$ 0.78	$ 0.70	$ 0.65

See accompanying notes to consolidated financial statements.

Nasdaq, Inc.
Consolidated Statements of Comprehensive Income
(in millions)

	Year Ended December 31,		
	2022	2021	2020
Net income	$ 1,123	$ 1,187	$ 933
Other comprehensive income (loss):			
Foreign currency translation gains (losses)	(375)	(176)	269
Income tax benefit (expense)[1]	(32)	(42)	49
Foreign currency translation, net	(407)	(218)	318
Employee benefit plan adjustment gains (losses)	5	(1)	—
Employee benefit plan income tax provision	(2)	—	—
Employee benefit plan, net	3	(1)	—
Total other comprehensive income (loss), net of tax	(404)	(219)	318
Comprehensive income	719	968	1,251
Comprehensive loss attributable to noncontrolling interests	2	—	—
Comprehensive income attributable to Nasdaq	$ 721	$ 968	$ 1,251

[1] Primarily relates to the tax effect of unrealized gains and losses on Euro denominated notes.

See accompanying notes to consolidated financial statements.

Nasdaq, Inc.
Consolidated Statements of Changes in Stockholders' Equity
(in millions)

	Year Ended December 31,					
	2022		2021		2020	
	Shares	$	Shares	$	Shares	$
Common stock	500	5	495	5	495	5
Additional paid-in capital						
Beginning balance		1,949		2,544		2,629
Share repurchase program	(5)	(308)	(9)	(468)	(6)	(222)
ASR agreement[1]	(6)	(325)	(7)	(475)	—	—
Share-based compensation	3	106	3	90	3	87
Stock option exercises, net	—	—	—	1	—	2
Other issuances of common stock, net[2]	1	23	19	257	3	48
Ending balance		1,445		1,949		2,544
Common stock in treasury, at cost						
Beginning balance		(437)		(376)		(336)
Other employee stock activity	(1)	(78)	(1)	(61)	—	(40)
Ending balance		(515)		(437)		(376)
Accumulated other comprehensive loss						
Beginning balance		(1,587)		(1,368)		(1,686)
Other comprehensive income (loss)		(404)		(219)		318
Ending balance		(1,991)		(1,587)		(1,368)
Retained earnings						
Beginning balance		6,465		5,628		5,027
Impact of adoption of ASU 2016-13		—		—		(12)
Net income attributable to Nasdaq		1,125		1,187		933
Cash dividends declared per common share		(383)		(350)		(320)
Ending balance		7,207		6,465		5,628
Total Nasdaq stockholders' equity		6,151		6,395		6,433
Noncontrolling interests						
Beginning balance		10		3		—
Net activity related to noncontrolling interests		3		7		3
Ending balance		13		10		3
Total Equity	492	$ 6,164	500	$ 6,405	495	$ 6,436

[1] See "ASR Agreement," of Note 12, "Nasdaq Stockholders' Equity," for further discussion.
[2] In 2021, other issuances of common stock primarily related to shares accelerated and issued upon the sale of our U.S. Fixed Income business.

See accompanying notes to consolidated financial statements.

Nasdaq, Inc.
Consolidated Statements of Cash Flows
(in millions)

	Year Ended December 31,		
	2022	2021	2020
Cash flows from operating activities:			
Net income	$ 1,123	$ 1,187	$ 933
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	258	278	202
Share-based compensation	106	90	87
Deferred income taxes	38	94	41
Extinguishment of debt	16	33	36
Net gain on divestiture of business	—	(84)	—
Net income from unconsolidated investees	(31)	(52)	(70)
Other reconciling items included in net income	28	6	32
Net change in operating assets and liabilities, net of effects of acquisitions:			
Receivables, net	(101)	(6)	(167)
Other assets	98	(140)	26
Accounts payable and accrued expenses	19	(17)	5
Section 31 fees payable to SEC	181	(162)	92
Accrued personnel costs	—	28	32
Deferred revenue	16	106	15
Other liabilities[1]	(45)	(278)	(12)
Net cash provided by operating activities	1,706	1,083	1,252
Cash flows from investing activities:			
Purchases of securities	(322)	(316)	(283)
Proceeds from sales and redemptions of securities	320	285	402
Proceeds from divestiture of business, net of cash divested	—	190	—
Proceeds from sale of investment securities	—	—	22
Acquisition of businesses, net of cash and cash equivalents acquired	(41)	(2,430)	(157)
Purchases of property and equipment	(152)	(163)	(188)
Investments related to default funds and margin deposits, net[2]	211	(132)	109
Other investing activities	33	(87)	(27)
Net cash provided by (used in) investing activities	49	(2,653)	(122)
Cash flows from financing activities:			
Proceeds from (repayments of) commercial paper, net	238	420	(391)
Repayments of debt and credit commitment	(1,097)	(804)	(1,468)
Payment of debt extinguishment cost	(16)	(33)	(36)
Proceeds from issuances of debt, net of issuance costs and utilization of credit commitment	541	826	3,807
Repurchases of common stock	(308)	(468)	(222)
ASR agreement	(325)	(475)	—
Dividends paid	(383)	(350)	(320)
Proceeds received from employee stock activity and other issuances	23	26	50
Payments related to employee shares withheld for taxes	(78)	(61)	(40)
Default funds and margin deposits	2,440	2,330	527
Other financing activities	1	7	3
Net cash provided by financing activities	1,036	1,418	1,910
Effect of exchange rate changes on cash and cash equivalents and restricted cash and cash equivalents	(1,293)	(331)	353
Net increase (decrease) in cash and cash equivalents and restricted cash and cash equivalents	1,498	(483)	3,393
Cash and cash equivalents, restricted cash and cash equivalents at beginning of period	5,496	5,979	2,586
Cash and cash equivalents, restricted cash and cash equivalents at end of period	$ 6,994	$ 5,496	$ 5,979
Reconciliation of Cash, Cash Equivalents and Restricted Cash and Cash Equivalents			
Cash and cash equivalents	$ 502	$ 393	$ 2,745
Restricted cash and cash equivalents	22	29	37
Restricted cash and cash equivalents (default funds and margin deposits)	6,470	5,074	3,197
Total	$ 6,994	$ 5,496	$ 5,979
Supplemental Disclosure Cash Flow Information			
Interest paid	$ 116	$ 118	$ 97
Income taxes paid, net of refund[1]	$ 274	$ 501	$ 290

(1) In 2021, includes payment of an acquired tax liability related to the Verafin acquisition. See “2021 Acquisition,” of Note 4, “Acquisitions and Divestiture,” for further discussion.
(2) Includes purchases and proceeds from sales and redemptions related to the default funds and margin deposits of our clearing operations. For further information, see "Default Fund Contributions and Margin Deposits," within Note 15, "Clearing Operations."

See accompanying notes to consolidated financial statements.

1. ORGANIZATION AND NATURE OF OPERATIONS

Nasdaq is a global technology company serving the capital markets and other industries. Our diverse offerings of data, analytics, software and services enable clients to optimize and execute their business vision with confidence.

In 2022, we announced a new organizational structure which aligns our businesses more closely with the foundational shifts that are driving the evolution of the global financial system. In order to amplify our strategy, we aligned the Company more closely with evolving client needs. As a result, our four previous business segments, Market Technology, Investment Intelligence, Corporate Platforms and Market Services, have been changed to align with our new corporate structure that now includes three business segments: Capital Access Platforms, Market Platforms, and Anti-Financial Crime.

For further discussion of our businesses, see “Products and Services,” of “Item 1. Business.”

Market Platforms

Our Market Platforms segment includes our Trading Services and Marketplace Technology businesses. Our Trading Services business primarily includes revenues from equity derivatives trading, cash equity trading, Nordic fixed income trading & clearing, Nordic commodities and U.S. Tape plans data. We operate multiple exchanges and other marketplace facilities across several asset classes, including derivatives, commodities, cash equity, debt, structured products and ETPs. In addition, in certain countries where we operate exchanges, we also provide clearing, settlement and central depository services. In June 2021, we sold our U.S. Fixed Income business which included an electronic platform for trading of U.S. Treasuries. See “2021 Divestiture,” of Note 4, “Acquisitions and Divestiture,” for further discussion.

Our transaction-based platforms provide market participants with the ability to access, process, display and integrate orders and quotes. The platforms allow the routing and execution of buy and sell orders as well as the reporting of transactions, providing fee-based revenues.

In addition to our trading and clearing services business as well as our carbon market offering, we also announced our planned launch of a new digital assets business to power the digital asset ecosystem in September 2022. The launch underpins Nasdaq’s ambition to advance and help facilitate broader institutional participation in digital assets by providing trusted and institutional-grade solutions, focused on enhanced custody, liquidity and integrity. Nasdaq Digital Assets is expected to initially develop an advanced custody solution. Nasdaq’s offering is subject to regulatory approval in applicable jurisdictions.

Our Marketplace Technology business includes our trade management services and our market technology businesses.

Trade management services provides market participants with a wide variety of alternatives for connecting to and accessing our markets for a fee. Our marketplaces may be accessed via a number of different protocols used for quoting, order entry, trade reporting and connectivity to various data feeds. We also provide colocation services to market participants, whereby we offer firms cabinet space and power to house their own equipment and servers within our data centers. Additionally, we offer a number of wireless connectivity offerings between select data centers using millimeter wave and microwave technology. In June 2022, we completed the wind-down of our Nordic broker services business.

Our market technology business is a leading global technology solutions provider and partner to exchanges, clearing organizations, central securities depositories, regulators, banks, brokers, buy-side firms and corporate businesses. Our solutions are utilized by leading markets in the U.S., Europe and Asia as well as emerging markets in the Middle East, Latin America, and Africa.

Capital Access Platforms

Our Capital Access Platforms segment includes our Data & Listing Services, Index and Workflow & Insights businesses.

Our data business sells and distributes historical and real-time market data to the sell-side, the institutional investing community, retail online brokers, proprietary trading firms and other venues, as well as internet portals and data distributors. Our data products can enhance transparency of market activity within our exchanges and provide critical information to professional and non-professional investors globally. Additionally, our Nasdaq Cloud Data Service provides a flexible and efficient method of delivery for real-time exchange data and other financial information.

Our listing services business operates in the U.S. and Europe on a variety of listing platforms around the world to provide multiple global capital raising solutions for public companies. Our main listing markets are The Nasdaq Stock Market and the Nasdaq Nordic and Nasdaq Baltic exchanges. Through Nasdaq First North, our Nordic and Baltic operations also offer alternative marketplaces for smaller companies and growth companies. In July 2021, we contributed our NPM business, which was included in our Listing Services business, to a standalone, independent company, of which we own the largest minority interest, together with a consortium of third-party financial institutions. The NPM business provides liquidity solutions for private companies to enable employees, investors, and companies to execute transactions.

As of December 31, 2022, there were 4,230 total listings on The Nasdaq Stock Market, including 528 ETPs. The combined market capitalization was approximately $19.3 trillion. In Europe, the Nasdaq Nordic and Nasdaq Baltic exchanges, together with Nasdaq First North, were home to 1,251 listed companies with a combined market capitalization of approximately $1.9 trillion.

Our Index business develops and licenses Nasdaq-branded indexes and financial products. We also license cash-settled options, futures and options on futures on our indexes. As of December 31, 2022, 379 ETPs listed on 26 exchanges in over 20 countries tracked a Nasdaq index and accounted for $315 billion in AUM.

Workflow & Insights includes our analytics and corporate solutions businesses. Our analytics business provides asset managers, investment consultants and institutional asset owners with information and analytics to make data-driven investment decisions, deploy their resources more productively, and provide liquidity solutions for private funds. Through our eVestment and Solovis solutions, we provide a suite of cloud-based solutions that help institutional investors and consultants conduct pre-investment due diligence, and monitor their portfolios post-investment. The eVestment platform also enables asset managers to efficiently distribute information about their firms and funds to asset owners and consultants worldwide.

Through the Solovis platform, endowments, foundations, pensions and family offices transform how they collect and aggregate investment data, analyze portfolio performance, model and predict future outcomes, and share meaningful portfolio insights with key stakeholders. The Nasdaq Fund Network and Nasdaq Data Link are additional platforms in our suite of investment data analytics offerings and data management tools.

Our corporate solutions business includes our Investor Relations Intelligence, ESG Solutions and Governance Solutions products, which serve both public and private companies and organizations. Our public company clients can be companies listed on our exchanges or other U.S. and global exchanges. Our private company clients include a diverse group of organizations ranging from family-owned companies, government organizations, law firms, privately held entities, and various non-profit organizations to hospitals and healthcare systems. We help organizations enhance their ability to understand and expand their global shareholder base, improve corporate governance, and navigate the evolving ESG landscape through our suite of advanced technology, analytics, reporting and consulting services. In June 2022, we acquired Metrio, a provider of ESG data collection, analytics and reporting services based in Montreal, Canada. We plan to integrate Metrio’s SaaS platform into our suite of ESG solutions.

Anti-Financial Crime

Our Anti-Financial Crime segment provides anti-financial crime management solutions on a cloud-based platform to help detect, investigate, and report money laundering and financial fraud through Verafin, which was acquired in February 2021. Our Anti-Financial Crime segment includes Nasdaq Trade Surveillance, a SaaS solution designed for brokers and other market participants to assist them in complying with market rules, regulations and internal market surveillance policies; Nasdaq Market Surveillance, a market surveillance solution for markets and regulators. See “2021 Acquisition,” of Note 4, “Acquisitions and Divestiture,” for further discussion.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Presentation and Principles of Consolidation

The consolidated financial statements are prepared in accordance with U.S. GAAP and include the accounts of Nasdaq, its wholly-owned subsidiaries and other entities in which Nasdaq has a controlling financial interest. When we do not have a controlling interest in an entity but exercise significant influence over the entity’s operating and financial policies, such investment is accounted for under the equity method of accounting. We recognize our share of earnings or losses of an equity method investee based on our ownership percentage. See “Equity Method Investments,” of Note 6, “Investments,” for further discussion of our equity method investments.

The accompanying consolidated financial statements reflect all adjustments which are, in the opinion of management, necessary for a fair statement of the results. These adjustments are of a normal recurring nature. All significant intercompany accounts and transactions have been eliminated in consolidation.

Certain prior year amounts have been reclassified to conform to the current year presentation.

During the fourth quarter of 2021, we adjusted the presentation of cash and cash equivalents held within default funds and margin deposits on the consolidated statement of cash flows from operating activities, to present them as restricted cash and cash equivalents with the associated changes being included within cash flows from investing and financing activities. These balances cannot be used to satisfy the Company's operating or other liabilities. See Note 15, “Clearing Operations,” for further discussion of the default funds and margin deposits.

Prior period amounts have also been adjusted to conform to current period presentation. This immaterial adjustment had no impact on our previously reported consolidated balance sheets, consolidated statements of income, or consolidated statements of comprehensive income.

The table below presents a summary of the 2020 Statements of Cash Flows as reported and as adjusted:

	Year Ended December 31, 2020		
	As Reported	Adjustment	Adjusted
		(in millions)	
Net cash provided by operating activities	$ 1,252	$ —	$ 1,252
Net cash used in investing activities	(231)	109	(122)
Net cash provided by financing activities	1,383	527	1,910
Effect of exchange rate changes on cash, cash equivalents, restricted cash and cash equivalents	16	337	353
Net increase in cash, cash equivalents, restricted cash and cash equivalents	2,420	973	3,393
Cash, cash equivalents, restricted cash and cash equivalents at beginning of period	362	2,224	2,586
Cash, cash equivalents, restricted cash and cash equivalents at end of period	$ 2,782	$ 3,197	$ 5,979
Reconciliation of Cash, Cash Equivalents and Restricted Cash and Cash Equivalents			
Cash and cash equivalents	$ 2,745	$ —	$ 2,745
Restricted cash and cash equivalents	37	—	37
Restricted cash and cash equivalents (Default funds and margin deposits)	—	3,197	3,197
Total	$ 2,782	$ 3,197	$ 5,979

Use of Estimates

In preparing our consolidated financial statements, we make assumptions, judgments and estimates that can have a significant impact on our revenue, operating income and net income, as well as on the value of certain assets and liabilities in our consolidated balance sheets. At least quarterly, we evaluate our assumptions, judgments and estimates, and make changes as deemed necessary.

Foreign Currency

Foreign denominated assets and liabilities are remeasured into the functional currency at exchange rates in effect at the balance sheet date and recorded through the income statement. Gains or losses resulting from foreign currency transactions are remeasured using the rates on the dates on which those elements are recognized during the period, and are included in general, administrative and other expense in the Consolidated Statements of Income.

Translation gains or losses resulting from translating our subsidiaries' financial statements from the local functional currency to the reporting currency, net of tax, are included in accumulated other comprehensive loss within stockholders' equity in the Consolidated Balance Sheets. Assets and liabilities are translated at the balance sheet date while revenues and expenses are translated at the date the transaction occurs or at an applicable average rate.

Cash and Cash Equivalents

Cash and cash equivalents include all non-restricted cash in banks and highly liquid investments with original maturities of 90 days or less at the time of purchase. Such equivalent investments included in cash and cash equivalents in the Consolidated Balance Sheets were $242 million as of December 31, 2022 and $109 million as of December 31, 2021. Cash equivalents are carried at cost plus accrued interest, which approximates fair value due to the short maturities of these investments.

Restricted Cash

Restricted cash and cash equivalents, which was $22 million as of December 31, 2022 and $29 million as of December 31, 2021, is restricted from withdrawal due to a contractual or regulatory requirement or not available for general use and as such is classified as restricted in the Consolidated Balance Sheets. As of December 31, 2022 and 2021, restricted cash and cash equivalents primarily includes funds held for regulatory capital for our trading and clearing businesses.

Default Funds and Margin Deposits

Nasdaq Clearing members' cash contributions are included in default funds and margin deposits in the Consolidated Balance Sheets as both a current asset and a current liability. These balances may fluctuate over time due to changes in the amount of deposits required and whether members choose to provide cash or non-cash contributions. Non-cash contributions include highly rated government debt securities that must meet specific criteria approved by Nasdaq Clearing. Non-cash contributions are pledged assets that are not recorded in the Consolidated Balance Sheets as Nasdaq Clearing does not take legal ownership of these assets and the risks and rewards remain with the clearing members.

Receivables, net

Our receivables are concentrated with our member firms, market data distributors, listed companies, investor relations intelligence, governance, anti-financial crime and marketplace technology customers. Receivables are shown net of allowance for credit losses. The allowance is maintained at a level that management believes to be sufficient to absorb expected losses over the life of our accounts receivable portfolio. The allowance is increased by the provision for bad debts, which is included in general, administrative and other expense in the Consolidated Statements of Income, and decreased by the amount of charge-offs, net of recoveries.

The allowance is primarily based on an aging methodology. This method applies loss rates based on historical loss information which is disaggregated by business segment and, as deemed necessary, is adjusted for other factors and considerations that could impact collectibility. Additionally, we consider corporate default rate averages over an extended period as compared to the period covered by our historical loss data and include an adjustment to historical loss percentages for current conditions and expected future conditions if necessary.

In circumstances where a specific customer's inability to meet its financial obligations is known (i.e., bankruptcy filings), we determine whether a specific provision for bad debts is required. Accounts receivable are written-off against the allowance when collection efforts cease. Due to changing economic, business and market conditions, we review the allowance quarterly and make changes to the allowance through the provision for bad debts as appropriate. If circumstances change (i.e., higher than expected defaults or an unexpected material adverse change in a major customer's ability to pay), our estimates of recoverability could be reduced by a material amount. The total allowance netted against receivables in the Consolidated Balance Sheets was $15 million as of December 31, 2022, $17 million as of December 31, 2021 and $21 million as of December 31, 2020. The change in the balance in 2022 was immaterial.

In 2020 we adopted ASU 2016-13, which changed the impairment model for certain financial instruments. We recorded a $12 million non-cash cumulative effect adjustment to retained earnings on our opening Consolidated Balance Sheets as of January 1, 2020 as a result of the adoption of this new standard.

Investments

Purchases and sales of investment securities are recognized on settlement date.

Financial Investments

Financial investments are comprised of trading securities bought principally to meet regulatory capital requirements mainly for our clearing operations at Nasdaq Clearing. These investments are classified as trading securities as they are generally sold in the near term, with changes in fair value included in other income in the Consolidated Statements of Income.

Fair value is generally obtained from third-party pricing sources. When available, quoted market prices are used to determine fair value. If quoted market prices are not available, fair values are estimated using pricing models with observable market inputs. The inputs to the valuation models vary by the type of security being priced but are typically benchmark yields, reported trades, broker-dealer quotes, and prices of similar assets. Pricing models generally do not entail material subjectivity because the methodologies employed use inputs observed from active markets. See "Fair Value Measurements," below for further discussion of fair value measures.

Equity Securities

Investments in equity securities with readily determinable fair values (other than those accounted for under the equity method or those that result in consolidation of the investee) are measured at fair value and any changes in fair value are recognized in other income in the Consolidated Statements of Income.

Equity investments without readily determinable fair values are accounted for under the measurement alternative, under which investments are measured at cost, less any impairment, plus or minus changes resulting from observable price changes in orderly transactions for the identical or a similar investment of the same issuer on a prospective basis. We assess relevant transactions that occur on or before the balance sheet date to identify observable price changes, and we regularly monitor these investments to evaluate whether there is an indication that the investment is impaired, based on the share price from the investee's latest financing round, the performance of the investee in relation to its own operating targets, the investee's liquidity and cash position, and general market conditions. If a qualitative assessment indicates that the security is impaired, Nasdaq will estimate the fair value of the security and, if the fair value is less than the carrying amount of the security, will recognize an impairment loss in net income equal to the difference in the period the impairment occurs. See Note 6, "Investments," for further discussion of our equity securities.

For the years ended December 31, 2022, 2021 and 2020, no material adjustments were made to the carrying value of our equity securities.

Our investments in equity securities are included in other non-current assets in the Consolidated Balance Sheets, as we intend to hold these investments for more than one year.

Equity Method Investments

In general, the equity method of accounting is used when we own 20% to 50% of the outstanding voting stock of a company or when we are able to exercise significant influence over the operating and financial policies of a company. We have certain investments in which we have determined that we have significant influence and as such account for the investments under the equity method of accounting. We record our estimated pro-rata share of earnings or losses each reporting period and record any dividends as a reduction in the investment balance. We evaluate our equity method investments for other-than-temporary declines in value by considering a variety of factors such as the earnings capacity of the investment and the fair value of the investment compared to its carrying amount. In addition, for investments where the market value is readily determinable, we consider the underlying stock price. If the estimated fair value of the investment is less than the carrying amount and management considers the decline in value to be other than temporary, the excess of the carrying amount over the estimated fair value is recognized in net income in the period the impairment occurs. See Note 6, "Investments," for further discussion of our equity method investments.

No impairments were recorded to reduce the carrying value of our equity method investments in 2022, 2021 or 2020.

Derivative Financial Instruments and Hedging Activities

Non-Designated Derivatives

We use foreign exchange forward contracts to manage foreign currency exposure of intercompany loans, accounts receivable, accounts payable and other balance sheet items. These contracts are not designated as hedges for financial reporting purposes. The change in fair value of these contracts is recognized in general, administrative and other expense in the Consolidated Statements of Income and offsets the foreign currency exposure.

As of December 31, 2022 and 2021, the fair value amounts of our derivative instruments were immaterial.

Net Investment Hedges

Net assets of our foreign subsidiaries are exposed to volatility in foreign currency exchange rates. We may utilize net investment hedges to offset the translation adjustment arising from re-measuring our investment in foreign subsidiaries.

Our 2029, 2030 and 2033 Notes have been designated as a hedge of our net investment in certain foreign subsidiaries to mitigate the foreign exchange risk associated with certain investments in these subsidiaries. Any increase or decrease related to the remeasurement of the 2029, 2030, and 2033 Notes into U.S. dollars is recorded in accumulated other comprehensive loss within stockholders' equity in the Consolidated Balance Sheets. See "2029 Notes," "2030 Notes," and "2033 Notes" of Note 9, "Debt Obligations," for further discussion.

Property and Equipment, net

Property and equipment, including leasehold improvements, are carried at cost less asset impairment charges and accumulated depreciation and amortization. Depreciation and amortization are recognized using the straight-line method over the estimated useful lives of the related assets, which range from 10 to 40 years for buildings and improvements, 3 to 5 years for data processing equipment, and 5 to 10 years for furniture and equipment.

Leasehold improvements are amortized using the straight-line method over the shorter of their estimated useful lives or the remaining term of the related lease.

We develop systems solutions for both internal and external use. Certain costs incurred in connection with developing or obtaining internal use software are capitalized. In addition, certain costs of computer software to be sold, leased, or otherwise marketed as a separate product or as part of a product or process are capitalized beginning when a product's technological feasibility has been established and ending when a product is available for general release. Technological feasibility is established upon completion of a detailed program design or, in its absence, completion. Prior to reaching technological feasibility, all costs are charged to expense. Unamortized capitalized costs are included in data processing equipment and software, within property and equipment, net in the Consolidated Balance Sheets. Capitalized software costs are amortized on a straight-line basis over the estimated useful lives of the software, generally 5 to 10 years. Amortization of these costs is included in depreciation and amortization expense in the Consolidated Statements of Income.

Implementation costs incurred in a cloud computing arrangement that is a service contract are capitalized as a prepaid asset, included in other assets in our Consolidated Balance Sheets, and are amortized over the expected service period in the relevant expense category in the Consolidated Statements of Income.

Property and equipment are subject to impairment testing when events or conditions indicate that the carrying amount of an asset may not be recoverable. The carrying amount of an asset is not recoverable if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset, or for internal use software, the fair value of the asset. Any required impairment loss is measured as the amount by which the carrying amount of the asset exceeds its fair value and is recorded as a reduction in the carrying amount of the related asset and a charge to operating results.

See Note 7, "Property and Equipment, net," for further discussion.

Leases

At inception, we determine whether a contract is or contains a lease. We have operating leases which are primarily real estate leases for our U.S. and European headquarters and for general office space. As of December 31, 2022, these leases have varying lease terms with remaining maturities ranging from 2 to 14 years. Operating lease balances are included in operating lease assets, other current liabilities, and operating lease liabilities in our Consolidated Balance Sheets. We do not have any leases classified as finance leases.

Operating lease assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Operating lease assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. Since our leases do not provide an implicit rate, we use our incremental borrowing rate based on the estimated rate of interest for collateralized borrowing over a similar term of the lease payments at commencement date in determining the present value of lease payments. The operating lease asset also includes any lease payments made and excludes lease incentives. Our lease terms include options to extend or terminate the lease when we are reasonably certain that we will exercise that option. Lease expense for lease payments is recognized on a straight-line basis over the lease term. Certain of our lease agreements include rental payments adjusted periodically for inflation based on an index or rate. These payments are included in the initial measurement of the operating lease liability and operating lease asset. However, rental payments that are based on a change in an index or a rate are considered variable lease payments and are expensed as incurred.

We have lease agreements with lease and non-lease components, which are accounted for as a single performance obligation to the extent that the timing and pattern of transfer are similar for the lease and non-lease components and the lease component qualifies as an operating lease. We do not recognize lease liabilities and operating lease assets for leases with a term of 12 months or less. We recognize these lease payments on a straight-line basis over the lease term. See Note 16, "Leases," for further discussion.

Goodwill and Indefinite-Lived Intangible Assets

Goodwill represents the excess of purchase price over the value assigned to the net assets, including identifiable intangible assets, of a business acquired. Goodwill is allocated to our reporting units based on the assignment of the fair values of each reporting unit of the acquired company. We recognize specifically identifiable intangibles, such as customer relationships, technology, exchange and clearing registrations, trade names and licenses when a specific right or contract is acquired. Goodwill and intangible assets deemed to have indefinite useful lives, primarily exchange and clearing registrations, are not amortized but instead are tested for impairment at least annually as of October 1 and more frequently whenever events or changes in circumstances indicate that the fair value of the asset may be less than its carrying amount, such as changes in the business climate, poor indicators of operating performance or the sale or disposition of a significant portion of a reporting unit. When testing goodwill and indefinite-lived intangible assets for impairment, we have the option of first performing a qualitative assessment to determine whether it is more likely than not that the fair value of a reporting unit or indefinite-lived intangible asset is less than their respective carrying amounts as the basis to determine if it is necessary to perform a quantitative impairment test. If we choose not to complete a qualitative assessment, or if the initial assessment indicates that it is more likely than not that the carrying amount of a reporting unit or the carrying amount of an indefinite-lived intangible asset exceeds their respective estimated fair values, a quantitative test is required.

In performing a quantitative impairment test, we compare the fair value of each reporting unit and indefinite-lived intangible asset with their respective carrying amounts. If the carrying amounts of the reporting unit or the indefinite-lived intangible asset exceed their respective fair values, an impairment charge is recognized in an amount equal to the difference, limited to the total amount of goodwill allocated to that reporting unit or the total carrying value of the indefinite-lived intangible asset.

There was no impairment of goodwill or indefinite-lived intangible assets for the years ended December 31, 2022, 2021 and 2020. Future disruptions to our business and events, such as prolonged economic weakness or unexpected significant declines in operating results of any of our reporting units or businesses, may result in goodwill or indefinite-lived intangible asset impairment charges in the future.

Other Long-Lived Assets

We review our other long-lived assets, such as finite-lived intangible assets and property and equipment, for potential impairment when there is evidence that events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. The carrying amount of an asset is not recoverable if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset. Fair value of finite-lived intangible assets and property and equipment is based on various valuation techniques. Any required impairment loss is measured as the amount by which the carrying amount of the asset exceeds its fair value and is recorded as a reduction in the carrying amount of the related asset and a charge to operating results.

There were no material finite-lived impairment charges in 2022 and 2020. We recorded pre-tax, non-cash finite-lived intangible assets impairment charges of $14 million in 2021 related to a finite-lived intangible asset for customer relationships associated with the wind down of a previous acquisition. In addition, we also recorded pre-tax, non-cash property and equipment asset impairment charges of $8 million in 2022, $4 million in 2021 and $14 million in 2020.

Revenue Recognition and Transaction-Based Expenses

Revenue From Contracts With Customers

Our revenue recognition policies under "Revenue from Contracts with Customers (Topic 606)," are described in the following paragraphs.

Contract Balances

Substantially all of our revenues are considered to be revenues from contracts with customers. The related accounts receivable balances are recorded in our Consolidated Balance Sheets as receivables which are net of an allowance for credit losses of $15 million as of December 31, 2022 and $17 million as of December 31, 2021. The changes in the balance between periods were immaterial. We do not have obligations for warranties, returns or refunds to customers.

For the majority of our contracts with customers there is no significant variable consideration. We do not have a material amount of revenues recognized from performance obligations that were satisfied in prior periods. We do not provide disclosures about transaction price allocated to unsatisfied performance obligations if contract durations are less than one year.

For contract durations that are one-year or greater, the portion of transaction price allocated to unsatisfied performance obligations is included in Note 3, "Revenue From Contracts With Customers." Our deferred revenue primarily arises from contract liabilities related to our fees for annual and initial listings, workflow & insights, marketplace technology and anti-financial crime contracts. Deferred revenue is the only significant contract asset or liability as of December 31, 2022. See Note 8, "Deferred Revenue," for our discussion of deferred revenue balances, activity, and expected timing of recognition. See "Revenue Recognition" below for further descriptions of our revenue contracts.

Sales commissions earned by our sales force are considered incremental and recoverable costs of obtaining a contract with a customer. These costs are deferred and amortized on a straight-line basis over the period of benefit that we have determined to be the contract term or estimated service period. Sales commissions for renewal contracts are deferred and amortized on a straight-line basis over the related contractual renewal period. Amortization expense is included in compensation and benefits expense in the Consolidated Statements of Income. The balance of deferred costs and related amortization expense are not material to our consolidated financial statements. Sales commissions are expensed when incurred if contract durations are one year or less. Sales taxes are excluded from transaction prices.

Certain judgments and estimates were used in the identification and timing of satisfaction of performance obligations and the related allocation of transaction price and are discussed below. We believe that these represent a faithful depiction of the transfer of services to our customers.

