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, 2019

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**
0.875% Senior Notes due 2030	**NDAQ30**	**The Nasdaq Stock Market**
1.75% Senior Notes due 2029	**NDAQ29**	**The Nasdaq Stock Market**
1.750% Senior Notes due 2023	**NDAQ23**	**The Nasdaq Stock Market**
3.875% Senior Notes due 2021	**NDAQ21**	**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 is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

As of June 28, 2019, the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was approximately $11.1 billion (this amount represents approximately 115.5 million shares of Nasdaq, Inc.'s common stock based on the last reported sales price of $96.17 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, 2020
Common Stock, $0.01 par value per share	165,011,712 shares

Documents Incorporated by Reference: Certain portions of the Definitive Proxy Statement for the 2020 Annual Meeting of Stockholders are incorporated by reference into Part III of this Form 10-K.

Nasdaq, Inc.

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 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.

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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.

401(k) Plan: Voluntary Defined Contribution Savings Plan

2016 Credit Facility: $400 million senior unsecured term loan facility repaid in full and terminated in June 2019

2017 Credit Facility: $1 billion senior unsecured revolving credit facility which matures on April 25, 2022

2019 Notes: $500 million aggregate principal amount of senior unsecured floating rate notes repaid in full on maturity in March 2019

2020 Notes: $600 million aggregate principal amount of 5.55% senior unsecured notes repaid in full and terminated in May 2019

2021 Notes: €600 million aggregate principal amount of 3.875% senior unsecured notes due June 7, 2021

2023 Notes: €600 million aggregate principal amount of 1.75% senior unsecured notes due May 19, 2023

2024 Notes: $500 million aggregate principal amount of 4.25% senior unsecured notes due June 1, 2024

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

ASU: Accounting Standards Update

ATS: Alternative Trading System

AUM: Assets Under Management

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

CCP: Central Counterparty

CFTC: U.S. Commodity Futures Trading Commission

EMIR: European Market Infrastructure Regulation

Equity Plan: Nasdaq Equity Incentive Plan

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

IPO: Initial Public Offering

LIBOR: London Interbank Offered Rate

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

NFX: Nasdaq Futures, Inc.

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 2020 Annual Meeting of Stockholders

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

SI: Systematic Internalizer

S&P: Standard & Poor's

S&P 500: S&P 500 Stock Index

SRO: Self-regulatory Organization

SSMA: Swedish Securities Markets Act 2007:528

TSR: Total Shareholder Return

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

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

VAT: Value Added Tax

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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 is based on data generated internally by us, which includes best efforts underwritings; therefore, the data may not be comparable to other publicly-available IPO data. Data in this Annual Report on Form 10-K for new listings of equity securities on The Nasdaq Stock Market is based on data generated internally by us, which includes best efforts underwritings, issuers that switched from other listing venues, closed-end funds and ETPs. 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 "Item 1A. Risk Factors" 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;*
- *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, de-leveraging and capital return initiatives;*
- *our products, order backlog 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.*

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 and analytics offerings;*
- *our ability to keep up with rapid technological advances and adequately address cybersecurity risks;*
- *economic, political and market conditions and fluctuations, including interest rate and foreign currency risk, inherent in U.S. and international operations;*
- *the performance and reliability of our technology and technology of third parties on which we rely;*
- *any significant error 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

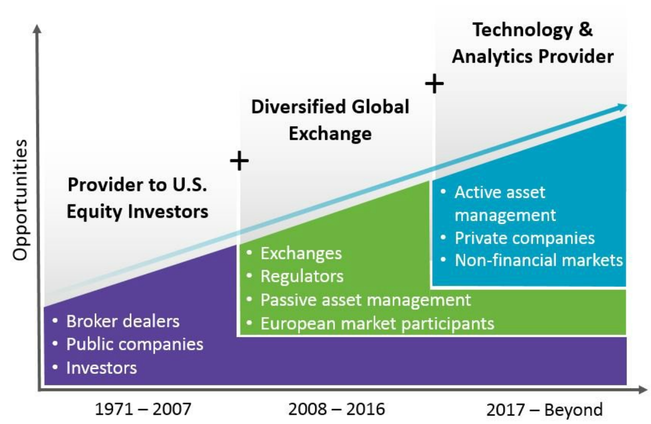
Nasdaq is a global technology company serving the capital markets and other industries. Our diverse offerings of data, analytics, software and services enables clients to optimize and execute their business vision with confidence.

We manage, operate and provide our products and services in four business segments: Market Services, Corporate Services, Information Services and Market Technology.

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 fully operational as an independent registered national securities exchange in 2007. In 2006, Nasdaq also reorganized its operations into a holding company structure.

In February 2008, Nasdaq and OMX AB combined their businesses. 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. In connection with this acquisition, we changed our corporate name to The NASDAQ OMX Group, Inc. We operated under this name until we rebranded our business as Nasdaq, Inc. in 2015. The chart below shows our historical evolution from 1971 through the present.



Growth Strategy

Since our transformative combination with OMX AB in 2008, we have grown our business both organically and through acquisitions that have expanded our operations globally and increasingly diversified our product and service offerings. This evolution was driven by our ability to create opportunities in areas adjacent to our core businesses, many of which are non-transaction based and rooted in innovative technology. To keep pace with our understanding of future trends and to ensure our continued success in the evolving business environment, we have focused on refining our vision, mission and strategy:

Our Vision: We reimagine markets to realize the potential of tomorrow.

Our Mission: We bring together ingenuity, integrity and insights to deliver markets that accelerate economic progress and empower people to achieve their greatest ambitions.

Our Strategy: Our strategic direction is driven by our continuous examination of: (i) key macroeconomic, regulatory and technology trends, (ii) consultation with our clients about short- and long-term trends in their businesses and (iii) the competitive landscape.

Under the strategic direction that we have been implementing over the past three years, we have focused on maximizing the resources, people and capital allocated to our largest growth opportunities, particularly in our Market Technology and Information Services segments. In addition, we are committed to maintaining and enhancing the marketplace platform businesses that are core to Nasdaq, and reducing capital and resources in areas that we believe are not as strategic to our clients and have less growth potential within Nasdaq.

- *Increasing Investment in Businesses Where We See the Highest Growth Opportunity*. We have increased investment in areas that we believe help solve our clients' biggest challenges and are likely to generate growth for our stockholders. These areas include: the data analytics business within our Information Services segment; NPM, within our Corporate Services segment; and our Market Technology segment (including our regulatory technology business).

  Consistent with this objective, in 2019 we acquired Cinnober Financial Technology AB, or Cinnober, which is now part of our Market Technology segment. We also are continuing to invest in the Market Technology segment through the NFF and the expansion and enhancement of our Nasdaq Trade Surveillance offering, including the incorporation of machine intelligence capabilities.

- *Sustaining Our Foundation.* As we strive to grow our business, we also have focused on enhancing our leadership position in the marketplaces in which we operate as we continue to innovate with new functionality and strong market share in our core markets. For example, we expect the migration of Nasdaq BX Options to a new trading platform that leverages the NFF to be completed during the third quarter of this year. This updated technology will drive commonality across our internal derivatives markets.

- *Optimizing Slower Growth Businesses*. We continually review areas that are not critical to our core. In these areas, we expect to continue to target resiliency and efficiency versus growth, and free up resources when possible to redirect toward greater opportunities. We completed several divestitures in 2019. In March 2019, we completed the sale of our BWise enterprise governance, risk and compliance software platform. In October 2019, we completed the divestiture of the Nordic Fund Market, an electronic mutual fund service that was a smaller unit of our Broker Services business, in November 2019, we sold the core assets of our NFX business and in January 2020, management commenced an orderly wind-down of our broker services operations business.

Products and Services

We manage, operate and provide our products and services in four business segments: Market Services, Corporate Services, Information Services and Market Technology.

Market Services

Our Market Services segment includes our Equity Derivative Trading and Clearing, Cash Equity Trading, FICC and Trade Management Services businesses.

Equity Derivative Trading and Clearing

We operate six electronic options exchanges in the U.S.: 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. Together, our combined options market share in 2019 represented the largest share of the U.S. market for multiply-listed options on equities and ETFs. Our options trading platforms provide trading opportunities to both retail investors, algorithmic trading firms and market makers, who tend to prefer electronic trading, and institutional investors, who typically pursue more complex trading strategies and often trade on the floor.

In Europe, Nasdaq offers trading in derivatives, such as stock options and futures and index options and futures. Nasdaq Clearing offers clearing services for fixed-income options and futures, stock options and futures, index options and futures, and interest rate swaps by serving as the CCP. Nasdaq Clearing also operates a clearing service for the resale and repurchase agreement market.

Cash Equity Trading

In the U.S., we 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 and registered securities exchanges.

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

In Europe, Nasdaq operates exchanges in Stockholm (Sweden), Copenhagen (Denmark), Helsinki (Finland), and Reykjavik (Iceland). We also operate exchanges in Tallinn (Estonia), Riga (Latvia) and Vilnius (Lithuania).

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 membership and a single source for Nordic data products. Settlement and registration of cash equity trading takes place in Sweden, Finland, Denmark and Iceland via the local central securities depositories. In addition, Nasdaq owns two central securities depositories that provide notary, settlement, central maintenance and other services in the Baltic countries and Iceland.

FICC

Our FICC business includes the Nasdaq Fixed Income business and Nasdaq Commodities.

The U.S. portion of Nasdaq Fixed Income includes an electronic platform for trading U.S. Treasuries. The electronic trading platform provides real-time institutional trading of benchmark U.S. Treasury securities. Through this business, we provide trading access to the U.S. Treasury securities market with an array of trading instruments to meet various investment goals across the fixed income spectrum.

The European portion of Nasdaq Fixed Income provides a wide range of products and services, such as trading and clearing, for fixed income products in Sweden, Denmark, Finland, Iceland, Lithuania and Latvia. Nasdaq is the largest bond listing venue in the Nordics, with more than 6,500 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 for CCP clearing. Nasdaq Clearing acts as the counterparty to both the buyer and seller.

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

Nasdaq Oslo ASA, which is authorized by the Norwegian Ministry of Finance and supervised by the Norwegian Financial Supervisory Authority, is the commodity derivatives exchange for European products. All trades with Nasdaq Oslo ASA are subject to clearing with Nasdaq Clearing, which is a CCP authorized under EMIR by the SFSA to conduct clearing operations.

Trade Management Services

We provide 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 offer the Nasdaq

Workstation, a browser-based, front-end interface that allows market participants to view data and enter orders, quotes and trade reports. In addition, we offer a variety of add-on compliance tools to help firms 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 routes between select data centers using millimeter wave and microwave technology.

Our broker services operations business primarily offers technology and customized securities administration solutions to financial participants in the Nordic market. Such services and solutions primarily consist of flexible back-office systems, which allow customers to efficiently manage safekeeping, settlement and corporate actions and reporting, and include connectivity to exchanges and central securities depositories. In January 2020, we commenced an orderly wind-down of this broker services operations business. We expect this wind-down to continue through the second quarter of 2021.

Corporate Services

Our Corporate Services segment includes our Listing Services and Corporate Solutions businesses. These businesses deliver critical capital market and governance solutions across the lifecycle of public and private companies.

Listing Services

We operate a variety of listing platforms around the world to provide multiple global capital raising solutions for private and public companies. Companies listed on our markets represent a diverse array of industries including, among others, health care, 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 must meet minimum listing requirements, including specified financial and corporate governance criteria. Once listed, companies must meet continued listing standards. The Nasdaq Stock Market currently has three listing tiers: The Nasdaq Global Select Market, The Nasdaq Global Market and The Nasdaq Capital Market. All three market tiers maintain rigorous listing and corporate governance standards (both initial and ongoing).

As of December 31, 2019, a total of 3,140 companies listed securities on The Nasdaq Stock Market, with 1,420 listings on The Nasdaq Global Select Market, 870 on The Nasdaq Global Market and 850 on The Nasdaq Capital Market.

We seek new listings, including from companies conducting IPOs as well as companies looking to switch from alternative exchanges. In 2019, The Nasdaq Stock Market attracted 313 new listings, including 188 IPOs, representing 78% of U.S. IPOs in 2019. The new listings were comprised of the following:

Switches from the New York Stock Exchange LLC, or NYSE, NYSE American LLC, or NYSE American, or IEX	16
IPOs	188
Upgrades from OTC	31
ETPs and Other Listings	78
Total	313

During 2019, we had 16 new listings resulting from new companies switching their listings from NYSE, NYSE American or IEX to join Nasdaq, and combined with companies that transferred additional securities to Nasdaq during 2019, an aggregate of $230 billion in global equity market capitalization switched to Nasdaq. Our new U.S. corporate bond listing offering won 11 new issues and 37 existing bonds that transferred from NYSE. Notable switches in 2019 included Exelon Corporation, ViacomCBS Inc., and Noble Energy Inc.

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, 2019, a total of 1,040 companies listed securities on our Nordic and Baltic exchanges and Nasdaq First North.

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 2019, a total of 53 new companies listed on our Nordic and Baltic exchanges and Nasdaq First North. In addition, 10 companies upgraded their listings from Nasdaq First North to the Nordic and Baltic exchanges.

Our Listing Services business also includes NPM, which provides liquidity solutions for private companies and private funds. NPM's platform helps employees, investors, companies, funds and institutions execute transactions, whether for private companies, private investment funds, or other private asset classes. In 2019, NPM announced an agreement with a secondary fund advisor to provide enhanced execution capabilities for general partner, or GP, sponsored secondary transactions using our platform. We believe that the combined offering can bring greater standardization and efficiency to this market while appealing to the broader ecosystem of GPs, limited partners and secondary investors.

We are continuing to grow our recently launched U.S. Corporate Bond exchange for the listing and trading of corporate bonds. This exchange operates pursuant to The Nasdaq Stock Market exchange license and is powered by the NFF. Surveillance is conducted by the Nasdaq regulatory team, assisted by our Nasdaq Trade Surveillance solution. As of December 31, 2019, 58 corporate bonds traded on the Corporate Bond exchange.

Corporate Solutions

Our Corporate Solutions business serves 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. We help organizations enhance their ability to understand and expand their global shareholder base, and improve corporate governance through our suite of advanced technology, analytics, and consultative services.

As of December 31, 2019, we provided Corporate Solutions products and services in the following key areas:

- *Investor Relations Intelligence*. We offer a global team of consultative experts that deliver advisory services including Strategic Capital Intelligence, Shareholder Identification and Perception Studies as well as an industry-leading platform, Nasdaq IR Insight®, to investor relations professionals. These solutions allow investor relations officers to better manage their investor relations programs, understand their investor base, target new investors, manage meetings and consume key data elements such as equity research, consensus estimates and news.
- *Governance Solutions*. We provide a global technology offering that streamlines the meeting process for board of directors and executive leadership teams and helps them accelerate decision making and strengthen governance. Our solutions protect sensitive data and facilitate productive collaboration, so board members and teams can work faster and more effectively.

  In October 2019, Nasdaq acquired the Center for Board Excellence, or CBE, a provider of corporate governance and compliance solutions for boards of directors, CEOs, corporate secretaries and general counsels.

Information Services

Our Information Services business provides the global investing community with access to the financial markets together with strong investment insights.

Our Information Services segment is organized into the following businesses:

- Market Data;
- Index; and
- Investment Data & Analytics.

For both institutional and retail investors, our market and alternative data enhances transparency and access to the markets we operate, and we help guide investment decisions around the globe through our proprietary indexes and investment data and analytics.

Market Data

Our Market Data business sells and distributes historical and real-time market data to the sell-side, the buy-side, retail online brokers, proprietary trading shops, other venues, internet portals and data distributors.

Our market data products enhance transparency of market activity within our exchanges and provide critical information to professional and non-professional investors globally. 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 our customers who in turn provide subscriptions for this information. Our systems enable distributors to gain access to our market depth, mutual 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 also offer TotalView products for our Nasdaq BX, Nasdaq PSX, Nasdaq Fixed Income and other 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 six U.S. options exchanges, Nordic and U.S. futures, Nordic commodities, and U.S. Treasuries.

Our Market Data business also includes revenues from U.S. tape plans. The plan administrators sell quotation and last sale information for all transactions in Nasdaq-listed securities, 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.

The Nasdaq Nordic and Nasdaq Baltic exchanges, as well as Nasdaq Commodities, also offer data products and services. These data products and services provide critical market transparency to professional and non-professional investors who participate in European marketplaces and, at the same time, give investors greater insight into these markets.

Much like the U.S. products, European data products and services are based on trading information from the Nasdaq Nordic and Nasdaq Baltic exchanges, as well as Nasdaq Commodities, for the following classes of assets: cash equities, bonds, derivatives and commodities. We provide varying levels of quote and trade information to market participants and to data distributors, who in turn provide subscriptions for this information. Significant European data products include Nordic Equity TotalView, Nordic Derivative TotalView, and Nordic Fixed Income TotalView, Level 2 and Analytics.