Revenue Recognition

Our primary revenue contract classifications are described below. Although we may discuss additional revenue details in our "Management's Discussion and Analysis of Financial Condition and Results of Operations," the categories below best represent those that depict similar economic characteristics of the nature, amount, timing and uncertainty of our revenues and cash flows.

Market Platforms

Trading Services

Transaction-Based Trading and Clearing

Transaction-based trading and clearing includes equity derivative trading and clearing, cash equity trading and FICC revenues. Nasdaq charges transaction fees for trades executed on our exchanges, as well as on orders that are routed to and executed on other market venues. Nasdaq charges clearing fees for contracts cleared with Nasdaq Clearing.

In the U.S., transaction fees are based on trading volumes for trades executed on our U.S. exchanges and in Europe, transaction fees are based on the volume and value of traded and cleared contracts. In Canada, transaction fees are based on trading volumes for trades executed on our Canadian exchange.

Nasdaq satisfies its performance obligation for trading services upon the execution of a customer trade and clearing services when a contract is cleared, as trading and clearing transactions are substantially complete when they are executed and we have no further obligation to the customer at that time. Transaction-based trading and clearing fees can be variable and are based on trade volume tiered discounts. Transaction revenues, as well as any tiered volume discounts, are calculated and billed monthly in accordance with our published fee schedules. In the U.S., we also pay liquidity payments to customers based on our published fee schedules. We use these payments to improve the liquidity on our markets and therefore recognize those payments as a cost of revenue.

For U.S. equity derivative trading, we credit a portion of the per share execution charge to the market participant that provides the liquidity. For U.S. and Canadian cash equity trading, including for The Nasdaq Stock Market, Nasdaq PSX and Nasdaq CXC, we credit a portion of the per share execution charge to the market participant that provides the liquidity, and for Nasdaq BX and Nasdaq CX2, we credit a portion of the per share execution charge to the market participant that takes the liquidity. We record these credits as transaction rebates that are included in transaction-based expenses in the Consolidated Statements of Income. These transaction rebates are paid on a monthly basis and the amounts due are included in accounts payable and accrued expenses in the Consolidated Balance Sheets.

In the U.S., we pay Section 31 fees to the SEC for supervision and regulation of securities markets. We pass these costs along to our customers through our equity derivative trading and clearing fees and our cash equity trading fees. We collect the fees as a pass-through charge from organizations executing eligible trades on our options exchanges and our cash equity platforms and we recognize these amounts in transaction-based expenses when incurred. Section 31 fees received are included in cash and cash equivalents in the Consolidated Balance Sheets at the time of receipt and, as required by law, the amount due to the SEC is remitted semiannually and recorded as Section 31 fees payable to the SEC in the Consolidated Balance Sheets until paid. Since the amount recorded as revenues is equal to the amount recorded as transaction-based expenses, there is no impact on our revenues less transaction-based expenses. As we hold the cash received until payment to the SEC, we earn interest income on the related cash balances.

Under our Limitation of Liability Rule and procedures, we may, subject to certain caps, provide compensation for losses directly resulting from our systems' actual failure to correctly process an order, quote, message or other data into our platform. We do not record a liability for any potential claims that may be submitted under the Limitation of Liability Rule unless they meet the provisions required in accordance with U.S. GAAP. As such, losses arising as a result of the rule are accrued and charged to expense only if the loss is probable and estimable.

U.S. Tape Plans

For U.S. Tape plans, revenues are collected monthly based on published fee schedules and distributed quarterly to the U.S. exchanges based on a formula required by Regulation NMS that takes into account both trading and quoting activity. These revenues are presented on a net basis as all indicators of principal versus agent reporting under U.S. GAAP have been considered in analyzing the appropriate presentation of the revenue sharing. The following are primary indicators of net reporting:

- We are the administrator for the UTP plan, in addition to being a participant in the plan. In our unique role as administrator, we facilitate the collection and dissemination of revenues on behalf of the plan participants. As a participant, we share in the net distribution of revenues according to the plan on the same terms as all other plan participants.
- The operating committee of the plan, which is comprised of representatives from each of the participants, including us solely in our capacity as a plan participant, is responsible for setting the level of fees to be paid by distributors and subscribers and taking action in accordance with the provisions of the plan, subject to SEC approval.
- Risk of loss on the revenue is shared equally among plan participants according to the plan.

Marketplace Technology

Trade management services

We provide market participants with a wide variety of alternatives for connecting to and accessing our markets for a fee. We also offer market participants colocation services, whereby we charge firms for cabinet space and power to house their own equipment and servers within our data centers. These participants are charged monthly fees for cabinet space, connectivity and support in accordance with our published fee schedules. These fees are recognized on a monthly basis when the performance obligation is met. We also earn revenues from annual and monthly exchange membership and registration fees. Revenues for monthly exchange membership and registration fees are recognized on a monthly basis as the service is provided. Revenues from annual fees for exchange membership and registration fees are recognized ratably over the following twelve-month period since the customer receives and consumes the benefit as Nasdaq provides the service. We also offered broker services to financial participants in the Nordic market primarily offering back office technology solutions. Revenues from broker services are based on a fixed basic fee for licensing, maintenance and support and development, and an incremental fee depending on the number of transactions. Broker services revenues were generally billed and recognized monthly. As previously disclosed, in January 2020, we commenced an orderly wind-down of this broker services business. The wind-down was completed in the second quarter of 2022.

Market Technology

Market technology revenues primarily consist of SaaS revenues, software, license and support revenues, and change request revenues.

We enter into long-term contracts with customers to develop customized technology solutions, license the right to use software, and provide support and other services to our customers. We also enter into agreements to modify the system solutions sold by Nasdaq after delivery has occurred. In addition, we enter into subscription agreements which allow customers to connect to our servers to access our software.

Our long-term contracts with customers to develop customized technology solutions, license the right to use software and provide support and other services to our customers have multiple performance obligations. The performance obligations are generally: (i) software license and installation service and (ii) software support. We have determined that the software license and installation service are not distinct as the license and the customized installation service are inputs to produce the combined output, a functional and integrated software system.

For contracts with multiple performance obligations, we allocate the contract transaction price to each performance obligation using our best estimate of the standalone selling price of each distinct good or service in the contract. In instances where standalone selling price is not directly observable, such as when we do not sell the product or service separately, we determine the standalone selling price predominantly through an expected cost plus a margin approach. For the years ended December 31, 2022, 2021 and 2020 we recognized revenues of $75 million, $77 million and $90 million, respectively, related to the contracts described above.

Contract modifications are routine in the performance of our contracts. Contracts are often modified to account for changes in contract specifications or requirements. In most instances, contract modifications are for goods and services that are not distinct, and, therefore, are accounted for as part of the existing contract.

For our long-term contracts, payments are generally made throughout the contract life and can be dependent on either reaching certain milestones or paid upfront in advance of the service period depending on the stage of the contract. For subscription agreements, contract payment terms can be quarterly, annually or monthly, in advance. For all other contracts, payment terms vary.

We generally recognize revenue over time as our customers simultaneously receive and consume the benefits provided by our performance because our customer controls the asset for which we are creating, our performance does not create an asset with alternative use, and we have a right to payment for performance completed to date. For these services, we recognize revenue over time using costs incurred to date relative to total estimated costs at completion to measure progress toward satisfying our performance obligation. Incurred costs represent work performed, which corresponds with, and thereby depicts, the transfer of control to the customer. Contract costs generally include labor and direct overhead. For software support and update services, and for subscription agreements which allow customers to connect to our servers to access our software, we generally recognize revenue ratably over the service period beginning on the date our service is made available to the customer since the customer receives and consumes the benefit consistently over the period as Nasdaq provides the services.

Accounting for our long-term contracts requires judgment relative to assessing risks and their impact on the estimate of revenues and costs. Our estimates are impacted by factors such as the potential for schedule and technical issues, productivity, and the complexity of work performed. When adjustments in estimated total contract costs are required, any changes in the estimated revenues from prior estimates are recognized in the current period for the effect of such change. If estimates of total costs to be incurred on a contract exceed estimates of total revenues, a provision for the entire estimated loss on the contract is recorded in the period in which the loss is determined.

Capital Access Platforms

Data and Listings

Data revenues are earned from U.S. and European proprietary data products. We earn revenues primarily based on the number of data subscribers and distributors of our data. Data revenues are subscription-based and are recognized on a monthly basis.

Listing services revenues primarily include initial listing fees and annual renewal fees. Under Topic 606, the initial listing fee is allocated to multiple performance obligations including initial and subsequent listing services and corporate solutions products (when a company qualifies to receive certain complimentary IPO products under the applicable Nasdaq rule), as well as a customer's material right to renew the option to list on our exchanges. In performing this allocation, the standalone selling price of the performance obligations is based on the initial and annual listing fees and the standalone selling price of the IPO complimentary services is based on its market value. All listing fees are billed upfront and the identified performance obligations are satisfied over time since the customer receives and consumes the benefit as Nasdaq provides the listing service. The amount of revenue related to IPO complimentary services performance obligation is recognized ratably over a three-year period, which is based on contract terms, with the remaining revenue recognized ratably over six years which is based on our historical listing experience and projected future listing duration.

In the U.S., annual renewal fees are charged to listed companies based on their number of outstanding shares at the end of the prior year and are recognized ratably over the following twelve-month period since the customer receives and consumes the benefit as Nasdaq provides the service. Annual fees are charged to newly listed companies on a pro-rata basis, based on outstanding shares at the time of listing and recognized over the remainder of the year. European annual renewal fees, which are received from companies listed on our Nasdaq Nordic and Nasdaq Baltic exchanges and Nasdaq First North, are directly related to the listed companies' market capitalization on a trailing twelve-month basis and are recognized ratably over the following twelve-month period since the customer receives and consumes the benefit as Nasdaq provides the service.

Index

We develop and license Nasdaq-branded indexes and financial products. We also provide index data products and custom calculation services for third-party clients. Revenues primarily include license fees from these branded indexes and financial products in the U.S. and abroad. We primarily have two types of license agreements: transaction-based licenses and asset-based licenses. Transaction-based licenses are generally renewable agreements. Customers are charged based on transaction volume or a minimum contract amount, or both. If a customer is charged based on transaction volume, we recognize revenue when the transaction occurs. If a customer is charged based on a minimum contract amount, we recognize revenue on a pro-rata basis over the licensing term since the customer receives and consumes the benefit as Nasdaq provides the service. Asset-based licenses are also generally renewable agreements. Customers are charged based on a percentage of AUM for licensed products, per the agreement, on a monthly or quarterly basis. These revenues are recognized over the term of the license agreement since the customer receives and consumes the benefit as Nasdaq provides the service. Revenue from index data subscriptions are recognized on a monthly basis.

Workflow & Insights

Analytics revenues are earned from investment content and analytics products. We earn revenues primarily based on the number of content and analytics subscribers and distributors.

Subscription agreements are generally one to three years in term, payable in advance, and provide for automatic renewal. Subscription-based revenues are recognized over time on a ratable basis over the contract period beginning on the date that our service is made available to the customer since the customer receives and consumes the benefit as Nasdaq provides the service.

Our corporate solutions business includes our Investor Relations Intelligence, ESG Services and Governance Solutions businesses, which serve both public and private companies and organizations.

Corporate solutions revenues primarily include subscription and transaction-based income from our investor relations intelligence and governance solutions products and services. Subscription-based revenues earned are recognized over time on a ratable basis over the contract period beginning on the date that our service is made available to the customer since the customer receives and consumes the benefit as Nasdaq provides the service. Generally, fees are billed in advance and the contract provides for automatic renewal. As part of subscription agreements, customers can also be charged usage fees based upon actual usage of the services provided. Revenues from usage fees are recognized at a point in time when the service is provided.

Anti-Financial Crime

Anti-Financial Crime revenues primarily consist of SaaS revenues. We enter into subscription agreements which allow customers access to our cloud platform, or in the case of certain surveillance customers, a connection to our servers to access the software. Subscription agreements are generally three years in term, payable in advance, with the option of automatic renewal for some products. Subscription-based revenues are recognized over time on a ratable basis over the contract period beginning on the date that our service is made available to the customer since the customer receives and consumes the benefit as Nasdaq provides the service.

Other Revenues

Other revenues include revenues related to our Nordic broker services business for which we completed the wind-down in June 2022, as well as revenues associated with our U.S. Fixed Income business, which was sold in June 2021. Prior to the closing of the transaction, these revenues were included in our Market Platforms and Capital Access Platforms segments. See “2021 Divestiture,” of Note 4, “Acquisitions and Divestiture,” to the consolidated financial statements for further discussion of this divestiture. Additionally, for the years ended December 31, 2021 and 2020, other revenues include revenues associated with the NPM business which we contributed in July 2021 to a standalone, independent company, of which we own the largest minority interest, together with a consortium of third-party financial institutions. Prior to July 2021, these revenues were included in our Capital Access Platforms segment. For the twelve months ended December 31, 2022, other revenues also include a transitional services agreement associated with a divested business.

Earnings Per Share

We present both basic and diluted earnings per share. Basic earnings per share is computed by dividing net income attributable to Nasdaq by the weighted-average number of common shares outstanding for the period. Diluted earnings per share is computed by dividing net income attributable to Nasdaq by the weighted-average number of common shares and common share equivalents outstanding during the period and reflects the assumed conversion of all dilutive securities, which primarily consist of restricted stock, PSUs, and employee stock options. Common share equivalents are excluded from the computation in periods for which they have an anti-dilutive effect. Stock options for which the exercise price exceeds the average market price over the period are anti-dilutive and, accordingly, are excluded from the calculation. Shares which are considered contingently issuable are included in the computation of dilutive earnings per share on a weighted average basis when management determines the applicable performance criteria would have been met if the performance period ended as of the date of the relevant computation. See Note 13, “Earnings Per Share,” for further discussion.

Pension and Post-Retirement Benefits

Pension and other post-retirement benefit plan information for financial reporting purposes is developed using actuarial valuations. We assess our pension and other post-retirement benefit plan assumptions on a regular basis. In evaluating these assumptions, we consider many factors, including evaluation of the discount rate, expected rate of return on plan assets, mortality rate, healthcare cost trend rate, retirement age assumption, our historical assumptions compared with actual results and analysis of current market conditions and asset allocations. See Note 10, "Retirement Plans," for further discussion.

Discount rates used for pension and other post-retirement benefit plan calculations are evaluated annually and modified to reflect the prevailing market rates at the measurement date of a high-quality fixed-income debt instrument portfolio that would provide the future cash flows needed to pay the benefits included in the benefit obligations as they come due. Actuarial assumptions are based upon management's best estimates and judgment.

The expected rate of return on plan assets for our U.S. pension plans represents our long-term assessment of return expectations which may change based on significant shifts in economic and financial market conditions. The long-term rate of return on plan assets is derived from return assumptions based on targeted allocations for various asset classes. While we consider the pension plans' recent performance and other economic growth and inflation factors, which are supported by long-term historical data, the return expectations for the targeted asset categories represent a long-term prospective return.

Share-Based Compensation

Nasdaq uses the fair value method of accounting for share-based awards. Share-based awards, or equity awards, include restricted stock, PSUs, and stock options. The fair value of restricted stock awards and PSUs, other than PSUs granted with market conditions, is determined based on the grant date closing stock price less the present value of future cash dividends. We estimate the fair value of PSUs granted with market conditions using a Monte Carlo simulation model at the date of grant. The fair value of stock options are estimated using the Black-Scholes option-pricing model.

We generally recognize compensation expense for equity awards on a straight-line basis over the requisite service period of the award, taking into account an estimated forfeiture rate. Granted but unvested shares are generally forfeited upon termination of employment.

Excess tax benefits or expense related to employee share-based payments, if any, are recognized as income tax benefit or expense in the Consolidated Statements of Income when the awards vest or are settled.

Nasdaq also has an ESPP that allows eligible employees to purchase a limited number of shares of our common stock at six-month intervals, called offering periods, at 85.0% of the lower of the fair market value on the first or the last day of each offering period. The 15.0% discount given to our employees is included in compensation and benefits expense in the Consolidated Statements of Income.

See Note 11, "Share-Based Compensation," for further discussion of our share-based compensation plans.

Merger and Strategic Initiatives

We incur incremental direct merger and strategic initiative costs relating to various completed and potential acquisitions, divestitures, and other strategic opportunities. These costs generally include integration costs, as well as legal, due diligence and other third-party transaction costs.

Fair Value Measurements

Fair value is defined as the price that would be received from selling an asset or paid to transfer a liability, or the exit price, in an orderly transaction between market participants at the measurement date. When determining the fair value measurements for assets and liabilities required or permitted to be either recorded or disclosed at fair value, we consider the principal or most advantageous market in which we would transact, and we also consider assumptions that market participants would use when pricing the asset or liability. Fair value measurement establishes a hierarchy of valuation techniques based on whether the inputs to those valuation techniques are observable or unobservable. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect Nasdaq's market assumptions. These two types of inputs create the following fair value hierarchy:

- Level 1 - Quoted prices for identical instruments in active markets.
- Level 2 - Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations whose inputs are observable or whose significant value drivers are observable.
- Level 3 - Instruments whose significant value drivers are unobservable.

This hierarchy requires the use of observable market data when available.

See Note 14, "Fair Value of Financial Instruments," for further discussion.

Tax Matters

We use the asset and liability method to determine income taxes on all transactions recorded in the consolidated financial statements. Deferred tax assets (net of valuation allowances) and deferred tax liabilities are presented net by jurisdiction as either a non-current asset or liability in our Consolidated Balance Sheets, as appropriate. Deferred tax assets and liabilities are determined based on differences between the financial statement carrying amounts and the tax basis of existing assets and liabilities (i.e., temporary differences) and are measured at the enacted rates that will be in effect when these differences are realized. If necessary, a valuation allowance is established to reduce deferred tax assets to the amount that is more likely than not to be realized.

In order to recognize and measure our unrecognized tax benefits, management determines whether a tax position is more likely than not to be sustained upon examination, including resolution of any related appeals or litigation processes, based on the technical merits of the position. Once it is determined that a position meets the recognition thresholds, the position is measured to determine the amount of benefit to be recognized in the consolidated financial statements. Interest and/or penalties related to income tax matters are recognized in income tax expense.

Stock Split Effected in the Form of a Stock Dividend

On August 26, 2022, we effected a 3-for-1 stock split of the Company's common stock in the form of a stock dividend to shareholders of record as of August 12, 2022. The par value per share of our common stock remains $0.01 per share. All references made with respect to a number of shares or per share amounts throughout this Annual Report on Form 10-K have been retroactively adjusted to reflect the stock split.

Subsequent Events

We have evaluated subsequent events through the issuance date of this Annual Report on Form 10-K.

3. REVENUE FROM CONTRACTS WITH CUSTOMERS

Disaggregation of Revenue

The following tables summarize the disaggregation of revenue by major product and service and by segment for the years ended December 31, 2022, 2021 and 2020:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Market Platforms			
Trading Services, net	$ 1,019	$ 1,037	$ 932
Marketplace Technology	562	545	525
Capital Access Platforms			
Data & Listing Services	729	680	574
Index	486	459	324
Workflow & Insights	469	429	389
Anti-Financial Crime	306	231	116
Other revenues	11	39	43
Revenues less transaction-based expenses	$ 3,582	$ 3,420	$ 2,903

Substantially all revenues from the Capital Access Platforms and Anti-Financial Crime segments as well as our Marketplace Technology business were recognized over time for the years ended December 31, 2022, 2021 and 2020. For the years ended December 31, 2022, 2021 and 2020 approximately 93.1%, 93.6%, and 94.8% respectively, of Trading Services revenues were recognized at a point in time and 6.9%, 6.4% and 5.2%, respectively, were recognized over time.

Contract Balances

Substantially all of our revenues are considered to be revenues from contracts with customers. The related accounts receivable balances are recorded in our Consolidated Balance Sheets as receivables, which are net of allowance for doubtful accounts of $15 million as of December 31, 2022 and $17 million as of December 31, 2021. The changes in the balance between periods were immaterial. We do not have obligations for warranties, returns or refunds to customers.

For the majority of our contracts with customers, except for our market technology and listing services contracts, our performance obligations range from three months to three years and there is no significant variable consideration.

Deferred revenue is the only significant contract asset or liability as of December 31, 2022. Deferred revenue represents consideration received that is yet to be recognized as revenue for unsatisfied performance obligations. Deferred revenue primarily represents our contract liabilities related to our fees for Annual and Initial Listings, Workflow & Insights, Market Technology and Anti-Financial Crime contracts. See Note 8, "Deferred Revenue," for our discussion on deferred revenue balances, activity, and expected timing of recognition.

We do not have a material amount of revenue recognized from performance obligations that were satisfied in prior periods. We do not provide disclosures about transaction price allocated to unsatisfied performance obligations if contract durations are less than one year. For our initial listings, the transaction price allocated to remaining performance obligations is included in deferred revenue. For our Market Technology, Anti-Financial Crime, and Workflow & Insights contracts, the portion of transaction price allocated to unsatisfied performance obligations is presented in the table below. To the extent consideration has been received, unsatisfied performance obligations would be included in the table below as well as deferred revenue.

The following table summarizes the amount of the transaction price allocated to performance obligations that are unsatisfied, for contract durations greater than one year, as of December 31, 2022:

	Market Technology	Anti-Financial Crime	Workflow & Insights	Total
	(in millions)			
2023	$ 193	$ 382	$ 137	$ 712
2024	155	214	79	448
2025	127	90	30	247
2026	92	27	11	130
2027	54	10	8	72
2028+	72	6	—	78
Total	$ 693	$ 729	$ 265	$ 1,687

4. ACQUISITIONS AND DIVESTITURE

We completed the following acquisitions and divestiture in 2022 and 2021. Financial results of each transaction are included in our consolidated financial statements from the date of each acquisition.

2022 Acquisition

In June 2022, we acquired Metrio, a provider of ESG data collection, analytics and reporting services based in Montreal, Canada. We plan to integrate Metrio's SaaS platform into our suite of ESG solutions. Metrio is part of our Workflow & Insight business in our Capital Access Platforms segment.

2021 Divestiture

In June 2021, we sold our U.S. Fixed Income business, which was part of our FICC business within our Market Platforms segment, to Tradeweb Markets Inc. We recognized a pre-tax gain on the sale of $84 million, net of disposal costs. The pre-tax gain was included in net gain on divestiture of business in the Consolidated Statements of Income.

In connection with this sale, we issued approximately 6.2 million shares of Nasdaq common stock. Nasdaq used the proceeds from the sale, available tax benefits and working and clearing capital of this business, as well as other sources of cash, to repurchase shares of Nasdaq common stock to reduce the impact on earnings per share dilution from the sale. To facilitate these repurchases, in June 2021, the board of directors authorized an increase to the share repurchase program. These share repurchases were completed during the second quarter of 2022. See "Share Repurchase Program," of Note 12, "Nasdaq Stockholders' Equity," for further discussion.

2021 Acquisition

Acquisition of Verafin

In February 2021, we completed the acquisition of Verafin, a SaaS technology provider of anti-financial crime management solutions that provides a cloud-based platform to help detect, investigate, and report money laundering and fraud, for an aggregate purchase price of $2.75 billion, subject to certain adjustments. The $2.75 billion purchase price included a cash payment of $102 million, reflected in cash from operating activities in our Consolidated Statements of Cash Flows, the release of which was subject to certain employment-related conditions following the closing of the transaction. During the fourth quarter of 2022, the parties to the transaction agreed that the remaining amount of the $102 million initial cash payment not yet paid would be accelerated and paid to the eligible former Verafin employees. The remaining expense was recorded as merger and strategic initiatives expense. Verafin is part of our Anti-Financial Crime segment.

The amounts in the table below represent the final allocation of the purchase price. The allocation of the purchase price was subject to revision during the measurement period, a period not to exceed 12 months from the acquisition date. Adjustments to the provisional values, which may include tax and other estimates, during the measurement period are recorded in the reporting period in which the adjustment amounts are determined. In 2021, we recorded a measurement period adjustment of $9 million. This adjustment resulted in an increase to both total net liabilities acquired and goodwill. This adjustment did not result in an impact to our Consolidated Statements of Income. The allocation of the purchase price for Verafin was finalized in the first quarter of 2022.

		(in millions)
Goodwill	$	1,882
Acquired Intangible Assets		815
Total Net Liabilities Acquired		(46)
Purchase Consideration	$	2,651

Intangible Assets

The following table presents the details of acquired intangible assets for Verafin at the date of acquisition. Acquired intangible assets with finite lives are amortized using the straight-line method.

	Customer Relationships	Technology	Trade Name	Total Acquired Intangible Assets
Intangible asset value (in millions)	$ 532	$ 246	$ 37	$ 815
Discount rate used	7.5 %	7.5 %	7.5 %	
Estimated average useful life	22 years	7 years	20 years	

Customer Relationships

Customer relationships represent the non-contractual and contractual relationships with customers.

Methodology

Customer relationships were valued using the income approach, specifically an excess earnings method. The excess earnings method examines the economic returns contributed by the identified tangible and intangible assets of a company, and then isolates the excess return that is attributable to the intangible asset being valued.

Discount Rate

The discount rate used reflects the amount of risk associated with the hypothetical cash flows for the customer relationships relative to the overall business. In developing a discount rate for the customer relationships, we estimated a weighted-average cost of capital for the overall business and we utilized this rate as an input when discounting the cash flows. The resulting discounted cash flows were then tax-effected at the applicable statutory rate.

For our acquisition of Verafin, a discounted tax amortization benefit was added to the fair value of the assets under the assumption that the customer relationships would be amortized for tax purposes over a period of 20 years.

Estimated Useful Life

We estimate the useful life based on the historical behavior of the customers and a parallel analysis of the customers using the excess earnings method.

Technology

As part of our acquisition of Verafin, we acquired developed technology.

Methodology

The developed technology was valued using the income approach, specifically the relief-from-royalty method, or RFRM. The RFRM is used to estimate the cost savings that accrue to the owner of an intangible asset who would otherwise have to pay royalties or license fees on revenues earned through the use of the asset. The royalty rate is applied to the projected revenue over the expected remaining life of the intangible asset to estimate royalty savings. The net after-tax royalty savings are calculated for each year in the remaining economic life of the technology and discounted to present value.

Discount Rate

The discount rate used reflects the amount of risk associated with the hypothetical cash flows for the developed technology relative to the overall business as discussed above in “Customer Relationships.”

Estimated Useful Life

We have estimated the useful life of the Verafin technology to be 7 years.

Trade Name

As part of our acquisition of Verafin, we acquired a trade name. The trade name is recognized in the industry and carries a reputation for quality. As such, the reputation and positive recognition embodied in the trade name is a valuable asset to Nasdaq.

Methodology

The Verafin trade name was valued using the income approach, specifically the RFRM as discussed above in “Technology.”

Discount Rate

The discount rate used reflects the amount of risk associated with the hypothetical cash flows for the trade name relative to the overall business as discussed above in “Customer Relationships.”

Estimated Useful Life

We have estimated the useful life of the Verafin trade name to be 20 years and our intention is to continue to use it in the branding of products.

Pro Forma Results and Acquisition-Related Costs

The consolidated financial statements for the years ended December 31, 2022, 2021 and 2020 include the financial results of the above acquisitions from the date of the acquisitions. Pro forma financial results have not been presented since these acquisitions were not material to our financial results.

Acquisition-related costs for the transactions described above were expensed as incurred and are included in merger and strategic initiatives expense in the Consolidated Statements of Income.

5. GOODWILL AND ACQUIRED INTANGIBLE ASSETS

Goodwill

The following table presents the changes in goodwill by business segment during the year ended December 31, 2022:

		(in millions)
Market Platforms		
Balance at December 31, 2021	$	3,129
Foreign currency translation adjustments		(217)
Balance at December 31, 2022	$	2,912
Capital Access Platforms		
Balance at December 31, 2021	$	4,292
Goodwill acquired		40
Foreign currency translation and other adjustments		(154)
Balance at December 31, 2022	$	4,178
Anti-Financial Crime		
Balance at December 31, 2021	$	1,012
Foreign currency translation adjustments		(3)
Balance at December 31, 2022	$	1,009
Total		
Balance at December 31, 2021	$	8,433
Balance at Goodwill acquired		40
Foreign currency translation adjustments		(374)
Balance at December 31, 2022	$	8,099

In the table above, the December 31, 2021 balances reflect the revised goodwill following our corporate realignment. As of October 1, 2022, as required under ASC 350-20, the carrying value of goodwill was reassigned to our new reportable segments based on a relative fair value allocation approach.

As of December 31, 2022, the amount of goodwill that is expected to be deductible for tax purposes in future periods is $35 million.

Goodwill represents the excess of purchase price over the value assigned to the net assets, including identifiable intangible assets, of a business acquired. Goodwill is allocated to our reporting units based on the assignment of the fair values of each reporting unit of the acquired company. We test goodwill for impairment at the reporting unit level annually, or in interim periods if certain events occur indicating that the carrying amount may be impaired, such as changes in the business climate, poor indicators of operating performance or the sale or disposition of a significant portion of a reporting unit. There was no impairment of goodwill for the years ended December 31, 2022, 2021 and 2020; however, events such as prolonged economic weakness or unexpected significant declines in operating results of any of our reporting units or businesses, may result in goodwill impairment charges in the future.

Acquired Intangible Assets

The following table presents details of our total acquired intangible assets, both finite- and indefinite-lived:

		December 31, 2022		December 31, 2021
Finite-Lived Intangible Assets		(in millions)		
Gross Amount				
Technology	$	304	$	295
Customer relationships		2,005		2,050
Trade names and other		60		60
Foreign currency translation adjustment		(209)		(143)
Total gross amount	$	2,160	$	2,262
Accumulated Amortization				
Technology	$	(97)	$	(54)
Customer relationships		(778)		(711)
Trade names and other		(17)		(11)
Foreign currency translation adjustment		120		81
Total accumulated amortization	$	(772)	$	(695)
Net Amount				
Technology	$	207	$	241
Customer relationships		1,227		1,339
Trade names and other		43		49
Foreign currency translation adjustment		(89)		(62)
Total finite-lived intangible assets	$	1,388	$	1,567
Indefinite-Lived Intangible Assets				
Exchange and clearing registrations	$	1,257	$	1,257
Trade names		121		121
Licenses		52		52
Foreign currency translation adjustment		(237)		(184)
Total indefinite-lived intangible assets	$	1,193	$	1,246
Total intangible assets, net	$	2,581	$	2,813

There was no impairment of indefinite-lived intangible assets for the years ended December 31, 2022, 2021 and 2020. We recorded an impairment charge of $14 million in 2021 related to a finite-lived intangible asset for customer relationships associated with the wind down of a previous acquisition included in depreciation and amortization expense in the Consolidated Statements of Income. There were no material finite-lived impairment charges in 2022 and 2020.

The following table presents our amortization expense for acquired finite-lived intangible assets:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Amortization expense	$ 153	$ 170	$ 103

The table below presents the estimated future amortization expense (excluding the impact of foreign currency translation adjustments of $89 million as of December 31, 2022) of acquired finite-lived intangible assets as of December 31, 2022:

	(in millions)
2023	$ 159
2024	153
2025	151
2026	148
2027	147
2028+	719
Total	$ 1,477

6. INVESTMENTS

The following table presents the details of our investments:

	December 31, 2022	December 31, 2021
	(in millions)	
Financial investments	$ 181	$ 208
Equity method investments	390	363
Equity securities	86	67

Financial Investments

Financial investments are comprised of trading securities, primarily highly rated European government debt securities, of which $161 million as of December 31, 2022 and $162 million as of December 31, 2021, are assets primarily utilized to meet regulatory capital requirements, mainly for our clearing operations at Nasdaq Clearing.

Equity Method Investments

We record our estimated pro-rata share of earnings or losses each reporting period and record any dividends as a reduction in the investment balance. As of December 31, 2022 and 2021, our equity method investments primarily included our 40.0% equity interest in OCC.

The carrying amounts of our equity method investments are included in other non-current assets in the Consolidated Balance Sheets. No impairments were recorded for the years end December 31, 2022, 2021 and 2020.

Net income recognized from our equity interest in the earnings and losses of these equity method investments, primarily OCC, was $31 million, $52 million and $70 million for the years ended December 31, 2022, 2021 and 2020, respectively. For the year ended December 31, 2022, lower equity interest in the earnings of OCC, as compared to 2021, was primarily driven by a reduction in the clearing fee rate that OCC charges its customers, partially offset by elevated U.S. industry trading volumes.

Equity Securities

The carrying amounts of our equity securities are included in other non-current assets in the Consolidated Balance Sheets. We elected the measurement alternative for substantially all of our equity securities as they do not have a readily determinable fair value. No material adjustments were made to the carrying value of our equity securities for the years ended December 31, 2022, 2021 and 2020. As of December 31, 2022 and December 31, 2021, our equity securities primarily represent various strategic investments made through our corporate venture program as well as investments acquired through various acquisitions.

7. PROPERTY AND EQUIPMENT, NET

The following table presents our major categories of property and equipment, net:

	Year Ended December 31,	
	2022	2021
	(in millions)	
Data processing equipment and software	$ 786	$ 735
Furniture, equipment and leasehold improvements	305	288
Total property and equipment	1,091	1,023
Less: accumulated depreciation and amortization and impairment charges	(559)	(514)
Total property and equipment, net	$ 532	$ 509

Depreciation and amortization expense for property and equipment was $105 million for the year ended December 31, 2022, $108 million for the year ended December 31, 2021, and $99 million for the year ended December 31, 2020. These amounts are included in depreciation and amortization expense in the Consolidated Statements of Income.

We recorded pre-tax, non-cash property and equipment asset impairment charges on capitalized software that was retired and accelerated depreciation expense on certain assets as a result of a decrease in their useful life of $8 million in 2022, $4 million in 2021 and $14 million in 2020. These charges are included in restructuring charges in the Consolidated Statements of Income. See Note 20, "Restructuring Charges," for further discussion. There were no other material impairments of property and equipment recorded in 2022, 2021 and 2020.

As of December 31, 2022 and 2021, we did not own any real estate properties.

8. DEFERRED REVENUE

Deferred revenue represents consideration received that is yet to be recognized as revenue. The changes in our deferred revenue during the year ended December 31, 2022 are reflected in the following table:

	Balance at December 31, 2021	Additions	Revenue Recognized	Adjustments	Balance at December 31, 2022
	(in millions)				
Market Platforms:					
Market Technology	$ 36	$ 28	$ (30)	$ (5)	$ 29
Capital Access Platforms:					
Initial Listing	145	25	(51)	(3)	116
Annual Listings	2	3	(2)	(1)	2
Workflow & Insights	159	166	(152)	(1)	172
Anti-Financial Crime	81	106	(79)	—	108
Other	25	12	(13)	(3)	21
Total	$ 448	$ 340	$ (327)	$ (13)	$ 448

In the above table:

- Additions primarily reflect deferred revenue billed in the current period, net of recognition.
- Revenue recognized includes revenue recognized during the current period that was included in the beginning balance.
- Adjustments reflect foreign currency translation adjustments.
- Other primarily includes deferred revenue from our Index business, data contracts and non-U.S. listing of additional shares fees. These fees are included in our Capital Access Platforms segment.

As of December 31, 2022, we estimate that our deferred revenue will be recognized in the following years:

Fiscal year ended:	2023	2024	2025	2026	2027	2028+	Total
	(in millions)						
Market Platforms:							
Market Technology	$ 28	$ 1	$ —	$ —	$ —	$ —	$ 29
Capital Access Platforms:							
Initial Listings	40	30	20	17	8	1	116
Annual Listings	2	—	—	—	—	—	2
Workflow & Insights	169	3	—	—	—	—	172
Anti-Financial Crime	106	2	—	—	—	—	108
Other	12	5	3	1	—	—	21
Total	$ 357	$ 41	$ 23	$ 18	$ 8	$ 1	$ 448

The timing of recognition of deferred revenue related to certain market technology contracts is primarily dependent upon the completion of customization and any significant modifications made pursuant to existing market technology contracts. As such, as it relates to market technology revenues, the timing represents our best estimate.

9. DEBT OBLIGATIONS

The following table presents the changes in the carrying amount of our debt obligations during the year ended December 31, 2022:

	December 31, 2021	Additions	Payments, Foreign Currency Translation and Accretion	December 31, 2022
		(in millions)		
Short-term debt:				
Commercial paper	$ 420	$ 3,685	$ (3,441)	$ 664
2022 Notes	598	—	(598)	—
2024 Notes	499	—	(499)	—
Total short-term debt	$ 1,517	$ 3,685	$ (4,538)	$ 664
Long-term debt - senior unsecured notes:				
2026 Notes	498	—	—	498
2029 Notes	676	—	(39)	637
2030 Notes	676	—	(39)	637
2050 Notes	486	—	—	486
2031 Notes	643	—	1	644
2040 Notes	644	—	—	644
2033 Notes	694	—	(41)	653
2052 Notes	—	541	—	541
2022 Credit Facility	(4)	(2)	1	(5)
Total long-term debt	$ 4,313	$ 539	$ (117)	$ 4,735
Total debt obligations	$ 5,830	$ 4,224	$ (4,655)	$ 5,399

In the table above, the 2024 Notes were reclassified to short-term debt as of March 31, 2022.

The long-term debt senior unsecured notes in the table above, and discussion below, are listed based on their issuance date.

Commercial Paper Program

Our U.S. dollar commercial paper program is supported by our 2022 Credit Facility which provides liquidity support for the repayment of commercial paper issued through this program. See “2022 Credit Facility” below for further discussion. The effective interest rate of commercial paper issuances fluctuates as short term interest rates and demand fluctuate. The fluctuation of these rates may impact our interest expense.

In January 2022, we issued commercial paper to partially fund our ASR agreement. See “ASR Agreement,” of Note 12, “Nasdaq Stockholders' Equity.” In December 2022, we issued commercial paper to repay in full and redeem our 2022 Notes. For further discussion see “2022 Notes” below. As of December 31, 2022, we had $664 million outstanding under our commercial paper program.

Senior Unsecured Notes

Our 2040 Notes were issued at par. All of our other outstanding senior unsecured notes were issued at a discount. As a result of the discount, the proceeds received from each issuance were less than the aggregate principal amount. As of December 31, 2022, the amounts in the table above reflect the aggregate principal amount, less the unamortized debt discount and the unamortized debt issuance costs, which are being accreted through interest expense over the life of the applicable notes. For our Euro denominated notes, the “Payments, Foreign Currency Translation and Accretion” column also includes the impact of foreign currency translation. Our senior unsecured notes are general unsecured obligations which rank equally with all of our existing and future unsubordinated obligations and are not guaranteed by any of our subsidiaries. The senior unsecured notes were issued under indentures that, among other things, limit our ability to consolidate, merge or sell all or substantially all of our assets, create liens, and enter into sale and leaseback transactions. The senior unsecured notes may be redeemed by Nasdaq at any time, subject to a make-whole amount.

Upon a change of control triggering event (as defined in the various supplemental indentures governing the applicable notes), the terms require us to repurchase all or part of each holder’s notes for cash equal to 101% of the aggregate principal amount purchased plus accrued and unpaid interest, if any.

Early Extinguishment of 2024 Notes

In May 2014, Nasdaq issued the 2024 Notes, which paid interest semiannually at a rate of 4.25% per annum. In April 2022, we primarily used the net proceeds from the 2052 Notes to repay in full and redeem our 2024 Notes. For further discussion see “2052 Notes” below. In connection with the early extinguishment of the 2024 Notes, in April 2022 we recorded a pre-tax charge of $16 million, which primarily includes a make-whole redemption price premium.

2026 Notes

In June 2016, Nasdaq issued the 2026 Notes, which pay interest semi-annually at a rate of 3.85% per annum until June 30, 2026. Such interest rate may vary with Nasdaq’s debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 5.85%.

2029 Notes

In April 2019, Nasdaq issued the 2029 Notes, which pay interest annually at a rate of 1.75% per annum until March 28, 2029. Such interest rate may vary with Nasdaq’s debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 3.75%.

The 2029 Notes have been designated as a hedge of our net investment in certain foreign subsidiaries to mitigate the foreign exchange risk associated with certain investments in these subsidiaries. The decrease in the carrying amount of $39 million noted in the "Payments, Foreign Currency Translation and Accretion" column in the table above primarily reflects the remeasurement of the 2029 Notes into U.S. dollars and is recorded in accumulated other comprehensive loss within Nasdaq's stockholders' equity in the Consolidated Balance Sheets as of December 31, 2022.

2030 Notes

In February 2020, Nasdaq issued the 2030 Notes, which pay interest annually at a rate of 0.875% in arrears, which began on February 13, 2021.

The 2030 Notes were designated as a hedge of our net investment in certain foreign subsidiaries to mitigate the foreign exchange risk associated with certain investments in these subsidiaries. The decrease in the carrying amount of $39 million noted in the "Payments, Foreign Currency Translation and Accretion" column in the table above primarily reflects the remeasurement of the 2030 Notes into U.S. dollars and is recorded in accumulated other comprehensive loss within Nasdaq's stockholders' equity in the Consolidated Balance Sheets as of December 31, 2022.

2050 Notes

In April 2020, Nasdaq issued the 2050 Notes, which pay interest semi-annually at a rate of 3.25% per annum until April 28, 2050. Such rate may vary with Nasdaq's debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 5.25%.

2022, 2031 and 2040 Notes

In December 2020, Nasdaq issued the 2022, 2031 and 2040 Notes. The net proceeds were used to partially fund the acquisition of Verafin. For further discussion of the acquisition of Verafin, see "2021 Acquisition," of Note 4, "Acquisitions and Divestiture."

2022 Notes

In December 2022, we used the net proceeds from commercial paper to repay, in full, the 2022 Notes. The 2022 Notes paid interest semi-annually in arrears, which began on June 21, 2021.

2031 Notes

The 2031 Notes pay interest semi-annually in arrears, which began on January 15, 2021. The interest rate of 1.650% may vary with Nasdaq's debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 3.65%.

2040 Notes

The 2040 Notes pay interest semi-annually in arrears, which began on June 21, 2021. The interest rate of 2.500% may vary with Nasdaq's debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 4.50%.

2033 Notes

In July 2021, Nasdaq issued the 2033 Notes, which pay interest annually in arrears, at a rate of 0.900%, beginning on July 30, 2022.

The 2033 Notes have been designated as a hedge of our net investment in certain foreign subsidiaries to mitigate the foreign exchange risk associated with certain investments in these subsidiaries. The decrease in the carrying amount of $41 million noted in the "Payments, Foreign Currency Translation and Accretion" column in the table above primarily reflects the remeasurement of the 2033 Notes into U.S. dollars and is recorded in accumulated other comprehensive loss within Nasdaq stockholders' equity in the Consolidated Balance Sheets as of December 31, 2022.

2052 Notes

In March 2022, Nasdaq issued $550 million aggregate principal amount of 3.950% senior notes due in 2052, which pay interest semi-annually in arrears, beginning on September 7, 2022. The interest rate of 3.950% may vary with Nasdaq's debt rating, to the extent Nasdaq is downgraded below investment grade, up to a rate not to exceed 5.950%. The net proceeds from the 2052 Notes were $541 million after deducting the underwriting discount and expenses of the offering. We used the net proceeds from the 2052 Notes to redeem all of the 2024 Notes in April 2022.

Credit Facilities

2022 Credit Facility

In December 2020, Nasdaq entered into the 2020 Credit Facility, which replaced a former credit facility and consists of a $1.25 billion five-year revolving credit facility (with sublimits for non-dollar borrowings, swingline borrowings and letters of credit). We amended and restated the 2020 Credit Facility in December 2022 with a new maturity date of December 16, 2027. Nasdaq intends to use funds available under the 2022 Credit Facility for general corporate purposes and to provide liquidity support for the repayment of commercial paper issued through the commercial paper program. Nasdaq is permitted to repay borrowings under our 2022 Credit Facility at any time in whole or in part, without penalty.

As of December 31, 2022, no amounts were outstanding on the 2022 Credit Facility. The $(5) million balance represents unamortized debt issuance costs which are being accreted through interest expense over the life of the credit facility.

Borrowings under the revolving credit facility and swingline borrowings bear interest on the principal amount outstanding at a variable interest rate based on either the SOFR (or a successor rate to SOFR), the base rate (as defined in the 2022 credit agreement), or other applicable rate with respect to non-dollar borrowings, plus an applicable margin that varies with Nasdaq's debt rating. We are charged commitment fees of 0.100% to 0.250%, depending on our credit rating, whether or not amounts have been borrowed. These commitment fees are included in interest expense and were not material for the years ended December 31, 2022 and 2021.

The 2022 Credit Facility contains financial and operating covenants. Financial covenants include a maximum leverage ratio. Operating covenants include, among other things, limitations on Nasdaq's ability to incur additional indebtedness, grant liens on assets, dispose of assets and make certain restricted payments. The facility also contains customary affirmative covenants, including access to financial statements, notice of defaults and certain other material events, maintenance of properties and insurance, and customary events of default, including cross-defaults to our material indebtedness.

The 2022 Credit Facility includes an option for Nasdaq to increase the available aggregate amount by up to $750 million, subject to the consent of the lenders funding the increase and certain other conditions.

Other Credit Facilities

Certain of our European subsidiaries have several other credit facilities, which are available in multiple currencies, primarily to support our Nasdaq Clearing operations in Europe, as well as to provide a cash pool credit line for one subsidiary. These credit facilities, in aggregate, totaled $184 million as of December 31, 2022 and $212 million as of December 31, 2021 in available liquidity, none of which was utilized. Generally, these facilities each have a one year term. The amounts borrowed under these various credit facilities bear interest on the principal amount outstanding at a variable interest rate based on a base rate (as defined in the applicable credit agreement), plus an applicable margin. We are charged commitment fees (as defined in the applicable credit agreement), whether or not amounts have been borrowed. These commitment fees are included in interest expense and were not material for the years ended December 31, 2022 and 2021.

These facilities include customary affirmative and negative operating covenants and events of default.

Debt Covenants

As of December 31, 2022, we were in compliance with the covenants of all of our debt obligations.

10. RETIREMENT PLANS

Defined Contribution Savings Plan

We sponsor a 401(k) plan which is a voluntary defined contribution savings plan, for U.S. employees. Employees are immediately eligible to make contributions to the plan and are also eligible for an employer contribution match at an amount equal to 100.0% of the first 6.0% of eligible employee contributions. Savings plan expense is included in compensation and benefits expense in the Consolidated Statements of Income:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Savings Plan expense	$ 17	$ 14	$ 14

Pension and Supplemental Executive Retirement Plans

We maintain non-contributory, defined-benefit pension plans, non-qualified SERPs for certain senior executives and other post-retirement benefit plans for eligible employees in the U.S., collectively referred to as the Nasdaq Benefit Plans. Our pension plans and SERPs are frozen. Future service and salary for all participants do not count toward an accrual of benefits under the pension plans and SERPs. Most employees outside the U.S. are covered by local retirement plans or by applicable social laws. Benefits under social laws are generally expensed in the periods in which the costs are incurred. The total expense for these plans is included in compensation and benefits expense in the Consolidated Statements of Income:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Retirement Plans expense	$ 24	$ 26	$ 23

Nasdaq recognizes the funded status of the Nasdaq Benefit Plans, measured as the difference between the fair value of the plan assets and the benefit obligation, in the Consolidated Balance Sheets.

As of December 31, 2022, the fair value of our U.S. defined-benefit pension plan's assets was $79 million and the benefit obligation was $81 million. As a result, the U.S. defined-benefit pension plan is underfunded by $2 million as of December 31, 2022.

As of December 31, 2021, the fair value of our U.S. defined-benefit pension plan's assets was $111 million and the benefit obligation was $112 million. As a result, the U.S. defined-benefit pension plan was underfunded by $1 million as of December 31, 2021.

During 2022 and 2021, we did not make any contributions to our U.S. defined-benefit pension plan. For our SERP and other post-retirement benefit plans, the net underfunded liability was $28 million as of December 31, 2022 and $34 million as of December 31, 2021. The underfunded liability for the above plans is included in accrued personnel costs and other non-current liabilities in the Consolidated Balance Sheets. The plan assets of the Nasdaq Benefit Plans are invested per target allocations adopted by Nasdaq's Pension and 401(k) Committee and are primarily invested in collective fund investments that have underlying investments in fixed income securities. The collective fund investments are valued at net asset value which is a practical expedient to estimate fair value.

Accumulated Other Comprehensive Loss

As of December 31, 2022, accumulated other comprehensive loss for the Nasdaq Benefit Plans was $23 million reflecting an unrecognized net loss of $28 million, partially offset by an income tax benefit of $5 million, primarily due to our pension plans.

Estimated Future Benefit Payments

We expect to make the following benefit payments to participants in the next ten fiscal years under the Nasdaq Benefit Plans:

Fiscal Year Ended:	Pension	SERP	Post-retirement	Total
	(in millions)			
2023	$ 8	$ 5	$ —	$ 13
2024	7	3	—	10
2025	7	3	—	10
2026	8	2	—	10
2027	8	2	—	10
2028 through 2032	33	7	2	42
	$ 71	$ 22	$ 2	$ 95

Nonqualified Deferred Compensation Plan

In June 2022, we established the Nasdaq, Inc. Nonqualified Deferred Compensation Plan. This plan provides certain eligible employees with the opportunity to defer a portion of their annual salary and bonus up to certain approval limits. All deferrals and associated earnings are our general unsecured obligations and were immaterial for the year ended December 31, 2022.

11. SHARE-BASED COMPENSATION

We have a share-based compensation program for employees and non-employee directors. Share-based awards granted under this program include restricted stock (consisting of restricted stock units), PSUs and stock options. For accounting purposes, we consider PSUs to be a form of restricted stock. Generally, annual employee awards are granted on April 1st of each year.

Summary of Share-Based Compensation Expense

The following table presents the total share-based compensation expense resulting from equity awards and the 15.0% discount for the ESPP for the years ended December 31, 2022, 2021 and 2020, which is included in compensation and benefits expense in the Consolidated Statements of Income:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Share-based compensation expense before income taxes	$ 106	$ 90	$ 87

Common Shares Available Under Our Equity Plan

As of December 31, 2022, we had approximately 26.4 million shares of common stock authorized for future issuance under our Equity Plan.

Restricted Stock

We grant restricted stock to most employees. The grant date fair value of restricted stock awards is based on the closing stock price at the date of grant less the present value of future cash dividends. Restricted stock awards granted to employees below the manager level generally vest 33.3% on the first anniversary of the grant date, 33.3% on the second anniversary of the grant date, and 33.3% on the third anniversary of the grant date. Restricted stock awards granted to employees at or above the manager level generally vest 33.3% on the second anniversary of the grant date, 33.3% on the third anniversary of the grant date, and 33.3% on the fourth anniversary of the grant date.

Summary of Restricted Stock Activity

The following table summarizes our restricted stock activity for the years ended December 31, 2022, 2021 and 2020:

	Restricted Stock		
	Number of Awards	Weighted-Average Grant Date Fair Value	
Unvested at December 31, 2019	4,460,268	$	25.79
Granted	2,229,900		29.98
Vested	(1,498,071)		24.32
Forfeited	(274,944)		27.06
Unvested at December 31, 2020	4,917,153	$	28.07
Granted	1,523,235		50.52
Vested	(1,624,809)		27.78
Forfeited	(416,559)		34.04
Unvested at December 31, 2021	4,399,020	$	35.39
Granted	1,785,138		57.65
Vested	(1,525,442)		31.22
Forfeited	(278,203)		42.07
Unvested at December 31, 2022	4,380,513	$	45.48

As of December 31, 2022, $111 million of total unrecognized compensation cost related to restricted stock is expected to be recognized over a weighted-average period of 1.8 years.

PSUs

PSUs are based on performance measures that impact the amount of shares that each recipient will receive upon vesting. Prior to April 1, 2020, we had two performance-based PSU programs for certain officers, a one-year performance-based program and a three-year cumulative performance-based program that focuses on TSR. Effective April 1, 2020, to better align the equity programs for eligible officers, the one-year performance-based program was eliminated and all eligible officers now participate in the three-year cumulative performance-based program. The performance periods are complete for all PSUs granted under the one-year performance-based program, and all shares underlying these PSUs have vested as of December 31, 2022.

One-Year PSU Program

The grant date fair value of PSUs under the one-year performance-based program was based on the closing stock price at the date of grant less the present value of future cash dividends. Under this program, an eligible employee received a target grant of PSUs, but could have received from 0.0% to 150.0% of the target amount granted, depending on the achievement of performance measures. These awards vest ratably on an annual basis over a three-year period commencing with the end of the one-year performance period. Compensation cost was recognized over the performance period and the three-year vesting period based on the probability that such performance measures will be achieved, taking into account an estimated forfeiture rate.

Three-Year PSU Program

Under the three-year performance-based program, each eligible individual receives PSUs, subject to market conditions, with a three-year cumulative performance period that vest at the end of the performance period. Compensation cost is recognized over the three-year performance period, taking into account an estimated forfeiture rate, regardless of whether the market condition is satisfied, provided that the requisite service period has been completed. Performance will be determined by comparing Nasdaq's TSR to two peer groups, each weighted 50.0%. The first peer group consists of exchange companies, and the second peer group consists of all companies in the S&P 500. Nasdaq's relative performance ranking against each of these groups will determine the final number of shares delivered to each individual under the program. The award issuance under this program will be between 0.0% and 200.0% of the number of PSUs granted and will be determined by Nasdaq's overall performance against both peer groups. However, if Nasdaq's TSR is negative for the three-year performance period, regardless of TSR ranking, the award issuance will not exceed 100.0% of the number of PSUs granted. We estimate the fair value of PSUs granted under the three-year PSU program using the Monte Carlo simulation model, as these awards contain a market condition.

Grants of PSUs that were issued in 2020 with a three-year performance period exceeded the applicable performance parameters. As a result, an additional 764,748 units above the original target were granted in the first quarter of 2023 and were fully vested upon issuance.

The following weighted-average assumptions were used to determine the weighted-average fair values of the PSU awards granted under the three-year PSU program for the years ended December 31, 2022 and 2021:

	Year Ended December 31,			
	2022		2021	
Weighted-average risk free interest rate		2.61 %		0.33 %
Expected volatility		30.04 %		30.30 %
Weighted-average grant date share price	$	60.55	$	51.88
Weighted-average fair value at grant date	$	63.68	$	72.75

In the table above, the risk-free interest rate for periods within the expected life of the award is based on the U.S. Treasury yield curve in effect at the time of grant; and we use historic volatility for PSU awards issued under the three-year PSU program, as implied volatility data could not be obtained for all the companies in the peer groups used for relative performance measurement within the program.

In addition, the annual dividend assumption utilized in the Monte Carlo simulation model is based on Nasdaq's dividend yield at the date of grant.

Summary of PSU Activity

The following table summarizes our PSU activity for the years ended December 31, 2022, 2021 and 2020:

	PSUs			
	One-Year Program		Three-Year Program	
	Number of Awards	Weighted-Average Grant Date Fair Value	Number of Awards	Weighted-Average Grant Date Fair Value
Unvested at December 31, 2019	951,753	$ 26.96	2,392,353	$ 32.77
Granted	80,340	28.06	960,984	35.81
Vested	(415,269)	26.03	(902,301)	27.19
Forfeited	(108,180)	27.47	(21,069)	32.75
Unvested at December 31, 2020	508,644	$ 27.78	2,429,967	$ 36.04
Granted	—	—	1,081,707	58.66
Vested	(299,292)	27.66	(1,178,181)	38.95
Forfeited	(60,150)	27.76	(41,121)	47.43
Unvested at December 31, 2021	149,202	$ 28.01	2,292,372	$ 45.01
Granted	—	—	1,495,092	45.66
Vested	(142,459)	28.02	(1,735,842)	32.57
Forfeited	(6,743)	27.85	(85,080)	52.27
Unvested at December 31, 2022	—	$ —	1,966,542	$ 56.44

In the table above, the granted amount under the three-year program reflects additional awards granted based on overachievement of performance parameters.

As of December 31, 2022, total unrecognized compensation cost related to the three-year PSU program is $44 million and is expected to be recognized over a weighted-average period of 1.3 years.

Stock Options

In January 2022, in connection with a new five year employment agreement, our Chief Executive Officer received an aggregate of 613,872 performance-based non-qualified stock options, which will vest as follows:

- 50% will vest contingent upon the achievement of certain performance conditions; and
- 50% will vest five years after the grant date, subject to continued employment through such date.

The fair value of stock options are estimated using the Black-Scholes option-pricing model. These options expire 10 years after the date of grant. There were no stock option awards granted for the years ended December 31, 2021 and 2020.

A summary of stock option activity for the years ended December 31, 2022, 2021 and 2020 is as follows:

	Number of Stock Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (in millions)
Outstanding at December 31, 2019	1,137,306	$ 18.11		
Exercised	(255,585)	7.97		
Forfeited	(1,662)	6.98		
Outstanding at December 31, 2020	880,059	$ 21.07	5.5	$ 20
Exercised	(73,227)	8.43		
Forfeited	(381)	8.43		
Outstanding at December 31, 2021	806,451	$ 22.23	5.0	$ 39
Granted	613,872	67.49		
Outstanding at December 31, 2022	1,420,323	$ 41.79	6.2	$ 32
Exercisable at December 31, 2022	806,451	$ 22.23	4.0	$ 32

The net cash proceeds from the exercise of 73,227 stock options for the year ended December 31, 2021 was $1 million. The net cash proceeds from the exercise of 255,585 stock options for the year ended December 31, 2020 was $2 million. The total pre-tax intrinsic value of stock options exercised was $3 million for the year ended December 31, 2021 and $9 million for the year ended December 31, 2020.

As of December 31, 2022, the aggregate pre-tax intrinsic value of the outstanding and exercisable stock options in the above table was $32 million and $32 million, respectively, and represents the difference between our closing stock price on December 31, 2022 of $61.35 and the exercise price, times the number of shares that would have been received by the option holder had the option holder exercised the stock options on that date. This amount can change based on the fair market value of our common stock. As of December 31, 2021, 0.8 million outstanding stock options were exercisable and the weighted-average exercise price was $22.23.

ESPP

We have an ESPP under which approximately 12.1 million shares of our common stock were available for future issuance as of December 31, 2022. Under our ESPP, employees may purchase shares having a value not exceeding 10.0% of their annual compensation, subject to applicable annual Internal Revenue Service limitations. We record compensation expense related to the 15.0% discount that is given to our employees.

	Year Ended December 31, 2022	2021	2020
Number of shares purchased by employees	591,820	605,274	663,369
Weighted-average price of shares purchased	$ 43.54	$ 41.41	$ 31.93
Compensation expense (in millions)	$ 8	$ 7	$ 5

12. NASDAQ STOCKHOLDERS' EQUITY

Common Stock

As of December 31, 2022, 900,000,000 shares of our common stock were authorized, 513,157,630 shares were issued and 491,592,491 shares were outstanding. As of December 31, 2021, 900,000,000 shares of our common stock were authorized, 520,256,817 shares were issued and 500,038,905 shares were outstanding. The holders of common stock are entitled to one vote per share, except that our certificate of incorporation limits the ability of any shareholder to vote in excess of 5.0% of the then-outstanding shares of Nasdaq common stock.

Common Stock in Treasury, at Cost

We account for the purchase of treasury stock under the cost method with the shares of stock repurchased reflected as a reduction to Nasdaq stockholders' equity and included in common stock in treasury, at cost in the Consolidated Balance Sheets. Shares repurchased under our share repurchase program are currently retired and canceled and are therefore not included in the common stock in treasury balance. If treasury shares are reissued, they are recorded at the average cost of the treasury shares acquired. We held 21,565,139 shares of common stock in treasury as of December 31, 2022 and 20,217,912 shares as of December 31, 2021, most of which are related to shares of our common stock withheld for the settlement of employee tax withholding obligations arising from the vesting of restricted stock and PSUs.

Share Repurchase Program

As of December 31, 2022, our board of directors authorized an increase to our share repurchase program and the remaining aggregate authorized amount under the existing share repurchase program was $650 million.

These repurchases may be made from time to time at prevailing market prices in open market purchases, privately-negotiated transactions, block purchase techniques, an accelerated share repurchase program or otherwise, as determined by our management. The repurchases are primarily funded from existing cash balances. The share repurchase program may be suspended, modified or discontinued at any time, and has no defined expiration date.

The following is a summary of our share repurchase activity, excluding the repurchases done through our ASR agreement described below, reported based on settlement date, for the year ended December 31, 2022:

	Year Ended December 31, 2022
Number of shares of common stock repurchased	5,465,595
Average price paid per share	$ 56.26
Total purchase price (in millions)	$ 308

In the table above, the number of shares of common stock repurchased excludes an aggregate of 1,347,227 shares withheld upon the vesting of restricted stock and PSUs for the year ended December 31, 2022.

As discussed above in "Common Stock in Treasury, at Cost," shares repurchased under our share repurchase program are currently retired and cancelled.

ASR Agreement

In January 2022, we entered into an ASR agreement to repurchase $325 million of common stock. We received a total delivery of 5,629,161 shares of common stock and completed the ASR program during the first quarter of 2022.

Preferred Stock

Our certificate of incorporation authorizes the issuance of 30,000,000 shares of preferred stock, par value $0.01 per share, issuable from time to time in one or more series. As of December 31, 2022 and December 31, 2021, no shares of preferred stock were issued or outstanding.

Stock Split

See "Stock Split Effected in the Form of a Stock Dividend," of Note 2, "Basis of Presentation and Principles of Consolidation."

Cash Dividends on Common Stock

During 2022, our board of directors declared and paid the following cash dividends:

Declaration Date	Dividend Per Common Share	Record Date	Total Amount Paid (in millions)	Payment Date
January 26, 2022	$ 0.18	March 11, 2022	$ 88	March 25, 2022
April 20, 2022	0.20	June 10, 2022	98	June 24, 2022
July 19, 2022	0.20	September 16, 2022	99	September 30, 2022
October 19, 2022	0.20	December 2, 2022	98	December 16, 2022
			$ 383	

The total amount paid of $383 million was recorded in retained earnings within Nasdaq's stockholders' equity in the Consolidated Balance Sheets at December 31, 2022.

In January 2023, the board of directors approved a regular quarterly cash dividend of $0.20 per share on our outstanding common stock. The dividend is payable on March 31, 2023 to shareholders of record at the close of business on March 17, 2023. The estimated aggregate payment of this dividend is $98 million. Future declarations of quarterly dividends and the establishment of future record and payment dates are subject to approval by the board of directors.

The board of directors maintains a dividend policy with the intention to provide stockholders with regular and increasing dividends as earnings and cash flows increase.

13. EARNINGS PER SHARE

The following table sets forth the computation of basic and diluted earnings per share:

	Year Ended December 31,		
	2022	2021	2020
Numerator:	(in millions, except share and per share amounts)		
Net income attributable to common shareholders	$ 1,125	$ 1,187	$ 933
Denominator:			
Weighted-average common shares outstanding for basic earnings per share	492,420,787	497,698,377	493,245,573
Weighted-average effect of dilutive securities:			
Employee equity awards	5,436,778	7,389,189	6,406,596
Contingent issuance of common stock	—	—	1,059,654
Weighted-average common shares outstanding for diluted earnings per share	497,857,565	505,087,566	500,711,823
Basic and diluted earnings per share:			
Basic earnings per share	$ 2.28	$ 2.38	$ 1.89
Diluted earnings per share	$ 2.26	$ 2.35	$ 1.86

In the table above, employee equity awards from our PSU program, which are considered contingently issuable, are included in the computation of dilutive earnings per share on a weighted average basis when management determines that the applicable performance criteria would have been met if the performance period ended as of the date of the relevant computation.

Securities that were not included in the computation of diluted earnings per share because their effect was antidilutive were immaterial for the years ended December 31, 2021 and 2020.

14. FAIR VALUE OF FINANCIAL INSTRUMENTS

The following tables present our financial assets and financial liabilities that were measured at fair value on a recurring basis as of December 31, 2022 and December 31, 2021.