Index

Our Index business develops and licenses Nasdaq-branded indexes, associated derivatives, and financial products and also provides custom calculation services for third-party clients. 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, 2019, 332 ETPs listed in 20 countries and on 24 different exchanges tracked a Nasdaq index and accounted for $233 billion in AUM. This includes approximately $100 billion in ETP AUM that tracked our smart beta indexes during this same time period, which accounted for approximately 43% of the total ETP AUM tracking Nasdaq's indexes. Our flagship index, the Nasdaq-100 Index, includes the top 100 non-financial securities listed on The Nasdaq Stock Market.

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 our more than 30,000 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.

Investment Data & Analytics

Our Investment Data & Analytics business provides asset managers, investment consultants and asset owners with information and analytics to facilitate better investment decisions. Through eVestment, we provide a flexible suite of cloud-based solutions to help the institutional investing community identify and capitalize on global investment trends and to select and monitor investment managers. eVestment's products also enable asset managers to market their funds worldwide. Nasdaq Fund Network and Quandl are additional components in our suite of investment data and analytics offerings. Nasdaq Fund Network gathers and distributes daily net asset values from approximately 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. Quandl strengthens our position as a leading source for financial, economic, and alternative datasets. For hedge funds, investment banks and other asset managers, we provide predictive insights to inform investment decisions from discovered data.

Market Technology

Powering over 100 market infrastructure operators in more than 50 countries, 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 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, and non-capital markets customers, including those in insurance liabilities securitization and digital advertising futures trading.

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. Additionally, more than 160 market participants leverage our surveillance technology globally to manage their integrity obligations and assist them in complying with market rules, regulations and internal market surveillance policies.

In January 2019, we bolstered our Market Technology business by acquiring Cinnober, a major Swedish financial technology provider to brokers, exchanges and clearinghouses worldwide that provides technology solutions similar and complimentary to our Market Technology business. This acquisition strengthened our position as a leading market infrastructure technology provider.

Market Infrastructure Operators (MIO) & New Markets Portfolio

For MIOs, we provide and deliver mission-critical solutions across the trade lifecycle via the NFF, which is our flexible and modular architecture and technology that provides next generation capital markets capabilities in an open and agile environment. The NFF 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. During 2019, we continued to invest in the NFF by enabling emerging technologies, including integrating technology for issuance and settlement of securities, cloud-enabled trading and clearing, and machine learning applications.

Our New Markets initiative is focused on extending the NFF's capabilities and our expertise as a market operator outside of capital markets. Market Technology currently offers its services to several digital assets exchanges, a commercial real estate market, the reinsurance market, an airline derivatives market, and several sports wagering operators.

Many MIO and New Markets 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.

Buy- and Sell-side Portfolio

We continue to expand the NFF offering to the global bank and broker community. Regulatory pressure across multiple jurisdictions has made outsourcing of front-office infrastructure an attractive option for sell-side organizations and, as a result, we offer trading and execution infrastructure for SIs, single-dealer platforms and both multi-lateral and organized trading facilities. Our execution platform business added four new banks in 2019, in addition to the two global investment banks that have been working with us since 2017.

We also continue to gain market share for our Nasdaq Trade Surveillance solution, which is a managed service designed for brokers and other market participants to assist them in complying with market rules, regulations and internal market surveillance policies. In addition, our products include Nasdaq Risk, which is a suite of products that offer a real-time, multi-tiered risk solution that integrates pre-, at- and on-trade risk management, including margining.

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 (i) identifying areas for improvement in systems and (ii) 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 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.

Core Technology. The NFF is Nasdaq's approach to delivering end-to-end solutions for market infrastructure operators, buy-side firms, sell-side firms and other non-financial markets. 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, the NFF enables end users to leverage recent technology developments.

Competitive Strengths

We are a global technology company that in recent years, through building on capital markets experience, technological expertise, and a clear understanding of our clients' needs, has diversified its product and service offerings.

A Unique Value Proposition

We operate a diverse and resilient capital markets franchise with a marketplace core. Our businesses provide capital-markets infrastructure services to industry players, allowing us to:

- Develop efficient and reliable technologies to facilitate capital markets activity;
- Manage the complexities and costs of business on a global scale; and
- Provide data, tools and insights that drive sound decision making.

Technological Strength

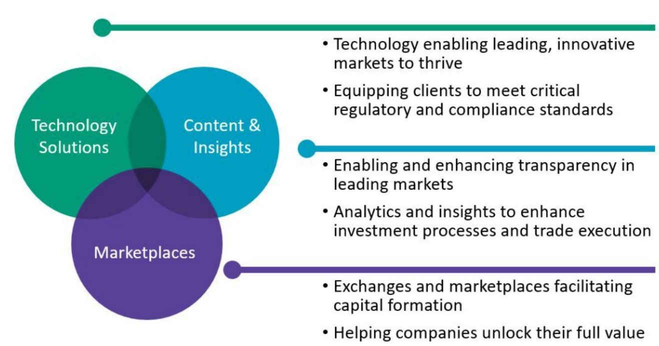
We are living through a time where innovative technologies are transforming financial services. We have come a long way in trading since Nasdaq launched the first fully electronic exchange in 1971 and we see forces accelerating that will bring major changes to the capital markets. The strength and resiliency of our technology, enhanced by our Market 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.

A Focus on Client Needs Throughout the Marketplace

We strive to serve a diverse range of clients by:

- **Brokers and Traders** - Helping brokers and traders to confidently plan, optimize and execute their business vision.
- **Market Participants** - Enabling market participants to monitor and capitalize on real-time market changes.
- **Investors and Asset Managers** - Offering products and services to assist investors and asset managers in optimizing their portfolios and offerings.
- **Listed Companies** - Promoting the capital health of our listed companies.
- **Private Companies** - Working with private companies to meet liquidity needs, manage relationships with long-term institutional investors and oversee their entire equity program.
- **Market Infrastructure Players** - Assisting market infrastructure players (exchanges, regulators, clearinghouses, and central securities depositories) in increasing efficiency, meeting customer needs and growing revenue.
- **Capital-Markets** - Delivering efficiencies through economies of scale (cost, speed, connectivity) to all members of the capital-markets ecosystem.

Client Orientation



Competition

Market Services

We face intense competition in North America and Europe in businesses that comprise our Market Services segment. We seek to provide market participants with greater functionality, trading system stability, speed of execution, 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 Miami, and Intercontinental Exchange, Inc., or ICE. In cash equities in the U.S., we compete with exchanges operated by Cboe and ICE. New exchanges in the U.S. have recently been launched or announced, including one to be established by a group of our customers. 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.

In Europe, our cash equities markets compete with exchanges such as Cboe, Euronext N.V., Deutsche Börse A.G. and London Stock Exchange Group plc, or LSE, and many MTFs such as Turquoise. Our competitors in the trading and clearing of options and futures on European equities include the Eurex Group companies, or Eurex, Cboe, ICE Futures Europe and the MTFs. In addition, in equities in Europe we face competition from other broker-owned systems, dark pools, 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. MTFs and SIs are already attracting a significant share of electronically matched volume. With the regulatory environment likely to stay more favorable to alternative trading venues, we expect such venues to 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. As part of this, trading on SIs has increased markedly as volumes migrate from more transparent types of trading venues.

Our FICC business also operates in an intensely competitive environment. Our trading platform for benchmark U.S. treasuries faces competition from both long-established competitors, such as CME Group Inc. (which recently acquired BrokerTec) and newly emerging electronic and voice brokerages, and the operating environment remains extremely challenging. Our European fixed income and commodities products and services are subject to relentless competitive pressure from European exchanges and clearinghouses.

Our Trade Management Services business competes with other exchange operators, extranet providers, and data center providers.

Corporate Services

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 an 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.

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 A.G. 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.

In our Corporate Solutions business, competition is varied and can be fragmented. For our Investor Relations Intelligence business, 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. The competitive landscape for our Governance Solutions business varies by customer sector and geography. Most participants offer SaaS solutions that are supported by a data center strategy. Some firms offer specialized services that focus on a single niche sector. The larger players often offer additional services. Customers frequently seek single-source providers that are able to address a broad range of needs within a single platform.

Information Services

Our Market Data business in the U.S. includes both proprietary and consolidated data products. Proprietary data products are made up exclusively of data derived from each exchange's systems. Consolidated data products 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. In Europe, all data products are proprietary, as there is no official data consolidator. 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 in both the U.S. and Europe is under competitive threat 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.

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.

Our Index business 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.

Our Investment Data & 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, Mercer and any number of smaller firms along with start-up data providers and aggregators. Additionally, other large providers to the financial services industry, such as Bloomberg and Refinitiv, are believed to be interested in pursuing certain aspects of the services we provide.

Market Technology

Traditionally, exchanges and exchange-related businesses internally developed technology, sometimes aided by consultants. However, over time this model has 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 segment: exchange operators and technology providers unaffiliated with exchanges. These organizations make available a range of off-the-shelf technology, including trading, clearing, market surveillance, 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.

A wide range of providers compete with us in surveillance. In surveillance, standardization of products and budget pressures drive customers to focus on pricing.

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 Practice

We operate a corporate venture program to make minority investments primarily in emerging growth financial technology companies that are strategically relevant to, and aligned with, Nasdaq. Investments are made through the venture program to further our organic 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, with aggregate initial and follow-on investments of approximately $42 million in ten companies in various sectors, including data and analytics, digital assets, market infrastructure, machine intelligence and regulatory technology.

Environmental, Social and Governance Matters

Nasdaq is committed to long-term environmental, social and governance, or ESG, advocacy, oversight, and philanthropy to engage with stakeholders at all levels. During 2019, we broadened our corporate and community ESG efforts, including expanding ESG oversight of our own operations and furthering our commitment to greater sustainability. We also expanded our ESG services and solutions with new offerings for our clients, including our Nasdaq Sustainable Bond Network, which provides access to detailed information on sustainable, green and social bonds and allows investors to obtain detailed information on sustainable bonds for product due diligence, selection and monitoring.

For more information regarding our ESG efforts, both internally and externally, please see 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:

- regulation of our registered national securities exchanges; and
- regulation of our U.S. broker-dealer and investment advisor subsidiaries.

National Securities Exchanges. SROs in the securities industry are an essential component of the regulatory scheme of the Exchange Act 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. 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.

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, following 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 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. 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 interested in listing 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 five broker-dealers: Nasdaq Execution Services, LLC, Execution Access, LLC, NPM Securities, SMTX, 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.

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. SMTX acts as an intermediary to facilitate closings of, and introduce prospective accredited investors in connection with, private non-capital raising transactions. Nasdaq Capital Markets Advisory acts as a third-party advisor to privately-held or publicly-traded companies during IPOs and various other offerings.

Two of our broker-dealers also are registered with the SEC as an ATS. Execution Access operates as the broker-dealer for our fixed income business, including as Nasdaq Fixed Income's registered ATS for U.S. Treasury securities. NPM Securities operates an ATS that facilitates the purchase and sale of ownership interests in primary and 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.

The SEC, FINRA and the exchanges adopt rules and examine broker-dealers and require strict compliance with their rules and regulations. 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, 2019, 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 that was extended for a five-year term beginning in October 2015. 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.

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 new 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. Regulation SCI policies and procedures were created, internal policies and procedures were updated, and an information technology governance program was developed 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. We also operate NFX, a designated contract market under the Commodity Exchange Act that is subject to regulatory oversight by the CFTC, an independent agency with the mandate to regulate commodity futures and options markets in the U.S.

As a designated contract market, NFX is required to comply with 23 Core Principles as set forth in Section 5(d) of the Commodity Exchange Act and with Part 38 of the CFTC's regulations. NFX is also subject to the requirements of Part 40 of the CFTC's regulations with respect to the adoption of new rules or rule amendments and the listing of new products.

In November 2019, we entered into an agreement to sell the core assets of our NFX platform to a third-party.

The Dodd-Frank Wall Street Reform and Consumer Protection Act also has 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 comply with the terms and conditions of an exemption order granted by the other jurisdictions. Oversight of the exchange is performed by Nasdaq Canada's lead regulator, the Ontario Securities Commission. Additionally, Nasdaq Fixed Income provides access to Canadian-based "Permitted Clients" for trading non-Canadian fixed income securities and is subject to Canadian securities regulations in connection with providing these services.

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, 2022, 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 clearinghouses that comprise Nasdaq Nordic and Nasdaq Baltic maintain favorable liquidity and offer fair and efficient trading.

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 in relation to 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 speedy, 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.

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 (agreement on the EEA 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 Norwegian FSA supervises the Norwegian exchange on an autonomous basis and the Norwegian exchange has a separate market surveillance function overseen by the Norwegian FSA.

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 to Stockholm. In addition, there are special personnel who carry out surveillance activities at Nasdaq Oslo and each of the three Baltic exchanges. In Finland and Sweden, 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 by the respective president of the exchange.

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 and Sweden. Suspected insider trading is reported to the appropriate authorities in the respective country.

In the United Kingdom, The Nasdaq Stock Market and Nasdaq Oslo ASA 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 will come into effect on December 31, 2020, at the end of the Brexit implementation period and last for three years. We will be applying for permanent recognition within six months of the end of this implementation period.

Employees

As of December 31, 2019, Nasdaq had 4,361 employees.

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 http://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 Nasdaq's 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, market volatility, changes in investment patterns and priorities, 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 is likely to 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, data, indexes and corporate solutions, a decline in trading volumes or values and deterioration of the economic welfare of our listed companies.

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 Services 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.

Information Services 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.

There may be less demand for our Corporate Solutions or Market Technology products if global economic conditions are weak. Our customers historically cut back on purchases of new services and technology when growth rates decline, thereby reducing our opportunities to sell new products and services or upgrade existing products and services.

A reduction in trading volumes or values, market share of trading, the number of our listed companies, or demand for Information Services, Market Technology or Corporate Services 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 Technology, Information Services and Corporate Services 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, or announced a plan to launch, 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, 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. In addition, pricing in our Corporate Services, Indexes and Market Technology businesses is subject to competitive pressures.

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. These consequences could result in service outages, lower trading volumes or values, financial losses, decreased customer satisfaction 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 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, initiatives and enhancements to existing products. If these products and initiatives are not successful, 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. 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. Additionally, it is also possible that 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. In recent years, trading and clearing volumes and values across our markets have fluctuated significantly depending on market conditions and other factors beyond our control. Current initiatives being considered by regulators and governments could have a material adverse effect on overall trading and clearing volumes or values. 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 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 new 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 Market Data business.

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

Our systems and operations are vulnerable to damage or interruption from security breaches. 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 by human error or malicious activity and criminal organizations may seek to profit from stolen data. Computer 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 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, could damage our reputation and cause us to lose customers, experience lower trading volumes or values, incur significant liabilities or otherwise have a negative impact on our business, financial condition and operating results. Any system breach may go undetected for an extended period of time. As cybersecurity threats continue to increase in frequency and sophistication, and as the domestic and international regulatory and compliance structure related to information security, data privacy and data usage 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, which could adversely impact our business, financial condition and operating results.

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 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.

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 16, "Clearing Operations." There are no assurances that similar defaults will not occur again, which could result in substantial expenses. 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 or stand as riskless principal to 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 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 may not be sufficient.

In addition, one of our broker-dealer subsidiaries, Execution Access, has a clearing arrangement with the Industrial and Commercial Bank of China Financial Services LLC, or ICBC. As of December 31, 2019, we have contributed $15 million of clearing deposits to ICBC in connection with this clearing arrangement. Some of the trading activity in Execution Access is cleared by ICBC through the Fixed Income Clearing Corporation. Execution Access assumes the counterparty risk of clients that do not clear through the Fixed Income Clearing Corporation. Counterparty risk of clients exists for Execution Access between the trade date and settlement date of the individual transactions, which is at least one business day (or more, if specified by the U.S. Treasury issuance calendar). Counterparties that do not clear through the Fixed Income Clearing Corporation are subject to a credit due diligence process and may be required to post collateral, provide principal letters, or provide other forms of credit enhancement to Execution Access for the purpose of mitigating counterparty risk. Daily position trading limits are also enforced for such counterparties. Although we believe that the potential for us to be required to make payments under these arrangements is mitigated through the pledged collateral and our risk management policies, no guarantee can be provided that these arrangements will at all times 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 despite these improvement measures, 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 on The Nasdaq Stock Market and the Nasdaq Nordic and Nasdaq Baltic exchanges could cause a decrease in revenues for future years. Furthermore, a prolonged decrease in the number of listings could negatively impact the growth of our transactions revenues. Our Corporate Solutions business is also impacted by declines in the listings market or increases in acquisitions activity as there will 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 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, 2019, goodwill totaled $6.4 billion and intangible assets, net of accumulated amortization, totaled $2.2 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 was no impairment of goodwill for the years ended December 31, 2019, 2018 and 2017, and there were no indefinite-lived intangible asset impairment charges in 2019, 2018 and 2017.

We may experience future events that may result in asset impairments. Future disruptions to our business, prolonged economic weakness 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.

For additional discussion of our goodwill, indefinite-lived intangible assets and other long-lived assets, including related impairment, see "Goodwill and Related Impairment," "Indefinite-Lived Intangible Assets and Related Impairment," and "Other Long-Lived Assets and Related Impairment," of "Critical Accounting Policies and Estimates," of Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations," and "Goodwill and Indefinite-Lived Intangible Assets," and "Valuation of Other Long-Lived Assets," of Note 2, "Summary of Significant Accounting Policies," Note 6, "Goodwill and Acquired Intangible Assets," Note 7, "Investments," and Note 8, "Property and Equipment, net," to the consolidated financial statements.

Acquisitions, dispositions, 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 also may divest additional businesses or assets in the future. Although we cannot predict our transactional activities with complete accuracy, 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. Many of the other potential purchasers of assets in our industry 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 startups through our Nasdaq Venture 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, 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:

- problems with effective integration of operations;
- 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;
- difficulties in realizing projected efficiencies, synergies and cost savings; and
- changes in our credit rating and financing costs.

Charges to earnings resulting from acquisition, integration 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.

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. While we have policies and procedures to identify, monitor and manage our risks and regulatory obligations, we cannot assure you 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 and markets for violations of applicable requirements.

For example, during 2016, the SFSA and the other Nordic financial supervisory authorities conducted investigations of cybersecurity processes at our Nordic exchanges and clearinghouse. In December 2016, we were issued a $6 million fine by the SFSA as a result of findings in connection with its investigation. The SFSA's conclusions related to governance issues rather than systems and platform security. We have appealed this decision and the final outcome is still pending.

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. NFX, our futures exchange, is also regulated by the CFTC and subject to a requirement to self-certify changes to these rules by filing with the CFTC. 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 plan's requirements. Creating 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 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. 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 Regulation (EU) 2016/1011, compliance with which could be costly or cause a change in our business practices.

Furthermore, 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 or future court rulings may have an adverse impact on our revenue from proprietary data products.

Regulatory and legal developments could reduce the amount of revenue that we earn from our proprietary data products. In the U.S., we generally are required to file with the SEC to establish or modify the fees that we charge for our data products. In recent years, certain industry groups have objected to the ability of exchanges to charge for certain data products.

In October 2018, the SEC determined that we had not established that a fee for one of our data products was fair and reasonable, and also directed us to establish a procedure for reviewing other challenged fees. We have appealed both SEC actions to a federal appeals court. If the results of appeals, or further actions by the SEC, are detrimental to our U.S. exchanges' ability to charge for data products, there could be a negative impact on our revenues. We cannot predict whether, or in what form, any regulatory changes will be implemented, or their potential impact on our business. A determination by the SEC, for example, to link data fees to marginal costs, to take a more active role in the data rate-setting process, or to reduce the current levels of data fees could have an adverse effect on our market data revenues.

In Canada, all new marketplace fees and changes to existing fees, including trading and 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 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 data products to customers on a non-discriminatory and reasonable commercial basis. The MiFID II/MiFIR rules entail that the price for regulated 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 data products adversely. In addition, any future actions by European Union institutions could affect our ability to offer data products in the same manner as today, thereby causing an adverse effect on our market data revenues.

Regulatory changes and changes in market structure 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 transaction fees. The SEC, FINRA and the national securities exchanges have introduced several initiatives to ensure the oversight, integrity and resilience of markets.

Industry responses to the MiFID II and MiFIR rules, EU Benchmark Regulation or other applicable rules could affect our operations in Europe. Changes to the rules themselves could also affect our operations in Europe. In addition, actions on any of the specific regulatory issues currently under review in the U.S. and Europe could have a material impact on our business.

With respect to our regulated businesses, our business model can be severely impacted by policy decisions. For example, the SEC has proposed an exchange transaction fee pilot program that could result in future regulatory changes and we, along with other stock exchanges, have challenged the SEC's order adopting the program in a court action. Similarly, the SEC has proposed possible changes to the governance of securities information processors as well as regulations to modify the infrastructure for the collection, consolidation and dissemination of market data for exchange-listed national market stocks, that if approved, may or may not adversely affect our revenues. 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. While we support regulatory efforts to review and improve the structure, resilience and integrity of the markets, these proposed regulatory changes and future reforms 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.

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.

Some of our other liability risks arise under the laws and regulations relating to the tax, employment, intellectual property, anti-money laundering, technology export, foreign asset controls, foreign corrupt practices, employee labor and employment areas, including anti-discrimination and fair-pay laws and regulations.

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 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. The prime objective of such monitoring activities is to promote confidence in the exchanges among the general public and to ensure fair and orderly functioning markets. The monitoring functions within the Nasdaq Nordic and Nasdaq Baltic exchanges are the responsibility of the surveillance departments or other surveillance personnel. The surveillance departments or personnel are intended to strengthen the integrity of and confidence in these exchanges and to avoid conflicts of interest. 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 the handling of personal data and information may affect our services or result in increased costs, legal claims or fines against us.

Our business relies 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 collection, storage, handling, use, disclosure, transfer and security of personal data continue to evolve; 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.

Recently effective laws such as the European Union General Data Protection Regulation, or GDPR, and the California Consumer Privacy Act, or CCPA, can have application and effect beyond their territorial limits, and require companies to meet new requirements regarding the handling of personal data. In addition to directly applying to certain Nasdaq business activities, these laws impact many of our customers, which may affect their requirements and decisions related to services that we offer. Although we have implemented a program to address privacy requirements, our efforts to comply with GDPR, CCPA and other 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. Furthermore, enforcement actions and investigations by regulatory authorities, as well as third party litigation, related to data security incidents and privacy violations continue to increase. 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 may increase the cost of our offerings, 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 assure you 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

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 those 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, 2019 was $3.4 billion. We may borrow additional amounts by utilizing available liquidity under our existing credit facilities or issuing short-term, unsecured commercial paper notes through our commercial paper program.

Our leverage 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 incur additional indebtedness, grant liens on assets, dispose of assets and make certain restricted payments. 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 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. 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.

Should we need to raise funds through issuing additional equity, our equity holders will suffer dilution. Should we need to raise funds through incurring additional debt, we may become subject to covenants even 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 and other financial and statistical information;
- 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 solutions and market technology products, the accuracy of the quote and trade information provided by our Market Data 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;
- 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.

Damage to our reputation could cause some issuers not to list their securities on our exchanges, as well as reduce the trading volumes or values on our exchanges or cause us to lose customers in our Market Data, Indexes, Corporate Solutions or Market Technology businesses. This, in turn, may have a material adverse effect on our business, financial condition and operating results.

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 on our branded materials and pursue patent protection for software products, inventions and other processes developed by us. We also 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. In particular, amendments to the U.S. patent law may affect our ability to protect and defend 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.

RISKS RELATED TO OUR OPERATIONS AND COMMON STOCK

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 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, 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;
- changes in government monetary or tax policy;
- the perceived attractiveness of the U.S. or European capital markets; and
- inflation.

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.

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.

We rely on third parties for regulatory, data center, data storage, data content, clearing and other services. To the extent that any of our vendors or other third-party service providers experiences difficulties, 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.

We also rely on members of our trading community to maintain markets and add liquidity. To the extent that any of our largest members experiences difficulties, materially changes its business relationship with us or is unable for any reason to perform market making activities, our business or our reputation may be materially 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 and financial results.

Climate change may have a long-term adverse impact on our business.

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 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, create adverse market conditions, including trading volatility beyond historical levels, and adversely affect our business, reputation, financial condition and operating results.

Uncertainty relating to the effects of the United Kingdom's exit from the European Union could cause uncertainty and adversely impact our business.

We continue to evaluate the potential effect of the United Kingdom's departure from the European Union (commonly referred to as Brexit) on our business operations and financial results. The withdrawal of the United Kingdom from membership in the European Union may cause unfavorable consequences, including a deterioration of general economic conditions, increased costs from re-imposition of tariffs on trade between the United Kingdom and the European Union and increased volatility of foreign exchange rates. Brexit could adversely affect political, regulatory, or trading conditions in the United Kingdom and in Europe and it could contribute to instability in global political institutions and regulatory agencies. Brexit could also lead to legal uncertainty and differing laws and regulations between the United Kingdom and the European Union. Brexit may also have adverse tax effects on movement of products or activities between the United Kingdom and the European Union.

Currently, we do not anticipate that Brexit will have a material impact on our operations or our financial results. While we have operations in the United Kingdom, these operations are limited in scope and not material to our overall business.

However, we may be impacted if our customers in the United Kingdom are subject to additional costs or restrictions in accessing our products or services. In addition, the overall impact of Brexit may create further global economic uncertainty, which may adversely impact the activities of our customers.

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. Competition for key personnel in the various localities and business segments in which we operate is intense. Our ability to attract and retain key personnel, in particular senior officers or technology personnel, will be dependent on a number of factors, including prevailing market conditions and compensation 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.

Our non-U.S. business operates in various international markets, particularly emerging markets that are subject to greater political, economic and social uncertainties than developed countries.

Our non-U.S. business operates in various international markets, including but not limited to Northern Europe, the Baltics, the Middle East, Africa and Asia. Therefore, 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, may increase risk. Some of these economies may be subject to greater political, economic and social uncertainties than countries with more developed institutional structures.

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, pandemic, 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 U.S. East Coast, and Stockholm 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. For example, 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, the United Kingdom, Australia and many other foreign countries. We therefore have significant exposure to exchange rate movements between the Euro, Swedish Krona and other foreign currencies towards 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 comprises senior executives and has responsibility for regularly reviewing risks and referring significant risks to the board of directors or specific board committees. By definition, some 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 based upon a review of relevant considerations. Accordingly, 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 quarterly 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 believe the facilities that we occupy are adequate for the purposes for which they are currently used and are well-maintained.

Item 3. Legal Proceedings

See "Legal and Regulatory Matters - Litigation," of Note 19, "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, 2020, we had approximately 235 holders of record of our common stock.

Issuer Purchases of Equity Securities

Share Repurchase Program

See "Share Repurchase Program," of Note 13, "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 following table summarizes the share repurchase activity of our common stock during the fiscal quarter ended December 31, 2019:

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 2019				
Share repurchase program	—	$ —	—	$ 632
Employee transactions(1)	12,578	$ 98.24	N/A	N/A
November 2019				
Share repurchase program	—	$ —	—	$ 632
Employee transactions(1)	1,110	$ 99.23	N/A	N/A
December 2019				
Share repurchase program	—	$ —	—	$ 632
Employee transactions(1)	58,749	$ 106.72	N/A	N/A
Total Quarter Ended December 31, 2019				
Share repurchase program	—	$ —	—	$ 632
Employee transactions(1)	72,437	$ 105.13	N/A	N/A

N/A Not applicable.

(1) Represents shares surrendered to us to satisfy tax withholding obligations arising from the vesting of restricted stock and PSUs issued to employees.

PERFORMANCE GRAPH

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 for the past five years. We changed our peer group in 2019 to include a broader set of global exchanges with sizable market capitalization. The new peer group, collectively referred to as the 2019 peer group, is comprised of the following companies:

2019 Peer Group

• ASX Limited	• Deutsche Börse AG	• LSE
• B3 S.A.[1]	• Euronext N.V.[1]	• Singapore Exchange Limited[1]
• Bolsas Mexicana de Valores, S.A.B. de C.V.[1]	• Hong Kong Exchanges and Clearing Limited[1]	• TMX Group Limited
• Cboe	• ICE	
• CME Group Inc.	• Japan Exchange Group, Inc[1]	

[1] Denotes company added to new peer group in 2019.

The old peer group, collectively referred to as the 2018 peer group, was comprised of the following companies:

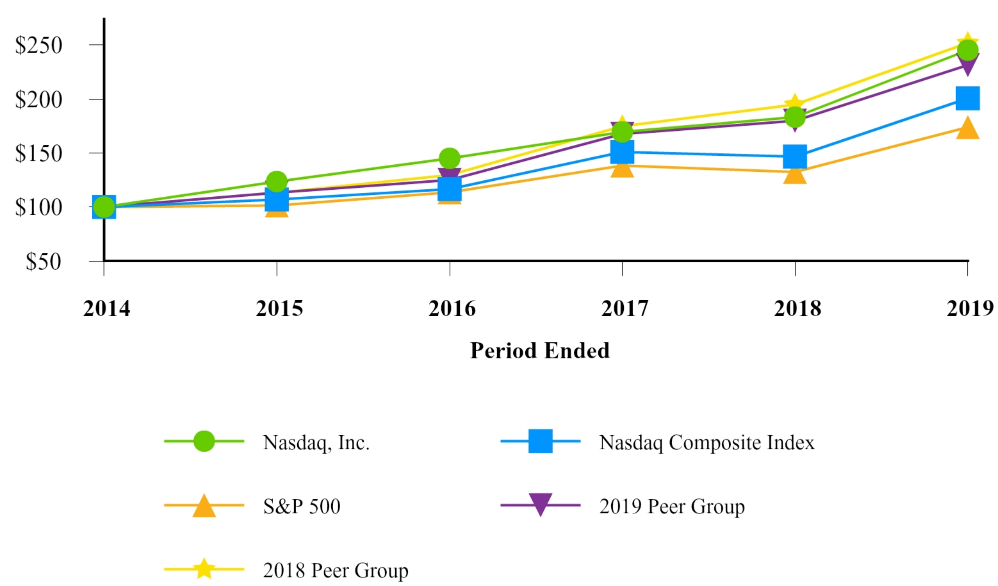
2018 Peer Group

• ASX Limited	• Deutsche Börse AG	• TMX Group Limited
• Cboe	• ICE	
• CME Group Inc.	• LSE	

The figures represented below assume an initial investment of $100 in the common stock or index at the closing price on December 31, 2014 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 12/31/2014 in stock or index, including reinvestment of dividends.

	Fiscal Year Ended December 31,					
	2014	2015	2016	2017	2018	2019
Nasdaq, Inc.	$ 100	$ 123	$ 145	$ 169	$ 183	$ 245
Nasdaq Composite Index	100	107	116	151	147	200
S&P 500	100	101	114	138	132	174
2019 Peer Group	100	113	125	168	180	231
2018 Peer Group	100	113	130	175	195	252

Item 6. Selected Financial Data

The following tables present selected financial data and should be read in conjunction with the consolidated financial statements and notes thereto of Nasdaq and Management's Discussion and Analysis of Financial Condition and Results of Operations included elsewhere in this Form 10-K. We completed our acquisition of Cinnober in January 2019 and several acquisitions and divestitures during the years ended 2015 through 2019. The financial results of such acquisitions are included in our consolidated financial statements from the respective acquisition dates. On January 1, 2019, we adopted ASU 2016-02, "Leases," or ASU 2016-02, and elected the optional transition method to initially apply the standard at the January 1, 2019 adoption date. As a result, we applied the new lease standard prospectively to our leases existing or commencing on or after January 1, 2019. Comparative periods presented were not restated upon adoption. On January 1, 2018, we adopted ASU 2014-09, "Revenue from Contracts with Customers (Topic 606)," using the full retrospective method which required restatement of our 2017 and 2016 financial statements.

Selected Financial Data

	Year Ended December 31,				
	2019	2018	2017	2016	2015
	(in millions, except share and per share amounts)				
Statements of Income Data:					
Total revenues	$ 4,262	$ 4,277	$ 3,948	$ 3,704	$ 3,403
Transaction-based expenses	(1,727)	(1,751)	(1,537)	(1,428)	(1,313)
Revenues less transaction-based expenses	2,535	2,526	2,411	2,276	2,090
Total operating expenses	1,518	1,498	1,420	1,440	1,370
Operating income	1,017	1,028	991	836	720
Net income attributable to Nasdaq	774	458	729	106	428
Per share information:					
Basic earnings per share	$ 4.69	$ 2.77	$ 4.38	$ 0.64	$ 2.56
Diluted earnings per share	$ 4.63	$ 2.73	$ 4.30	$ 0.63	$ 2.50
Cash dividends declared per common share	$ 1.85	$ 1.70	$ 1.46	$ 1.21	$ 0.90
Weighted-average common shares outstanding for earnings per share:					
Basic	164,931,628	165,349,471	166,364,299	165,182,290	167,285,450
Diluted	166,970,161	167,691,299	169,585,031	168,800,997	171,283,271

	December 31,				
	2019	2018	2017	2016	2015
	(in millions)				
Balance Sheets Data:					
Cash and cash equivalents and financial investments	$ 623	$ 813	$ 612	$ 648	$ 502
Default funds and margin deposits	2,996	4,742	3,988	3,301	2,228
Goodwill	6,366	6,363	6,586	6,027	5,395
Total assets	13,924	15,700	15,354	13,411	11,257
Long-term debt	2,996	2,956	3,727	3,603	2,364
Total Nasdaq stockholders' equity	5,639	5,449	5,880	5,428	5,609

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, 2019 and December 31, 2018. Discussion of fiscal year 2017 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, 2018 and December 31, 2017 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, 2018, which was previously filed with the SEC on February 22, 2019.