	December 31, 2022			
	Total	Level 1	Level 2	Level 3
	(in millions)			
European government debt securities	$ 147	$ 147	$ —	$ —
Corporate debt securities	7	—	7	—
State-owned enterprises and municipal securities	7	—	7	—
Swedish mortgage bonds	20	—	20	—
Total assets at fair value	$ 181	$ 147	$ 34	$ —

	December 31, 2021			
	Total	Level 1	Level 2	Level 3
	(in millions)			
European government debt securities	$ 144	$ 144	$ —	$ —
Corporate debt securities	20	—	20	—
State-owned enterprises and municipal securities	11	—	11	—
Swedish mortgage bonds	21	—	21	—
Time deposits	12	—	12	—
Total assets at fair value	$ 208	$ 144	$ 64	$ —

Financial Instruments Not Measured at Fair Value on a Recurring Basis

Some of our financial instruments are not measured at fair value on a recurring basis but are recorded at amounts that approximate fair value due to their liquid or short-term nature. Such financial assets and financial liabilities include: cash and cash equivalents, restricted cash and cash equivalents, receivables, net, certain other current assets, accounts payable and accrued expenses, Section 31 fees payable to SEC, accrued personnel costs, commercial paper and certain other current liabilities.

Our investment in OCC is accounted for under the equity method of accounting. We have elected the measurement alternative for the majority of our equity securities, which primarily represent various strategic investments made through our corporate venture program. See “Equity Method Investments,” and “Equity Securities,” of Note 6, “Investments,” for further discussion.

We also consider our debt obligations to be financial instruments. As of December 31, 2022, the majority of our debt obligations were fixed-rate obligations. We are exposed to changes in interest rates as a result of borrowings under our 2022 Credit Facility, as the interest rates on this facility have a variable rate depending on the maturity of the borrowing and the implied underlying reference rate. As of December 31, 2022, we had no outstanding borrowings under our 2022 Credit Facility. We are also exposed to changes in interest rates as a result of the amounts outstanding from the sale of commercial paper under our commercial paper program. As of December 31, 2022, we had $664 million outstanding under our commercial paper program. The fair value of our remaining debt obligations utilizing discounted cash flow analyses for our floating rate debt, and prevailing market rates for our fixed rate debt was $4.4 billion as of December 31, 2022 and $5.9 billion as of December 31, 2021. The discounted cash flow analyses are based on borrowing rates currently available to us for debt with similar terms and maturities. The fair value of our commercial paper as of December 31, 2022 approximated the carrying value since the rates of interest on this short-term debt approximated market rates. Our commercial paper and our fixed rate and floating rate debt are categorized as Level 2 in the fair value hierarchy.

For further discussion of our debt obligations, see Note 9, “Debt Obligations.”

Non-Financial Assets Measured at Fair Value on a Non-Recurring Basis

Our non-financial assets, which include goodwill, intangible assets, and other long-lived assets, are not required to be carried at fair value on a recurring basis. Fair value measures of non-financial assets are primarily used in the impairment analysis of these assets. Any resulting asset impairment would require that the non-financial asset be recorded at its fair value. Nasdaq uses Level 3 inputs to measure the fair value of the above assets on a non-recurring basis. As of December 31, 2022 and December 31, 2021, there were no non-financial assets measured at fair value on a non-recurring basis.

15. CLEARING OPERATIONS

Nasdaq Clearing

Nasdaq Clearing is authorized and supervised under EMIR as a multi-asset clearinghouse by the SFSA. Such authorization is effective for all member states of the European Union and certain other non-member states that are part of the European Economic Area, including Norway. The clearinghouse acts as the CCP for exchange and OTC trades in equity derivatives, fixed income derivatives, resale and repurchase contracts, power derivatives, emission allowance derivatives, and seafood derivatives.

Through our clearing operations in the financial markets, which include the resale and repurchase market, the commodities markets, and the seafood market, Nasdaq Clearing is the legal counterparty for, and guarantees the fulfillment of, each contract cleared. These contracts are not used by Nasdaq Clearing for the purpose of trading on its own behalf. As the legal counterparty of each transaction, Nasdaq Clearing bears the counterparty risk between the purchaser and seller in the contract. In its guarantor role, Nasdaq Clearing has precisely equal and offsetting claims to and from clearing members on opposite sides of each contract, standing as the CCP on every contract cleared. In accordance with the rules and regulations of Nasdaq Clearing, default fund and margin collateral requirements are calculated for each clearing member’s positions in accounts with the CCP. See “Default Fund Contributions and Margin Deposits” below for further discussion of Nasdaq Clearing’s default fund and margin requirements.

Nasdaq Clearing maintains three member sponsored default funds: one related to financial markets, one related to commodities markets and one related to the seafood market. Under this structure, Nasdaq Clearing and its clearing members must contribute to the total regulatory capital related to the clearing operations of Nasdaq Clearing. This structure applies an initial separation of default fund contributions for the financial, commodities and seafood markets in order to create a buffer for each market’s counterparty risks. See “Default Fund Contributions” below for further discussion of Nasdaq Clearing’s default fund. A power of assessment and a liability waterfall have also been implemented to further align risk between Nasdaq Clearing and its clearing members. See “Power of Assessment” and “Liability Waterfall” below for further discussion.

Nasdaq Commodities Clearing Default

In September 2018, a member of the Nasdaq Clearing commodities market defaulted due to the inability to post sufficient collateral to cover increased margin requirements for the positions of the relevant member, which had experienced losses due to sharp adverse movements in the Nordic - German power market spread. Nasdaq Clearing followed default procedures and offset the future market risk on the defaulting member’s positions.

In December 2018, the SFSA initiated a review of Nasdaq Clearing. In January 2021, the SFSA issued a warning combined with an administrative fine of approximately $29 million (SEK 300 million) to Nasdaq Clearing based on its review. Nasdaq Clearing appealed the SFSA´s decision to the Administrative Court. In December 2021, the court rejected Nasdaq Clearing's appeal and upheld the decision of the SFSA. In January 2022, Nasdaq Clearing appealed this decision to the Administrative Court of Appeal. The most recent hearing took place in October 2022, and we received the decision in November 2022. The court decided to reduce the administrative fine issued by the SFSA from 300 million SEK to 250 million SEK (approximately $24 million). In December 2022, Nasdaq Clearing appealed the decision of the Administrative Court of Appeal to the Supreme Administrative Court of Appeal. While we continue to firmly believe in the merit of our appeal, due to the decision by the Administrative Court, we have determined it is appropriate to record an accrual for the full amount of the administrative fine issued by the SFSA. A charge for $29 million was recorded to regulatory expense in our Consolidated Statements of Income for the year ended December 31, 2021. As a result of the reduced fine communication in 2022, we have released $5 million to regulatory expense for the year ended December 31, 2022.

Default Fund Contributions and Margin Deposits

As of December 31, 2022, clearing member default fund contributions and margin deposits were as follows:

	December 31, 2022		
	Cash Contributions	Non-Cash Contributions	Total Contributions
		(in millions)	
Default fund contributions	$ 1,345	$ 115	$ 1,460
Margin deposits	5,676	7,683	13,359
Total	$ 7,021	$ 7,798	$ 14,819

Of the total default fund contributions of $1,460 million, Nasdaq Clearing can utilize $1,377 million as capital resources in the event of a counterparty default. The remaining balance of $83 million pertains to member posted surplus balances.

Our clearinghouse holds material amounts of clearing member cash deposits which are held or invested primarily to provide security of capital while minimizing credit, market and liquidity risks. While we seek to achieve a reasonable rate of return, we are primarily concerned with preservation of capital and managing the risks associated with these deposits.

Clearing member cash contributions are maintained in demand deposits held at central banks and large, highly rated financial institutions or secured through direct investments, primarily central bank certificates and highly rated European government debt securities with original maturities primarily one year or less, reverse repurchase agreements and multilateral development bank debt securities. Investments in reverse repurchase agreements range in maturity from 2 to 10 days and are secured with highly rated government securities and multilateral development banks. The carrying value of these securities approximates their fair value due to the short-term nature of the instruments and reverse repurchase agreements.

Nasdaq Clearing has invested the total cash contributions of $7,021 million as of December 31, 2022 and $5,911 million as of December 31, 2021, in accordance with its investment policy as follows:

	December 31, 2022	December 31, 2021
	(in millions)	
Demand deposits	$ 4,775	$ 3,061
Central bank certificates	1,695	2,013
Restricted cash and cash equivalents	**$ 6,470**	**$ 5,074**
European government debt securities	222	414
Reverse repurchase agreements	192	152
Multilateral development bank debt securities	137	271
Investments	**$ 551**	**$ 837**
Total	**$ 7,021**	**$ 5,911**

In the table above, the change from December 31, 2021 to December 31, 2022 includes currency translation adjustments of $1,255 million for restricted cash and cash equivalents and $75 million for investments.

For the years ended December 31, 2022, 2021 and 2020 investments related to default funds and margin deposits, net includes purchases of investment securities of $47,525 million, $41,098 million and $54,046 million, respectively, and proceeds from sales and redemptions of investment securities of $47,736 million, $40,966 million and $54,155 million, respectively.

In the investment activity related to default fund and margin contributions, we are exposed to counterparty risk related to reverse repurchase agreement transactions, which reflect the risk that the counterparty might become insolvent and, thus, fail to meet its obligations to Nasdaq Clearing. We mitigate this risk by only engaging in transactions with high credit quality reverse repurchase agreement counterparties and by limiting the acceptable collateral under the reverse repurchase agreement to high quality issuers, primarily government securities and other securities explicitly guaranteed by a government. The value of the underlying security is monitored during the lifetime of the contract, and in the event the market value of the underlying security falls below the reverse repurchase amount, our clearinghouse may require additional collateral or a reset of the contract.

Default Fund Contributions

Required contributions to the default funds are proportional to the exposures of each clearing member. When a clearing member is active in more than one market, contributions must be made to all markets' default funds in which the member is active. Clearing members' eligible contributions may include cash and non-cash contributions. Cash contributions received are maintained in demand deposits held at central banks and large, highly rated financial institutions or invested by Nasdaq Clearing, in accordance with its investment policy, either in central bank certificates, highly rated government debt securities, reverse repurchase agreements with highly rated government debt securities as collateral, or multilateral development bank debt securities. Nasdaq Clearing maintains and manages all cash deposits related to margin collateral. All risks and rewards of collateral ownership, including interest, belong to Nasdaq Clearing. Clearing members' cash contributions are included in default funds and margin deposits in the Consolidated Balance Sheets as both a current asset and a current liability. Non-cash contributions include highly rated government debt securities that must meet specific criteria approved by Nasdaq Clearing. Non-cash contributions are pledged assets that are not recorded in the Consolidated Balance Sheets as Nasdaq Clearing does not take legal ownership of these assets and the risks and rewards remain with the clearing members. These balances may fluctuate over time due to changes in the amount of deposits required and whether members choose to provide cash or non-cash contributions. Assets pledged are held at a nominee account in Nasdaq Clearing's name for the benefit of the clearing members and are immediately accessible by Nasdaq Clearing in the event of a default. In addition to clearing members' required contributions to the liability waterfall, Nasdaq Clearing is also required to contribute capital to the liability waterfall and overall regulatory capital as specified under its clearinghouse rules. As of December 31, 2022, Nasdaq Clearing committed capital totaling $125 million to the liability waterfall and overall regulatory capital, in the form of government debt securities, which are recorded as financial investments in the Consolidated Balance Sheets. The combined regulatory capital of the clearing members and Nasdaq Clearing is intended to secure the obligations of a clearing member exceeding such member's own margin and default fund deposits and may be used to cover losses sustained by a clearing member in the event of a default.

Margin Deposits

Nasdaq Clearing requires all clearing members to provide collateral, which may consist of cash and non-cash contributions, to guarantee performance on the clearing members' open positions, or initial margin. In addition, clearing members must also provide collateral to cover the daily margin call if needed. See "Default Fund Contributions" above for further discussion of cash and non-cash contributions.

Similar to default fund contributions, Nasdaq Clearing maintains and manages all cash deposits related to margin collateral. All risks and rewards of collateral ownership, including interest, belong to Nasdaq Clearing and are recorded in revenues. These cash deposits are recorded in default funds and margin deposits in the Consolidated Balance Sheets as both a current asset and a current liability.

Pledged margin collateral is not recorded in our Consolidated Balance Sheets as all risks and rewards of collateral ownership, including interest, belong to the counterparty. Assets pledged are held at a nominee account in Nasdaq Clearing's name for the benefit of the clearing members and are immediately accessible by Nasdaq Clearing in the event of a default.

Nasdaq Clearing marks to market all outstanding contracts and requires payment from clearing members whose positions have lost value. The mark-to-market process helps identify any clearing members that may not be able to satisfy their financial obligations in a timely manner allowing Nasdaq Clearing the ability to mitigate the risk of a clearing member defaulting due to exceptionally large losses. In the event of a default, Nasdaq Clearing can access the defaulting member's margin and default fund deposits to cover the defaulting member's losses.

Regulatory Capital and Risk Management Calculations

Nasdaq Clearing manages risk through a comprehensive counterparty risk management framework, which is comprised of policies, procedures, standards and financial resources. The level of regulatory capital is determined in accordance with Nasdaq Clearing's regulatory capital and default fund policy, as approved by the SFSA. Regulatory capital calculations are continuously updated through a proprietary capital-at-risk calculation model that establishes the appropriate level of capital.

As mentioned above, Nasdaq Clearing is the legal counterparty for each contract cleared and thereby guarantees the fulfillment of each contract. Nasdaq Clearing accounts for this guarantee as a performance guarantee. We determine the fair value of the performance guarantee by considering daily settlement of contracts and other margining and default fund requirements, the risk management program, historical evidence of default payments, and the estimated probability of potential default payouts. The calculation is determined using proprietary risk management software that simulates gains and losses based on historical market prices, extreme but plausible market scenarios, volatility and other factors present at that point in time for those particular unsettled contracts. Based on this analysis, excluding any liability related to the Nasdaq commodities clearing default (see discussion above), the estimated liability was nominal and no liability was recorded as of December 31, 2022.

Power of Assessment

To further strengthen the contingent financial resources of the clearinghouse, Nasdaq Clearing has power of assessment that provides the ability to collect additional funds from its clearing members to cover a defaulting member's remaining obligations up to the limits established under the terms of the clearinghouse rules. The power of assessment corresponds to 230.0% of the clearing member's aggregate contribution to the financial, commodities and seafood markets' default funds.

Liability Waterfall

The liability waterfall is the priority order in which the capital resources would be utilized in the event of a default where the defaulting clearing member's collateral and default fund contribution would not be sufficient to cover the cost to settle its portfolio. If a default occurs and the defaulting clearing member's collateral, including cash deposits and pledged assets, is depleted, then capital is utilized in the following amount and order:

- junior capital contributed by Nasdaq Clearing, which totaled $40 million as of December 31, 2022;
- a loss-sharing pool related only to the financial market that is contributed to by clearing members and only applies if the defaulting member's portfolio includes interest rate swap products;
- specific market default fund where the loss occurred (i.e., the financial, commodities, or seafood market), which includes capital contributions of the clearing members on a pro-rata basis; and
- fully segregated senior capital for each specific market contributed by Nasdaq Clearing, calculated in accordance with clearinghouse rules, which totaled $21 million as of December 31, 2022.

If additional funds are needed after utilization of the liability waterfall, or if part of the waterfall has been utilized and needs to be replenished, then Nasdaq Clearing will utilize its power of assessment and additional capital contributions will be required by non-defaulting members up to the limits established under the terms of the clearinghouse rules.

During 2022, Nasdaq Clearing updated its recovery plan and rule book by introducing additional recovery tools, in line with the new European Union regulations for the recovery and resolution of central counterparties, which became effective during 2022.

In addition to the capital held to withstand counterparty defaults described above, Nasdaq Clearing also has committed capital of $64 million to ensure that it can handle an orderly wind-down of its operation, and that it is adequately protected against investment, operational, legal, and business risks.

Market Value of Derivative Contracts Outstanding

The following table presents the market value of derivative contracts outstanding prior to netting:

	December 31, 2022
	(in millions)
Commodity and seafood options, futures and forwards	$ 654
Fixed-income options and futures	2,282
Stock options and futures	141
Index options and futures	43
Total	$ 3,120

In the table above:

- We determined the fair value of our option contracts using standard valuation models that were based on market-based observable inputs including implied volatility, interest rates and the spot price of the underlying instrument.
- We determined the fair value of our futures contracts based upon quoted market prices and average quoted market yields.
- We determined the fair value of our forward contracts using standard valuation models that were based on market-based observable inputs including benchmark rates and the spot price of the underlying instrument.

Derivative Contracts Cleared

The following table presents the total number of derivative contracts cleared through Nasdaq Clearing for the years ended December 31, 2022 and 2021:

	Year Ended December 31,	
	2022	2021
Commodity and seafood options, futures and forwards	288,142	536,252
Fixed-income options and futures	21,992,124	23,140,918
Stock options and futures	18,619,950	20,308,811
Index options and futures	45,616,647	37,860,187
Total	86,516,863	81,846,168

In the table above, the total volume in cleared power related to commodity contracts was 413 Terawatt hours (TWh) and 813 TWh for the years ended December 31, 2022 and 2021, respectively.

Resale and Repurchase Agreements Contracts Outstanding and Cleared

The outstanding contract value of resale and repurchase agreements was $120 million and $139 million as of December 31, 2022 and 2021, respectively. The total number of resale and repurchase agreements contracts cleared was 6,287,717 and 6,070,414 for the years ended December 31, 2022 and 2021, respectively.

16. LEASES

We have operating leases which are primarily real estate leases predominantly for our U.S. and European headquarters, data centers and for general office space. The following table provides supplemental balance sheet information related to Nasdaq's operating leases:

Leases	Balance Sheet Classification	December 31, 2022	December 31, 2021
		(in millions)	
Assets:			
Operating lease assets	Operating lease assets	$ 444	$ 366
Liabilities:			
Current lease liabilities	Other current liabilities	$ 54	$ 37
Non-current lease liabilities	Operating lease liabilities	452	386
Total lease liabilities		$ 506	$ 423

The following table summarizes Nasdaq's lease cost:

	Year Ended December 31, 2022	2021	2020
	(in millions)		
Operating lease cost	$ 75	$ 85	$ 85
Variable lease cost	32	28	26
Sublease income	(3)	(4)	(4)
Total lease cost	$ 104	$ 109	$ 107

In the table above, operating lease costs include short-term lease cost, which was immaterial.

The following table reconciles the undiscounted cash flows for each of the first five years and total of the remaining years to the operating lease liabilities recorded in our Consolidated Balance Sheets.

	December 31, 2022
	(in millions)
2023	$ 71
2024	70
2025	60
2026	51
2027	48
2028+	314
Total lease payments	614
Less: interest	(108)
Present value of lease liabilities	$ 506

In the table above, interest is calculated using the interest rate for each lease. Present value of lease liabilities include the current portion of $54 million.

Total lease payments in the table above exclude $51 million of legally binding minimum lease payments for leases signed but not yet commenced.

The following table provides information related to Nasdaq's lease term and discount rate:

	December 31, 2022
Weighted-average remaining lease term (in years)	10.5
Weighted-average discount rate	3.6 %

The following table provides supplemental cash flow information related to Nasdaq's operating leases:

	Year Ended December 31, 2022	2021	2020
	(in millions)		
Cash paid for amounts included in the measurement of operating lease liabilities	$ 66	$ 77	$ 77
Lease assets obtained in exchange for operating lease liabilities	$ 137	$ 45	$ 100

17. INCOME TAXES

Income Before Income Tax Provision

The following table presents the domestic and foreign components of income before income tax provision:

	Year Ended December 31, 2022	2021	2020
	(in millions)		
Domestic	$ 1,216	$ 1,299	$ 898
Foreign	259	235	314
Income before income tax provision	$ 1,475	$ 1,534	$ 1,212

Income Tax Provision

The income tax provision consists of the following amounts:

	Year Ended December 31, 2022	2021	2020
	(in millions)		
Current income taxes provision:			
Federal	$ 170	$ 144	$ 114
State	67	45	50
Foreign	77	64	74
Total current income taxes provision	314	253	238
Deferred income taxes provision (benefit):			
Federal	36	82	37
State	6	22	6
Foreign	(4)	(10)	(2)
Total deferred income taxes provision	38	94	41
Total income tax provision	$ 352	$ 347	$ 279

We have determined that undistributed earnings of certain non-U.S. subsidiaries will be reinvested for an indefinite period of time. We have both the intent and ability to indefinitely reinvest these earnings. As of December 31, 2022, the cumulative amount of undistributed earnings in these subsidiaries is $273 million. Given our intent and ability to reinvest these earnings for an indefinite period of time, we have not accrued a deferred tax liability on these earnings. A determination of an unrecognized deferred tax liability related to these earnings is not practicable.

A reconciliation of the income tax provision, based on the U.S. federal statutory rate, to our actual income tax provision for the years ended December 31, 2022, 2021 and 2020 is as follows:

	Year Ended December 31,		
	2022	2021	2020
Federal income tax provision at the statutory rate	21.0 %	21.0 %	21.0 %
State income tax provision, net of federal effect	3.8 %	3.9 %	4.2 %
Excess tax benefits related to employee share-based compensation	(0.9)%	(1.3)%	(0.6)%
Non-U.S. subsidiary earnings	0.5 %	0.3 %	0.5 %
Tax credits and deductions	(0.3)%	(0.3)%	(0.2)%
Change in unrecognized tax benefits	1.1 %	0.6 %	(0.6)%
Other, net	(1.3)%	(1.6)%	(1.3)%
Actual income tax provision	23.9 %	22.6 %	23.0 %

The increase in our effective tax rate in 2022 compared to 2021 was primarily due to an increase in state unrecognized tax benefits. The decrease in our effective tax rate in 2021 compared to 2020 was primarily due to a tax benefit related to federal, state and local provision to return adjustments, which is included in other, net in the table above and excess tax benefits related to employee share-based compensation.

The effective tax rate may vary from period to period depending on, among other factors, the geographic and business mix of earnings and losses. These same and other factors, including history of pre-tax earnings and losses, are taken into account in assessing the ability to realize deferred tax assets.

President Biden signed into law the Inflation Reduction Act of 2022 on August 16, 2022. Nasdaq does not expect any material impact to the financial statements or our effective tax rate in future periods.

Deferred Income Taxes

The temporary differences, which give rise to our deferred tax assets and (liabilities), consisted of the following:

	December 31,	
	2022	2021
	(in millions)	
Deferred tax assets:		
Deferred revenues	$ 18	$ 12
U.S. federal net operating loss	5	—
Foreign net operating loss	12	4
State net operating loss	3	1
Compensation and benefits	42	32
Tax credits	3	—
Federal benefit of uncertain tax positions	9	6
Operating lease liabilities	118	99
Unrealized losses	—	2
Other	33	30
Gross deferred tax assets	243	186
Less: valuation allowance	(4)	(4)
Total deferred tax assets, net of valuation allowance	$ 239	$ 182
Deferred tax liabilities:		
Amortization of software development costs and depreciation	$ (65)	$ (65)
Amortization of acquired intangible assets and goodwill	(375)	(322)
Investments	(105)	(99)
Unrealized gains	(29)	—
Operating lease assets	(103)	(84)
Other	(15)	(16)
Gross deferred tax liabilities	$ (692)	$ (586)
Net deferred tax liabilities	$ (453)	$ (404)
Reported as:		
Non-current deferred tax assets	$ 3	$ 2
Deferred tax liabilities, net	(456)	(406)
Net deferred tax liabilities	$ (453)	$ (404)

In the table above, non-current deferred tax assets are included in other non-current assets in the Consolidated Balance Sheets.

We recognized a valuation allowance of $4 million as of December 31, 2022 and 2021 due to recurring operating losses in a foreign jurisdiction. Based on all available positive and negative evidence, we believe the sources of future taxable income are sufficient to realize the remainder of Nasdaq's deferred tax asset inventory.

Nasdaq has deferred tax assets associated with NOLs in U.S. state and local and non-U.S. jurisdictions with the following expiration dates:

Jurisdiction	December 31, 2021		Expiration Date
	(in millions)		
Foreign NOL	$	12	No expiration
Federal NOL		5	No expiration
State NOL		3	2025-2040

Unrecognized Tax Benefits

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

	Year Ended December 31,		
	2022	2021	2020
		(in millions)	
Beginning balance	$ 57	$ 42	$ 48
Additions as a result of tax positions taken in prior periods	13	16	9
Additions as a result of tax positions taken in the current period	9	11	2
Reductions related to settlements with taxing authorities	(7)	(6)	(6)
Reductions as a result of lapses of the applicable statute of limitations	(2)	(6)	(11)
Ending balance	$ 70	$ 57	$ 42

We had $70 million of unrecognized tax benefits as of December 31, 2022, $57 million as of December 31, 2021, and $42 million as of December 31, 2020 which, if recognized in the future, would affect our effective tax rate. Nasdaq does not believe that our unrecognized tax benefits will materially change over the next 12 months.

We recognize interest and/or penalties related to income tax matters in the provision for income taxes in our Consolidated Statements of Income, which was less than $1 million tax expense for the year ended December 31, 2022, and a tax benefit of $2 million for both years ended December 31, 2021 and 2020. Accrued interest and penalties, net of tax effect were $5 million as of December 31, 2022 and $4 million as of December 31, 2021.

Tax Audits

Nasdaq and its eligible subsidiaries file a consolidated U.S. federal income tax return and applicable state and local income tax returns and non-U.S. income tax returns. We are subject to examination by federal, state and local, and foreign tax authorities. Our Federal income tax return for the years 2019 through 2021 is subject to examination by the Internal Revenue Service. Several state tax returns are currently under examination by the respective tax authorities for the years 2012 through 2021. Non-U.S. tax returns are subject to examination by the respective tax authorities for the years 2017 through 2022. We regularly assess the likelihood of additional assessments by each jurisdiction and have established tax reserves that we believe are adequate in relation to the potential for additional assessments. Examination outcomes and the timing of examination settlements are subject to uncertainty. Although the results of such examinations may have an impact on our unrecognized tax benefits, we do not anticipate that such impact will be material to our consolidated financial position or results of operations. We do not expect to settle any material tax audits in the next twelve months.

18. COMMITMENTS, CONTINGENCIES AND GUARANTEES

Guarantees Issued and Credit Facilities Available

In addition to the default fund contributions and margin collateral pledged by clearing members discussed in Note 15, “Clearing Operations,” we have obtained financial guarantees and credit facilities, which are guaranteed by us through counter indemnities, to provide further liquidity related to our clearing businesses. Financial guarantees issued to us totaled $4 million as of December 31, 2022 and $5 million December 31, 2021. As discussed in “Other Credit Facilities,” of Note 9, “Debt Obligations,” we also have credit facilities primarily related to our Nasdaq Clearing operations, which are available in multiple currencies, and totaled $184 million as of December 31, 2022 and $212 million as of December 31, 2021 in available liquidity, none of which was utilized.

Other Guarantees

Through our clearing operations in the financial markets, Nasdaq Clearing is the legal counterparty for, and guarantees the performance of, its clearing members. See Note 15, “Clearing Operations,” for further discussion of Nasdaq Clearing performance guarantees.

We have provided a guarantee related to lease obligations for The Nasdaq Entrepreneurial Center, Inc., which is a not-for-profit organization designed to convene, connect and engage aspiring and current entrepreneurs. This entity is not included in the consolidated financial statements of Nasdaq.

We believe that the potential for us to be required to make payments under these arrangements is unlikely. Accordingly, no contingent liability is recorded in the Consolidated Balance Sheets for the above guarantees.

Routing Brokerage Activities

One of our broker-dealer subsidiaries, Nasdaq Execution Services, provides a guarantee to securities clearinghouses and exchanges under its standard membership agreements, which require members to guarantee the performance of other members. If a member becomes unable to satisfy its obligations to a clearinghouse or exchange, other members would be required to meet its shortfalls. To mitigate these performance risks, the exchanges and clearinghouses often require members to post collateral, as well as meet certain minimum financial standards. Nasdaq Execution Services' maximum potential liability under these arrangements cannot be quantified. However, we believe that the potential for Nasdaq Execution Services to be required to make payments under these arrangements is unlikely. Accordingly, no contingent liability is recorded in the Consolidated Balance Sheets for these arrangements.

Legal and Regulatory Matters

Armenian Stock Exchange Investigation

As disclosed in our prior filings with the SEC, a former non-U.S. subsidiary of Nasdaq, NASDAQ OMX Armenia OJSC, operated the Armenian Stock Exchange and the Central Depository of Armenia, which are regulated by the Central Bank of Armenia under Armenian law. In accordance with the requirements of Armenian law, Mellat Bank SB CJSC, an Armenian entity that is designated under Executive Order 13382, was a market participant on the Armenian Stock Exchange and, as a result, paid participation and transaction fees to the Armenian Stock Exchange during the period from 2012-2014. In 2014, we voluntarily self-disclosed this matter to the U.S. Department of Treasury's Office of Foreign Assets Control, or OFAC, and received authorization from OFAC to continue, if necessary, certain activities pertaining to Mellat Bank SB CJSC in Armenia in a limited manner. In 2015, Nasdaq sold a majority of its ownership of Nasdaq OMX Armenia OJSC, with the remaining minority interest sold in 2018.

OFAC has been conducting an inquiry into the Armenian Stock Exchange matter described above and in our prior filings since 2016, and during the first quarter of 2021, we were advised that OFAC is considering a civil monetary penalty in connection with that matter. We are currently in discussions with OFAC.

We believe our decision to voluntarily self-report this issue and our continued cooperation with OFAC, along with the permit we received from OFAC in connection with our transactions involving the Armenian Stock Exchange, will be mitigating factors with respect to the matter, and that any monetary fines or restrictions will not be material to our financial results. We cannot currently predict when our discussions with OFAC will conclude or the exact amount of any potential penalties imposed, but have accrued for an immaterial loss contingency.

CFTC Matter

In June 2022, NASDAQ Futures, Inc. ("NFX"), a non-operational, wholly-owned subsidiary of Nasdaq, received a telephonic "Wells Notice" from the staff of the CFTC relating to certain alleged potential violations by NFX of provisions of the Commodity Exchange Act and CFTC rules thereunder during the period beginning July 2015 through October 2018. The Wells Notice informed NFX that the CFTC staff has made, subject to consideration of NFX's response, a preliminary determination to recommend that the CFTC authorize an enforcement action against NFX in connection with its former futures exchange business. Nasdaq sold NFX's futures exchange business to a third-party in November 2019, including the portfolio of open interest in NFX contracts. During 2020, all remaining open interest in NFX contracts was migrated to other exchanges and NFX ceased operation. A Wells Notice is neither a formal charge of wrongdoing nor a final determination that the recipient has violated any law. NFX has submitted a response to the Wells Notice that contests all aspects of the Staff's position, and is engaged in discussions with the CFTC staff concerning a potential resolution to the investigation, which could include a settlement of the matter. While Nasdaq believes NFX has a meritorious defense to any claims alleged by the CFTC staff, we are unable to predict the outcome of this matter and it could have a negative effect on our operating results or reputation, which could be material. Accordingly, we are unable to reasonably estimate any potential loss or range of loss, and therefore, we have not accrued for a loss contingency.

Nasdaq Commodities Clearing Default

In 2022, as a result of a decision received in the fourth quarter, we recorded an adjustment to reduce a previous accrual recorded in 2021 related to an administrative fine issued by the SFSA associated with the default which occurred in 2018. The charge and subsequent adjustment were included in regulatory expense in our Consolidated Statements of Income for the years ended December 31, 2022 and 2021. See "Nasdaq Commodities Clearing Default," of Note 15, "Clearing Operations," for further information.

Other Matters

Except as disclosed above and in prior reports filed under the Exchange Act, we are not currently a party to any litigation or proceeding that we believe could have a material adverse effect on our business, consolidated financial condition, or operating results. However, from time to time, we have been threatened with, or named as a defendant in, lawsuits or involved in regulatory proceedings.

In the normal course of business, Nasdaq discusses matters with its regulators raised during regulatory examinations or otherwise subject to their inquiries. Management believes that censures, fines, penalties or other sanctions that could result from any ongoing examinations or inquiries will not have a material impact on its consolidated financial position or results of operations. However, we are unable to predict the outcome or the timing of the ultimate resolution of these matters, or the potential fines, penalties or injunctive or other equitable relief, if any, that may result from these matters.

Tax Audits

We are engaged in ongoing discussions and audits with taxing authorities on various tax matters, the resolutions of which are uncertain. Currently, there are matters that may lead to assessments, some of which may not be resolved for several years. Based on currently available information, we believe we have adequately provided for any assessments that could result from those proceedings where it is more likely than not that we will be assessed. We review our positions on these matters as they progress. See “Tax Audits,” of Note 17, “Income Taxes,” for further discussion.

19. BUSINESS SEGMENTS

In 2022, we announced a new organizational structure which aligns our businesses more closely with the foundational shifts that are driving the evolution of the global financial system. In order to amplify our strategy, we aligned the Company more closely with evolving client needs. During the fourth quarter of 2022, we began to manage, operate and provide our products and services in line with this new divisional structure. As a result, our four previous business segments, Market Technology, Investment Intelligence, Corporate Platforms and Market Services have been changed to align with our new corporate structure that includes three business segments: Market Platforms, Capital Access Platforms and Anti-Financial Crime. See Note 1, “Organization and Nature of Operations,” for further discussion of our reportable segments.

This Annual Report on Form 10-K presents our results in alignment with the new corporate structure. All periods presented are restated to reflect the new structure.

Our management allocates resources, assesses performance and manages these businesses as three separate segments. We evaluate the performance of our segments based on several factors, of which the primary financial measure is operating income. Results of individual businesses are presented based on our management accounting practices and structure. Our chief operating decision maker does not review total assets or statements of income below operating income by segments as key performance metrics; therefore, such information is not presented below.

The following table presents certain information regarding our business segments for the years ended December 31, 2022, 2021 and 2020:

	Year Ended December 31,		
	2022	2021	2020
Market Platforms	(in millions)		
Total revenues	$ 4,225	$ 4,048	$ 4,179
Transaction-based expenses	(2,644)	(2,466)	(2,722)
Revenues less transaction-based expenses	1,581	1,582	1,457
Depreciation and amortization*	59	64	55
Operating income	859	893	784
Purchase of property and equipment	83	96	125
Capital Access Platforms			
Total revenues	1,684	1,568	1,287
Depreciation and amortization*	36	34	30
Operating income	916	844	651
Purchase of property and equipment	50	50	54
Anti-Financial Crime			
Total revenues	306	231	116
Depreciation and amortization*	10	8	6
Operating income	80	44	35
Purchase of property and equipment	19	17	9
Corporate Items			
Total revenues	11	39	43
Depreciation and amortization	153	172	111
Operating loss	(291)	(340)	(236)
Consolidated			
Total revenues	$ 6,226	$ 5,886	$ 5,625
Transaction-based expenses	(2,644)	(2,466)	(2,722)
Revenues less transaction-based expenses	$ 3,582	$ 3,420	$ 2,903
Depreciation and amortization	$ 258	$ 278	$ 202
Operating income	$ 1,564	$ 1,441	$ 1,234
Purchase of property and equipment	$ 152	$ 163	$ 188

*excludes amortization of acquired intangible assets.

Certain amounts are allocated to Corporate Items in our management reports as we believe they do not contribute to a meaningful evaluation of a particular segment's ongoing operating performance. These items, which are presented in the table below, include the following:

- *Amortization expense of acquired intangible assets:* We amortize intangible assets acquired in connection with various acquisitions. Intangible asset amortization expense can vary from period to period due to episodic acquisitions completed, rather than from our ongoing business operations. As such, if intangible asset amortization is included in performance measures, it is more difficult to assess the day-to-day operating performance of the segments, and the relative operating performance of the segments between periods. Management does not consider intangible asset amortization expense for the purpose of evaluating the performance of our segments or their managers or when making decisions to allocate resources. Therefore, we believe performance measures excluding intangible asset amortization expense provide management with a useful representation of our segments' ongoing activity in each period.
- *Merger and strategic initiatives expense:* We have pursued various strategic initiatives and completed acquisitions and divestitures in recent years that have resulted in expenses which would not have otherwise been incurred. These expenses generally include integration costs, as well as legal, due diligence and other third-party transaction costs. The frequency and the amount of such expenses vary significantly based on the size, timing and complexity of the transaction. Management does not consider merger and strategic initiatives expense for the purpose of evaluating the performance of our segments or their managers or when making decisions to allocate resources. Therefore, we believe performance measures excluding merger and strategic initiatives expense provide management with a useful representation of our segments' ongoing activity in each period.
- *Restructuring charges:* In October 2022, following our September announcement to realign our segments and leadership, we initiated a divisional alignment program with a focus on realizing the full potential of this structure. In 2019, we initiated the transition of certain technology platforms to advance our strategic opportunities as a technology and analytics provider and continue the realignment of certain business areas. See Note 20, “Restructuring Charges,” for further discussion of these plans. We believe performance measures excluding restructuring charges provide management with a useful representation of our segments' ongoing activity in each period.
- *Revenues and expenses - divested/contributed businesses:* For 2022 and 2021, we have included in corporate items the revenues and expenses of our U.S. Fixed Income business, which was previously included in our Market Platforms and Capital Access Platforms results. See “2021 Divestiture,” of Note 4, “Acquisitions and Divestiture,” for further discussion of this divestiture. Also included are the revenues and expenses of our Nordic broker services business for which we completed the wind-down in June 2022. For 2021 and 2020, we included in corporate items the revenues and expenses associated with the NPM business which we contributed to a standalone, independent company, of which we own the largest minority interest, together with a consortium of third-party financial institutions in July 2021. Prior to July, these revenues were previously included in our Capital Access Platforms results.
- *Other items:* We have included certain other charges or gains in corporate items, to the extent we believe they should be excluded when evaluating the ongoing operating performance of each individual segment. Other items include:
  - for the year ended December 31, 2022, accruals related to a legal matter, included in general, administrative and other expense in our Consolidated Statements of Income and a regulatory matter offset by the release of $5 million in relation to the reduction of the administrative fine issued by the SFSA included in regulatory expense in our Consolidated Statements of Income;
  - for the year ended December 31, 2021 a charge related to an administrative fine imposed by the SFSA. The 2022 and 2021 SFSA fine is associated with the default that occurred in 2018, see “Nasdaq Commodities Clearing Default,” of Note 15, “Clearing Operations,” for further discussion; and for the year ended December 31, 2020 the reversal of a regulatory fine issued by the SFSA. All charges and releases have been included in regulatory expense in the Consolidated Statements of Income;
  - for the year ended December 31, 2020, a provision for notes receivable associated with the funding of technology development for the consolidated audit trail;
  - for the years ended December 31, 2022, 2021 and 2020, a charge on extinguishment of debt;
  - for the year ended December 31, 2020, charitable donations made to the Nasdaq Foundation, COVID-19 response and relief efforts, and social justice charities; and
  - for the years ended December 31, 2022 and 2020, certain litigation costs which are recorded in professional and contract services expense in the Consolidated Statements of Income.

The above charges are recorded in general, administrative and other expense, unless otherwise noted, in our Consolidated Statements of Income.

The following table summarizes our Corporate Items:

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Revenues - divested/contributed businesses	$ 11	$ 39	$ 43
Expenses:			
Amortization expense of acquired intangible assets	153	170	103
Merger and strategic initiatives expense	82	87	33
Restructuring charges	15	31	48
Regulatory matters	1	33	(6)
Provision for notes receivable	—	—	6
Extinguishment of debt	16	33	36
Charitable donations	—	—	17
Expenses - divested/contributed businesses	5	16	24
Other	30	9	18
Total expenses	302	379	279
Operating loss	$ (291)	$ (340)	$ (236)

For further discussion of our segments' results, see "Segment Operating Results," of "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations."

Geographic Data

The following table presents total revenues and property and equipment, net by geographic area for 2022, 2021 and 2020. Revenues are classified based upon the location of the customer. Property and equipment information is based on the physical location of the assets.

	Total Revenues	Property and Equipment, Net
2022:	(in millions)	
United States	$ 5,100	$ 344
All other countries	1,126	188
Total	$ 6,226	$ 532
2021:		
United States	$ 4,822	$ 325
All other countries	1,064	184
Total	$ 5,886	$ 509
2020:		
United States	$ 4,662	$ 311
All other countries	963	164
Total	$ 5,625	$ 475

Our property and equipment, net for all other countries primarily includes assets held in Sweden. No single customer accounted for 10.0% or more of our revenues in 2022, 2021 and 2020.

20. RESTRUCTURING CHARGES

In October 2022, following our September announcement to realign our segments and leadership, we initiated a divisional alignment program with a focus on realizing the full potential of this structure. In connection with the program, we expect to incur $115 million to $145 million in pre-tax charges principally related to employee-related costs, consulting, asset impairments and contract terminations over a two-year period. We expect to achieve benefits, in the form of combined annual run rate operating efficiencies and revenue synergies of approximately $30 million annually by 2025. Costs related to the divisional alignment program will be recorded as restructuring charges in the Consolidated Statements of Income.

In September 2019, we initiated the transition of certain technology platforms to advance the Company's strategic opportunities as a technology and analytics provider and continue the realignment of certain business areas. In connection with these restructuring efforts, we retired certain elements of our market infrastructure and technology product offerings as we implement NFF and other technologies internally and externally. This represented a fundamental shift in our strategy and technology as well as executive realignment. In June 2021, we completed our 2019 restructuring plan and recognized total pre-tax charges of $118 million over a two-year period. Total pre-tax charges related primarily to non-cash items such as asset impairments and accelerated depreciation, and third-party consulting costs. Severance and employee-related charges were also incurred.

The following table presents a summary of the 2022 and 2019 restructuring plan charges in the Consolidated Statements of Income for the years ended December 31, 2022, 2021 and 2020.

	Year Ended December 31,		
	2022	2021	2020
	(in millions)		
Asset impairment charges	$ 8	$ 4	$ 14
Consulting services	3	19	22
Contract terminations	—	—	3
Employee-related costs	3	1	3
Other	1	7	6
Total restructuring charges	$ 15	$ 31	$ 48

Exhibit 4.18

DESCRIPTION OF THE REGISTRANT'S SECURITIES REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

Nasdaq, Inc. (the "Company") has four classes of securities registered under Section 12 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"):

(1) Common Stock, par value $0.01 per share ("Common Stock");

(2) 0.900% Senior Notes due 2033;

(3) 0.875% Senior Notes due 2030; and

(4) 1.75% Senior Notes due 2029.

As used in this summary, the terms "Nasdaq," "the Company," "we," "our," and "us" refer solely to Nasdaq, Inc. and not its subsidiaries, unless otherwise specified.

Description of Common Stock

The following is a description of the material terms and provisions relating to our common stock. Because it is a summary, the following description is not complete and is subject to and qualified in its entirety by reference to our Amended and Restated Certificate of Incorporation, as amended, or Certificate, and by-laws, and provisions of Delaware law which define the rights of our stockholders.

The holders of our common stock are entitled to one vote per share on all matters to be voted upon by the stockholders except that no person may exercise voting rights in respect of any shares in excess of 5% of the then outstanding shares of our Common Stock. Subject to certain additional conditions, this limitation does not apply to persons exempted from this limitation by our Board of Directors prior to the time such person owns more than 5.0% of the then-outstanding shares of our common stock.

At any meeting of our stockholders, a majority of the votes entitled to be cast will constitute a quorum for such meeting.

Holders of common stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by our board of directors out of funds legally available for them. In the event of our liquidation, dissolution, or winding-up, the holders of our common stock are entitled to share ratably in all assets remaining after payment of liabilities, subject to prior distribution rights of preferred stock, if any, then outstanding. Our common stock has no preemptive or conversion rights or other subscription rights. There are no redemption or sinking fund provisions applicable to our common stock. All outstanding shares of common stock are fully paid and non-assessable. Future dividends, if any, will be determined by our board of directors.

Certain Provisions of our Certificate and By-Laws

Some provisions of our Certificate and by-laws, which provisions are summarized below, may be deemed to have an anti-takeover effect and may delay, defer, or prevent a tender offer or takeover attempt that a stockholder might consider in its best interest, including those attempts that might result in a premium over the market price for the shares held by stockholders.

Advance Notice Requirements for Stockholder Proposals and Directors Nominations

Our by-laws provide that stockholders seeking to bring business before an annual meeting of stockholders, or to nominate candidates for election as directors at an annual meeting of stockholders, must provide timely notice in writing. To be timely, a stockholder's notice must be delivered to or mailed and received at our principal executive offices not less than 90 nor more than 120 days prior to the anniversary date of the immediately preceding annual meeting of stockholders; provided, that in the event that the annual meeting is called for a date that is not within 30 days before or 70 days after such anniversary date, notice by the shareholder in order to be timely must be received not earlier than 120 days prior to the meeting and not later than the later of 90 days prior to the meeting and the close of business on the 10th day following the date on which notice of the date of the annual meeting was first publicly announced by Nasdaq. In the case of a special meeting of stockholders called for the purpose of electing directors, notice by the stockholder in order to be timely must be received not earlier than 120 days prior to the meeting and not later than the later of 90 days prior to the meeting or the close of business on the 10th day following the day on which public disclosure of the date of the special meeting and our nominees was first made. In addition, our by-laws specify certain requirements as to the form and content of a stockholder's notice. These provisions may preclude stockholders from bringing matters before an annual meeting of stockholders or from making nominations for directors at an annual or special meeting of stockholders.

Proxy Access

Our by-laws include a proxy access provision that permits a stockholder, or a group of stockholders, owning at least three percent of our outstanding shares of common stock continuously for at least three years to nominate and include in the proxy materials for an annual meeting of stockholders director nominees constituting up to the greater of two individuals and 25% of the total number of directors then in office, provided that the stockholder(s) and nominee(s) satisfy the requirements specified in the by-laws.

Stockholder Action

Our Certificate provides that stockholders are not entitled to act by written consent in lieu of a meeting.

Right to Call Special Meeting

Our by-laws provide that stockholders representing 15% or more of our outstanding shares can convene a special meeting of shareholders.

Amendments; Vote Requirements

The General Corporation Law of the State of Delaware provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation’s certificate of incorporation, unless a corporation’s certificate of incorporation requires a greater percentage. Our Certificate imposes majority voting requirements in connection with stockholder amendments to the by-laws and in connection with the amendment of certain provisions of the Certificate, including those provisions of the Certificate relating to the limitations on voting rights of certain persons, removal of directors and prohibitions on stockholder action by written consent.

Authorized But Unissued Shares

The authorized but unissued shares of our common stock will be available for future issuance without stockholder approval in most cases. These additional shares may be utilized for a variety of corporate purposes, including future public or private offerings to raise additional capital, corporate acquisitions and employee benefit plans. The existence of authorized but unissued shares of our common stock could render more difficult, or discourage, an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Delaware Business Combination Statute

We are organized under Delaware law. Delaware law generally prohibits a publicly-held or widely-held corporation from engaging in a “business combination” with an “interested stockholder” for three years after the stockholder becomes an interested stockholder. An "interested stockholder" is a person who, together with affiliates and associates, owns (or, in some cases, within three years, did own) directly or indirectly 15% or more of the corporation's outstanding voting stock. A "business combination" includes a merger, asset sale or other transaction that results in a financial benefit to the interested stockholder. However, Delaware law does not prohibit these business combinations if:

1. before the stockholder becomes an interested stockholder, the corporation's board approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;

2. after the transaction that results in the stockholder becoming an interested stockholder, the interested stockholder owns at least 85% of the corporation's outstanding voting stock (excluding certain shares); or

3. the corporation's board approves the business combination and the holders of at least two-thirds of the corporation's outstanding voting stock that the interested stockholder does not own authorize the business combination at a meeting of stockholders.

Stockholders' Agreement

On December 14, 2022, we entered into an amendment to our stockholders' agreement with Investor AB (the "Amended Stockholders' Agreement"), amending the original stockholders' agreement that was entered into between Nasdaq and Investor AB on December 16, 2010.

The Amended Stockholders' Agreement reinstated Investor AB's right to propose for nomination one person, reasonably acceptable to our Nominating & ESG Committee, for election to our Board of Directors so long as Investor AB continues to beneficially own at least 10% of the outstanding common stock of Nasdaq. We are obligated by the terms of the Amended Stockholders' Agreement to (i) include the Investor AB designee as a nominee to the Board of Directors on each slate of nominees for election to the Board of Directors proposed by management of Nasdaq, (ii) recommend the election of the Investor AB designee to our shareholders and (iii) otherwise use our reasonable best efforts (which shall include the solicitation of proxies) to cause the Investor AB designee to be elected to the Board of Directors.

The foregoing summary of the Amended Stockholders' Agreement does not purport to be complete and is subject to, and qualified in its entirety by, the full text of the Amended Stockholders' Agreement, which was filed as Exhibit 4.1 to Nasdaq's Current Report on Form 8-K filed on December 16, 2022.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare. Its address is 480 Washington Boulevard, Jersey City, New Jersey 07310 and its telephone number is (800) 736-3001.

Listing

Our common stock is listed on The Nasdaq Stock Market under the trading symbol “NDAQ.”

Description of the 0.900% Senior Notes Due 2033

The 0.900% Senior Notes due 2033 (the "2033 Notes") were issued under an indenture, dated as of June 7, 2013 (the "base indenture") between Nasdaq, Inc. and Wells Fargo Bank, National Association, as trustee (the "Trustee") and a twelfth supplemental indenture dated as of July 30, 2021 (the "supplemental indenture" and, together with the base indenture, the "indenture") by and among Nasdaq, the Trustee and HSBC Bank USA, National Association, as registrar and transfer agent. The indenture is publicly available at www.sec.gov.

We issued €615 million aggregate principal amount of the 2033 Notes on July 30, 2021.

This summary is subject to, and qualified in its entirety by reference to, all the provisions of the 2033 Notes and the indenture, including definitions of certain terms used therein.

General

The 2033 Notes:

- are senior unsecured obligations of ours;
- rank equally in right of payment with all of our other senior unsecured indebtedness from time to time outstanding, commercial paper issuances and indebtedness under our credit facility;
- are structurally subordinated in right of payment to all existing and future obligations of our subsidiaries, including claims with respect to trade payables; and
- are effectively subordinated in right of payment to all of our existing and future secured indebtedness and other secured obligations to the extent of the value of the collateral securing any such indebtedness and other obligations.

The 2033 Notes were issued in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

Principal, Maturity and Interest

The 2033 Notes will bear interest at a rate of 0.900% per year. Interest on the Notes is payable annually in arrears on July 30 of each year, beginning on July 30, 2022, and will be computed on the basis of the actual number of days in the period for which interest is being calculated and the actual number of days from and including the last date on which interest was paid on the 2033 Notes (or the settlement date if no interest has been paid or duly provided for on the 2033 Notes), to but excluding the next date on which interest is paid or duly provided for. This payment convention is referred to as ACTUAL/ACTUAL (ICMA) as defined in the rulebook of the International Capital Market Association. Interest on the 2033 Notes will accrue from and including the settlement date and will be paid to holders of record on the day immediately prior to the applicable interest payment date.

The 2033 Notes will mature on July 30, 2033. On the maturity date of the 2033 Notes, the holders will be entitled to receive 100% of the principal amount of such 2033 Notes. The 2033 Notes will not have the benefit of any sinking fund.

If any interest payment date, redemption date or maturity date falls on a day that is not a business day, then the relevant payment may be made on the next succeeding business day and no interest will accrue because of such delayed payment. With respect to the 2033 Notes, when we use the term "business day" we mean any day except a Saturday, a Sunday or a day on which banking institutions in the applicable place of payment are authorized or required by law, regulation or executive order to close.

Claims against the Company for payment of principal, interest and additional amounts, if any, on the 2033 Notes will become void unless presentment for payment is made (where so required under the indenture) within, in the case of principal and additional amounts, if any, a period of ten years or, in the case of interest, a period of five years, in each case from the applicable original date of payment therefor.

Euro Notes—Issuance in Euros

Initial holders of the 2033 Notes paid for the 2033 Notes in euros, and principal, premium, if any, and interest payments and additional amounts, if any, in respect of the 2033 Notes will be payable in euros. If, on or after the date of this prospectus supplement, the euro is unavailable to us due to the imposition of exchange controls or other circumstances beyond our control or the euro is no longer used by the then member states of the European Monetary Union that have adopted the euro as their currency or for the settlement of transactions by public institutions within the international banking community, then all payments in respect of the 2033 Notes will be made in U.S. dollars until the euro is again available to us or so used.

The amount payable on any date in euros will be converted to U.S. dollars on the basis of the most recently available market exchange rate for euros as determined by us in our sole discretion. Any payment in respect of the 2033 Notes so made in U.S. dollars will not constitute an event of default under the indenture or the 2033 Notes. Neither the trustee nor the paying agent will be responsible for obtaining exchange rates, effecting conversions or otherwise handling redenominations.

Ranking

The 2033 Notes are general unsecured obligations of ours and will rank equally with all of our existing and future unsubordinated obligations.

Holders of any secured indebtedness and other secured obligations of the Company will have claims that are prior to your claims as holders of the 2033 Notes, to the extent of the value of the assets securing such indebtedness and other obligations, in the event of any bankruptcy, liquidation or similar proceeding.

Further Issues

The 2033 Notes constituted a separate series of debt securities under the indenture, limited to €615 million. Under the indenture, we may, without the consent of the holders of the 2033 Notes, issue additional 2033 Notes of the same or a different series from time to time in the future in an unlimited aggregate principal amount; *provided* that if any such additional 2033 Notes are not fungible with the 2033 Notes offered hereby (or any other tranche of additional 2033 Notes) for U.S. federal income tax purposes, then such additional 2033 Notes will have different ISIN and/or Common Code numbers than the Notes offered hereby (and any such other tranche of additional 2033 Notes). The 2033 Notes and any additional 2033 Notes of the same series would rank equally and ratably and would be treated as a single class for all purposes under the indenture. This means that, in circumstances where the indenture provides for the holders of debt securities of any series to vote or take any action, any of the outstanding 2033 Notes, as well as any additional 2033 Notes that we may issue by reopening such series, will vote or take action as a single class.

Redemption

Optional Redemption

The 2033 Notes will be redeemable, in whole at any time or in part from time to time, at our option, prior to April 30, 2033, at a redemption price (the "make-whole redemption price") equal to the greater of (i) 100% of the principal amount of the 2033 Notes and (ii) as determined by the Quotation Agent (as defined below), the sum of the present values of the remaining scheduled payments of principal and interest on the 2033 Notes (exclusive of interest accrued and unpaid as of the date of redemption), discounted to the date of redemption on an annual basis (ACTUAL/ACTUAL (ICMA)) at the Bund Rate (as defined below), plus 20 basis points, plus accrued and unpaid interest thereon to the date of redemption. However, if the redemption date is after a record date and on or prior to a corresponding interest payment date, the interest will be paid on the redemption date to the holder of record on the record date.

Notwithstanding the foregoing, at any time on or after April 30, 2033 (three months before their maturity date), the 2033 Notes will be redeemable, in whole or in part, at our option and at any time or from time to time, at a redemption price equal to 100% of the principal amount of the 2033 Notes to be redeemed plus accrued and unpaid interest thereon to, but excluding, the date of redemption.

Notice of any redemption will be mailed at least 10 days, but not more than 60 days, before the redemption date to each registered holder of 2033 Notes to be redeemed. Once notice of redemption is mailed, the 2033 Notes called for redemption will become due and payable on the redemption date and at the applicable redemption price, plus accrued and unpaid interest to, but not including, the redemption date. Unless we default in payment of the redemption price, on and after the redemption date, interest will cease to accrue on the 2033 Notes (or portion thereof) to be redeemed on such redemption date.

"Bund Rate" means, with respect to any redemption date, the rate per annum equal to the annual equivalent yield to maturity of the Comparable German Bund Issue, assuming a price for the Comparable German Bund Issue (expressed as a percentage of its principal amount) equal to the Comparable German Bund Price for such redemption date.

"Comparable German Bund Issue" means that German Bundesanleihe security selected by the Quotation Agent as having a maturity comparable to the remaining term of the 2033 Notes to be redeemed that would be utilized, at the time of selection and in accordance with customary
financial practice, in pricing new issues of corporate notes of comparable maturity to the remaining term of the Notes.

"Comparable German Bund Price" means, with respect to any redemption date, (i) the average of four Reference German Bund Dealer Quotations for such redemption date, after excluding the highest and lowest such Reference German Bund Dealer Quotations or (ii) if the Quotation Agent obtains fewer than four such Reference German Bund Dealer Quotations, the average of all such quotations.

"Quotation Agent" means a Reference German Bund Dealer appointed by us.

"Reference German Bund Dealer" means any dealer of German Bundesanleihe securities selected by us in good faith.

"Reference German Bund Dealer Quotations" means, with respect to each Reference German Bund Dealer and any redemption date, the average, as determined by us, of the bid and asked prices for the Comparable German Bund Issue (expressed in each case as a percentage of its principal amount) quoted in writing to the Quotation Agent by such Reference German Bund Dealer at 3:30 p.m., Frankfurt, Germany time, on the third business day preceding such redemption date.

If we elect to redeem less than all of the 2033 Notes, and such 2033 Notes are at the time represented by a global note, then the depositary will select by lot the particular interests to be redeemed. If we elect to redeem less than all of the 2033 Notes, and any of such 2033 Notes are not represented by a global note, then the trustee will select the particular 2033 Notes to be redeemed in a manner it deems appropriate and fair (and the depositary will select by lot the particular interests in any global note to be redeemed).

We may at any time, and from time to time, purchase the 2033 Notes at any price or prices in the open market or otherwise.

Repurchase upon Change of Control Triggering Event

If a Change of Control Triggering Event (as defined below) occurs with respect to the 2033 Notes, unless we have exercised our right to redeem the 2033 Notes, we will be required to make an offer to repurchase all or, at the holder's option, any part (equal to €100,000 or any integral multiple of €1,000 in excess thereof) of each holder's 2033 Notes pursuant to the offer described below (the "Change of Control Offer").

In the Change of Control Offer, we will be required to offer payment in cash equal to 101% of the aggregate principal amount of 2033 Notes repurchased plus accrued and unpaid interest, if any, on the 2033 Notes repurchased to, but not including, the date of purchase (the "Change of Control Payment").

"Change of Control" means the occurrence of any of the following: (1) the direct or indirect sale, transfer, conveyance or other disposition (other than by way of merger or consolidation), in one or a series of related transactions, of all or substantially all of the assets of us and our Subsidiaries taken as a whole to any Person or group of related Persons for purposes of Section 13(d) of the Exchange Act (a "Group") other than us or one of our subsidiaries; (2) the approval by the holders of our common stock of any plan or proposal for our liquidation or dissolution; (3) the consummation of any transaction (including, without limitation, any merger or consolidation) the result of which is that any Person or Group becomes the beneficial owner, directly or indirectly, of more than 50% of the then outstanding number of shares of our Voting Stock; or (4) the first day on which a majority of the members of our board of directors are not Continuing Directors.

Notwithstanding the foregoing, a transaction will not be deemed to involve a Change of Control if (1) we become a direct or indirect wholly owned subsidiary of a holding company and (2)(A) the direct or indirect holders of the Voting Stock of such holding company immediately following that transaction are substantially the same as the holders of our Voting Stock immediately prior to that transaction or (B) immediately following that transaction no Person or Group (other than a holding company satisfying the requirements of this sentence) is the beneficial owner, directly or indirectly of more than 50% of the Voting Stock of such holding company.

"Change of Control Triggering Event" means the occurrence of both a Change of Control and a Below Investment Grade Rating Event (as such term is defined in the indenture) occurring in respect of that Change of Control.

"Continuing Directors" means, as of any date of determination, any member of our board of directors who (1) was a member of our board of directors on the date of the issuance of the 2033 Notes; or (2) was nominated or approved for election, elected or appointed to our board of directors with the approval of a majority of the Continuing Directors who were members of our board of directors at the time of such nomination, approval, election or appointment (either by a specific vote or by approval of the proxy statement issued by us in which such member was named as a nominee for election as a director).

"Person" means any individual, firm, limited liability company, corporation, partnership, association, joint venture, tribunal, trust, government or political subdivision or agency or instrumentality thereof, or any other entity or organization and includes a "person" as used in Section 13(d)(3) of the Exchange Act.

"Voting Stock" of any specified Person as of any date means the capital stock of such Person that is at the time entitled to vote generally in the election of the board of directors of such Person.

The definition of "Change of Control" includes a phrase relating to the sale, transfer, conveyance or other disposition of "all or substantially all" of our consolidated assets. There is no precise, established definition of the phrase "substantially all" under applicable law.

Accordingly, your ability to require us to purchase your 2033 Notes as a result of the sale, transfer, conveyance or other disposition of less than all of our assets may be uncertain.

Certain Covenants

The indenture contains, among others, restrictive covenants regarding (i) our ability to consolidate or merge with another entity or to sell, transfer or otherwise convey all or substantially all of our assets to another entity, (ii) create or permit certain significant subsidiaries to create or permit to exist certain liens and (iii) certain sale and lease-back transactions involving certain subsidiaries.

Events of Default

Holders of the 2033 Notes will have specified rights if an Event of Default (as defined below) occurs. The term "Event of Default" in respect of the 2033 Notes means any of the following:

(1) we do not pay interest on any of the 2033 Notes within 30 days of its due date;

(2) we fail to pay the principal (or premium, if any) of any 2033 Note, when such principal becomes due and payable, at maturity, upon acceleration, upon redemption or otherwise;

(3) we fail to comply with certain covenants under the indenture;

(4) we remain in breach of a covenant or warranty in respect of the indenture or 2033 Notes (other than a covenant included in the indenture solely for the benefit of debt securities of another series) for 90 days after we receive a written notice of default, which notice must be sent by either the trustee or holders of at least 25% in principal amount of the outstanding 2033 Notes;

(5) we file for bankruptcy, or other events of bankruptcy, insolvency or reorganization specified in the indenture;

(6) we default on any indebtedness of ours or of a significant subsidiary having an aggregate amount of at least $200,000,000, constituting a default either of payment of principal when due and payable or which results in acceleration of the indebtedness unless the default has been cured or waived or the indebtedness discharged in full within 60 days after we have been notified of the default by the trustee or holders of at least 25% of the outstanding 2033 Notes; or

(7) one or more final judgments for the payment of money in an aggregate amount in excess of $200,000,000 above available insurance or indemnity coverage shall be rendered against us or any significant subsidiary and the same shall remain undischarged for a period of 60 consecutive days during which execution shall not be effectively stayed.

If an Event of Default (other than an Event of Default specified in clause (5) above) with respect to the 2033 Notes has occurred, the trustee or the holders of at least 25% in principal amount of the 2033 Notes may declare the entire unpaid principal amount of (and premium, if any), and all the accrued interest on, the Notes to be due and immediately payable. This is called a declaration of acceleration of maturity. There is no action on the part of the trustee or any holder of the 2033 Notes required for such declaration if the Event of Default is the Company’s bankruptcy, insolvency or reorganization. Holders of a majority in principal amount of the 2033 Notes may also waive certain past defaults under the indenture with respect to the 2033 Notes on behalf of all of the holders of the 2033 Notes. A declaration of acceleration of maturity may be canceled, under specified circumstances, by the holders of at least a majority in principal amount of the 2033 Notes and the trustee.

Except in cases of default, where the trustee has special duties, the trustee is not required to take any action under the indenture at the request of holders unless the holders offer the trustee protection from expenses and liability satisfactory to the trustee. If an indemnity satisfactory to the trustee is provided, the holders of a majority in principal amount of 2033 Notes may direct the time, method and place of conducting any lawsuit or other formal legal action seeking any remedy available to the trustee. The trustee may refuse to follow those directions in certain circumstances specified in the indenture. No delay or omission in exercising any right or remedy will be treated as a waiver of the right, remedy or Event of Default.

Modification of the Indenture and Waiver of Rights of Holders

Under certain circumstances, we can make changes to the indenture and the 2033 Notes. Some types of changes require the approval of each holder of 2033 Notes, some require approval by a vote of a majority of the holders of the 2033 Notes, and some changes do not require any approval at all.

Description of the 0.875% Senior Notes Due 2030

The 0.875% Senior Notes due 2030 (the "2030 Notes") were issued under an indenture, dated as of June 7, 2013 (the "base indenture") between Nasdaq, Inc. and Wells Fargo Bank, National Association, as trustee (the "Trustee") and a seventh supplemental indenture dated as of February 13, 2020 (the "supplemental indenture" and, together with the base indenture, the "indenture"). The indenture is publicly available at www.sec.gov.