Business Segments

We manage, operate and provide our products and services in four business segments: Market Services, Corporate Services, Information Services and Market Technology. See Note 1, "Organization and Nature of Operations," and Note 20, "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 four separate segments.

Sources of Revenues and Transaction-Based Expenses

See "Revenue Recognition and Transaction-Based Expenses," of Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements for further discussion of our sources of revenues and transaction-based expenses.

Nasdaq's Operating Results

Key Drivers

The following table includes key drivers for our Market Services, Corporate Services, Information Services and Market Technology segments. In evaluating the performance of our business, our senior management closely evaluates these key drivers.

	Year Ended December 31,		
	2019	2018	2017
Market Services			
Equity Derivative Trading and Clearing			
U.S. equity options			
Total industry average daily volume (in millions)	17.5	18.2	14.7
Nasdaq PHLX matched market share	15.9%	15.7%	17.3%
The Nasdaq Options Market matched market share	8.8%	9.4%	9.2%
Nasdaq BX Options matched market share	0.2%	0.4%	0.7%
Nasdaq ISE Options matched market share	9.0%	8.8%	9.1%
Nasdaq GEMX Options matched market share	4.2%	4.5%	5.2%
Nasdaq MRX Options matched market share	0.2%	0.1%	0.1%
Total matched market share executed on Nasdaq's exchanges	38.3%	38.9%	41.6%
Nasdaq Nordic and Nasdaq Baltic options and futures			
Total average daily volume of options and futures contracts(1)	366,289	339,139	330,218
Cash Equity Trading			
Total U.S.-listed securities			
Total industry average daily share volume (in billions)	7.03	7.32	6.53
Matched share volume (in billions)	348.1	358.5	295.9
The Nasdaq Stock Market matched market share	17.2%	15.9%	14.2%
Nasdaq BX matched market share	1.7%	2.8%	3.1%
Nasdaq PSX matched market share	0.7%	0.8%	0.8%
Total matched market share executed on Nasdaq's exchanges	19.6%	19.5%	18.1%
Market share reported to the FINRA/Nasdaq Trade Reporting Facility	29.8%	31.3%	34.5%
Total market share(2)	49.4%	50.8%	52.6%
Nasdaq Nordic and Nasdaq Baltic securities			
Average daily number of equity trades executed on Nasdaq's exchanges	590,705	618,579	552,104
Total average daily value of shares traded (in billions)	$ 4.5	$ 5.6	$ 5.3
Total market share executed on Nasdaq's exchanges	70.9%	67.0%	67.5%
FICC			
Fixed Income			
U.S. fixed income volume ($ billions traded)	$ 10,465	$ 15,983	$ 17,800
Total average daily volume of Nasdaq Nordic and Nasdaq Baltic fixed income contracts	112,738	132,475	116,357
Commodities			
Power contracts cleared (TWh)(3)	842	1,067	1,199
Corporate Services			
IPOs			
The Nasdaq Stock Market	188	186	136
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic	34	53	88
Total new listings			
The Nasdaq Stock Market(4)	313	303	268
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic(5)	53	72	108
Number of listed companies			
The Nasdaq Stock Market(6)	3,140	3,058	2,949
Exchanges that comprise Nasdaq Nordic and Nasdaq Baltic(7)	1,040	1,019	984
Information Services			
Number of licensed ETPs	332	365	324
ETP AUM tracking Nasdaq indexes (in billions)	$ 233	$ 172	$ 167
Market Technology			
Order intake (in millions)(8)	$ 366	$ 223	$ 249
Annualized recurring revenue, or ARR, (in millions)(9)	$ 260	$ 222	$ 205

(1) Includes Finnish option contracts traded on Eurex.

(2) 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.

(3) Transactions executed on Nasdaq Commodities or OTC and reported for clearing to Nasdaq Commodities measured by Terawatt hours (TWh).

(4) New listings include IPOs, including those completed on a best efforts basis, issuers that switched from other listing venues, closed-end funds and separately listed ETPs.

(5) 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.

(6) Number of total listings on The Nasdaq Stock Market at period end, including 412 ETPs as of December 31, 2019, 392 as of December 31, 2018 and 373 as of December 31, 2017.

(7) Represents companies listed on the Nasdaq Nordic and Nasdaq Baltic exchanges and companies on the alternative markets of Nasdaq First North.

(8) Total contract value of orders signed during the period.

(9) ARR is the annualized fourth quarter revenue of Market Technology support and SaaS subscription contracts. ARR is currently one of our key performance metrics to assess the health and trajectory of our 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 during the reporting period used in calculating ARR may or may not be extended or renewed by our customers.

* * * * * *

Financial Summary

The following table summarizes our financial performance for the year ended December 31, 2019 when compared with the same period in 2018 and for the year ended December 31, 2018 when compared with the same period in 2017. The comparability of our results of operations between reported periods is impacted by our acquisition of Cinnober in January 2019, the divestiture of the BWise enterprise governance, risk and compliance software platform in March 2019, the divestiture of the Public Relations Solutions and Digital Media Services businesses in April 2018, and an increase in net income from unconsolidated investees. See Note 4, "Acquisitions and Divestitures," and "Equity Method Investments," of Note 7, "Investments," to the consolidated financial statements for further discussion of these transactions. For a detailed discussion of our results of operations, see "Segment Operating Results" below.

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
	(in millions, except per share amounts)				
Revenues less transaction-based expenses	$ 2,535	$ 2,526	$ 2,411	0.4 %	4.8 %
Operating expenses	1,518	1,498	1,420	1.3 %	5.5 %
Operating income	1,017	1,028	991	(1.1)%	3.7 %
Interest expense	(124)	(150)	(143)	(17.3)%	4.9 %
Gain on sale of investment security	—	118	—	(100.0)%	N/M
Net gain on divestiture of businesses	27	33	—	(18.2)%	N/M
Net income from unconsolidated investees	84	18	15	366.7 %	20.0 %
Income before income taxes	1,019	1,064	872	(4.2)%	22.0 %
Income tax provision	245	606	143	(59.6)%	323.8 %
Net income attributable to Nasdaq	$ 774	$ 458	$ 729	69.0 %	(37.2)%
Diluted earnings per share	$ 4.63	$ 2.73	$ 4.30	69.6 %	(36.5)%
Cash dividends declared per common share	$ 1.85	$ 1.70	$ 1.46	8.8 %	16.4 %

N/M Not meaningful.

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."

Segment Operating Results

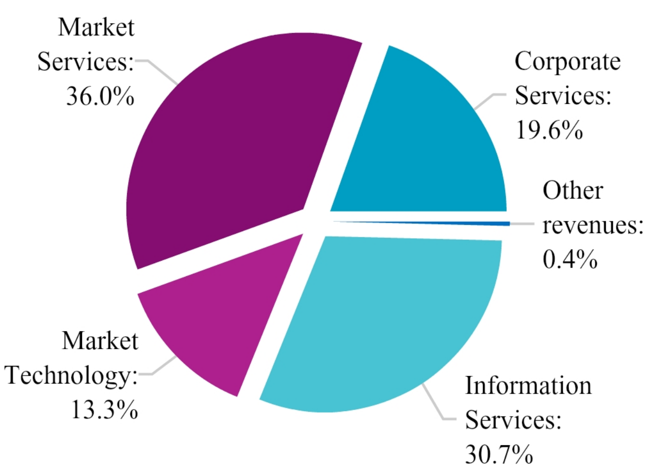
The following table shows our revenues by segment, transaction-based expenses for our Market Services segment and total revenues less transaction-based expenses:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Market Services	$ 2,639	$ 2,709	$ 2,418	(2.6)%	12.0 %
Transaction-based expenses	(1,727)	(1,751)	(1,537)	(1.4)%	13.9 %
Market Services revenues less transaction-based expenses	912	958	881	(4.8)%	8.7 %
Corporate Services	496	487	459	1.8 %	6.1 %
Information Services	779	714	588	9.1 %	21.4 %
Market Technology	338	270	247	25.2 %	9.3 %
Other revenues[1]	10	97	236	(89.7)%	(58.9)%
Total revenues less transaction-based expenses	$ 2,535	$ 2,526	$ 2,411	0.4 %	4.8 %

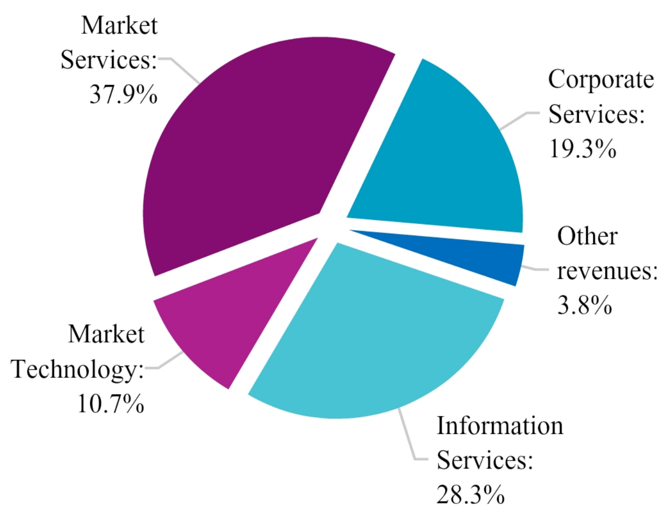
(1) Includes the revenues from the BWise enterprise governance, risk and compliance software platform which was sold in March 2019 and the Public Relations Solutions and Digital Media Services businesses which were sold in April 2018. Prior to the sale dates, these revenues were included in our Corporate Solutions business within our Corporate Services segment. See "2019 Divestitures," and "2018 Divestiture," of Note 4, "Acquisitions and Divestitures," to the consolidated financial statements for further discussion.

The following charts show our Market Services, Corporate Services, Information Services, and Market Technology segments as a percentage of our total revenues less transaction-based expenses of $2,535 million in 2019, $2,526 million in 2018 and $2,411 million in 2017:

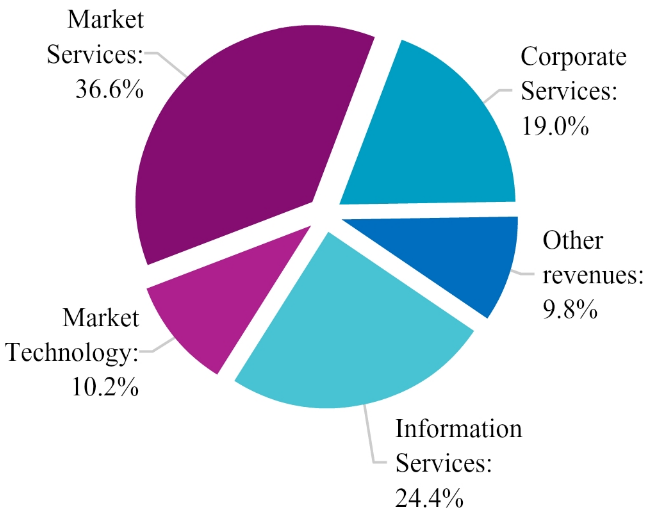
2019 Percentage of Revenues Less Transaction-based Expenses by Segment



2018 Percentage of Revenues Less Transaction-based Expenses by Segment



2017 Percentage of Revenues Less Transaction-based Expenses by Segment



MARKET SERVICES

The following table shows total revenues, transaction-based expenses, and total revenues less transaction-based expenses from our Market Services segment:

	Year Ended December 31, 2019	2018	2017	Percentage Change 2019 vs. 2018	2018 vs. 2017
	(in millions)				
Market Services Revenues:					
Equity Derivative Trading and Clearing Revenues[(1)]	$ 816	$ 849	$ 752	(3.9)%	12.9 %
Transaction-based expenses:					
Transaction rebates	(477)	(506)	(450)	(5.7)%	12.4 %
Brokerage, clearance and exchange fees[(1)]	(47)	(44)	(43)	6.8 %	2.3 %
Equity derivative trading and clearing revenues less transaction-based expenses	**292**	**299**	**259**	**(2.3)%**	**15.4 %**
Cash Equity Trading Revenues[(2)]	1,462	1,476	1,279	(0.9)%	15.4 %
Transaction-based expenses:					
Transaction rebates	(847)	(830)	(692)	2.0 %	19.9 %
Brokerage, clearance and exchange fees[(2)]	(352)	(361)	(334)	(2.5)%	8.1 %
Cash equity trading revenues less transaction-based expenses	**263**	**285**	**253**	**(7.7)%**	**12.6 %**
FICC Revenues	70	92	96	(23.9)%	(4.2)%
Transaction-based expenses:					
Transaction rebates	(3)	(8)	(16)	(62.5)%	(50.0)%
Brokerage, clearance and exchange fees	(1)	(2)	(2)	(50.0)%	— %
FICC revenues less transaction-based expenses	**66**	**82**	**78**	**(19.5)%**	**5.1 %**
Trade Management Services Revenues	**291**	**292**	**291**	**(0.3)%**	**0.3 %**
Total Market Services revenues less transaction-based expenses	**$ 912**	**$ 958**	**$ 881**	**(4.8)%**	**8.7 %**

(1) Includes Section 31 fees of $43 million in 2019, $39 million in 2018, and $40 million in 2017. Section 31 fees are recorded as equity derivative trading and clearing revenues with a corresponding amount recorded in transaction-based expenses.

(2) Includes Section 31 fees of $337 million in 2019, $343 million in 2018, and $319 million in 2017. Section 31 fees are recorded as cash equity trading revenues with a corresponding amount recorded in transaction-based expenses.

Equity Derivative Trading and Clearing Revenues

Equity derivative trading and clearing revenues and equity derivative trading and clearing revenues less transaction-based expenses decreased in 2019 compared with 2018, reflecting in large part a significantly lower volume and volatility market environment in the U.S. as compared to 2018. The decrease in equity derivative trading and clearing revenues in 2019 was primarily due to lower U.S. industry trading volumes and lower overall U.S. matched market share executed on Nasdaq's exchanges, partially offset by a higher U.S. gross capture rate and higher Section 31 pass-through fee revenue. The decrease in equity derivative trading and clearing revenues less transaction-based expenses in 2019 was primarily due to lower U.S. industry trading volumes and lower overall U.S. matched market share executed on Nasdaq's exchanges, partially offset by a higher U.S. net capture rate. The decreases in equity derivative trading and clearing revenues and equity derivative trading and clearing revenues less transaction-based expenses also included an unfavorable impact from foreign exchange of $3 million related to Nasdaq's Nordic exchanges.

Section 31 fees are recorded as equity derivative trading and clearing revenues with a corresponding amount recorded as transaction-based expenses. In the U.S., 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 of shares traded. Since the amount recorded in revenues is equal to the amount recorded as transaction-based expenses, there is no impact on our revenues less transaction-based expenses. Section 31 fees increased in 2019 compared with 2018 primarily due to higher average SEC fee rates, partially offset by lower dollar value traded on Nasdaq's exchanges.

Transaction rebates, in which we credit a portion of the per share execution charge to the market participant, decreased in 2019 compared with 2018 primarily due to lower U.S. industry trading volumes, a decrease in our overall U.S. matched market share executed on Nasdaq's exchanges, and a decrease in the U.S. rebate capture rate.

Brokerage, clearance and exchange fees increased in 2019 compared with 2018 primarily due to higher Section 31 pass-through fees, as discussed above.

Cash Equity Trading Revenues

Cash equity trading revenues and cash equity trading revenues less transaction-based expenses decreased in 2019 compared with 2018 reflecting in large part the lower volume and volatility market environment in the U.S. as compared to 2018 as mentioned above in "Equity Derivative Trading and Clearing Revenues." The decrease in cash equity trading revenues in 2019 was primarily due to lower U.S. industry trading volumes and lower Section 31 pass-through fee revenue, partially offset by a higher U.S. gross capture rate.

The decrease in cash equity trading revenues less transaction-based expenses in 2019 primarily reflects lower U.S. and European industry trading volumes and a lower U.S. net capture rate due to a particularly strong 2018 period, partially offset by a higher European net capture rate.

The decreases in cash equity trading revenues and cash equity trading revenues less transaction-based expenses also included an unfavorable impact from foreign exchange of $7 million related to Nasdaq's Nordic exchanges.

Similar to equity derivative trading and clearing, in the U.S. we record Section 31 fees as cash equity trading revenues with a corresponding amount recorded as transaction-based expenses. We are assessed these fees from the SEC and pass them through to our customers in the form of incremental fees. 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. Section 31 fees decreased in 2019 compared with 2018 primarily due to lower dollar value traded on Nasdaq's exchanges, partially offset by higher average SEC fee rates.

Transaction rebates increased in 2019 compared with 2018. For The Nasdaq Stock Market, Nasdaq PSX and Nasdaq Canada 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 Canada CX2, we credit a portion of the per share execution charge to the market participant that takes the liquidity. The increase in 2019 was primarily due to a higher U.S. rebate capture rate, partially offset by lower U.S. industry trading volumes.

Brokerage, clearance and exchange fees decreased in 2019 compared with 2018 primarily due to lower Section 31 pass-through fees, as discussed above, and lower routing fees.

FICC Revenues

FICC revenues and FICC revenues less transaction-based expenses decreased in 2019 compared with 2018 primarily due to a decline in U.S. fixed income products revenues as well as a decrease in European commodities products revenues due to lower volumes and an unfavorable impact from foreign exchange of $4 million.

Trade Management Services Revenues

Trade management services revenues decreased slightly in 2019 compared with 2018 primarily due to an unfavorable impact from foreign exchange of $3 million, partially offset by an increase in colocation and port connectivity revenues.

* * * * * *

CORPORATE SERVICES

The following table shows revenues from our Corporate Services segment:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Corporate Services:					
Listing Services	$ 296	$ 290	$ 267	2.1%	8.6%
Corporate Solutions	200	197	192	1.5%	2.6%
Total Corporate Services	$ 496	$ 487	$ 459	1.8%	6.1%

Listing Services Revenues

Listing services revenues increased in 2019 compared with 2018 primarily due to higher listings revenues resulting from an increase in the number of listed companies, partially offset by the run-off of fees earned from U.S. listing of additional shares and an unfavorable impact from foreign exchange of $5 million.

Corporate Solutions Revenues

Corporate solutions revenues increased in 2019 compared with 2018 primarily due to an increase in both governance solutions revenues and investor relations intelligence revenues, partially offset by an unfavorable impact from foreign exchange of $2 million.

INFORMATION SERVICES

The following table shows revenues from our Information Services segment:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Information Services:					
Market Data	$ 398	$ 390	$ 369	2.1%	5.7%
Index	223	206	171	8.3%	20.5%
Investment Data & Analytics	158	118	48	33.9%	145.8%
Total Information Services	$ 779	$ 714	$ 588	9.1%	21.4%

Market Data Revenues

Market data revenues increased in 2019 compared with 2018 primarily due to new proprietary data sales, notably growth in the Asia Pacific region, and higher U.S. tape revenues from under-reported data usage. The increase was partially offset by an unfavorable impact from foreign exchange of $4 million.

Index Revenues

Index revenues increased in 2019 compared with 2018 primarily due to higher average AUM in ETPs linked to Nasdaq indexes and higher licensing revenues from futures trading linked to the Nasdaq 100 Index.

Investment Data & Analytics Revenues

Investment data & analytics revenues increased in 2019 compared with 2018 primarily due to an increase in eVestment revenues resulting from a $23 million purchase price adjustment on deferred revenue in 2018, organic growth, and the impact of our acquisition of Quandl.

* * * * * *

MARKET TECHNOLOGY

The following table shows revenues from our Market Technology segment:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Market Technology	$ 338	$ 270	$ 247	25.2%	9.3%

Market Technology Revenues

Market technology revenues increased in 2019 compared with 2018 primarily due to the inclusion of revenues associated with the acquisition of Cinnober, an increase in the size and number of software delivery projects, an increase in SaaS surveillance revenues, and higher change request revenues, partially offset by an unfavorable impact from foreign exchange of $6 million.

OTHER REVENUES

Other revenues include the revenues from the BWise enterprise governance, risk and compliance software platform, which was sold in March 2019 and the revenues from the Public Relations Solutions and Digital Media Services businesses which were sold in April 2018. Prior to the sale dates, these revenues were included in our Corporate Solutions business. See “2019 Divestitures,” and “2018 Divestiture,” of Note 4, “Acquisitions and Divestitures,” to the consolidated financial statements for further discussion of these divestitures.

Expenses

Operating Expenses

The following table shows our operating expenses:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Compensation and benefits	$ 707	$ 712	$ 670	(0.7)%	6.3 %
Professional and contract services	127	144	153	(11.8)%	(5.9)%
Computer operations and data communications	133	127	125	4.7 %	1.6 %
Occupancy	97	95	94	2.1 %	1.1 %
General, administrative and other	125	120	82	4.2 %	46.3 %
Marketing and advertising	39	37	31	5.4 %	19.4 %
Depreciation and amortization	190	210	188	(9.5)%	11.7 %
Regulatory	31	32	33	(3.1)%	(3.0)%
Merger and strategic initiatives	30	21	44	42.9 %	(52.3)%
Restructuring charges	39	—	—	N/M	— %
Total operating expenses	$ 1,518	$ 1,498	$ 1,420	1.3 %	5.5 %

N/M Not meaningful.

Compensation and benefits expense decreased in 2019 compared with 2018 primarily due to lower compensation costs resulting from our 2019 and 2018 divestitures, lower performance incentives, and a favorable impact from foreign exchange of $17 million, partially offset by higher salary costs and higher compensation expense from our 2019 and 2018 acquisitions.

Headcount increased to 4,361 employees as of December 31, 2019 from 4,099 as of December 31, 2018 primarily due to our 2019 acquisitions and growth in our Market Technology and Investment Data & Analytics businesses, partially offset by our 2019 divestitures.

Professional and contract services expense decreased in 2019 compared with 2018 primarily due to our 2019 and 2018 divestitures, lower consulting costs, and a favorable impact from foreign exchange of $3 million, partially offset by higher litigation costs.

Computer operations and data communications expense increased in 2019 compared with 2018 primarily due to higher market data feed costs, partially offset by lower costs resulting from our 2018 divestiture and a favorable impact from foreign exchange of $2 million.

Occupancy expense increased in 2019 compared with 2018 mainly due to higher costs associated with additional facility and rent costs resulting from expansion of our new U.S. headquarters in New York and our 2019 and 2018 acquisitions, partially offset by lower costs due to our 2018 divestiture and a favorable impact from foreign exchange of $3 million.

General, administrative and other expense increased in 2019 compared with 2018 primarily due to a provision recorded for notes receivable associated with the funding of technology development for the CAT, a charge related to a tax reserve for certain prior year examinations, and a charge for a make-whole redemption price premium paid on the early extinguishment of our 2020 Notes, partially offset by charges associated with the clearing default which occurred in 2018, lower costs resulting from our 2019 and 2018 divestitures, and a favorable impact from foreign exchange of $2 million. The provision for notes receivable is a consequence of changes to the CAT project, and particularly the decision by Nasdaq and the other exchanges to impair the value of the technology built by the original vendor, who has been replaced. For further discussion of the clearing default, see "Nasdaq Commodities Clearing Default," of Note 16, "Clearing Operations," to the consolidated financial statements.

Marketing and advertising expense increased in 2019 compared with 2018 primarily due to an increase in advertising spend.

Depreciation and amortization expense decreased in 2019 compared with 2018 primarily due to a decrease in amortization expense recorded on capitalized software as a result of our 2019 restructuring plan, a decrease in amortization expense recorded on intangible assets which became fully amortized, a decrease in depreciation expense related to the divestiture of BWise, and a favorable impact from foreign exchange of $3 million. Partially offsetting these decreases was additional amortization expense associated with acquired intangible assets. See Note 21, "Restructuring Charges," to the consolidated financial statements for further discussion of our 2019 restructuring plan and charges associated with this plan.

Merger and strategic initiatives expense increased in 2019 compared with 2018. 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 will vary based on the size and frequency of the activities described above.

Restructuring charges were $39 million in 2019. See Note 21, “Restructuring Charges,” to the consolidated financial statements for further discussion of our 2019 restructuring plan and charges associated with this plan.

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Non-operating Income and Expenses

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

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Interest income	$ 10	$ 10	$ 7	— %	42.9 %
Interest expense	(124)	(150)	(143)	(17.3)%	4.9 %
Net interest expense	(114)	(140)	(136)	(18.6)%	2.9 %
Gain on sale of investment security	—	118	—	(100.0)%	N/M
Net gain on divestiture of businesses	27	33	—	(18.2)%	N/M
Other income	5	7	2	(28.6)%	250.0 %
Net income from unconsolidated investees	84	18	15	366.7 %	20.0 %
Total non-operating income (expenses)	$ 2	$ 36	$ (119)	(94.4)%	(130.3)%

N/M Not meaningful.

Interest Expense

Interest expense decreased in 2019 compared with 2018 primarily due to the refinancing of the 2020 Notes with the 2029 Notes at a lower interest rate and lower outstanding debt obligations. See Note 10, “Debt Obligations,” to the consolidated financial statements for further discussion of our debt obligations.

The following table shows our interest expense:

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		(in millions)			
Interest expense on debt	$ 115	$ 140	$ 135	(17.9)%	3.7%
Accretion of debt issuance costs and debt discount	6	7	6	(14.3)%	16.7%
Other fees	3	3	2	— %	50.0%
Interest expense	$ 124	$ 150	$ 143	(17.3)%	4.9%

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Gain on Sale of Investment Security

In December 2018, we recorded a pre-tax gain of $118 million ($93 million after tax) on the sale of an investment security. See “Equity Securities,” of Note 7, “Investments,” to the consolidated financial statements for further discussion.

Net Gain on Divestiture of Businesses

The net gain on divestiture of businesses in 2019 primarily relates to our divestiture of BWise. See “2019 Divestitures,” of Note 4, “Acquisitions and Divestitures,” to the consolidated financial statements for further discussion.

The net gain on divestiture of businesses in 2018 relates to our 2018 divestiture. See “2018 Divestiture,” of Note 4, “Acquisitions and Divestitures,” to the consolidated financial statements for further discussion.

Net Income from Unconsolidated Investees

Net income from unconsolidated investees increased in 2019 compared with 2018 primarily due to income recognized from our equity method investment in OCC. See “Equity Method Investments,” of Note 7, “Investments,” to the consolidated financial statements for further discussion.

Tax Matters

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

	Year Ended December 31,			Percentage Change	
	2019	2018	2017	2019 vs. 2018	2018 vs. 2017
		($ in millions)			
Income tax provision	$ 245	$ 606	$ 143	(59.6)%	323.8%
Effective tax rate	24.0%	57.0%	16.4%		

For further discussion of our tax matters, see Note 18, "Income Taxes," to the consolidated financial statements.

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Non-GAAP Financial Measures

In addition to disclosing results determined in accordance with U.S. GAAP, we also have provided 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. Non-GAAP net income attributable to Nasdaq for the periods presented below is calculated by adjusting for the following items:

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, the relative operating performance of the businesses between periods, and the earnings power of Nasdaq. Performance measures excluding intangible asset amortization therefore provide investors with a useful representation of our businesses' 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. Accordingly, we exclude these costs for purposes of calculating non-GAAP measures which provide a more meaningful analysis of Nasdaq's ongoing operating performance or comparisons in Nasdaq's performance between periods.

Restructuring charges: We initiated the transition of certain technology platforms to advance our strategic opportunities as a technology and analytics provider and continue the re-alignment of certain business areas. See Note 21, "Restructuring Charges," to the consolidated financial statements for further discussion of our 2019 restructuring plan. Charges associated with this plan represent a fundamental shift in our strategy and technology as well as executive re-alignment and will be excluded for purposes of calculating non-GAAP measures as they are not reflective of ongoing operating performance or comparisons in Nasdaq's performance between periods.

Net income from unconsolidated investee: See "OCC Capital Plan," of Note 7, "Investments," to the consolidated financial statements for further discussion. Our income on our investment in OCC may vary significantly compared to prior years due to the disapproval of the OCC's capital plan. Accordingly, we will exclude this income from current and prior periods for purposes of calculating non-GAAP measures which provide a more meaningful analysis of Nasdaq's ongoing operating performance or comparisons in Nasdaq's performance between periods.

Clearing default loss: In 2018, we recorded a $31 million charge related to a default of a Nasdaq Clearing commodities member that occurred in September 2018. See "Nasdaq Commodities Clearing Default," of Note 16, "Clearing Operations," to the consolidated financial statements for further discussion of the default. We have excluded the charge related to the default as we believe it is non-recurring, as there has never been another loss due to member default in our clearinghouse, and should be excluded when evaluating the ongoing operating performance of Nasdaq. Any expenses associated with the evaluation and enhancement of processes and procedures will not be excluded from our GAAP results.

Other significant 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. We believe the exclusion of such amounts allows management and investors to better understand the ongoing financial results of Nasdaq.

For 2019, other significant items primarily included:

- a provision for notes receivable associated with the funding of technology development for the CAT which is recorded in general, administrative and other expense in the Consolidated Statements of Income;
- a loss on extinguishment of debt which is recorded in general, administrative and other expense in the Consolidated Statements of Income; and
- a net gain on divestiture of businesses which primarily represents our pre-tax net gain of $27 million on the sale of BWise;
- other items:
    - a tax reserve for certain prior year examinations which is recorded in general, administrative and other expense in the Consolidated Statements of Income;
    - certain litigation costs which are recorded in professional and contract services expense in the Consolidated Statements of Income.

For 2018, other significant items primarily included:

- a net gain on divestiture of businesses which represents our pre-tax net gain of $33 million on the sale of the Public Relations Solutions and Digital Media Services businesses;
- a gain on the sale of an investment security which represents our pre-tax gain of $118 million on the sale of our 5.0% ownership interest in LCH Group Holdings Limited, or LCH;
- other items:
    - charges related to uncertain positions pertaining to sales and use tax and VAT which are recorded in general, administrative and other expense in the Consolidated Statements of Income; and
    - certain litigation costs which are recorded in professional and contract services expense in the Consolidated Statements of Income.

Significant tax items:

The non-GAAP adjustment to the income tax provision included the tax impact of each non-GAAP adjustment and:

- for 2019, a tax benefit of $10 million primarily related to an adjustment to the 2018 federal and state tax returns and a tax benefit of $10 million related to capital distributions from the OCC. See "OCC Capital Plan," of Note 7, "Investments," to the consolidated financial statements for further discussion of our OCC investment.
- for 2018, a net $7 million increase to tax expense due to a remeasurement of unrecognized tax benefits (excluding the reversal of certain Swedish tax benefits discussed below) and the impact of state tax rate changes.

Additional adjustments included the following items:

- for 2019 and 2018, excess tax benefits related to employee share-based compensation to reflect the recognition of the income tax effects of share-based awards when awards vest or are settled. This item is subject to volatility and will vary based on the timing of the vesting of employee share-based compensation arrangements and fluctuation in our stock price.
- for 2018:
    - the impact of enacted U.S. tax legislation, which related to the Tax Cuts and Jobs Act that was enacted in December 2017. We recorded an increase to tax expense of $290 million and a reduction to deferred tax assets related to foreign currency translation as a result of the finalization of the provisional estimate related to this act; and
    - a reversal of certain Swedish tax benefits. See Note 18, "Income Taxes," to the consolidated financial statements for further discussion.

The following table shows 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, 2019		Year Ended December 31, 2018		Year Ended December 31, 2017	
	(in millions, except share and per share amounts)					
	Net Income	Diluted Earnings Per Share	Net Income	Diluted Earnings Per Share	Net Income	Diluted Earnings Per Share
U.S. GAAP net income attributable to Nasdaq and diluted earnings per share	$ 774	$ 4.63	$ 458	$ 2.73	$ 729	$ 4.30
Non-GAAP adjustments:						
Amortization expense of acquired intangible assets	101	0.60	109	0.65	92	0.54
Merger and strategic initiatives expense	30	0.18	21	0.13	44	0.26
Restructuring charges	39	0.23	—	—	—	—
Net income from unconsolidated investee	(82)	(0.49)	(16)	(0.10)	(13)	(0.08)
Clearing default loss	—	—	31	0.18	—	—
Provision for notes receivable	20	0.12	—	—	—	—
Extinguishment of debt	11	0.07	—	—	10	0.06
Net gain on divestiture of businesses	(27)	(0.16)	(33)	(0.20)	—	—
Gain on sale of investment security	—	—	(118)	(0.69)	—	—
Other	17	0.11	17	0.10	3	0.02
Total non-GAAP adjustments	109	0.66	11	0.07	136	0.80
Adjustment to the income tax provision to reflect non-GAAP adjustments and other tax items	(43)	(0.26)	6	0.03	(66)	(0.39)
Excess tax benefits related to employee share-based compensation	(5)	(0.03)	(9)	(0.05)	(40)	(0.24)
Impact of enacted U.S. tax legislation	—	—	290	1.73	(89)	(0.52)
Reversal of certain Swedish tax benefits	—	—	41	0.24	—	—
Total non-GAAP tax adjustments	(48)	(0.29)	328	1.95	(195)	(1.15)
Total non-GAAP adjustments, net of tax	61	0.37	339	2.02	(59)	(0.35)
Non-GAAP net income attributable to Nasdaq and diluted earnings per share	$ 835	$ 5.00	$ 797	$ 4.75	$ 670	$ 3.95
Weighted-average common shares outstanding for diluted earnings per share		166,970,161		167,691,299		169,585,031

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 our common stock and debt. Currently, our cost and availability of funding remain healthy.