We issued €600 million aggregate principal amount of the 2030 Notes on February 13, 2020.

This summary is subject to, and qualified in its entirety by reference to, all the provisions of the 2030 Notes and the indenture, including definitions of certain terms used therein.

General

The 2030 Notes:

- are senior unsecured obligations of ours;
- rank equally in right of payment with all of our other senior unsecured indebtedness from time to time outstanding, commercial paper issuances and indebtedness under our credit facility;
- are structurally subordinated in right of payment to all existing and future obligations of our subsidiaries, including claims with respect to trade payables; and
- are effectively subordinated in right of payment to all of our existing and future secured indebtedness and other secured obligations to the extent of the value of the collateral securing any such indebtedness and other obligations.

The 2030 Notes were issued in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

Principal, Maturity and Interest

The 2030 Notes will bear interest at a rate of 0.875% per year. Interest on the Notes is payable annually in arrears on February 13 of each year, beginning on February 13, 2021, and will be computed on the basis of the actual number of days in the period for which interest is being calculated and the actual number of days from and including the last date on which interest was paid on the 2030 Notes (or the settlement date if no interest has been paid or duly provided for on the 2030 Notes), to but excluding the next date on which interest is paid or duly provided for. This payment convention is referred to as ACTUAL/ACTUAL (ICMA) as defined in the rulebook of the International Capital Market Association. Interest on the 2030 Notes will accrue from and including the settlement date and will be paid to holders of record on the day immediately prior to the applicable interest payment date.

The 2030 Notes will mature on February 13, 2030. On the maturity date of the 2030 Notes, the holders will be entitled to receive 100% of the principal amount of such 2030 Notes. The 2030 2030 Notes will not have the benefit of any sinking fund.

If any interest payment date, redemption date or maturity date falls on a day that is not a business day, then the relevant payment may be made on the next succeeding business day and no interest will accrue because of such delayed payment. With respect to the 2030 Notes, when we use the term “business day” we mean any day except a Saturday, a Sunday or a day on which banking institutions in the applicable place of payment are authorized or required by law, regulation or executive order to close.

Claims against the Company for payment of principal, interest and additional amounts, if any, on the 2030 Notes will become void unless presentment for payment is made (where so required under the indenture) within, in the case of principal and additional amounts, if any, a period of ten years or, in the case of interest, a period of five years, in each case from the applicable original date of payment therefor.

Euro Notes—Issuance in Euros

Initial holders of the 2030 Notes paid for the 2030 Notes in euros, and principal, premium, if any, and interest payments and additional amounts, if any, in respect of the 2030 Notes will be payable in euros. If, on or after the date of this prospectus supplement, the euro is unavailable to us due to the imposition of exchange controls or other circumstances beyond our control or the euro is no longer used by the then member states of the European Monetary Union that have adopted the euro as their currency or for the settlement of transactions by public institutions within the international banking community, then all payments in respect of the 2030 Notes will be made in U.S. dollars until the euro is again available to us or so used.

The amount payable on any date in euros will be converted to U.S. dollars on the basis of the most recently available market exchange rate for euros as determined by us in our sole discretion. Any payment in respect of the 2030 Notes so made in U.S. dollars will not constitute an event of default under the indenture or the 2030 Notes. Neither the trustee nor the paying agent will be responsible for obtaining exchange rates, effecting conversions or otherwise handling redenominations.

Ranking

The 2030 Notes are general unsecured obligations of ours and will rank equally with all of our existing and future unsubordinated obligations.

Holders of any secured indebtedness and other secured obligations of the Company will have claims that are prior to your claims as holders of the 2030 Notes, to the extent of the value of the assets securing such indebtedness and other obligations, in the event of any bankruptcy, liquidation or similar proceeding.

Further Issues

The 2030 Notes constituted a separate series of debt securities under the indenture, limited to €600 million. Under the indenture, we may, without the consent of the holders of the 2030 Notes, issue additional 2030 Notes of the same or a different series from time to time in the future in an unlimited aggregate principal amount; *provided* that if any such additional 2030 Notes are not fungible with the 2030 Notes offered hereby (or any other tranche of additional 2030 Notes) for U.S. federal income tax purposes, then such additional 2030 Notes will have different ISIN and/or Common Code numbers than the Notes offered hereby (and any such other tranche of additional 2030 Notes). The 2030 Notes and any additional 2030 Notes of the same series would rank equally and ratably and would be treated as a single class for all purposes under the indenture. This means that, in circumstances where the indenture provides for the holders of debt securities of any series to vote or take any action, any of the outstanding 2030 Notes, as well as any additional 2030 Notes that we may issue by reopening such series, will vote or take action as a single class.

Redemption

Optional Redemption

The 2030 Notes will be redeemable, in whole at any time or in part from time to time, at our option, at a redemption price (the "make-whole redemption price") equal to the greater of (i) 100% of the principal amount of the 2030 Notes and (ii) as determined by the Quotation Agent (as defined below), the sum of the present values of the remaining scheduled payments of principal and interest on the 2030 Notes (exclusive of interest accrued and unpaid as of the date of redemption), discounted to the date of redemption on an annual basis (ACTUAL/ACTUAL (ICMA)) at the Bund Rate (as defined below), plus 20 basis points, plus accrued and unpaid interest thereon to the date of redemption. However, if the redemption date is after a record date and on or prior to a corresponding interest payment date, the interest will be paid on the redemption date to the holder of record on the record date.

Notwithstanding the foregoing, at any time on or after November 13, 2029 (three months before their maturity date), the 2030 Notes will be redeemable, in whole or in part, at our option and at any time or from time to time, at a redemption price equal to 100% of the principal amount of the 2030 Notes to be redeemed plus accrued and unpaid interest thereon to, but excluding, the date of redemption.

Notice of any redemption will be mailed at least 30 days, but not more than 60 days, before the redemption date to each registered holder of 2030 Notes to be redeemed. Once notice of redemption is mailed, the 2030 Notes called for redemption will become due and payable on the redemption date and at the applicable redemption price, plus accrued and unpaid interest to, but not including, the redemption date. Unless we default in payment of the redemption price, on and after the redemption date, interest will cease to accrue on the 2030 Notes (or portion thereof) to be redeemed on such redemption date.

"Bund Rate" means, with respect to any redemption date, the rate per annum equal to the annual equivalent yield to maturity of the Comparable German Bund Issue, assuming a price for the Comparable German Bund Issue (expressed as a percentage of its principal amount) equal to the Comparable German Bund Price for such redemption date.

"Comparable German Bund Issue" means that German Bundesanleihe security selected by the Quotation Agent as having a maturity comparable to the remaining term of the 2030 Notes to be redeemed that would be utilized, at the time of selection and in accordance with customary financial practice, in pricing new issues of corporate notes of comparable maturity to the remaining term of the Notes.

"Comparable German Bund Price" means, with respect to any redemption date, (i) the average of four Reference German Bund Dealer Quotations for such redemption date, after excluding the highest and lowest such Reference German Bund Dealer Quotations or (ii) if the Quotation Agent obtains fewer than four such Reference German Bund Dealer Quotations, the average of all such quotations.

“Quotation Agent” means a Reference German Bund Dealer appointed by us.

“Reference German Bund Dealer” means any dealer of German Bundesanleihe securities selected by us in good faith.

“Reference German Bund Dealer Quotations” means, with respect to each Reference German Bund Dealer and any redemption date, the average, as determined by us, of the bid and asked prices for the Comparable German Bund Issue (expressed in each case as a percentage of its principal amount) quoted in writing to the Quotation Agent by such Reference German Bund Dealer at 3:30 p.m., Frankfurt, Germany time, on the third business day preceding such redemption date.

If we elect to redeem less than all of the 2030 Notes, and such 2030 Notes are at the time represented by a global note, then the depositary will select by lot the particular interests to be redeemed. If we elect to redeem less than all of the 2030 Notes, and any of such 2030 Notes are not represented by a global note, then the trustee will select the particular 2030 Notes to be redeemed in a manner it deems appropriate and fair (and the depositary will select by lot the particular interests in any global note to be redeemed).

We may at any time, and from time to time, purchase the 2030 Notes at any price or prices in the open market or otherwise.

Repurchase upon Change of Control Triggering Event

If a Change of Control Triggering Event (as defined below) occurs with respect to the 2030 Notes, unless we have exercised our right to redeem the 2030 Notes, we will be required to make an offer to repurchase all or, at the holder’s option, any part (equal to €100,000 or any integral multiple of €1,000 in excess thereof) of each holder’s 2030 Notes pursuant to the offer described below (the “Change of Control Offer”).

In the Change of Control Offer, we will be required to offer payment in cash equal to 101% of the aggregate principal amount of 2030 Notes repurchased plus accrued and unpaid interest, if any, on the 2030 Notes repurchased to, but not including, the date of purchase (the “Change of Control Payment”).

“Change of Control” means the occurrence of any of the following: (1) the direct or indirect sale, transfer, conveyance or other disposition (other than by way of merger or consolidation), in one or a series of related transactions, of all or substantially all of the assets of us and our Subsidiaries taken as a whole to any Person or group of related Persons for purposes of Section 13(d) of the Exchange Act (a "Group") other than us or one of our subsidiaries; (2) the approval by the holders of our common stock of any plan or proposal for our liquidation or dissolution; (3) the consummation of any transaction (including, without limitation, any merger or consolidation) the result of which is that any Person or Group becomes the beneficial owner, directly or indirectly, of more than 50% of the then outstanding number of shares of our Voting Stock; or (4) the first day on which a majority of the members of our board of directors are not Continuing Directors.

Notwithstanding the foregoing, a transaction will not be deemed to involve a Change of Control if (1) we become a direct or indirect wholly owned subsidiary of a holding company and (2)(A) the direct or indirect holders of the Voting Stock of such holding company immediately following that transaction are substantially the same as the holders of our Voting Stock immediately prior to that transaction or (B) immediately following that transaction no Person or Group (other than a holding company satisfying the requirements of this sentence) is the beneficial owner, directly or indirectly of more than 50% of the Voting Stock of such holding company.

"<u>Change of Control Triggering Event</u>" means the occurrence of both a Change of Control and a Below Investment Grade Rating Event (as such term is defined in the indenture) occurring in respect of that Change of Control.

"<u>Continuing Directors</u>" means, as of any date of determination, any member of our board of directors who (1) was a member of our board of directors on the date of the issuance of the 2030 Notes; or (2) was nominated or approved for election, elected or appointed to our board of directors with the approval of a majority of the Continuing Directors who were members of our board of directors at the time of such nomination, approval, election or appointment (either by a specific vote or by approval of the proxy statement issued by us in which such member was named as a nominee for election as a director).

"<u>Person</u>" means any individual, firm, limited liability company, corporation, partnership, association, joint venture, tribunal, trust, government or political subdivision or agency or instrumentality thereof, or any other entity or organization and includes a "person" as used in Section 13(d)(3) of the Exchange Act.

"<u>Voting Stock</u>" of any specified Person as of any date means the capital stock of such Person that is at the time entitled to vote generally in the election of the board of directors of such Person.

The definition of “Change of Control” includes a phrase relating to the sale, transfer, conveyance or other disposition of “all or substantially all” of our consolidated assets. There is no precise, established definition of the phrase “substantially all” under applicable law. Accordingly, your ability to require us to purchase your 2030 Notes as a result of the sale, transfer, conveyance or other disposition of less than all of our assets may be uncertain.

Certain Covenants

The indenture contains, among others, restrictive covenants regarding (i) our ability to consolidate or merge with another entity or to sell, transfer or otherwise convey all or substantially all of our assets to another entity, (ii) create or permit certain significant subsidiaries to create or permit to exist certain liens and (iii) certain sale and lease-back transactions involving certain subsidiaries.

Events of Default

Holders of the 2030 Notes will have specified rights if an Event of Default (as defined below) occurs. The term “Event of Default” in respect of the 2030 Notes means any of the following:

(1) we do not pay interest on any of the 2030 Notes within 30 days of its due date;

(2) we fail to pay the principal (or premium, if any) of any 2030 Note, when such principal becomes due and payable, at maturity, upon acceleration, upon redemption or otherwise;

(3) we fail to comply with certain covenants under the indenture;

(4) we remain in breach of a covenant or warranty in respect of the indenture or 2030 Notes (other than a covenant included in the indenture solely for the benefit of debt securities of another series) for 90 days after we receive a written notice of default, which notice must be sent by either the trustee or holders of at least 25% in principal amount of the outstanding 2030 Notes;

(5) we file for bankruptcy, or other events of bankruptcy, insolvency or reorganization specified in the indenture;

(6) we default on any indebtedness of ours or of a significant subsidiary having an aggregate amount of at least $150,000,000, constituting a default either of payment of principal when due and payable or which results in acceleration of the indebtedness unless the default has been cured or waived or the indebtedness discharged in full within 60 days after we have been notified of the default by the trustee or holders of at least 25% of the outstanding 2030 Notes; or

(7) one or more final judgments for the payment of money in an aggregate amount in excess of $150,000,000 above available insurance or indemnity coverage shall be rendered against us or any significant subsidiary and the same shall remain undischarged for a period of 60 consecutive days during which execution shall not be effectively stayed.

If an Event of Default (other than an Event of Default specified in clause (5) above) with respect to the 2030 Notes has occurred, the trustee or the holders of at least 25% in principal amount of the 2030 Notes may declare the entire unpaid principal amount of (and premium, if any), and all the accrued interest on, the Notes to be due and immediately payable. This is called a declaration of acceleration of maturity. There is no action on the part of the trustee or any holder of the 2030 Notes required for such declaration if the Event of Default is the Company's bankruptcy, insolvency or reorganization. Holders of a majority in principal amount of the 2030 Notes may also waive certain past defaults under the indenture with respect to the 2030 Notes on behalf of all of the holders of the 2030 Notes. A declaration of acceleration of maturity may be canceled, under specified circumstances, by the holders of at least a majority in principal amount of the 2030 Notes and the trustee.

Except in cases of default, where the trustee has special duties, the trustee is not required to take any action under the indenture at the request of holders unless the holders offer the trustee protection from expenses and liability satisfactory to the trustee. If an indemnity satisfactory to the trustee is provided, the holders of a majority in principal amount of 2030 Notes may direct the time, method and place of conducting any lawsuit or other formal legal action seeking any remedy available to the trustee. The trustee may refuse to follow those directions in certain circumstances specified in the indenture. No delay or omission in exercising any right or remedy will be treated as a waiver of the right, remedy or Event of Default.

Modification of the Indenture and Waiver of Rights of Holders

Under certain circumstances, we can make changes to the indenture and the 2030 Notes. Some types of changes require the approval of each holder of 2030 Notes, some require approval by a vote of a majority of the holders of the 2030 Notes, and some changes do not require any approval at all.

Description of the 1.75% Senior Notes Due 2029

The 1.75% Senior Notes due 2029 (the "2029 Notes") were issued under an indenture, dated as of June 7, 2013 (the "base indenture") between Nasdaq, Inc. and Wells Fargo Bank, National Association, as trustee (the "Trustee") and a sixth supplemental indenture dated as of April 1, 2019 (the "supplemental indenture" and, together with the base indenture, the "indenture"). The indenture is publicly available at www.sec.gov.

We issued €600 million aggregate principal amount of the 2029 Notes on April 1, 2019.

This summary is subject to, and qualified in its entirety by reference to, all the provisions of the 2029 Notes and the indenture, including definitions of certain terms used therein.

General

The 2029 Notes:

- are senior unsecured obligations;
- rank equally in right of payment with all of our other senior unsecured indebtedness from time to time outstanding, commercial paper issuances and indebtedness under our 2017 credit facility;
- are structurally subordinated in right of payment to all existing and future obligations of our subsidiaries, including claims with respect to trade payables; and
- are effectively subordinated in right of payment to all of our existing and future secured indebtedness and other secured obligations to the extent of the value of the collateral securing any such indebtedness and other obligations.

The 2029 Notes were issued in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

Principal, Maturity and Interest

The 2029 Notes bear interest at a rate of 1.75% per year. Interest on the 2029 Notes is payable annually in arrears on of each year, beginning on March 28, 2020, and is computed on the basis of the actual number of days in the period for which interest is being calculated and the actual number of days from and including the last date on which interest was paid on the 2029 Notes (or the settlement date if no interest has been paid or duly provided for on the 2029 Notes), to but excluding the next date on which interest is paid or duly provided for. This payment convention is referred to as ACTUAL/ACTUAL (ICMA) as defined in the rulebook of the International Capital Market Association. Interest on the 2029 Notes accrues from and including the settlement date and will be paid to holders of record on the day immediately prior to the applicable interest payment date.

The 2029 Notes will mature on March 28, 2029. On the maturity date of the 2029 Notes, the holders will be entitled to receive 100% of the principal amount of such 2029 Notes. The 2029 Notes will not have the benefit of any sinking fund.

If any interest payment date, redemption date or maturity date falls on a day that is not a business day, then the relevant payment may be made on the next succeeding business day and no interest will accrue because of such delayed payment. With respect to the 2029 Notes, when we use the term “business day” we mean any day except a Saturday, a Sunday or a day on which banking institutions in the applicable place of payment are authorized or required by law, regulation or executive order to close.

Claims against the Company for payment of principal, interest and additional amounts, if any, on the 2029 Notes will become void unless presentment for payment is made (where so required under the indenture) within, in the case of principal and additional amounts, if any, a period of ten years or, in the case of interest, a period of five years, in each case from the applicable original date of payment therefor.

Euro Notes—Issuance in Euros

Initial holders of the 2029 Notes paid for the 2029 Notes in euros, and principal, premium, if any, and interest payments and additional amounts, if any, in respect of the Notes will be payable in euros. If the euro is unavailable to us due to the imposition of exchange controls or other circumstances beyond our control or the euro is no longer used by the then member states of the European Monetary Union that have adopted the euro as their currency or for the settlement of transactions by public institutions within the international banking community, then all payments in respect of the 2029 Notes will be made in U.S. dollars until the euro is again available to us or so used.

The amount payable on any date in euros will be converted to U.S. dollars on the basis of the most recently available market exchange rate for euros as determined by us in our sole discretion. Any payment in respect of the 2029 Notes so made in U.S. dollars will not constitute an event of default under the indenture or the 2029 Notes. Neither the trustee nor the paying agent will be responsible for obtaining exchange rates, effecting conversions or otherwise handling redenominations.

Interest Rate Adjustment

The interest rate payable on the 2029 Notes will be subject to adjustment from time to time if either Moody's or S&P, or, in either case, any substitute rating agency downgrades (or subsequently upgrades) the credit rating assigned to the 2029 Notes.

Ranking

The 2029 Notes are general unsecured obligations of ours and rank equally with all of our existing and future unsubordinated obligations.

Holders of any secured indebtedness and other secured obligations of the Company will have claims that are prior to claims as holders of the 2029 Notes, to the extent of the value of the assets securing such indebtedness and other obligations, in the event of any bankruptcy, liquidation or similar proceeding.

Further Issues

The 2029 Notes constituted a separate series of debt securities under the indenture, limited to €600 million. Under the indenture, we may, without the consent of the holders of the 2029 Notes, issue additional 2029 Notes of the same or a different series from time to time in the future in an unlimited aggregate principal amount; provided, that, if any such additional 2029 Notes are not fungible with the 2029 Notes (or any other tranche of additional 2029 Notes) for U.S. federal income tax purposes, then such additional 2029 Notes will have different ISIN and/or Common Code numbers than the 2029 Notes (and any such other tranche of additional 2029 Notes). The 2029 Notes and any additional 2029 Notes of the same series would rank equally and ratably and would be treated as a single class for all purposes under the indenture. This means that, in circumstances where the indenture provides for the holders of debt securities of any series to vote or take any action, any of the outstanding 2029 Notes, as well as any additional 2029 Notes that we may issue by reopening such series, will vote or take action as a single class.

Redemption

Optional Redemption

The 2029 Notes will be redeemable, in whole at any time or in part from time to time, at our option, at a redemption price (the “make-whole redemption price”) equal to the greater of (i) 100% of the principal amount of the 2029 Notes, and (ii) as determined by the Quotation Agent (as defined below), the sum of the present values of the remaining scheduled payments of principal and interest on the 2029 Notes (exclusive of interest accrued and unpaid as of the date of redemption), discounted to the date of redemption on an annual basis (ACTUAL/ACTUAL (ICMA)) at the Bund Rate (as defined below), plus 30 basis points, plus accrued and unpaid interest thereon to the date of redemption. However, if the redemption date is after a record date and on or prior to a corresponding interest payment date, the interest will be paid on the redemption date to the holder of record on the record date.

Notwithstanding the foregoing, at any time on or after December 28, 2028 (three months before their maturity date), the 2029 Notes will be redeemable, in whole or in part, at our option and at any time or from time to time, at a redemption price equal to 100% of the principal amount of the 2029 Notes to be redeemed plus accrued and unpaid interest thereon to, but excluding, the date of redemption.

Notice of any redemption will be mailed at least 30 days, but not more than 60 days, before the redemption date to each registered holder of 2029 Notes to be redeemed. Once notice of redemption is mailed, the 2029 Notes called for redemption will become due and payable on the redemption date and at the applicable redemption price, plus accrued and unpaid interest to, but not including, the redemption date. Unless we default in payment of the redemption price, on and after the redemption date, interest will cease to accrue on the 2029 Notes (or portion thereof) to be redeemed on such redemption date.

“Bund Rate” means, with respect to any redemption date, the rate per annum equal to the annual equivalent yield to maturity of the Comparable German Bund Issue, assuming a price for the Comparable German Bund Issue (expressed as a percentage of its principal amount) equal to the Comparable German Bund Price for such redemption date.

“Comparable German Bund Issue” means that German Bundesanleihe security selected by the Quotation Agent as having a maturity comparable to the remaining term of the Notes to be redeemed that would be utilized, at the time of selection and in accordance with customary financial practice, in pricing new issues of corporate notes of comparable maturity to the remaining term of the Notes.

"Comparable German Bund Price" means, with respect to any redemption date, (i) the average of four Reference German Bund Dealer Quotations for such redemption date, after excluding the highest and lowest such Reference German Bund Dealer Quotations, or (ii) if the Quotation Agent obtains fewer than four such Reference German Bund Dealer Quotations, the average of all such quotations.

"Quotation Agent" means a Reference German Bund Dealer appointed by us.

"Reference German Bund Dealer" means any dealer of German Bundesanleihe securities selected by us in good faith.

"Reference German Bund Dealer Quotations" means, with respect to each Reference German Bund Dealer and any redemption date, the average, as determined by us, of the bid and asked prices for the Comparable German Bund Issue (expressed in each case as a percentage of its principal amount) quoted in writing to the Quotation Agent by such Reference German Bund Dealer at 3:30 p.m., Frankfurt, Germany time, on the third business day preceding such redemption date.

If we elect to redeem less than all of the 2029 Notes, and such 2029 Notes are at the time represented by a global note, then the depositary will select by lot the particular interests to be redeemed. If we elect to redeem less than all of the 2029 Notes, and any of such 2029 Notes are not represented by a global note, then the trustee will select the particular 2029 Notes to be redeemed in a manner it deems appropriate and fair (and the depositary will select by lot the particular interests in any global note to be redeemed).

We may at any time, and from time to time, purchase the 2029 Notes at any price or prices in the open market or otherwise.

Repurchase upon Change of Control Triggering Event

If a Change of Control Triggering Event (as defined below) occurs with respect to the 2029 Notes, unless we have exercised our right to redeem the 2029 Notes, we are required to make an offer to repurchase all or, at the holder's option, any part (equal to €100,000 or any integral multiple of €1,000 in excess thereof) of each holder's 2029 Notes pursuant to the offer described below (the "Change of Control Offer").

In the Change of Control Offer, we will be required to offer payment in cash equal to 101% of the aggregate principal amount of 2029 Notes repurchased plus accrued and unpaid interest, if any, on the Notes repurchased to, but not including, the date of purchase (the "Change of Control Payment").

"Change of Control" means the occurrence of any of the following: (1) the direct or indirect sale, transfer, conveyance or other disposition (other than by way of merger or consolidation), in one or a series of related transactions, of all or substantially all of the assets of us and our Subsidiaries taken as a whole to any Person or group of related Persons for purposes of Section 13(d) of the Exchange Act (a "Group") other than us or one of our subsidiaries; (2) the approval by the holders of our common stock of any plan or proposal for our liquidation or dissolution; (3) the consummation of any transaction (including, without limitation, any merger or consolidation) the result of which is that any Person or Group becomes the beneficial owner, directly or indirectly, of more than 50% of the then outstanding number of shares of our Voting Stock; or (4) the first day on which a majority of the members of our board of directors are not Continuing Directors.

Notwithstanding the foregoing, a transaction will not be deemed to involve a Change of Control if (1) we become a direct or indirect wholly owned Subsidiary of a holding company and (2)(A) the direct or indirect holders of the Voting Stock of such holding company immediately following that transaction are substantially the same as the holders of our Voting Stock immediately prior to that transaction or (B) immediately following that transaction no Person or Group (other than a holding company satisfying the requirements of this sentence) is the beneficial owner, directly or indirectly of more than 50% of the Voting Stock of such holding company.

"Change of Control Triggering Event" means the occurrence of both a Change of Control and a Below Investment Grade Rating Event (as such term is defined in the indenture) occurring in respect of that Change of Control.

"Continuing Directors" means, as of any date of determination, any member of our board of directors who (1) was a member of our board of directors on the date of the issuance of the Notes; or (2) was nominated or approved for election, elected or appointed to our board of directors with the approval of a majority of the Continuing Directors who were members of our board of directors at the time of such nomination, approval, election or appointment (either by a specific vote or by approval of the proxy statement issued by us in which such member was named as a nominee for election as a director).

"Person" means any individual, firm, limited liability company, corporation, partnership, association, joint venture, tribunal, trust, government or political subdivision or agency or instrumentality thereof, or any other entity or organization and includes a "person" as used in Section 13(d)(3) of the Exchange Act.

"Voting Stock" of any specified Person as of any date means the capital stock of such Person that is at the time entitled to vote generally in the election of the board of directors of such Person.

The definition of "Change of Control" includes a phrase relating to the sale, transfer, conveyance or other disposition of "all or substantially all" of our consolidated assets. There is no precise, established definition of the phrase "substantially all" under applicable law. Accordingly, the ability to require us to purchase 2029 Notes as a result of the sale, transfer, conveyance or other disposition of less than all of our assets may be uncertain.

Certain Covenants

The indenture contains, among others, restrictive covenants regarding (i) our ability to consolidate or merge with another entity or to sell, transfer or otherwise convey all or substantially all of our assets to another entity; (ii) create or permit certain significant subsidiaries to create or permit to exist certain liens and (iii) certain sale and lease-back transactions involving certain subsidiaries.

Events of Default

Holders of the 2029 Notes will have specified rights if an Event of Default (as defined below) occurs. The term "Event of Default" in respect of the Notes means any of the following:

(1) we do not pay interest on any of the Notes within 30 days of its due date;

(2) we fail to pay the principal (or premium, if any) of any Note, when such principal becomes due and payable, at maturity, upon acceleration, upon redemption or otherwise;

(3) failure by us to comply with the covenants under the indenture;

(4) we remain in breach of a covenant or warranty in respect of the indenture or 2029 Notes (other than a covenant included in the indenture solely for the benefit of debt securities of another series) for 90 days after we receive a written notice of default, which notice must be sent by either the trustee or holders of at least 25% in principal amount of the outstanding 2029 Notes;

(5) we file for bankruptcy, or other events of bankruptcy, insolvency or reorganization specified in the indenture;

(6) we default on any indebtedness of ours or of a significant subsidiary having an aggregate amount of at least $150,000,000, constituting a default either of payment of principal when due and payable or which results in acceleration of the indebtedness unless the default has been cured or waived or the indebtedness discharged in full within 60 days after we have been notified of the default by the trustee or holders of at least 25% of the outstanding 2029 Notes; or

(7) one or more final judgments for the payment of money in an aggregate amount in excess of $150,000,000 above available insurance or indemnity coverage shall be rendered against us or any significant subsidiary and the same shall remain undischarged for a period of 60 consecutive days during which execution shall not be effectively stayed.

If an Event of Default (other than an Event of Default specified in clause (5) above) with respect to the 2029 Notes has occurred, the Trustee or the holders of at least 25% in principal amount of
the 2029 Notes may declare the entire unpaid principal amount of (and premium, if any), and all the accrued interest on, the Notes to be due and immediately payable. This is called a declaration of acceleration of maturity. There is no action on the part of the trustee or any holder of the 2029 Notes required for such declaration if the Event of Default is the Company's bankruptcy, insolvency or reorganization. Holders of a majority in principal amount of the Notes may also waive certain past defaults under the indenture with respect to the 2029 Notes on behalf of all of the holders of the 2029 Notes. A declaration of acceleration of maturity may be canceled, under specified circumstances, by the holders of at least a majority in principal amount of the 2029 Notes and the trustee.

Except in cases of default, where the trustee has special duties, the trustee is not required to take any action under the indenture at the request of holders unless the holders offer the trustee protection from expenses and liability satisfactory to the trustee. If an indemnity satisfactory to the trustee is provided, the holders of a majority in principal amount of 2029 Notes may direct the time, method and place of conducting any lawsuit or other formal legal action seeking any remedy available to the trustee. The trustee may refuse to follow those directions in certain circumstances specified in the indenture. No delay or omission in exercising any right or remedy will be treated as a waiver of the right, remedy or Event of Default.

Before holders of the 2029 Notes are allowed to bypass the trustee and bring a lawsuit or other formal legal action or take other steps to enforce their rights or protect their interests relating to the 2029 Notes, the following must occur:

- such holders must give the trustee written notice that an Event of Default has occurred and remains uncured;
- holders of at least 25% in principal amount of the 2029 Notes must make a written request that the trustee take action because of the default and must offer the Trustee indemnity satisfactory to the trustee against the cost and other liabilities of taking that action; and
- the trustee must have failed to take action for 60 days after receipt of the notice and offer of indemnity.

Holders are, however, entitled at any time to bring a lawsuit for the payment of money due on the 2029 Notes on or after the due date.

Modification of the Indenture and Waiver of Rights of Holders

Under certain circumstances, we can make changes to the indenture and the 2029 Notes. Some types of changes require the approval of each holder of 2029 Notes, some require approval by a vote of a majority of the holders of the 2029 Notes, and some changes do not require any approval at all.

Exhibit 10.19

Nasdaq, Inc.
Change in Control Severance Plan
For Non-CEO Presidents, Executive Vice Presidents and Senior Vice Presidents

Effective November 26, 2013 (as amended December 6, 2022)

1. **Purpose**. The Nasdaq Change in Control Severance Pay Plan (the "Plan") has been established by Nasdaq, Inc. ("Nasdaq" or "the Company"), effective as of November 26, 2013 (as amended December 6, 2022) ("Effective Date") to promote the long-term financial interests of the Company and its shareholders by (i) providing key employees of the Company and its subsidiaries with assurances of fair and equitable treatment as well as severance benefits consistent with competitive practices in the event of a Change in Control of the Company and (ii) reducing the risk of departures and distractions of such employees in a Change in Control situation which would be detrimental to the Company and its shareholders.

2. **Definitions.** As used in this Plan, the following terms shall have the meanings set forth below:

(a) "Board" means the Board of Directors of Nasdaq, Inc.

(b) "Cause" means, for Executives employed in the United States, (i) the Executive's conviction of, or pleading nolo contendere to, any crime, whether a felony or misdemeanor, involving the purchase or sale of any security, mail or wire fraud, theft, embezzlement, moral turpitude, or Nasdaq or its affiliates' property (with the exception of minor traffic violations or similar misdemeanors); (ii) the Executive's repeated neglect of his or her duties; or (iii) the Executive's willful misconduct in connection with the performance of his or her duties. For Executives employed outside of the United States, "Cause" shall be defined consistent with the requirements of local law in the jurisdiction where the Executive is regularly assigned to work.

(c) "Change in Control" means the first to occur of any one of the following events:

(i) any "Person," as such term is used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934 (the "Exchange Act") is or becomes the beneficial owner, directly or indirectly, of more than 50% of the Voting Securities (not including any securities acquired directly (or through an underwriter) from Nasdaq), except a Person shall not include:

(A) Nasdaq;

(B) any Person who becomes the "beneficial owner" (as defined in Rule 13d-3 under the Exchange Act) of more than 50% of Nasdaq's then outstanding securities eligible to vote in the election of the Board ("Voting Securities") as a result of a reduction in the number of Voting Securities outstanding due to the repurchase of Voting Securities by Nasdaq unless and until such Person, after becoming aware that such Person has become the beneficial owner of more than 50% of the then outstanding Voting Securities, acquires beneficial ownership of additional Voting Securities representing 1% or more of the Voting Securities then outstanding,

(C) any trustee or other fiduciary holding securities under an employee benefit plan of Nasdaq, or

(D) any entity owned, directly or indirectly, by the stockholders of Nasdaq in substantially the same proportions as their ownership of Voting Securities is or becomes the beneficial owner, directly or indirectly, of more than 50% of the Voting Securities (not including any securities acquired directly (or through an underwriter) from Nasdaq or the Companies;

(ii) the date on which, within any twelve (12) month period (beginning on or after the Effective Date), a majority of the directors then serving on the Board are replaced by directors not endorsed by at least two-thirds (2/3) of the members of the Board before the date of appointment or election;

(iii) there is consummated a merger or consolidation of Nasdaq with any other corporation or entity or Nasdaq issues Voting Securities in connection with a merger or consolidation of any direct or indirect subsidiary of Nasdaq with any other corporation, other than:

(A) a merger or consolidation that would result in the Voting Securities outstanding immediately prior thereto continuing to represent (either by remaining outstanding or by being converted into Voting Securities of the surviving or parent entity) more than 50% of Nasdaq's then outstanding Voting Securities or more than 50% of the combined voting power of such surviving or parent entity outstanding immediately after such merger or consolidation or

(B) a merger or consolidation effected to implement a recapitalization of Nasdaq (or similar transaction) in which no Person, directly or indirectly, acquired more than 50% of Nasdaq's then outstanding Voting Securities (not including any securities acquired directly (or through an underwriter) from Nasdaq or the Companies); or

(iv) the consummation of an agreement for the sale or disposition by Nasdaq of all or substantially all of Nasdaq's assets (or any transaction having a similar effect), provided that such agreement or transaction of similar effect shall in all events require the disposition, within any twelve (12) month period, of at least 40% of the gross fair market value of all of Nasdaq's then assets; other than a sale or disposition by Nasdaq of all or substantially all of Nasdaq's assets to an entity, at least 50% of the combined voting power of the voting securities of which are owned directly or indirectly by stockholders of Nasdaq in substantially the same proportions as their ownership of Nasdaq immediately prior to such sale.

Notwithstanding anything in this Plan to the contrary, to the extent any provision of this Plan would cause a payment or benefit not exempt from the requirements of Code Section 409A to be made because of the occurrence of a Change in Control, then such payment or benefit shall not be made unless such Change in Control also constitutes a "change in ownership", "change in effective control" or "change in ownership of a substantial portion of the Company's assets" within the meaning of Code section 409A. Any payment that would have been made except for the application of the preceding sentence shall be made in accordance with the payment schedule that would have applied in the absence of a Change in Control (and other Executive rights that are tied to a Change in Control shall not be affected by this paragraph).

(d) "Companies" shall mean Nasdaq or any of its affiliates.

(e) "Disability" shall mean either (i) the inability of the Executive to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment that can be expected to result in death or can be expected to last for a continuous period of not less than 12 months or (ii) the Executive is, by reason of any medically determinable physical or mental impairment that can be expected to result in death or can be expected to last for a continuous period of not less than 12 months, receiving income replacement benefits for a period of not less than three months under an accident and health plan covering employees of the Companies. The Executive shall be deemed disabled if he is determined to be (i) totally disabled by the Social Security Administration (or a similar governmental agency in the country where the Executive is regularly assigned to work) or (ii) disabled in accordance with a disability insurance program, provided such definition of disabled under the program complies with the definition of Disability hereunder. Otherwise, such Disability shall be certified by a physician chosen by Nasdaq and reasonably acceptable to the Executive (unless he is then legally incapacitated, in which case such physician shall be reasonably acceptable to the Executive's authorized legal representative).

(f) "Employing Entity" shall mean Nasdaq or the affiliate that employs the Executive.

(g) "Executive" shall mean an individual who is either a Non-CEO President, an Executive Vice President or Senior Vice President of the Companies; provided, however that in no event shall an individual be eligible to participate in the Plan if the individual is covered under an active individual severance agreement entered into with the Companies.

(h) "Good Reason shall mean the Employing Entity (i) reducing the Executive's position, duties, or authority; (ii) failing to secure the agreement of any successor entity to the Company that the Executive shall continue in his or her position without reduction in position, duties or authority; or (iii) relocating the Executive's principal work location beyond a 50 mile radius of his or her work location as of the date immediately preceding the date of a Change in Control; provided that no event or condition shall constitute Good Reason unless (A) the Executive gives the Employing Entity written notice specifying his or her objection to such event or condition within 90 days following the occurrence of such event or condition, (B) such event or condition is not corrected, in all material respects, by the Employing Entity in a manner that is reasonably satisfactory to the Executive within 30 days following the Employing Entity's receipt of such notice and (C) the Executive resigns from his or her employment with the Employing Entity not more than 30 days following the expiration of the 30-day period described in the foregoing clause (B).

(i) "Qualifying Termination" means a termination of Executive's employment (i) by the Employing Entity other than for Cause or (ii) by Executive for Good Reason. Termination of Executive's employment on account of death, Disability or voluntary termination other than for Good Reason shall not be treated as a Qualifying Termination.

3. **Payments Upon Termination of Employment following a Change in Control**. If, within the period beginning on a Change in Control and ending two (2) years following such Change in Control, Executive's employment with the Employing Entity terminates by the Employing Entity for a reason other than for Cause, or within the period beginning on a Change in Control and ending one (1) year following such Change in Control, Executive's employment with the Employing Entity terminates by the Executive for Good Reason, Executive shall be entitled to the following payments and benefits subject to Section 3(e).

(a) Severance. On the sixtieth (60th) day following the date of Executive's Qualifying Termination, Nasdaq shall pay Executive a lump sum cash payment in accordance with the following schedule:

(i) if Executive is a non-CEO President or an Executive Vice President ("EVP") as of the Executive's Qualifying Termination, then Executive's lump sum cash payment shall be equal to the sum of (x) 200% of Executive's annual salary at the rate in effect on the date of Executive's Qualifying Termination and (y) 100% of Executive's "Individual Target Award" (as that term is defined in the Nasdaq Inc. Executive Corporate Incentive Plan (the "Executive Incentive Plan")) for the Plan Year (as that term is defined in the Incentive Plan) in which Executive's Qualifying Termination occurs, or if such Individual Target Award has not yet been established for such Plan Year, 100% of Executive's Individual Target Award for the Plan Year prior to the year in which the Qualifying Termination occurs.

(ii) if Executive is a Senior Vice President ("SVP") as of the Executive's Qualifying Termination, then the Executive's lump sum cash payment shall be equal to the sum of (x) 150% of Executive's annual salary at the rate in effect on the date of Executive's Qualifying Termination and (y) 100% of Executive's "Individual Target Award" (as that term is defined in The Nasdaq Inc. Corporate Incentive Plan (the "Corporate Incentive Plan")) for the Plan Year (as that term is defined in the Corporate Incentive Plan) in which Executive's Qualifying Termination occurs, or if such Individual Target Award has not yet been established for such Plan Year, 100% of Executive's Individual Target Award for the Plan Year prior to the year in which the Qualifying Termination occurs.

(b) Incentive Compensation. Notwithstanding any provision of the Incentive Plan to the contrary, Nasdaq shall pay Executive on the sixtieth (60th) day following the date of Executive's Qualifying Termination a lump sum cash payment equal to the sum of (i) any unpaid "Award" (as that term is defined in the Executive Incentive Plan or Corporate Incentive Plan, as applicable) which had been earned by Executive for a completed Plan Year and (ii) Executive's "Pro-Rata Individual Target Award." The term Pro-Rata Individual Target Award means in respect to the Plan Year during which Executive's Qualifying Termination occurs an amount equal to the product of (i) Executive's Individual Target Award for the Plan Year in which Executive's Qualifying Termination occurs, or if such Individual Target Award has not yet been established for such Plan Year, 100% of Executive's Individual Target Award for the Plan Year prior to the year in which the Qualifying Termination occurs and (ii) a fraction, the numerator of which equals the number of days from and including the first day of the Plan Year during which the Qualifying Termination occurred through and including the date of Executive's Qualifying Termination.

(c) United States Health and Welfare Benefits. Nasdaq shall pay to Executive on a monthly basis during the CIC Coverage Period a taxable monthly cash payment equal to the COBRA premium for the highest level of coverage available under the Employing Entity's group health plans, but reduced by the monthly amount that Executive would pay for such coverage if the Executive was an active employee. "CIC Coverage Period" shall mean the period (I) commencing on the first day of the month following the Release and Covenants Effective Date (provided that if the 60 day period described in Section 3(e) below begins in one calendar year and ends in another, the CIC Coverage Period shall commence not earlier than January 1 of the calendar year following an Executive's Qualifying Termination) and (II) ending on the earlier of (x) the expiration of 24 months from the first day of the CIC Coverage Period in the case of an Executive who is a non-CEO President or an EVP as of the Executive's Qualifying Termination (the expiration of 18 months in the case of an Executive who is a SVP as of the Executive's Qualifying Termination), and (y) the date that the Executive is eligible for coverage under the health care plans of a subsequent employer. The payments provided by this subparagraph (c) shall be conditioned upon the Executive being covered by the Company's health care plans immediately prior to the Executive's Qualifying Termination. The foregoing payments are not intended to limit or otherwise reduce any entitlements that Executive may have under COBRA.

(d) Non-United States Health and Welfare Benefits. Executives employed outside the United States shall receive a taxable monthly cash payment equivalent to the Employing Entity's share of the cost of the highest level of coverage available under the Employing Entity's group health plans during the CIC Coverage Period unless otherwise required by applicable local law.

(e) Outplacement Services. Nasdaq shall provide Executive with outplacement services suitable to Executive's position during the "Outplacement Coverage Period"; provided that if such outplacement services are provided by a third party, Nasdaq shall pay the cost of such outplacement services to the third party, up to a maximum amount of $50,000, no later than the last day of the third calendar year following the calendar year in which such Qualifying Termination occurs. The "Outplacement Coverage Period" shall mean the period (I) commencing on the first day of the month following the Release and Covenants Effective Date (provided that if the 60 day period described in Section 3(e) below begins in one calendar year and ends in another, the CIC Coverage Period shall commence not earlier than January 1 of the calendar year following an Executive's Qualifying Termination) and (II) ending on the earlier of (x) the expiration of 12 months from the first day of the Outplacement Coverage Period or, if earlier, (y) the date the Executive first accepts an offer of employment.

(f) Release and Restrictive Covenants. Notwithstanding anything to the contrary in this Agreement, receipt of benefits under Section 3 shall be contingent upon (i) Executive executing and delivering to Nasdaq a general release of claims following the date of the Executive's Qualifying Termination, in substantially the form attached as Exhibit A ("Release") that, within 60 days of the Executive's Qualifying Termination, has become irrevocable by the Executive and (ii) Executive executing and delivering to Nasdaq a restrictive covenants and cooperation agreement, in substantially the form attached as Exhibit B ("Covenants") that, within 60 days of the Executive's Qualifying Termination, has become irrevocable by the Executive. The date on which the Release and Covenants become irrevocable under this subparagraph (i) shall be referred to as the Release and Covenants Effective Date. If Executive fails to timely execute and deliver to Nasdaq the Release and Covenants, Nasdaq shall have no obligation to pay or provide the benefits provided under this Section 3 to the Executive. Executives employed outside of the United States will be required to execute comparable agreements consistent with the requirements of local law.

4. **Special Provisions for Executives Employed Outside of the United States**: The severance payment under this Plan includes all contractual and statutory payments that the Executive is entitled to upon termination or during or in respect of his/her notice period, including but not limited to:

   i. salary, pension, bonus, etc., payable in a notice period or in lieu of notice,

   ii. all severance payments payable under statute or collective or other agreements, and

   iii. compensation for untaken holiday.

Any part of the severance payment payable under this Plan which - pursuant to law or collective or other agreement - is to be paid into a public holiday fund, or pension scheme, etc., will be withheld by the Employing Entity and paid towards the relevant holiday fund or pension scheme, etc. The severance payment will be treated as advance payment for any compensation or awards which may be made to the employee by any court or tribunal (although no admission of liability in relation to any such compensation or award is made).

If the gross value of the Executive's contractual and statutory rights pertaining to termination of employment exceeds the severance payment under this Plan, the Executive will be entitled to receive his or her contractual and statutory rights (less any applicable deductions for income tax withholding and Executive's social taxes) instead of the severance payment under this Plan. In no event will the Executive be entitled to receive severance payments under this Plan in addition to other statutory or contractual entitlements payable in connection with the termination of employment.

5. **Withholding Taxes.** Nasdaq may withhold from all payments or benefits due to Executive hereunder or under any other plan or arrangement of the Companies all taxes which, by applicable federal, state, local or other law, Nasdaq determines it is required to withhold therefrom.

6. **Best Net**. In connection with the excise tax imposed by Section 4999 of the Internal Revenue Code ("Code"), as amended, the Nasdaq will provide for the "Best Net" so that Executive's aggregate severance payments and benefits would be reduced to $1.00 less than that amount which would trigger the Code Section 4999 excise tax if such reduction would result in such Executive receiving a greater after-tax benefit than Executive would receive if the full severance benefits were paid (i.e., the aggregate severance payments and benefits that Executive receives will be either the full amount of severance payments and benefits or an amount of severance payments and benefits reduced to the extent necessary so that Executive incurs no excise tax, whichever results in Executive receiving the greater amount, taking into account applicable federal, state and local income, employment and other applicable taxes, as well as the excise tax).

7. **Code Section 409A.** To the extent applicable, it is intended that the Plan comply with the provisions of Code Section 409A. The Plan will be administered and interpreted in a manner consistent with this intent, and any provision that would cause the Plan to fail to satisfy Code Section 409A will have no force and effect until amended to comply therewith (which amendment may be retroactive to the extent permitted by Code Section 409A). Notwithstanding anything contained herein to the contrary, for all purposes of this Plan, Executive shall not be deemed to have had a termination of employment until Executive has incurred a separation from service as defined in Treasury Regulation §1.409A-1(h) and, to the extent required to avoid accelerated taxation and/or tax penalties under Code Section 409A, payment of the amounts payable under the Plan that would otherwise be payable during the six-month period after the date of termination shall instead be paid on the first business day after the expiration of such six-month period, plus interest thereon, at a rate equal to the applicable "Federal short-term rate" (as defined in Code Section 1274(d)) for the month in which such date of termination occurs, from the respective dates on which such amounts would otherwise have been paid until the actual date of payment. In addition, for purposes of the Plan, each amount to be paid and each installment payment shall be construed as a separate, identified payment for purposes of Code Section 409A. With respect to expenses eligible for reimbursement under the terms of this Plan, (i) the amount of such expenses eligible for reimbursement in any taxable year shall not affect the expenses eligible for reimbursement in another taxable year and (ii) any reimbursements of such expenses shall be made no later than the end of the calendar year following the calendar year in which the related expenses were incurred, except, in each case, to the extent that the right to reimbursement does not provide for a "deferral of compensation" within the meaning of Code Section 409A.

8. **Waiver of Breach**. No waiver by any party hereto of a breach of any provision of the Plan by any other party, or of compliance with any condition or provision of the Plan to be performed by such other party, will operate or be construed as a waiver of any subsequent breach by such other party of any similar or dissimilar provisions and conditions at the same or any prior or subsequent time. The failure of any party hereto to take any action by reason of such breach will not deprive such parry of the right to take action at any time while such breach continues

9. **Amendment and Termination.** The Board may amend or terminate the Plan at any time; provided, however that no amendment of the Plan which is adopted on or after a Change in Control or during the 180-day period immediately preceding a Change in Control shall directly or indirectly adversely affect any Executive's rights and benefits under the Plan without the written consent of that Executive and further provided, that the upon and after a Change in Control, the Plan may not be terminated prior to the second anniversary of the occurrence of such Change in Control.

10. **Administration**. The Committee shall be responsible for administering this Plan. The Committee may employ attorneys, consultants, accountants, agents and other individuals, any of whom may be an employee of Nasdaq, and the Committee, Nasdaq, and its officers and directors shall be entitled to rely upon the advice, opinions or valuations of any such individuals. All actions taken and all interpretations and determinations made by the Committee shall be final and binding upon Executives, the Companies, and all other interested individuals.

11. **Binding Agreement; Successors.** In the event of any Change in Control, the provisions of this Plan shall be binding upon the surviving corporation, and such surviving corporation shall be treated as Nasdaq hereunder. This Plan shall inure to the benefit of and be enforceable by Executive's personal or legal representatives, executors, administrators, successors, heirs, distributees, devisees and legatees. If Executive dies while any amounts would be payable to Executive hereunder had Executive continued to live, all such amounts, unless otherwise provided herein, shall be paid in accordance with the terms of this Plan to such person or persons appointed in writing by Executive to receive such amounts or, if no person is so appointed, to Executive's estate.

12. **Gender and Number**. Except where otherwise indicated by the context, any masculine term used herein also shall include the feminine, the plural shall include the singular, and the singular shall include the plural.

13. **Unfunded Plan**. Executives shall have no right, title or interest whatsoever in or to any investments that the Companies may make to aid it in meeting its obligations under this Plan. Nothing contained in this Plan, and no action taken pursuant to its provisions, shall create or be construed to create a trust of any kind, or a fiduciary relationship between the Companies and any Executive, beneficiary, legal representative or any other individual. To the extent that any individual acquires a right to receive payments under this Plan, such right shall be no greater than the right of an unsecured general creditor of the Companies. All payments to be made hereunder shall be paid from the general funds of Nasdaq, and no special or separate fund shall be established, and no segregation of assets shall be made to assure payment of such amounts except as expressly set forth in this Plan.

14. **Governing Law and Miscellaneous.** The law of the State of New York shall govern this Plan without giving effect to its conflict of law principles. Should a court of competent jurisdiction find that any provision of this Plan is void, voidable, illegal, or unenforceable, no other provision shall be affected thereby and the balance shall be interpreted in a manner that gives effect to the intent of the parties. The normal rules of construction hold that all ambiguities are construed against the drafting party will not apply to the interpretation of this Plan.

Exhibit A

UNITED STATES GENERAL EXECUTIVE RELEASE AND WAIVER[1]

Reference is made to The Nasdaq Change in Control Severance Plan for Non-CEO Presidents, Executive Vice Presidents and Senior Vice Presidents (the "CIC Plan") that has been established by The Nasdaq, Inc. ("Nasdaq"), effective as of November 26, 2013 (as amended December 6, 2022) and under

which ("Executive") is covered. Capitalized terms not defined herein shall have the meaning ascribed to such terms in the CIC Plan.

FOR GOOD AND VALUABLE CONSIDERATION, as set forth in the CIC Plan (which is incorporated herein by reference as if set forth fully herein and made a part hereof), the receipt, sufficiency and adequacy of which is hereby acknowledged by Executive's signature below, Executive agrees as follows:

1. **Acknowledgment and Release**. Executive hereby accepts the separation package provided under the CIC Plan and hereby releases, discharges, and agrees to hold harmless the Companies, their predecessors, successors, their boards of directors and their members, employees, officers, parent, shareholders, employee benefit plans and their Plan Administrators, trusts, trustees, heirs, successors, and assigns (hereinafter referred to in this Release collectively as the "Releasees"), from all claims, liabilities, demands, and causes of action at law or equity, known or unknown, fixed or contingent, which Executive have, may have, will have, or claim to have against the Releasees as a result of Executive's employment and/or this separation and the conclusion of Executive's employment with the Releasees at any time up to and including the date of the execution of this General Executive Release and Waiver, excluding all claims that arise out of an asserted breach of the CIC Plan. Executive's agreement pursuant to this General Executive Release and Waiver is hereinafter referred to as the "Release". This includes, but is not limited to, claims arising under federal, state, or local laws prohibiting employment discrimination, including Title VII of the Civil Rights Act of 1964, as amended, the Age Discrimination in Employment Act, as amended (including the Older Workers Benefit Protection Act), the Employment Retirement Income Security Act of 1974, as amended, the Equal Pay Act, the Fair Labor Standards Act, as amended, the District of Columbia Human Rights Act, as amended, the Maryland Human Relations Act, the New York Executive Law, as amended, the New York City Administrative Code, as amended, the New York Labor Law, as amended, the District of Columbia Wage Payment and Wage Collection Law, as amended, the Maryland Wage Payment and Collection Act, as amended, claims growing out of any legal restrictions on an employer's right to terminate its employees in any jurisdiction, such as claims for wrongful or constructive discharge, breach of any express or implied contract, and/or any claims on any basis whatsoever regarding Executive's status, pay, position, or title while employed by the Releasees. Excluded from this Release are claims which cannot be lawfully waived, including the right to file an administrative charge of discrimination with federal or state agencies. Executive is, however, waiving all rights to monetary recovery in connection with any such charge.

   Executive specifically promise not to sue the Releasees in any forum for any of the above-mentioned claims, except that Executive may bring a lawsuit to challenge the validity of this letter agreement under the Age Discrimination in Employment Act ("ADEA"). If Executive violates this covenant, Executive will be required to pay the Releasees' defense costs, including its reasonable fees; alternatively, at Nasdaq's option, Nasdaq's remaining obligations to pay severance money and/or benefits under the CIC Plan shall cease, and Executive will be required to repay to Nasdaq upon demand all but $100.00 (one hundred dollars) of the payments and other benefits Executive received under the CIC Plan. The above payment/repayment provisions do not apply in the event Executive sues the Releasees under the ADEA.

2. **Governing Law**. The law of the State of New York shall govern this Release without giving effect to its conflict of law principles. Should a court of competent jurisdiction find that any provision of this Release is void, voidable, illegal, or unenforceable, no other provision shall be affected thereby and the balance shall be interpreted in a manner that gives effect to the intent of the parties. The parties agree that the normal rule of construction that holds that all ambiguities are construed against the drafting party will not apply to the interpretation of this Release.

[1] Executives assigned outside the United States shall be required to execute a comparable version of this agreement consistent with local law of the jurisdiction where the Executive is assigned.

3. **Headings**. We further acknowledge that the headings in this Release are for convenience only and have no bearing on the meaning of this Release.

4. **Time to Consider**. Executive acknowledges that Executive has been advised that Executive has twenty-one (21) days from the date of receipt of this Release to consider all the provisions of the Release and do hereby knowingly and voluntarily waive said given twenty-one day period. YOU FURTHER ACKNOWLEDGE THAT YOU HAVE READ THE RELEASE CAREFULLY, HAVE BEEN ADVISED BY NASDAQ TO, AND HAVE IN FACT, CONSULTED AN ATTORNEY, AND FULLY UNDERSTAND THAT BY SIGNING BELOW YOU ARE GIVING UP CERTAIN RIGHTS WHICH YOU MAY HAVE TO SUE OR ASSERT A CLAIM AGAINST THE RELEASEES AS DESCRIBED HEREIN. YOU ACKNOWLEDGE THAT YOU HAVE NOT BEEN FORCED OR PRESSURED IN ANY MANNER WHATSOEVER TO SIGN THIS RELEASE AND AGREE TO ALL OF ITS TERMS VOLUNTARILY.

5. **Revocation.** Executive shall have seven (7) days from the date of Executive's execution of the Release to revoke the Release, with respect to all claims referred to herein (including, without limitation, any and all claims arising under ADEA). If Executive revokes the Release, Nasdaq will not be obligated to honor its obligations under the CIC Plan.

6. **No Admission.** This Release does not constitute an admission of liability or wrongdoing of any kind by Executive or the Releasees.

7. **Coordination with Executive Restrictive Covenants and Cooperation Agreement.** In addition to the timely submission to Nasdaq of an executed Release, Executive acknowledges and agrees that the payment of any benefits under the CIC Plan to the Executive also is contingent upon the Executive's timely submission to Nasdaq of an executed Executive Restrictive Covenants and Cooperation Agreement in substantially the form attached as Exhibit B to the CIC Plan. Executive acknowledges that the Executive's failure to submit to Nasdaq on a timely basis an executed Executive Restrictive Covenants and Cooperation Agreement shall Waiver shall cause the Companies' obligation to make the payments and/or provide the benefits referred to in the CIC Plan to immediately cease.

If Executive agrees to the foregoing, please sign the enclosed copy of this Release in the space provided below and return it to me.

Very truly yours,

Nasdaq, Inc.

By: ______________________

By signing below, I, , certify that I have read, carefully reviewed, fully understand, and agree to all the provisions of this Release, which, along with the CIC Plan, Restrictive Covenants Agreement and any award agreements I entered into under the Equity Plan sets forth the entire agreement and understanding between Nasdaq and me. I acknowledge that I have not relied upon any representation or statement, written or oral, not set forth in such documents.

Date:

cc: People @ Nasdaq
Office of General Counsel

Exhibit B

UNITED STATES EXECUTIVE RESTRICTIVE COVENANTS AND COOPERATION AGREEMENT[2]

Reference is made to The Nasdaq Change in Control Severance Plan for Executive Vice Presidents and Senior Vice Presidents (the "CIC Plan") that has been established by Nasdaq, Inc.("Nasdaq"), effective as of November 26, 2013 and under which ("Executive") is covered. Capitalized terms not defined herein shall have the meaning ascribed to such terms in the CIC Plan.

FOR GOOD AND VALUABLE CONSIDERATION, as set forth in the CIC Plan (which is incorporated herein by reference as if set forth fully herein and made a part hereof), the receipt, sufficiency and adequacy of which is hereby acknowledged by Executive's signature below, Executive agrees as follows:

1. **Acknowledgment and Agreement**. Executive hereby accepts the separation package provided under the CIC Plan and hereby agrees to the provisions set forth in this Executive Restrictive Covenants and Cooperation Agreement ("Agreement"). Executive acknowledges that failure to submit to Nasdaq and executed Agreement during the time period specified in Section 7 of this Agreement shall cause the Companies' obligation to make the payments and/or provide the benefits referred to in the CIC Plan to immediately cease.

2. **Return of Nasdaq Property**. Executive agrees to promptly return all property of the Companies to Executive's manager. This includes (i) all documents, data, materials, details, and copies thereof in any form (electronic or hard copy) that are the property of the Companies or were created using the Companies resources or during any hours worked for the Companies including, without limitation, any data referred to in Section 5 of this Agreement and (ii) all other property of the Companies including, without limitation, all computer equipment, and associated passwords, property passes, keys, hardware keys, credit cards, and identification badges.

3. **Non-solicitation of Employees**. Executive agrees that Executive shall not directly recruit or solicit any current employee of the Companies to leave the employ of the Companies for one year following the date of Executive's Qualifying Termination. The term "directly" as used in this Section 3 shall mean that Executive shall not initiate such discussions with a current employee of the Companies.

4. **Post-termination Cooperation**. Executive agrees to cooperate with the Companies and to provide all information that the Companies may hereafter reasonably request with respect to any matter involving Executive's present or former relationship with the Companies, the work Executive has performed, or present or former employees of the Companies so long as such requests do not unreasonably interfere with any other job or important personal activity in which Executive is engaged. Nasdaq agrees to reimburse Executive for all reasonable out-of-pocket costs Executive incurs in connection therewith.

5. **Non-disclosure of Proprietary Information**. Executive agrees that, with regard to all confidential technical, business, tax, financial or proprietary knowledge and information Executive has obtained while employed by any of the Companies ("Proprietary Information"), Executive will not at any time disclose any such Proprietary Information to any person, firm, corporation, association, governmental agency, employee, or entity or use any such Proprietary Information for Executive's own benefit or for the benefit of any other person, firm, corporation or other entity, except the Companies and except as may be required by court order or subpoena. Executive agrees to notify the Nasdaq Office of General Counsel at the address noted in the CIC Plan as soon as practicable after Executive's receipt of such a court order or subpoena. For purposes of this letter

[2] Executives assigned outside the United States shall be required to execute a comparable version of this agreement consistent with local law of the jurisdiction where the Executive is assigned.

agreement, the term "Proprietary Information" does not include information that is in the public domain. For purposes of this letter agreement, the term "Proprietary Information" shall include, but not be limited to, non-public aspects of all information about or relating to the Companies which:

i. relates to specific matters such as trade secrets, pricing and advertising techniques or strategies, research and development activities, software development, market development, exchange registration, the Companies' costs, expenses, human resources or other employment issues, matters relating to pending litigation, any matters pertaining to pending, past or future mergers, studies, market penetration plans, listing retention plans and strategies, marketing plans and strategies, financial information, communication and/or public relations products, plans, programs, and strategies, financial formulas and methods relating to the Companies' business, computer software programs, accounting policies and practices, tax information, information from and about tax returns, tax strategies, policies and methods, and all strategic plans or other matters, strategies, and financial or operating information pertaining to clients, lenders, customers, counsel, or transactions as they may exist from time to time which Executive may have acquired or obtained directly or indirectly by virtue of Executive's employment with any of the Companies; and/or,

ii. is known to Executive from Executive's confidential employment relationship with the Companies.

The information described above shall be presumed to constitute "Proprietary Information," except to the extent that the same information: (i) was known to Executive prior to Executive's employment with the Companies as evidenced by written records in Executive's possession prior to such disclosure; (ii) was lawfully disclosed to Executive following the end of Executive's employment with the Companies by a third party under no obligation of confidentiality; and (iii) is generally known and available to all persons in the securities industry.

6. **Non-disparagement**. Executive agrees that Executive shall not issue, circulate, publish or utter any false or disparaging, statement, remarks, opinions or rumors about Nasdaq or its shareholders or any of the Companies unless giving truthful testimony under subpoena or court order. Notwithstanding the preceding or any other provision of this letter agreement to the contrary, Executive may provide truthful information to any governmental agency or self-regulatory organization with or without subpoena or court order. With the exception of communications made in a private corporate communication as an employee or consultant with regard to a listing decision of Executive's employer or Executive's consulting client, Executive agree that public communications regarding a preference for listing a security on a market other than Nasdaq, that the quality of Nasdaq as a securities market is in any way inferior to any other securities market or exchange, and/or that the regulatory efforts and programs of Nasdaq or the NASD are or have been lax in any way, are specifically defined as disparaging and will constitute a material breach of this Plan by Executive. Notwithstanding the foregoing, nothing in this Section 5 shall prevent Executive from making good faith, factual and truthful statements related to listing on Nasdaq as long as Executive's statements are not based on Proprietary Information.

7. **Non-compete**. Executive agrees that for one year following the date of Executive's Qualifying Termination, Executive will not, directly or indirectly, (i) engage in any "Competitive Business" (as defined below) for Executive's own account, (ii) enter the employ of, or render any services to, any person engaged in a Competitive Business, (iii) acquire a financial interest in, or otherwise become actively involved with, any person engaged in a Competitive Business, directly or indirectly, as an individual, partner, shareholder, officer, director, principal, agent, trustee or consultant, or (iv) interfere with business relationships (whether formed before or after the date of this Agreement) between Nasdaq and customers or suppliers of Nasdaq. For purposes of this Agreement, "Competitive Business" shall mean (x) any national securities exchange registered with the Securities and Exchange Commission, (y) any electronic communications network or (z) any other entity that engages in substantially the same business as Nasdaq, in each case in North America or in any other location in which Nasdaq operates.