In March 2019, we used net proceeds from the sale of commercial paper and cash on hand to redeem all of our 2019 Notes. In April 2019, we issued the 2029 Notes and in May 2019, we primarily used the net proceeds from the 2029 Notes to repay in full and terminate our 2020 Notes. In addition, in June 2019, we used proceeds from issuances of commercial paper to repay in full and terminate our 2016 Credit Facility, and in February 2020, we issued the 2030 Notes. We will primarily use the net proceeds from the 2030 Notes to redeem the 2021 Notes and for other general corporate purposes. See "1.75% Senior Unsecured Notes Due 2029," "Early Extinguishment of 5.55% Senior Unsecured Notes Due 2020," "Early Extinguishment of 2016 Credit Facility," "0.875%

Senior Unsecured Notes Due 2030," and "3.875% Senior Unsecured Notes Due 2021," of Note 10, "Debt Obligations," to the consolidated financial statements for further discussion.

We have the 2017 Credit Facility and a commercial paper program, which enable us to borrow efficiently at reasonable short-term interest rates. The commercial paper program is supported by our 2017 Credit Facility. See "Commercial Paper Program," and "2017 Credit Facility," of Note 10, "Debt Obligations," to the consolidated financial statements for further discussion.

As of December 31, 2019, no amounts were outstanding on the 2017 Credit Facility. The $2 million balance represents unamortized debt issuance costs. Of the $1 billion that is available for borrowing, $392 million provides liquidity support for the commercial paper program and for a letter of credit. As such, as of December 31, 2019, the total remaining amount available under the 2017 Credit Facility was $608 million, excluding the amounts that support the commercial paper program and letter of credit.

As part of the purchase price consideration of a prior acquisition, Nasdaq has contingent future obligations to issue 992,247 shares of Nasdaq common stock annually through 2027. See "Non-Cash Contingent Consideration," of Note 19, "Commitments, Contingencies and Guarantees," to the consolidated financial statements for further discussion.

In the near term, we expect that our operations and the availability under our revolving credit commitment 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 $63 million as of December 31, 2019, compared with $(200) million as of December 31, 2018, an increase of $263 million. Current asset balance changes decreased working capital by $2,080 million, with decreases in default funds and margin deposits, cash and cash equivalents, other current assets, and restricted cash, partially offset by increases in receivables, net and financial investments. Current liability balance changes increased working capital by $2,343 million, due to decreases in default funds and margin deposits, short-term debt, other current liabilities, accounts payable and accrued expenses, and accrued personnel costs, partially offset by increases in Section 31 fees payable to the SEC and deferred revenue.

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;
- increases in interest rates under our credit facilities;
- credit rating downgrades, which could limit our access to additional debt;
- a decrease in the market price of our common stock; and
- volatility or disruption in the public debt and equity markets.

The following sections discuss the effects of changes in our financial assets, debt obligations, regulatory capital requirements, and cash flows on our liquidity and capital resources.

Financial Assets

The following table summarizes our financial assets:

	December 31, 2019	December 31, 2018
	(in millions)	
Cash and cash equivalents	$ 332	$ 545
Restricted cash	30	41
Financial investments	291	268
Total financial assets	$ 653	$ 854

Cash and Cash Equivalents and Restricted Cash

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, 2019, our cash and cash equivalents of $332 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, 2019 decreased $213 million from December 31, 2018, primarily due to:

- repayments of debt obligations;
- cash dividends paid on our common stock;
- cash paid for acquisitions, net of cash and cash equivalents acquired;
- repurchases of our common stock; and
- purchases of property and equipment, partially offset by;
- net cash provided by operating activities;
- proceeds from issuances of long-term debt, net of issuance costs;
- proceeds from the divestiture of a business; and
- proceeds from commercial paper, net.

See "Cash Flow Analysis" below for further discussion.

Restricted cash is restricted from withdrawal due to contractual or regulatory requirements or is not available for general use. Restricted cash was $30 million as of December 31, 2019 and $41 million as of December 31, 2018, a decrease of $11 million. The decrease primarily relates to a decrease in cash pledged as collateral. Restricted cash is classified as restricted cash in the Consolidated Balance Sheets.

Repatriation of Cash

Our cash and cash equivalents held outside of the U.S. in various foreign subsidiaries totaled $160 million as of December 31, 2019 and $367 million as of December 31, 2018. The remaining balance held in the U.S. totaled $172 million as of December 31, 2019 and $178 million as of December 31, 2018.

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

Share Repurchase Program

See "Share Repurchase Program," of Note 13, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our share repurchase program.

Cash Dividends on Common Stock

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

	2019	2018
First quarter	$ 0.44	$ 0.38
Second quarter	0.47	0.44
Third quarter	0.47	0.44
Fourth quarter	0.47	0.44
Total	$ 1.85	$ 1.70

See "Cash Dividends on Common Stock," of Note 13, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of the dividends.

Financial Investments

Our financial investments totaled $291 million as of December 31, 2019 and $268 million as of December 31, 2018 and are primarily comprised of highly rated European government debt securities. Of these securities, $169 million as of December 31, 2019 and $166 million as of December 31, 2018 are assets primarily utilized to meet regulatory capital requirements, mainly for our clearing operations at Nasdaq Clearing. See Note 7, "Investments," to the consolidated financial statements for further discussion.

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Debt Obligations

The following table summarizes our debt obligations by contractual maturity:

	Maturity Date	December 31, 2019	December 31, 2018
		(in millions)	
Short-term debt:			
Commercial paper	Weighted-average maturity of 13 days	$ 391	$ 275
Senior unsecured floating rate notes	Repaid March 2019	—	500
5.55% senior unsecured notes[(1)]	Repaid May 2019	—	599
$400 million senior unsecured term loan facility	Repaid June 2019	—	100
Total short-term debt		391	1,474
Long-term debt:			
3.875% senior unsecured notes	June 2021	671	686
$1 billion senior unsecured revolving credit facility	April 2022	(2)	(4)
1.75% senior unsecured notes	May 2023	668	682
4.25% senior unsecured notes	June 2024	497	497
3.85% senior unsecured notes	June 2026	497	496
1.75% senior unsecured notes	March 2029	665	—
Total long-term debt		2,996	2,357
Total debt obligations		$ 3,387	$ 3,831

(1) Balance was reclassified to short-term debt as of March 31, 2019.

In addition to the $1 billion senior unsecured revolving credit facility, we also have other credit facilities primarily related to our Nasdaq Clearing operations in order to provide further liquidity. Other credit facilities, which are available in multiple currencies, totaled $203 million as of December 31, 2019 and $234 million as of December 31, 2018, in available liquidity, of which $15 million was utilized as of December 31, 2019 and none of which was utilized as of December 31, 2018.

As of December 31, 2019, we were in compliance with the covenants of all of our debt obligations.

See Note 10, "Debt Obligations," to the consolidated financial statements for further discussion of our debt obligations.

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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, 2019, our required regulatory capital of $147 million is 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, Execution Access, NPM Securities, SMTX, 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, 2019, the combined required minimum net capital totaled $1 million and the combined excess capital totaled $48 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 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, 2019, our required regulatory capital of $33 million is invested in European government debt securities that are included in financial investments and restricted cash 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, 2019, other required regulatory capital was $11 million and was primarily included in restricted cash and financial investments in the Consolidated Balance Sheets.

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Cash Flow Analysis

The following table summarizes the changes in cash flows:

	Year Ended December 31,			Percentage Change	
	2019	**2018**	**2017**	**2019 vs. 2018**	**2018 vs. 2017**
Net cash provided by (used in):		**(in millions)**			
Operating activities	$ 963	$ 1,028	$ 909	(6.3)%	13.1 %
Investing activities	(240)	196	(890)	(222.4)%	(122.0)%
Financing activities	(937)	(1,027)	(53)	(8.8)%	1,837.7 %
Effect of exchange rate changes on cash and cash equivalents and restricted cash	(10)	(10)	15	— %	(166.7)%
Net increase (decrease) in cash and cash equivalents and restricted cash	(224)	187	(19)	(219.8)%	(1,084.2)%
Cash and cash equivalents and restricted cash at beginning of period	586	399	418	46.9 %	(4.5)%
Cash and cash equivalents and restricted cash at end of period	$ 362	$ 586	$ 399	(38.2)%	46.9 %

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 which can be episodic, depending on the timing and size of a related business combination; expense associated with share-based compensation; 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 which is 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 timing of collections from customers and payments to the SEC.

Net cash provided by operating activities decreased $65 million in 2019 compared with 2018. The decrease was primarily driven by higher performance incentive payments made in 2019 compared with 2018 primarily due to prior year performance, a decline in cash flows related to our 2019 and 2018 divestitures, and payments made in 2019 associated with the capital relief program, partially offset by cash flows from our 2019 acquisitions and growth in net income.

Net Cash Used in (Provided by) Investing Activities

Net cash used in investing activities for 2019 primarily relates to $206 million of cash used for acquisitions, net of cash and cash equivalents acquired, $127 million of purchases of property and equipment, and $36 million of net purchases of securities, partially offset by receipt of cash of $132 million related to our 2019 divestitures.

Net cash provided by investing activities for 2018 primarily relates to $286 million of cash received from our 2018 divestiture and $169 million of proceeds from the sale of an investment security, partially offset by $111 million of purchases of property and equipment, $101 million of cash used for our 2018 acquisition, and $47 million of net purchases of securities.

Net Cash Used in Financing Activities

Net cash used in financing activities for 2019 primarily relates to $1,215 million in repayments of debt obligations, $305 million of dividend payments to our shareholders, and $200 million in repurchases of common stock, partially offset by $680 million from proceeds related to long-term debt issuances and $116 million in net borrowings of commercial paper.

Net cash used in financing activities for 2018 primarily relates to $394 million in repurchases of common stock, $280 million of dividend payments to our shareholders, $205 million of net repayments of commercial paper, and $115 million of repayments of debt obligations.

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

See Note 10, "Debt Obligations," to the consolidated financial statements for further discussion of our debt obligations.

See "Share Repurchase Program," and "Cash Dividends on Common Stock," of Note 13, "Nasdaq Stockholders' Equity," to the consolidated financial statements for further discussion of our share repurchase program and cash dividends paid on our common stock.

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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 shows these contractual obligations as of December 31, 2019.

	Payments Due by Period				
Contractual Obligations	**Total**	**Less than 1 year**	**1-3 years**	**3-5 years**	**More than 5 years**
			(in millions)		
Debt obligations by contract maturity(1)	$ 3,847	$ 481	$ 827	$ 1,278	$ 1,261
Operating lease obligations(2)	508	77	113	78	240
Real estate obligations(3)	128	—	12	27	89
Purchase obligations(4)	54	26	28	—	—
Other obligations(5)	9	9	—	—	—
Total	$ 4,546	$ 593	$ 980	$ 1,383	$ 1,590

(1) Our debt obligations include both principal and interest obligations. As of December 31, 2019, an interest rate of 2.73% was used to compute the amount of the contractual obligations for interest on the 2017 Credit Facility. All other debt obligations were primarily calculated on a 360-day basis at the contractual fixed rate multiplied by the aggregate principal amount as of December 31, 2019. See Note 10, "Debt Obligations," to the consolidated financial statements for further discussion.

(2) Operating lease obligations represent our undiscounted operating lease liabilities as of December 31, 2019. See Note 17, "Leases," to the consolidated financial statements for further discussion of our leases.

(3) Real estate obligations include legally binding minimum lease payments for leases signed but not yet commenced.

(4) Purchase obligations primarily represent minimum outstanding obligations due under software license agreements.

(5) Other obligations primarily consist of potential future escrow agreement payments related to prior acquisitions.

Non-Cash Contingent Consideration

See "Non-Cash Contingent Consideration," of Note 19, "Commitments, Contingencies and Guarantees," to the consolidated financial statements for further discussion.

Off-Balance Sheet Arrangements

For discussion of off-balance sheet arrangements see:

- Note 16, "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 19, "Commitments, Contingencies and Guarantees," to the consolidated financial statements for further discussion of:
    - Guarantees issued and credit facilities available;
    - Other guarantees;
    - Non-cash contingent consideration;
    - Escrow agreements;
    - 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, 2019, 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 100 basis points from levels as of December 31, 2019, the fair value of this portfolio would have declined by $7 million.

Debt Obligations

As of December 31, 2019, substantially all of our debt obligations are fixed-rate obligations. 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 amounts outstanding from the sale of commercial paper under our commercial paper program, which have variable interest rates. As of December 31, 2019, we had principal amounts outstanding of $391 million of commercial paper. A hypothetical 100 basis points increase in interest rates on our outstanding commercial paper would increase annual interest expense by approximately $4 million based on borrowings as of December 31, 2019.

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, 2019 and 2018 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, 2019					
Average foreign currency rate to the U.S. dollar	1.1193	0.1057	#	N/A	N/A
Percentage of revenues less transaction-based expenses	7.7%	7.6 %	5.0 %	79.7%	100.0%
Percentage of operating income[1]	13.9%	(4.3)%	(5.8)%	96.2%	100.0%
Impact of a 10% adverse currency fluctuation on revenues less transaction-based expenses	$ (19)	$ (19)	$ (13)	$ —	$ (51)
Impact of a 10% adverse currency fluctuation on operating income	$ (14)	$ (4)	$ (6)	$ —	$ (24)

	Euro	Swedish Krona	Other Foreign Currencies	U.S. Dollar	Total
	(in millions, except currency rate)				
Year Ended December 31, 2018					
Average foreign currency rate to the U.S. dollar	1.1800	0.1150	#	N/A	N/A
Percentage of revenues less transaction-based expenses	8.9%	7.3 %	5.2 %	78.6%	100.0%
Percentage of operating income	11.3%	0.1 %	(7.0)%	95.6%	100.0%
Impact of a 10% adverse currency fluctuation on revenues less transaction-based expenses	$ (23)	$ (18)	$ (13)	$ —	$ (54)
Impact of a 10% adverse currency fluctuation on operating income	$ (12)	$ —	$ (7)	$ —	$ (19)

(1) The decrease in 2019 percentage of operating income in Swedish Krona is primarily driven by costs associated with our 2019 restructuring plan. See Note 21, "Restructuring Charges," to the consolidated financial statements for further discussion of our 2019 restructuring plan.

\# 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, 2019 is presented in the following table:

	Net Assets	Impact of a 10% Adverse Currency Fluctuation
	(in millions)	
Swedish Krona[1]	$ 3,247	$ (325)
Norwegian Krone	174	(17)
Canadian Dollar	120	(12)
British Pound	222	(22)
Euro	33	(3)
Australian Dollar	105	(11)

(1) Includes goodwill of $2,397 million and intangible assets, net of $600 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.

Execution Access is an introducing broker which operates the trading platform for our Fixed Income business to trade in U.S. Treasury securities. Execution Access has a clearing arrangement with Industrial and Commercial Bank of China Financial Services LLC, or ICBC. As of December 31, 2019, we have contributed $15 million of clearing deposits to ICBC in connection with this clearing arrangement. These deposits are recorded in other current assets in our Consolidated Balance Sheets. Some of the trading activity in Execution Access is cleared by ICBC through the Fixed Income Clearing Corporation, with ICBC acting as agent. Execution Access assumes the counterparty risk of clients that do not clear through the Fixed Income Clearing Corporation. Counterparty risk of clients exists for Execution Access between the trade date and settlement date of the individual transactions, which is at least one business day (or more, if specified by the U.S. Treasury issuance calendar). Counterparties that do not clear through the Fixed Income Clearing Corporation are subject to a credit due diligence process and may be required to post collateral, provide principal letters, or provide other forms of credit enhancement to Execution Access for the purpose of mitigating counterparty risk. Daily position trading limits are also enforced for such counterparties.

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.