8. **Breach of Agreement.** If Executive materially breaches or threatens to materially breach Executive's obligations in set forth in this Agreement and/or commence a suit or action or complaint in contravention of the Release attached as Exhibit A to the CIC Plan, Executive acknowledges that the Companies' obligation to make the payments and/or provide the benefits referred to in the CIC Plan shall immediately cease, and that the Companies shall have, in addition to all other rights or remedies provided in law or in equity by reason of Executive's material breach, the right to seek the return of all payments and benefits paid pursuant to the CIC Plan unless prohibited by applicable law or regulation. Executive specifically agrees and acknowledges that the Companies, after affording Executive reasonable, written notice of the material breach or threatened material breach of this Agreement or the Release of the reasonable opportunity to cure, has the right to cease performing their obligations under the CIC Plan in advance of any determination of material breach by a court of competent jurisdiction. If the Companies cease performing their obligations due to such material breach or threatened material breach and a court of competent jurisdiction later determines that such action was without right, the Companies agree to pay Executive all monies thus withheld plus simple interest at the prime rate in effect at the time the payments ceased and Executive's reasonable costs and expenses incurred in such action (including attorney fees), and Executive agrees to accept this as Executive's exclusive remedy therefore, as follows: any benefit under Sections 3(a) and 3(b) of the CIC Plan, as applicable, that are otherwise to be paid in a single lump sum payment, shall, to the extent not otherwise previously paid to Executive, be paid to Executive in full (together with applicable interest) no later than the end of Executive's first taxable year in which such determination is made. Any reimbursement to Executive of the reasonable costs and expenses incurred in such action shall be made no later than March 15 following the end of the calendar year in which the final decision relating to such action is rendered. If the Companies cease performing their obligations due to such material breach or threatened material breach and a court of competent jurisdiction later determines that a breach occurred and that such action was thus appropriate and permitted under this Plan, Executive agrees to pay, in addition to such other costs as the court may direct, all of the Companies' reasonable costs and expenses, including attorney's fees, unless prohibited by applicable law or regulation.

9. **Time to Consider and Execute**. Executive acknowledges that Executive has been advised that Executive has twenty-eight (28) days from the date of receipt of this Agreement ("Executive Period") to consider all the provisions of the Agreement and to execute this Agreement and return it to Nasdaq.

10. **Coordination with General Executive Release and Waiver.** In addition to the timely submission to Nasdaq of an executed Agreement, Executive acknowledges and agrees that the payment of any benefits under the CIC Plan to the Executive also is contingent upon the Executive's timely submission to Nasdaq of an executed General Executive Release and Waiver in substantially the form attached as Exhibit A to the CIC Plan. Executive acknowledges that the Executive's failure to submit to Nasdaq on a timely basis an executed General Executive Release and Waiver shall cause the Companies' obligation to make the payments and/or provide the benefits referred to in the CIC Plan to immediately cease.

If Executive agrees to the foregoing, please sign the enclosed copy of this AGREEMENT in the space provided below and return it to me.

Very truly yours,

Nasdaq, Inc.

By: ______________________

By signing below, I, , certify that I have read, carefully reviewed, fully understand, and agree to all the provisions of this AGREEMENT, which, along with the CIC Plan, General Executive Release and Waiver, and any award agreements I entered into under the Equity Plan sets forth the entire agreement and understanding between Nasdaq and me. I acknowledge that I have not relied upon any representation or statement, written or oral, not set forth in such documents.

Date:

cc: People @ Nasdaq

Office of General Counsel

Exhibit 10.24

VERAFIN HOLDINGS INC.
AMENDED AND RESTATED MANAGEMENT INCENTIVE PLAN

Section 1. *Purpose*

This Amended and Restated Verafin Holdings Inc. Management Incentive Plan (this "Plan") is effective as of October 3, 2022, and is designed to promote the long-term financial interests and growth of Verafin Solutions ULC, a corporation existing under the laws of British Columbia (the "Company"), by motivating management personnel to achieve Company goals, and thereby furthering the alignment of the interests of Plan participants with those of the Company.

Section 2. *Definitions*

As used in this Plan, the following words shall have the following meanings:

(a) "Acceleration Event" means, with respect to a Key Employee, the occurrence of any of the following (prior to a Forfeiture Event with respect to such Key Employee): (i) such Key Employee's resignation or termination of employment with the Company or any of its Affiliates for Good Reason, (ii) termination of such Key Employee's employment with the Company or any of its Affiliates by the Company or its Affiliates other than for a Cause Event, or (iii) such Key Employee's death or Permanent Disability; *provided* that if the Key Employee's employment terminates on or in connection with the occurrence of an Acceleration Event, then, subject to applicable employment or labour standards legislation and compliance by the Company or any of its Affiliates, as applicable, with the Key Employee's termination and severance entitlements pursuant to the common law and/or the Key Employee's contract of employment with the Company or any of its Affiliates, as the case may be (in all cases, to the extent applicable), such Acceleration Event shall be treated as an Acceleration Event for purposes hereof only if such Key Employee executes (and does not revoke) a standard release of employment claims (including, without limitation, claims under applicable employment or labour standards legislation, human rights legislation, and occupational health and safety legislation) in a form reasonably satisfactory to the Company.

(b) "Affiliate" shall have the meaning ascribed thereto in Rule 12b-2 promulgated under the U.S. Securities Exchange Act of 1934, as amended, as in effect on the date hereof.

(c) "Award" means an award granted hereunder that entitles the Key Employee to a payment and award opportunity hereunder, subject to the terms and conditions of this Plan and the applicable Award Agreement.

(d) "Award Agreement" means any written or electronic agreement, contract or other instrument or document evidencing any Award, which may (but need not) require execution or acknowledgment by the applicable Key Employee.

(e) "Board" means the Board of Directors of the Company.

(f) "Business Day" means any day on which banks are required to be open to conduct business in New York City, New York and St. John's, Newfoundland and Labrador.

(g) "Cause Event" means, for the purposes of a Key Employee's rights and entitlements hereunder and not for any other purpose or entitlement, the occurrence of any one or more of the following events: (i) any commission by such Key Employee of a criminal act, felony or other indictable offence involving fraud, theft or embezzlement, (ii) any commission by such Key Employee of dishonesty, misrepresentation, conflict of interest or breach of trust, or (iii) any other act(s) or omission(s) by the Key Employee constituting just cause for termination at common law; *provided* that (x) the occurrence of any event under clause (ii) or (iii) is not cured by the Key Employee within 60 days of receipt of written notice from the Parent to the Key Employee and (y) if a Key Employee is charged with a criminal act, felony or other indictable offence involving fraud, theft or embezzlement, the amount, if any, that would have become payable hereunder to such Key Employee shall be set aside and held pending the outcome of such charge, and if the Key Employee is acquitted or the charge dropped then clause (i) shall not apply with respect to such criminal act, felony or other indictable offence involving fraud, theft or embezzlement.

(h) "Founder" means each of Jamie King, Raymond Pretty and Brendan Brothers.

(i) "Founder Majority" means a majority of the Founders that are employed by the Company or one of its Affiliates as of the applicable time.

(j) "Forfeiture Event" means, with respect to a Key Employee, (i) a resignation or termination of such Key Employee's employment with the Company or any of its Affiliates without Good Reason (other than a resignation or termination that occurs subsequent to an Acceleration Event), (ii) the termination of such Key Employee's employment with the Company or any of its Affiliates by the Company or its Affiliates for a Cause Event or (iii) a material breach by such Key Employee of such Key Employee's obligations under Article VI of the Escrow and Management Incentive Agreement, by and among Parent, Osprey Acquisition Corporation, the Company and various individual Company employees, dated as of November 18, 2020, as amended, modified or supplemented from time to time (the "EMIA"), in each case during the Performance Period.

(k) "Good Reason" means, with respect to any Key Employee, any act(s) or omission(s) constituting or resulting in (x) a constructive dismissal at common law, (y) a material adverse change to the Key Employee's role or responsibilities, or (z) a material breach by the Company of the Key Employee's contract of employment with the Company or any of its Affiliates, as the case may be; *provided* that no act or omission shall constitute Good Reason unless (i) the Key Employee gives written notice specifying the objection to such act or omission within 90 days following the occurrence of such act or omission, (ii) such act or omission is not corrected, in all material respects, in a manner that is reasonably satisfactory to the Key Employee within 30 days following the receipt of such notice, and (iii) the Key Employee resigns from the Key Employee's employment within not more than 30 days following the expiration of the thirty (30)-day period described in the foregoing clause (ii).

(l) "MIP Amount" means, with respect to a Key Employee, an amount determined in accordance with the formula set forth on Annex A. Subject to Section 5, the MIP Amount of a Key Employee shall be determined as soon as reasonably practicable following the conclusion of the Performance Period.

(m) "Parent" means Nasdaq, Inc., a Delaware corporation.

(n) "Parent Equity Plan" means the Nasdaq, Inc. Equity Incentive Plan (as amended and restated April 24, 2018), or any successor thereto.

(o) "Parent Price" means the Fair Market Value (as defined in the Parent Equity Plan) of one Parent Share as of the date of grant or transfer of the applicable Parent Share.

(p) "Parent Shares" means Shares (as defined in the Parent Equity Plan).

(q) "Party" means each of Parent, the Company and each of the Key Employees.

(r) "Performance Period" means the period commencing on February 11, 2021 and concluding on December 31, 2023.

(s) "Permanent Disability" means a physical or mental incapacity of the Key Employee that has prevented the Key Employee from performing the duties customarily assigned to the Key Employee for twelve consecutive months and that qualifies the Key Employee for long-term disability benefits under the applicable disability plan of the Company and its Affiliates (or if there is no such plan in effect at the time, then would have qualified such Key Employee under such plan in effect as of the date hereof).

(t) "Person" means an individual, a partnership, a corporation, a limited liability company, an association, a joint stock company, a trust, a joint venture, an unincorporated organization or a governmental entity or any department, agency or political subdivision thereof.

(u) "Restricted Stock Terms" shall include a vesting period of one year from the date of the end of the Performance Period and the standard terms and conditions that apply to restricted stock awards pursuant to the Parent Equity Plan, provided, however, that in the event of i) a resignation or termination of a Key Employee's employment with the Company or any of its Affiliates with Good Reason, or (ii) the termination of a Key Employee's employment with the Company or any of its Affiliates by the Company or its Affiliates other than for a Cause Event, the vesting of any stock award granted under this Amended and Restated Management Incentive Plan shall be fully accelerated for that Key Employee.

(v) "Subsidiary" means, with respect to any Person, any corporation of which a majority of the total voting power of shares entitled (without regard to the occurrence of any contingency) to vote in the election of directors, managers or trustees thereof is at the time owned or controlled, directly or indirectly, by such Person or one or more of the other Subsidiaries of such Person or a combination thereof, or any partnership, association or other business entity of which a majority of the partnership or other similar ownership interest is at the time owned or controlled, directly or indirectly, by such Person or one or more Subsidiaries of such Person or a combination thereof. For purposes of this definition, a Person is deemed to have a majority ownership interest in a partnership, association or other business entity if such Person is allocated a majority of the gains or losses of such partnership, association or other business entity or is or controls the managing director or general partner of such partnership, association or other business entity.

Section 3. *Administration*

This Plan shall be administered by the Board, in good faith. The Board shall have full power and authority to administer and interpret this Plan and Awards granted hereunder, including, without limitation, the power to (i) exercise all of the powers granted to it hereunder, (ii) construe, interpret and implement this Plan and any Award Agreement, (iii) prescribe, amend and rescind rules and regulations relating to this Plan, including rules governing its own operations, (iv) make all determinations necessary or advisable in administering this Plan and any Awards and Award Agreements, (v) correct any defect, supply any omission and reconcile any inconsistency in this Plan and any Awards or Award Agreements, (vi) delegate such powers and authority to such persons as it deems appropriate; *provided* that any such delegation is consistent with applicable law and any guidelines as may be established by the Board from time to time, and (vii) waive any forfeiture, vesting or other conditions under any Awards. Subject to

Section 9, the determination of the Board on all matters relating to this Plan, any Award Agreement or any Awards in good faith shall be final, binding and conclusive upon all Persons. Without limiting the generality of the foregoing, the Board may adjust the terms of Annex A in respect of changes to the equity structure of the Company or in the event of other material corporate transactions or restructuring events, to the extent that the Board in its good faith discretion determines necessary or appropriate to preserve the intended economic intent of the terms of Annex A, provided, however, that any such adjustment shall be made in consultation with the Founder Majority.

Section 4. *MIP Amount*

No later than April 1, 2024, each Key Employee shall receive (a) a lump sum cash payment equal to 50% of such Key Employee's MIP Amount, (b) unrestricted Parent Shares pursuant to the Parent Equity Plan, with the number of such shares equal to the quotient of 25% of such Key Employee's MIP Amount divided by the Parent Price, and (c) an award of restricted Parent Shares pursuant to the Parent Equity Plan, with the number of such shares equal to the quotient of 25% of such Key Employee's MIP Amount divided by the Parent Price (which award shall be subject to the Restricted Stock Terms); *provided* that such Key Employee (i) is employed by and providing services to the Company or one of its Affiliates as of the end of the Performance Period (such continued services requirement, the "Continued Service Requirement"), *provided* that such Continued Service Requirement shall be deemed satisfied if an Acceleration Event occurred during the Performance Period in respect of such Key Employee and (ii) has not experienced a Forfeiture Event during the Performance Period.

Section 5. *Forfeiture Event*

Subject to the express minimum requirements of applicable employment or labour standards legislation, if any, if a Forfeiture Event occurs during the Performance Period, the applicable Key Employee shall forfeit any entitlement under this Plan to any MIP Amount.

Section 6. *Amendment and Termination*

This Plan may only be amended, modified or supplemented, and any provision of this Plan may only be waived, in writing by the approval of each of Parent and the Founder Majority; *provided*, *however*, that notwithstanding anything to the contrary, any amendment, modification or supplement of this Plan that on its face materially adversely affects the rights or obligations of any Party differently than those of the other Parties (and in the case of a Key Employee, materially adversely relative to other Key Employees), as applicable, shall also require the written approval of the differentially adversely affected Party.

Section 7. *No Employment Rights*

Nothing in this Plan shall confer upon any Key Employee the right to continue in the employ of the Company or its affiliates or affect any right that the Company or its affiliates may have to terminate such employment.

Section 8. *Tax Withholding*

The Company may withhold from any amounts payable hereunder such taxes as the Company determines are required to be withheld pursuant to applicable law.

Section 9. *Dispute Resolution*

Any controversy or dispute arising in respect of this Plan, including without limitation, its administration, application or any issue with respect to any entitlement thereunder shall be resolved by arbitration in accordance with the procedures set forth in Section 7.4 of the EMIA.

Section 10. *Governing Law*

This Plan shall be construed in accordance with, and governed by, the laws of the State of Delaware without regard to conflicts of laws principles which would result in the application of the laws of another jurisdiction.

Exhibit 10.25

VERAFIN HOLDINGS INC.
AMENDED AND RESTATED MANAGEMENT INCENTIVE PLAN
AWARD AGREEMENT

Dear Brendan Brothers,

This letter represents your Award Agreement under the Verafin Holdings Inc. Amended and Restated Management Incentive Plan (the "MIP"). All capitalized terms used but not defined herein shall have the meanings ascribed to them in the MIP. Your Target MIP Amount for purposes of the MIP is $6,259,750, subject to the terms and conditions of the MIP (including Section 3 thereof). By your signature below, you acknowledge your agreement to the terms of the MIP and this Award Agreement, and also re-affirm your surviving obligations under the EMIA.

Thank you for your dedication to the Nasdaq and Verafin team.

Sincerely,

/s/ Jamie King
On behalf of Verafin Solutions ULC, successor to Osprey Acquisition Corporation and Verafin Holdings, Inc.
By: Jamie King
Title: Director

Acknowledged and Agreed:

/s/ Brendan Brothers
Brendan Brothers

Exhibit 10.26

VERAFIN HOLDINGS INC.
AMENDED AND RESTATED MANAGEMENT INCENTIVE PLAN
AWARD AGREEMENT

Dear Jamie King,

This letter represents your Award Agreement under the Verafin Holdings Inc. Amended and Restated Management Incentive Plan (the "MIP"). All capitalized terms used but not defined herein shall have the meanings ascribed to them in the MIP. Your Target MIP Amount for purposes of the MIP is $7,446,000, subject to the terms and conditions of the MIP (including Section 3 thereof). By your signature below, you acknowledge your agreement to the terms of the MIP and this Award Agreement, and also re-affirm your surviving obligations under the EMIA.

Thank you for your dedication to the Nasdaq and Verafin team.

Sincerely,

/s/ Ann Dennison
On behalf of Verafin Solutions ULC, successor to Osprey Acquisition Corporation and Verafin Holdings, Inc.
By: Ann Dennison
Title: Director

Acknowledged and Agreed:

/s/ Jamie King
Jamie King

Exhibit 21.1

Subsidiaries of Nasdaq, Inc.*

As of February 15, 2023

U.S. Entities

1. BoardVantage, Inc (organized in Delaware)
2. Boston Stock Exchange Clearing Corporation (organized in Massachusetts)
3. Consolidated Securities Source LLC (organized in Delaware)
4. Content Services, LLC (organized in Delaware)
5. Curzon Street Acquisition, LLC (organized in Delaware)
6. Directors Desk, LLC (organized in Delaware)
7. Dorsey, Wright & Associates, LLC (organized in Virginia)
8. eVestment Alliance Holdings, Inc. (organized in Delaware)
9. eVestment Alliance Holdings, LLC (organized in Georgia)
10. eVestment Alliance, LLC (organized in Georgia)
11. eVestment, Inc. (organized in Delaware)
12. ExactEquity, LLC (organized in Delaware)
13. FinQloud LLC (organized in Delaware)
14. FINRA/Nasdaq Trade Reporting Facility LLC (organized in Delaware)
15. FRAMLxchange Inc. (organized in Delaware)
16. FTEN, Inc. (organized in Delaware)
17. Granite Redux, Inc. (organized in Delaware)
18. GraniteBlock, Inc. (organized in Delaware)
19. International Securities Exchange Holdings, Inc. (organized in Delaware)
20. ISE ETF Ventures LLC (organized in Delaware)
21. Longitude LLC (organized in Delaware)
22. Nasdaq BX, Inc. (organized in Delaware)
23. Nasdaq Capital Markets Advisory LLC (organized in Delaware)
24. Nasdaq Commodities Clearing LLC (organized in Delaware)
25. Nasdaq Corporate Services, LLC (organized in Delaware)
26. Nasdaq Corporate Solutions, LLC (organized in Delaware)
27. Nasdaq Digital Asset Holdings, LLC (organized in Delaware)
28. NASDAQ Energy Futures, LLC (organized in Delaware)
29. Nasdaq Execution Services, LLC (organized in Delaware)
30. Nasdaq Fund Secondaries, LLC (organized in Delaware)
31. NASDAQ Futures, Inc. (organized in Delaware)
32. Nasdaq GEMX, LLC (organized in Delaware)
33. NASDAQ Global, Inc. (organized in Delaware)
34. Nasdaq Governance Solutions, Inc. (organized in Delaware)
35. Nasdaq Information, LLC (organized in Delaware)
36. Nasdaq International Market Initiatives, Inc. (organized in Delaware)
37. Nasdaq ISE, LLC (organized in Delaware)
38. Nasdaq MRX, LLC (organized in Delaware)
39. Nasdaq PHLX LLC (organized in Delaware)
40. Nasdaq SB Holdings, LLC (organized in Delaware)
41. Nasdaq SPS, LLC (organized in Delaware)
42. Nasdaq Technology Services, LLC (organized in Delaware)
43. NFSTX, LLC (organized in Delaware)
44. Norway Acquisition LLC (organized in Delaware)
45. OneReport, Inc, (organized in Vermont)
46. Operations & Compliance Network, LLC (organized in Delaware)
47. Public Plan IQ Limited Liability Company (organized in New Jersey)
48. QDiligence LLC (organized in Illinois)
49. Solovis, Inc.
50. Stock Clearing Corporation of Philadelphia (organized in Pennsylvania)
51. Strategic Financial Solutions, LLC (organized in Nevada)
52. Sybenetix Inc. (organized in Delaware)
53. The Center for Board Evaluation, Inc. (organized in North Carolina)
54. The Nasdaq Options Market LLC (organized in Delaware)
55. The Nasdaq Stock Market LLC (organized in Delaware)

56. U.S. Exchange Holdings, Inc. (organized in Delaware)
57. Verafin AcquisitionCo LLC (organized in Delaware)
58. Verafin USA Inc. (organized in Delaware)

Non-U.S. Subsidiaries

1. AB Nasdaq Vilnius (organized in Lithuania) (96.35% owned, directly or indirectly, by Nasdaq, Inc.)
2. AS eCSD Expert (organized in Estonia)
3. AS Pensionikeskus AS (organized in Estonia)
4. Cinnober Financial Technology AB (organized in Sweden)
5. Curzon Street Holdings Limited (organized in the United Kingdom)
6. Ensoleillement Inc. (organized in Canada)
7. eVestment Alliance (UK) Limited (organized in the United Kingdom)
8. eVestment Alliance Australia Pty Ltd (organized in Australia)
9. eVestment Alliance Hong Kong Limited (organized in Hong Kong)
10. Indxis Ltd (organized in the United Kingdom)
11. Metrio Software Inc. (organized in Quebec)
12. Nasdaq (Asia Pacific) Pte. Ltd. (organized in Singapore)
13. Nasdaq AB (organized in Sweden)
14. Nasdaq Australia Holding Pty Ltd (organized in Australia)
15. NASDAQ Canada Inc. (organized in Canada)
16. Nasdaq Clearing AB (organized in Sweden)
17. Nasdaq Copenhagen A/S (organized in Denmark)
18. Nasdaq Corporate Solutions (India) Private Limited (organized in India)
19. Nasdaq Corporate Solutions International Limited (organized in the United Kingdom)
20. Nasdaq CSD SE (organized in Latvia)
21. Nasdaq CXC Limited (organized in Canada)
22. Nasdaq Exchange and Clearing Services AB (organized in Sweden)
23. Nasdaq France SAS (organized in France)
24. Nasdaq Germany GmbH (organized in Germany)
25. Nasdaq Helsinki Ltd (organized in Finland)
26. Nasdaq Holding AB (organized in Sweden)
27. Nasdaq Holding Denmark A/S (organized in Denmark)
28. Nasdaq Holding Luxembourg Sárl (organized in Luxembourg)
29. Nasdaq Iceland hf. (organized in Iceland)
30. Nasdaq International Ltd (organized in the United Kingdom)
31. NASDAQ Korea Ltd (organized in South Korea)
32. Nasdaq Ltd (organized in Hong Kong)
33. Nasdaq Nordic Ltd (organized in Finland)
34. NASDAQ OMX Europe Ltd (organized in the United Kingdom)
35. Nasdaq Oslo ASA (organized in Norway)
36. Nasdaq Pty Ltd (organized in Australia)
37. Nasdaq Riga, AS (organized in Latvia) (92.98% owned, directly or indirectly, by Nasdaq, Inc.)
38. Nasdaq Spot AB (organized in Sweden)
39. Nasdaq Stockholm AB (organized in Sweden)
40. Nasdaq Tallinn AS (organized in Estonia)
41. Nasdaq Technology (Japan) Ltd (organized in Japan)
42. Nasdaq Technology AB (organized in Sweden)
43. Nasdaq Technology Energy Systems AS (organized in Norway)
44. Nasdaq Technology Italy Srl (organized in Italy)
45. Nasdaq Teknoloji Servisi Limited Sirketi (organized in Turkey)
46. Nasdaq Treasury AB (organized in Sweden)
47. Nasdaq Vilnius Services UAB (organized in Lithuania)
48. Nasdaq Wizer Solutions AB (organized in Sweden)
49. OMX Netherlands B.V. (organized in the Netherlands)
50. OMX Netherlands Holding B.V. (organized in the Netherlands)
51. OMX Treasury Euro AB (organized in Sweden) (99.9% owned, directly or indirectly, by Nasdaq, Inc.)
52. OMX Treasury Euro Holding AB (organized in Sweden)
53. Puro.earth (organized in Finland) (70% owned, directly or indirectly, by Nasdaq, Inc.)
54. Quandl, Inc. (organized in Canada, Federal)
55. RF Nordic Express AB (organized in Sweden) (50.1% owned, directly or indirectly, by Nasdaq, Inc.)
56. Shareholder.com B.V. (organized in the Netherlands)
57. Simplitium Ltd (organized in the United Kingdom)
58. SMARTS Broker Compliance Pty Ltd (organized in Australia)
59. SMARTS Market Surveillance Pty Ltd (organized in Australia)
60. Sybenetix Limited (organized in the United Kingdom)
61. Sybenetix Ukraine (organized in the Ukraine)
62. TopQ Software Limited (organized in the United Kingdom)

63. Verafin Solutions ULC (organized in Canada)
64. Whittaker & Garnier Limited (organized in the United Kingdom)

* The list of subsidiaries does not include not-for-profit entities or foreign branches of subsidiaries, or entities in which Nasdaq owns less than 50% of the entity.

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-3 No. 333-255666) of Nasdaq, Inc.,

(2) Registration Statement (Form S-8 No. 333-239891) pertaining to Nasdaq, Inc. Employee Stock Purchase Plan,

(3) Registration Statement (Form S-8 No. 333-225218) pertaining to Nasdaq, Inc. Equity Incentive Plan,

(4) Registration Statement (Form S-8 No. 333-196838) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Equity Incentive Plan,

(5) Registration Statement (Form S-8 No. 333-167724) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Employee Stock Purchase Plan,

(6) Registration Statement (Form S-8 No. 333-167723) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Equity Incentive Plan,

(7) Registration Statement (Form S-8 No. 333-110602) pertaining to The Nasdaq Stock Market, Inc. Equity Incentive Plan,

(8) Registration Statement (Form S-8 No. 333-106945) pertaining to the Employment Agreement with Robert Greifeld of The Nasdaq Stock Market, Inc.,

(9) Registration Statement (Form S-8 No. 333-76064) pertaining to The Nasdaq Stock Market, Inc. 2000 Employee Stock Purchase Plan,

(10) Registration Statement (Form S-8 No. 333-72852) pertaining to The Nasdaq Stock Market, Inc. 2000 Employee Stock Purchase Plan,

(11) Registration Statement (Form S-8 No. 333-70992) pertaining to The Nasdaq Stock Market, Inc. Equity Incentive Plan, and

(12) Registration Statement (Form S-8 No. 333-265824) pertaining to The Nasdaq, Inc. Deferred Compensation Plan;

of our reports dated February 23, 2023, with respect to the consolidated financial statements of Nasdaq, Inc. and the effectiveness of internal control over financial reporting of Nasdaq, Inc. included in this Annual Report (Form 10-K) of Nasdaq, Inc. for the year ended December 31, 2022.

/s/ Ernst & Young LLP

New York, New York
February 23, 2023

Exhibit 24.1

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all persons by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Erika Moore, and each of them acting individually, the undersigned's true and lawful attorneys-in-fact and agents, each with full power and substitution and resubstitution, for her and in her name, place, and stead, in any case and all capacities to:

(1) execute for and on behalf of the undersigned, an Annual Report on Form 10-K of Nasdaq, Inc. for the fiscal year ended December 31, 2022, including any and all amendments and additions thereto (collectively, the "Annual Report") in accordance with the Securities Exchange Act of 1934, as amended, and the rules thereunder;

(2) do and perform any and all acts for and on behalf of the undersigned which may be necessary or desirable to file, or cause to be filed, the Annual Report with all exhibits thereto (including this Power of Attorney), and other documents in connection therewith, with the United States Securities and Exchange Commission; and

(3) take any other action or any type whatsoever in connection with the foregoing which, in the opinion of such attorneys-in-fact, may be of benefit to, in the best interest of, or legally required by, the undersigned, it being understood that the documents executed by such attorneys-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorneys-in-fact may approve in such attorneys-in-fact's discretion.

The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Melissa M. Arnoldi
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Charlene T. Begley
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Steven D. Black
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Essa Kazim
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Thomas A. Kloet
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ John D. Rainey
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Michael R. Splinter
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

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(2) do and perform any and all acts for and on behalf of the undersigned which may be necessary or desirable to file, or cause to be filed, the Annual Report with all exhibits thereto (including this Power of Attorney), and other documents in connection therewith, with the United States Securities and Exchange Commission; and

(3) take any other action or any type whatsoever in connection with the foregoing which, in the opinion of such attorneys-in-fact, may be of benefit to, in the best interest of, or legally required by, the undersigned, it being understood that the documents executed by such attorneys-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorneys-in-fact may approve in such attorneys-in-fact's discretion.

The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Johan Torgeby
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all persons by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Erika Moore, and each of them acting individually, the undersigned's true and lawful attorneys-in-fact and agents, each with full power and substitution and resubstitution, for her and in her name, place, and stead, in any case and all capacities to:

(1) execute for and on behalf of the undersigned, an Annual Report on Form 10-K of Nasdaq, Inc. for the fiscal year ended December 31, 2022, including any and all amendments and additions thereto (collectively, the "Annual Report") in accordance with the Securities Exchange Act of 1934, as amended, and the rules thereunder;

(2) do and perform any and all acts for and on behalf of the undersigned which may be necessary or desirable to file, or cause to be filed, the Annual Report with all exhibits thereto (including this Power of Attorney), and other documents in connection therewith, with the United States Securities and Exchange Commission; and

(3) take any other action or any type whatsoever in connection with the foregoing which, in the opinion of such attorneys-in-fact, may be of benefit to, in the best interest of, or legally required by, the undersigned, it being understood that the documents executed by such attorneys-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorneys-in-fact may approve in such attorneys-in-fact's discretion.

The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Toni Townes-Whitley
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all persons by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Erika Moore, and each of them acting individually, the undersigned's true and lawful attorneys-in-fact and agents, each with full power and substitution and resubstitution, for him and in his name, place, and stead, in any case and all capacities to:

(1) execute for and on behalf of the undersigned, an Annual Report on Form 10-K of Nasdaq, Inc. for the fiscal year ended December 31, 2022, including any and all amendments and additions thereto (collectively, the "Annual Report") in accordance with the Securities Exchange Act of 1934, as amended, and the rules thereunder;

(2) do and perform any and all acts for and on behalf of the undersigned which may be necessary or desirable to file, or cause to be filed, the Annual Report with all exhibits thereto (including this Power of Attorney), and other documents in connection therewith, with the United States Securities and Exchange Commission; and

(3) take any other action or any type whatsoever in connection with the foregoing which, in the opinion of such attorneys-in-fact, may be of benefit to, in the best interest of, or legally required by, the undersigned, it being understood that the documents executed by such attorneys-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorneys-in-fact may approve in such attorneys-in-fact's discretion.

The undersigned hereby grants to each attorney-in-fact full power and authority to do and perform any and every act and thing whatsoever requisite, necessary or proper to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that such shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 23, 2023.

/s/ Alfred W. Zollar
Signature

Exhibit 31.1

CERTIFICATION

I, Adena T. Friedman, certify that:

1. I have reviewed this Annual Report on Form 10-K of Nasdaq, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

	/s/ Adena T. Friedman
Name:	Adena T. Friedman
Title:	Chief Executive Officer

Date: February 23, 2023

Exhibit 31.2

CERTIFICATION

I, Ann M. Dennison, certify that:

1. I have reviewed this Annual Report on Form 10-K of Nasdaq, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

	/s/ Ann M. Dennison
Name:	Ann M. Dennison
Title:	Executive Vice President and Chief Financial Officer

Date: February 23, 2023

Exhibit 32.1

**Certification of CEO and CFO Pursuant to
18 U.S.C. Section 1350
as Adopted Pursuant to
Section 906 of the Sarbanes-Oxley Act of 2002**

In connection with the Annual Report on Form 10-K of Nasdaq, Inc. (the “Company”) for the period ended December 31, 2022 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), Adena T. Friedman, as Chief Executive Officer of the Company, and Ann M. Dennison, as Executive Vice President and Chief Financial Officer of the Company, each hereby certifies, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of her knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of the operations of the Company.

	/s/ Adena T. Friedman
Name:	Adena T. Friedman
Title:	Chief Executive Officer
Date:	February 23, 2023
	/s/ Ann M. Dennison
Name:	Ann M. Dennison
Title:	Executive Vice President and Chief Financial Officer
Date:	February 23, 2023

This certification accompanies the Report pursuant to § 906 of the Sarbanes-Oxley Act of 2002 and shall not, except to the extent required by the Sarbanes-Oxley Act of 2002, be deemed filed by the Company for purposes of § 18 of the Securities Exchange Act of 1934, as amended.