On January 1, 2020, we adopted ASU 2016-13, "Measurement of Credit Losses on Financial Instruments." See "Financial Instruments - Credit Losses," of "Recent Accounting Pronouncements," of Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements for further discussion. This ASU changes the impairment model for certain financial instruments. The new model is a forward looking expected loss model and applies to financial assets subject to credit losses and measured at amortized cost and certain off-balance sheet credit exposures. This includes loans, held-to-maturity debt securities, loan commitments, financial guarantees and trade receivables.

We also are exposed to credit risk through our clearing operations with Nasdaq Clearing. See Note 16, "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 highly rated government and supranational debt instruments.

- *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 or supranational 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 of high quality sovereign debt (for example, European government and U.S. Treasury securities), central bank certificates and supranational debt instruments with short dated maturities.
- *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 supranational 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

Corporate Services Revenues

Listing Services Revenues

Listing services revenues primarily include annual renewal fees and initial listing fees. Annual renewal fees do not require any judgments or assumptions by management as these amounts are recognized ratably over the following 12-month period. However, the initial listing fee is allocated to multiple performance obligations including initial and subsequent listing services and corporate solutions services (when a company qualifies to receive these services 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 corporate solutions 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 the corporate solutions services performance obligation is recognized ratably over a two-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.

Market Technology 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 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. 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.

For further discussion related to recognition of these fees, see "Revenue From Contracts with Customers - Revenue Recognition - Corporate Services - Listing Services," and

"Revenue From Contracts with Customers - Revenue Recognition - Market Technology," of Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements.

Goodwill and Related Impairment

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. For purposes of performing our goodwill impairment test, our five reporting units are the Market Services segment, the two businesses comprising the Corporate Services segment: Listing Services and Corporate Solutions, the Information Services segment, and the Market Technology segment. We test for impairment during the fourth quarter of our fiscal year using an October 1 measurement date. When testing goodwill 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 is less than its carrying amount as the basis to determine if it is necessary to perform a quantitative goodwill impairment test. In performing a qualitative assessment, we consider the extent to which unfavorable events or circumstances identified, such as changes in economic conditions, industry and market conditions or company specific events, could affect the comparison of the reporting unit's fair value with its carrying amount. If we choose not to complete a qualitative assessment for a given reporting unit, or if the initial assessment indicates that it is more likely than not that the carrying amount of a reporting unit exceeds its estimated fair value, a quantitative test is required.

When assessing goodwill for impairment, our decision to perform a qualitative impairment assessment for a reporting unit 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 over its carrying amount at the last quantitative assessment date, and the amount of time in between quantitative fair value assessments.

The quantitative goodwill impairment test consists of two steps performed at the reporting unit level.

- The first step compares the estimated fair value of each reporting unit to its corresponding carrying amount, including goodwill. The fair value of each reporting unit is estimated using a combination of discounted cash flow valuation, which incorporates assumptions regarding future growth rates, terminal values, and discount rates, as well as guideline public company valuations, incorporating 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. If the reporting unit's estimated fair value exceeds its estimated carrying amount, goodwill is not impaired.
- If the first step results in the carrying amount exceeding the fair value of the reporting unit, then a second step must be completed in order to determine the amount of goodwill impairment that should be recorded, if any. In the second step, the implied fair value of the reporting unit's goodwill is determined by allocating the reporting unit's fair value to all of its assets and liabilities other than goodwill in a manner similar to a purchase price allocation. The implied fair value of the goodwill that results from the application of this second step is then compared to the carrying amount of the goodwill and an impairment charge is recorded for any difference.

On January 1, 2020, we adopted ASU 2017-04, "Simplifying the Test for Goodwill Impairment," or ASU 2017-04. See "Goodwill," of "Recent Accounting Pronouncements," of Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements for further discussion.

The following table presents the balances of goodwill for our reportable segments at the time of our 2019 annual impairment test:

		October 1, 2019
		(in millions)
Market Services	$	3,292
Corporate Services		439
Information Services		2,238
Market Technology		263
	$	6,232

In 2019, we performed a qualitative goodwill impairment test for all reporting units, as the excesses of their fair values over their respective carrying amounts at the time of the last quantitative test in 2017 were significant. In conducting the qualitative assessment, we evaluated the performance of each of these reporting units since the last quantitative test, as well as future financial projections to determine if there were any changes in the key inputs used to determine the fair values of each reporting unit. We also considered the qualitative factors in FASB Accounting Standards Codification Topic 350, "Intangibles–Goodwill and Other," as well as other relevant events and circumstances. Based on the results of the qualitative assessment for each reporting unit, we concluded based on a predominance of positive indicators and the weight of such indicators that the fair values of our reporting units are more likely than not greater than their respective carrying amounts and as a result, quantitative analyses were not needed. No goodwill impairment was recorded in 2019, 2018 and 2017.

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 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.

Indefinite-Lived Intangible Assets and Related Impairment

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 and more frequently whenever events or changes in circumstances indicate that the fair value of the asset may be less than its carrying amount. Similar to goodwill impairment testing, we test for impairment of indefinite-lived intangible assets during the fourth quarter of our fiscal year using an October 1 measurement date and may first perform a qualitative assessment, considering similar factors as discussed above in the goodwill impairment discussion, to determine if it is more likely than not that the fair value of the indefinite-lived intangible asset is less than its carrying amount. If we elect to perform or are required to perform a quantitative assessment, the test consists of a comparison of the fair value of the indefinite-lived intangible asset to its carrying amount as of the impairment testing date. If the carrying amount of the indefinite-lived intangible asset exceeds its fair value, an impairment charge is recorded for the difference. 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. During our annual indefinite-lived intangible asset impairment test during the fourth quarter of 2019, we performed a qualitative test as the excess fair value of each individual indefinite-lived intangible asset over its respective carrying amount at the time of the last quantitative test in 2017 was significant. Based on the results of the qualitative assessment, we concluded based on a predominance of positive indicators and the weight of such indicators that the fair values of our indefinite-lived intangible assets are more likely than not greater than their respective carrying amounts and as a result, quantitative analyses were not needed. There were no indefinite-lived intangible asset impairment charges in 2019, 2018 and 2017.

Subsequent to our annual indefinite-lived 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, equity method investments and equity securities, as well as 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. 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 as an additional factor. For equity securities, when assessing investments in private companies for impairment, we consider such factors as, among others, 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. 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.

No material impairments were recorded to reduce the carrying value of our finite-lived intangible assets, equity method investments or equity securities during 2019, 2018 or 2017.

We recorded pre-tax, non-cash property and equipment asset impairment charges of $24 million in 2019. The asset impairment charge in 2019 primarily related to capitalized software that was retired and is included in restructuring charges in the Consolidated Statements of Income for 2019. See Note 21, "Restructuring Charges," to the consolidated financial statements for a discussion of our 2019 restructuring plan. There were no other material impairments of property and equipment recorded in 2019, 2018 or 2017.

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 revenue and expense. 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

See "Recent Accounting Pronouncements," of Note 2, "Summary of Significant Accounting Policies," to the consolidated financial statements for further discussion of recently adopted accounting pronouncements that are applicable to Nasdaq.

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, 2019 and 2018, Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017, Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017, Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2019, 2018 and 2017, Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017 and notes to our consolidated financial statements, together with a report thereon of Ernst & Young LLP, dated February 25, 2020, are attached hereto as pages F-1 through F-49 and incorporated by reference herein.

* * * * * *

Summarized Quarterly Financial Data (Unaudited)

	1st Qtr 2019	2nd Qtr 2019	3rd Qtr 2019	4th Qtr 2019
	(in millions, except per share amounts)			
Total revenues	$ 1,039	$ 1,061	$ 1,096	$ 1,065
Transaction-based expenses	(405)	(438)	(464)	(419)
Revenues less transaction-based expenses	634	623	632	646
Total operating expenses	359	367	406	386
Operating income	275	256	226	260
Net income attributable to Nasdaq	$ 247	$ 174	$ 150	$ 202
Basic earnings per share	$ 1.49	$ 1.05	$ 0.91	$ 1.23
Diluted earnings per share	$ 1.48	$ 1.04	$ 0.90	$ 1.21
Cash dividends declared per common share	$ 0.44	$ 0.47	$ 0.47	$ 0.47

	1st Qtr 2018	2nd Qtr 2018	3rd Qtr 2018	4th Qtr 2018
	(in millions, except per share amounts)			
Total revenues	$ 1,151	$ 1,027	$ 964	$ 1,136
Transaction-based expenses	(485)	(412)	(364)	(491)
Revenues less transaction-based expenses	666	615	600	645
Total operating expenses	393	346	354	404
Operating income	273	269	246	241
Net income (loss) attributable to Nasdaq	$ 177	$ 162	$ 163	$ (44)
Basic earnings (loss) per share	$ 1.06	$ 0.98	$ 0.99	$ (0.27)
Diluted earnings (loss) per share	$ 1.05	$ 0.97	$ 0.97	$ (0.27)
Cash dividends declared per common share	$ 0.82	$ —	$ 0.44	$ 0.44

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 President and Chief Executive Officer, and Executive Vice President, Corporate Strategy 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 President and Chief Executive Officer and Executive Vice President, Corporate Strategy 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. During the quarter ended June 30, 2019, we implemented a new enterprise resource planning, or ERP, system, by transitioning certain of our operations, including the general ledger, to the new ERP system. We have modified our existing controls infrastructure, as well as added other processes and internal controls, to adapt to our new ERP system and to take advantage of the increased functionality of the new system.

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, 2019 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, 2019, 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, 2019, 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, 2019, 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, 2019, 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, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in stockholders' equity and cash flows for each of the three years in the period ended December 31, 2019, and the related notes and our report dated February 25, 2020 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 25, 2020

Item 9B. Other Information

None.

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 "Board of Directors-Proposal I: Election of Directors" 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 "Our Ethical Culture" in the Proxy Statement. Information about Nasdaq's nomination procedures, audit committee and audit 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 "Board of Directors-Proposal I: Election of Directors" and "Board of Directors-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 "Board of Directors-Director Compensation" and "Named Executive Officer 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 Information

Nasdaq's Equity Plan provides for the issuance of our equity securities to our officers and other employees, directors and consultants. In addition, nearly all employees of Nasdaq and its subsidiaries are eligible to participate in the ESPP at 85.0% of the fair market value of our common stock on the price calculation date. Employees in certain of our locations are ineligible due to local securities laws and regulations. In jurisdictions where participation in the ESPP is permitted, all of our employees may participate. The Equity Plan and the ESPP have been approved previously 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, 2019.

Plan Category	Number of shares to be issued upon exercise of outstanding options, warrants and rights(a)[1]	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	379,102	$ 54.32	12,082,402 (2)
Equity compensation plans not approved by stockholders	—	—	—
Total	379,102	$ 54.32	12,082,402 (2)

(1) The amounts in this column include only the number of shares to be issued upon exercise of outstanding options, warrants and rights. As of December 31, 2019, we also had 2,601,458 shares to be issued upon vesting of outstanding restricted stock and PSUs.

(2) This amount includes 10,427,582 shares of common stock that may be awarded pursuant to the Equity Plan and 1,654,820 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 "Board of Directors-Proposal I: Election of Directors" in the Proxy Statement.

Item 14. Principal Accounting Fees and Services

Information about principal accounting fees and services, as required by Item 9(e) of Schedule 14A, is incorporated herein by reference from the discussion under the heading "Audit Committee Matters-Annual Evaluation and 2020 Selection of Independent Auditors" in the Proxy Statement.

PART IV

Item 15. Exhibits, 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 Index

Exhibit Number	
2.1	Purchase Agreement, dated as of April 1, 2013, among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.), BGC Partners, Inc., BGC Holdings, L.P., BGC Partners, L.P., and, solely for purposes of certain sections thereof, Cantor Fitzgerald, L.P. (incorporated herein by reference to Exhibit 2.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2013 filed on August 8, 2013).
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).
3.2	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).
4.5	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	Registration Rights Agreement, dated as of June 28, 2013, by and among Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.), BGC Partners, Inc., BGC Holdings, L.P. and BGC Partners, L.P. (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on July 1, 2013).
4.12	Description of Securities.
10.1	Amended and Restated Board Compensation Policy, effective on April 23, 2019 (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
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 10.2 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
10.6	Form of Nasdaq Restricted Stock Unit Award Certificate (directors) (incorporated herein by reference to Exhibit 10.3 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
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 10.5 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
10.9	Form of Nasdaq Continuing Obligations Agreement (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended March 31, 2017 filed on May 10, 2017).*
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	Employment Agreement between Nasdaq and Adena Friedman, made and entered into on November 14, 2016 and effective as of January 1, 2017 (incorporated herein by reference to Exhibit 10.10 to the Annual Report on Form 10-K for the year ended December 31, 2016 filed on March 1, 2017).*

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 Offer Letter, dated as of May 10, 2016, between Nasdaq, Inc. and Michael Ptasznik (incorporated herein by reference to Exhibit 10.2 to the Quarterly Report on Form 10-Q for the quarter ended March 31, 2017 filed on May 10, 2017).*
10.15	Employment Agreement between Nasdaq and Bradley J. Peterson, dated August 1, 2016 (incorporated herein by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended September 30, 2016 filed on November 8, 2016).*
10.16	Employment Offer Letter, dated as of April 30, 2019, between Nasdaq, Inc. and Lauren B. Dillard (incorporated herein by reference to Exhibit 10.6 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2019 filed on August 5, 2019).*
10.17	Nasdaq Change in Control Severance Plan for Executive Vice Presidents and Senior Vice Presidents, effective November 26, 2013 (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on November 29, 2013).*
10.18	Credit Agreement, dated as of April 25, 2017, among Nasdaq, Inc., the various lenders from time to time party thereto, Bank of America, N.A., as administrative agent and an issuing bank, and the other financial institutions party thereto (incorporated herein by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on April 26, 2017).
10.19	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).
11	Statement regarding computation of per share earnings (incorporated herein by reference from Note 14 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 President and Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002 (“Sarbanes-Oxley”).
31.2	Certification of Executive Vice President, Corporate Strategy 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, 2019, formatted in iXBRL (Inline eXtensible Business Reporting Language): (i) Consolidated Balance Sheets as of December 31, 2019 and December 31, 2018; (ii) Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017; (iii) Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017; (iv) Consolidated Statements of Changes in Stockholders' Equity for the years ended December 31, 2019, 2018 and 2017; (v) Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017; 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 25, 2020.

Nasdaq, Inc.
(Registrant)

By:	/s/ Adena T. Friedman
Name:	**Adena T. Friedman**
Title:	**President and Chief Executive Officer**

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 25, 2020.

Name	Title
/s/ Adena T. Friedman **Adena T. Friedman**	President and Chief Executive Officer and Director (Principal Executive Officer)
/s/ Michael Ptasznik **Michael Ptasznik**	Executive Vice President, Corporate Strategy and Chief Financial Officer (Principal Financial Officer)
/s/ Ann M. Dennison **Ann M. Dennison**	Senior Vice President and Controller (Principal Accounting Officer)
* **Michael R. Splinter**	Chairman of the Board
* **Melissa M. Arnoldi**	Director
* **Charlene T. Begley**	Director
* **Steven D. Black**	Director
* **Essa Kazim**	Director
* **Thomas A. Kloet**	Director
* **John D. Rainey**	Director
* **Jacob Wallenberg**	Director
* **Lars R. Wedenborn**	Director
* **Alfred W. Zollar**	Director

* Pursuant to Power of Attorney

By:	/s/ John A. Zecca **John A. Zecca** **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, 2019 and 2018, 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, 2019 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, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, 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 25, 2020 expressed an unqualified opinion thereon.

Adoption of ASU No. 2016-02

As discussed in Note 2 to the consolidated financial statements, the Company changed its method of accounting for Leases in 2019 due to the adoption of ASU No. 2016-02, Leases (Topic 842).

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 3 and 9 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 recorded market technology deferred revenue of $66 million as of December 31, 2019 and recognized $338 million in revenue for the year ended December 31, 2019. The Company allocates the contract transaction price to each performance obligation using their 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. 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 customer contracts, including contract modifications, 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 3 and 9 to the consolidated financial statements related to market technology revenue recognition.

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

New York, New York
February 25, 2020

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

	December 31, 2019	December 31, 2018
Assets		
Current assets:		
Cash and cash equivalents	$ 332	$ 545
Restricted cash	30	41
Financial investments	291	268
Receivables, net	422	384
Default funds and margin deposits	2,996	4,742
Other current assets	219	390
Total current assets	4,290	6,370
Property and equipment, net	384	376
Goodwill	6,366	6,363
Intangible assets, net	2,249	2,300
Operating lease assets	346	—
Other non-current assets	289	291
Total assets	$ 13,924	$ 15,700
Liabilities		
Current liabilities:		
Accounts payable and accrued expenses	$ 148	$ 198
Section 31 fees payable to SEC	132	109
Accrued personnel costs	188	199
Deferred revenue	211	194
Other current liabilities	161	253
Default funds and margin deposits	2,996	4,742
Short-term debt	391	875
Total current liabilities	4,227	6,570
Long-term debt	2,996	2,956
Deferred tax liabilities, net	552	501
Operating lease liabilities	331	—
Other non-current liabilities	179	224
Total liabilities	8,285	10,251
Commitments and contingencies		
Equity		
Nasdaq stockholders' equity:		
Common stock, $0.01 par value, 300,000,000 shares authorized, shares issued: 171,075,011 at December 31, 2019 and 170,709,425 at December 31, 2018; shares outstanding: 165,094,440 at December 31, 2019 and 165,165,104 at December 31, 2018	2	2
Additional paid-in capital	2,632	2,716
Common stock in treasury, at cost: 5,980,571 shares at December 31, 2019 and 5,544,321 shares at December 31, 2018	(336)	(297)
Accumulated other comprehensive loss	(1,686)	(1,530)
Retained earnings	5,027	4,558
Total Nasdaq stockholders' equity	5,639	5,449
Total liabilities and equity	$ 13,924	$ 15,700

See accompanying notes to consolidated financial statements.

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

	Years Ended December 31,		
	2019	**2018**	**2017**
Revenues:			
Market Services	$ 2,639	$ 2,709	$ 2,418
Corporate Services	496	487	459
Information Services	779	714	588
Market Technology	338	270	247
Other revenues	10	97	236
Total revenues	4,262	4,277	3,948
Transaction-based expenses:			
Transaction rebates	(1,327)	(1,344)	(1,158)
Brokerage, clearance and exchange fees	(400)	(407)	(379)
Revenues less transaction-based expenses	2,535	2,526	2,411
Operating expenses:			
Compensation and benefits	707	712	670
Professional and contract services	127	144	153
Computer operations and data communications	133	127	125
Occupancy	97	95	94
General, administrative and other	125	120	82
Marketing and advertising	39	37	31
Depreciation and amortization	190	210	188
Regulatory	31	32	33
Merger and strategic initiatives	30	21	44
Restructuring charges	39	—	—
Total operating expenses	1,518	1,498	1,420
Operating income	1,017	1,028	991
Interest income	10	10	7
Interest expense	(124)	(150)	(143)
Gain on sale of investment security	—	118	—
Net gain on divestiture of businesses	27	33	—
Other income	5	7	2
Net income from unconsolidated investees	84	18	15
Income before income taxes	1,019	1,064	872
Income tax provision	245	606	143
Net income attributable to Nasdaq	$ 774	$ 458	$ 729
Per share information:			
Basic earnings per share	$ 4.69	$ 2.77	$ 4.38
Diluted earnings per share	$ 4.63	$ 2.73	$ 4.30
Cash dividends declared per common share	$ 1.85	$ 1.70	$ 1.46

See accompanying notes to consolidated financial statements.

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

	Years Ended December 31,		
	2019	2018	2017
Net income	$ 774	$ 458	$ 729
Other comprehensive income (loss):			
Foreign currency translation gains (losses)	(122)	(240)	214
Income tax expense[1]	(31)	(11)	(96)
Foreign currency translation, net	(153)	(251)	118
Employee benefit plan adjustment gains (losses)	(4)	9	(2)
Employee benefit plan income tax (benefit) expense	1	(9)	1
Employee benefit plan, net	(3)	—	(1)
Total other comprehensive income (loss), net of tax[2]	(156)	(251)	117
Comprehensive income attributable to Nasdaq	$ 618	$ 207	$ 846

(1) Primarily relates to the tax effect of unrealized gains on Euro denominated notes.
(2) Excludes a reclassification impact of $417 million from accumulated other comprehensive income to retained earnings within stockholders' equity in the Consolidated Statements of Changes in Stockholders' Equity for stranded tax effects related to the Tax Cuts and Jobs Act.

See accompanying notes to consolidated financial statements.

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

	Year Ended December 31,					
	2019		2018		2017	
	Shares	$	Shares	$	Shares	$
Common stock	165	2	167	2	167	2
Additional paid-in capital						
Beginning balance		2,716		3,024		3,104
Share repurchase program	(2)	(200)	(5)	(394)	(3)	(203)
Share-based compensation	1	79	2	69	2	70
Stock option exercises, net	0	2	0	3	1	24
Other issuances of common stock, net	0	35	0	14	0	29
Ending balance		2,632		2,716		3,024
Common stock in Treasury, at Cost						
Beginning balance		(297)		(247)		(176)
Other employee stock activity	0	(39)	0	(50)	(1)	(71)
Ending balance		(336)		(297)		(247)
Accumulated Other Comprehensive Loss						
Beginning balance		(1,530)		(862)		(979)
Other comprehensive income (loss)		(156)		(251)		117
Reclassification impact of Tax Reform		—		(417)		—
Ending balance		(1,686)		(1,530)		(862)
Retained Earnings						
Beginning balance		4,558		3,963		3,477
Net income		774		458		729
Reclassification impact of Tax Reform		—		417		—
Cash dividends declared per common share		(305)		(280)		(243)
Ending balance		5,027		4,558		3,963
Issuance of Nasdaq common stock related to a prior acquisition	1	—	1	—	1	—
Total Stockholders' Equity	165	$ 5,639	165	$ 5,449	167	$ 5,880

See accompanying notes to consolidated financial statements.

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

	Year Ended December 31, 2019	2018	2017
Cash flows from operating activities:			
Net income	$ 774	$ 458	$ 729
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	190	210	188
Share-based compensation	79	69	70
Deferred income taxes	35	301	7
Reversal of certain Swedish tax benefits	—	41	—
Net gain on divestiture of businesses	(27)	(33)	—
Gain on sale of investment security	—	(118)	—
Non-cash restructuring charges	25	—	—
Net income from unconsolidated investees	(84)	(18)	(15)
Other reconciling items included in net income	19	15	25
Net change in operating assets and liabilities, net of effects of divestiture and acquisitions:			
Receivables, net	(42)	(35)	11
Other assets	(173)	(40)	(30)
Accounts payable and accrued expenses	(49)	33	(12)
Section 31 fees payable to SEC	23	(19)	20
Accrued personnel costs	(9)	37	(41)
Deferred revenue	(15)	7	(29)
Other liabilities	217	120	(14)
Net cash provided by operating activities	963	1,028	909
Cash flows from investing activities:			
Purchases of securities	(579)	(421)	(392)
Proceeds from sales and redemptions of securities	543	374	424
Proceeds from divestiture of businesses, net	132	286	—
Proceeds from sale of investment security	11	169	—
Acquisition of businesses, net of cash and cash equivalents acquired	(206)	(75)	(776)
Purchases of property and equipment	(127)	(111)	(144)
Other investing activities	(14)	(26)	(2)
Net cash provided by (used in) investing activities	(240)	196	(890)
Cash flows from financing activities:			
Proceeds from (repayments of) commercial paper, net	116	(205)	480
Repayments of debt obligations	(1,215)	(115)	(708)
Payment of debt extinguishment cost	(11)	—	(9)
Proceeds from issuances of long-term debt, net of issuance costs	680	—	648
Repurchases of common stock	(200)	(394)	(203)
Dividends paid	(305)	(280)	(243)
Proceeds received from employee stock activity and other issuances	37	17	53
Payments related to employee shares withheld for taxes	(39)	(50)	(71)
Net cash used in financing activities	(937)	(1,027)	(53)
Effect of exchange rate changes on cash and cash equivalents and restricted cash	(10)	(10)	15
Net increase (decrease) in cash and cash equivalents and restricted cash	(224)	187	(19)
Cash and cash equivalents and restricted cash at beginning of period	586	399	418
Cash and cash equivalents and restricted cash at end of period	$ 362	$ 586	$ 399
Supplemental Disclosure Cash Flow Information			
Cash paid for:			
Interest	$ 120	$ 148	$ 129
Income taxes, net of refund	$ 205	$ 221	$ 154

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 enables clients to optimize and execute their business vision with confidence.

We manage, operate and provide our products and services in four business segments: Market Services, Corporate Services, Information Services and Market Technology.

Market Services

Our Market Services segment includes our Equity Derivative Trading and Clearing, Cash Equity Trading, FICC and Trade Management Services businesses. 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 some countries where we operate exchanges, we also provide broker services, clearing, settlement and central depository services. In October 2019, we sold the Nordic Fund Market, an electronic mutual fund service which was a small unit of our Broker Services business and in November 2019, we sold NFX's futures exchange business to a third party which acquired the core assets of NFX, including the portfolio of open interest in NFX contracts. Customers on the platform are migrating their open interest to other exchanges. Also, in January 2020, management commenced an orderly wind-down of our broker services operations business. We expect this wind-down to continue through the second quarter of 2021.

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.

For further discussion of our Market Services businesses, see "Products and Services," of "Item 1. Business."

Corporate Services

Our Corporate Services segment includes our Listing Services and Corporate Solutions businesses.

Our Listing Services business includes our U.S. and European Listing Services businesses. We operate a variety of listing platforms around the world to provide multiple global capital raising solutions for private and 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. Our Listing Services business also includes NPM, which provides liquidity solutions for private companies and private funds.

We are continuing to grow our recently launched U.S. Corporate Bond exchange for the listing and trading of corporate bonds. This exchange operates pursuant to The Nasdaq Stock Market exchange license and is powered by NFF.

As of December 31, 2019, there were 3,140 total listings on The Nasdaq Stock Market, including 412 ETPs. The combined market capitalization was approximately $14.9 trillion. In Europe, the Nasdaq Nordic and Nasdaq Baltic exchanges, together with Nasdaq First North, were home to 1,040 listed companies with a combined market capitalization of approximately $1.6 trillion.

Our Corporate Solutions business includes our Investor Relations Intelligence and Governance Solutions businesses, 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. We help organizations enhance their ability to understand and expand their global shareholder base and improve corporate governance through our suite of advanced technology, analytics, and consultative services. In October 2019, Nasdaq acquired CBE, a provider of corporate governance and compliance solutions for boards of directors, CEOs, corporate secretaries and general counsels. Nasdaq combined CBE with its Nasdaq Governance Solutions business, which includes board portal and collaboration technology solutions. We expect the combination will enhance Nasdaq's position as a leading provider of technology, research, insights and consultative services designed to advance governance excellence and collaboration at organizations worldwide.

For further discussion of our Corporate Services businesses, see "Products and Services," of "Item 1. Business."

In March 2019, we sold our BWise enterprise governance, risk and compliance software platform and in April 2018, we sold our Public Relations Solutions and Digital Media Services businesses. See Note 4, "Acquisitions and Divestitures," for further discussion.

As of December 31, 2018, BWise was classified as held for sale. See Note 5, "Assets and Liabilities Held for Sale," for further discussion.

For segment reporting purposes, we have included the revenues and expenses of BWise and the Public Relations Solutions and Digital Media Services businesses in corporate items. These businesses were part of the Corporate Solutions business, within our Corporate Services segment, prior to the date of sale. For discussion of business segments, see Note 20, "Business Segments."

Information Services

Our Information Services segment includes our Market Data, Index and Investment Data & Analytics businesses.

Our Market Data business sells and distributes historical and real-time quote and trade information to the sell-side, the buy-side, retail online brokers, proprietary trading shops, other venues, internet portals and data distributors. Our market data products enhance transparency of market activity within our exchanges and provide critical information to professional and non-professional investors globally.

Our Index business develops and licenses Nasdaq-branded indexes, associated derivatives, and financial products and also provides custom calculation services for third-party clients. As of December 31, 2019, we had 332 ETPs licensed to Nasdaq's indexes which had $233 billion in AUM.

Our Investment Data & Analytics business is a leading content and analytics cloud-based solutions provider used by asset managers, investment consultants and asset owners to help facilitate better investment decisions.

For further discussion of our Information Services businesses, see "Products and Services," of "Item 1. Business."

Market Technology

Our Market Technology segment 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 Market Technology business is the sales channel for our complete global offering to other marketplaces. In January 2019, we acquired Cinnober, a Swedish financial technology provider to brokers, exchanges and clearinghouses worldwide.

Market Technology provides technology solutions for trading, clearing, settlement, surveillance and information dissemination to markets with wide-ranging requirements, from the leading markets in the U.S., Europe and Asia to emerging markets in the Middle East, Latin America, and Africa. Our marketplace solutions can handle a wide array of assets, including cash equities, equity derivatives, currencies, various interest-bearing securities, commodities, energy products and digital currencies, and are currently powering more than 100 marketplaces in more than 50 countries. Market Technology also provides market surveillance services to broker-dealer firms worldwide, as well as risk management solutions.

For further discussion of our Market Technology business, see "Products and Services," of "Item 1. Business."

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 7, "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.

Use of Estimates

The preparation of consolidated financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts and the disclosure of contingent amounts in the consolidated financial statements and accompanying notes. Actual results could differ from those estimates.

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 $135 million as of December 31, 2019 and $198 million as of December 31, 2018. Cash equivalents are carried at cost plus accrued interest, which approximates fair value due to the short maturities of these investments.

Restricted Cash

Current restricted cash, which was $30 million as of December 31, 2019 and $41 million as of December 31, 2018, is restricted from withdrawal due to a contractual or regulatory requirement or not available for general use and is classified as restricted cash in the Consolidated Balance Sheets. As of December 31, 2019 and 2018, current restricted cash primarily includes restricted cash held for our trading and clearing businesses.

Receivables, net

Our receivables are concentrated with our member firms, market data distributors, listed companies and corporate solutions and market technology customers. Receivables are shown net of a reserve for uncollectible accounts. The reserve for bad debts is maintained at a level that management believes to be sufficient to absorb estimated losses in the accounts receivable portfolio. The reserve is increased by the provision for bad debts which is charged against operating results and decreased by the amount of charge-offs, net of recoveries. The provision for bad debts is included in general, administrative and other expense in the Consolidated Statements of Income. The amount charged against operating results is based on several factors including, but not limited to, the length of time a receivable is past due and our historical experience with the particular customer. In circumstances where a specific customer's inability to meet its financial obligations is known (i.e., bankruptcy filings), we record a specific provision for bad debts against amounts due to reduce the receivable to the amount we reasonably believe will be collected. Accounts receivable are written-off against the reserve for bad debts when collection efforts cease. Due to changing economic, business and market conditions, we review the reserve for bad debts monthly and make changes to the reserve 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 reserve netted against receivables in the Consolidated Balance Sheets was $9 million as of December 31, 2019, $13 million as of December 31, 2018 and $9 million as of December 31, 2017. The changes in the balance between periods was immaterial.

Investments

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

Financial investments

Financial investments are primarily comprised of short-term investments with maturities greater than 90 days. These investments are 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. Changes in fair value of trading securities are included in other income in the Consolidated Statements of Income. Debt securities that are classified as available-for-sale investment securities are primarily comprised of commercial paper and are carried at fair value with unrealized gains and losses, net of tax, reported in accumulated other comprehensive loss within stockholders' equity in the Consolidated Balance Sheets. Realized gains and losses on these securities are included in earnings upon disposition of the securities using the specific identification method. In addition, realized losses are recognized when management determines that a decline in value is other than temporary, which requires judgment regarding the amount and timing of recovery. For financial investments that are classified as available-for-sale securities, we also consider the extent to which cost exceeds fair value, the duration of that difference, management's judgment about the issuer's current and prospective financial condition, as well as our intent and ability to hold the security until recovery of the unrealized losses.

Fair value of both trading and available-for-sale investment securities 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, recognize an impairment loss in net income equal to the difference in the period the impairment occurs. See Note 7, "Investments," for further discussion of our equity securities.

For the years ended December 31, 2019, 2018 and 2017, no material impairment charges were recorded on our equity securities and there were no upward or downward adjustments recorded.

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 pro-rata share of earnings or losses each 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 7, "Investments," for further discussion of our equity method investments.

No material impairments were recorded to reduce the carrying value of our equity method investments in 2019, 2018 or 2017.

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.

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, 2019 and 2018, 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 2021, 2023, 2029, and 2030 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 2021, 2023, 2029, and 2030 Notes into U.S. dollars is recorded in accumulated other comprehensive loss within stockholders' equity in the Consolidated Balance Sheets. See "3.875% Senior Unsecured Notes Due 2021," "1.75% Senior Unsecured Notes Due 2023," "1.75% Senior Unsecured Notes Due 2029," and "0.875% Senior Unsecured Notes Due 2030," of Note 10, "Debt Obligations," for further discussion.

Property and Equipment, net

Property and equipment, including leasehold improvements, are carried at cost less 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, 2 to 5 years for data processing equipment, and 5 to 10 years for furniture and equipment.

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.

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.

See Note 8, "Property and Equipment, net," for further discussion.

Leases

On January 1, 2019, we adopted ASU 2016-02 and elected the optional transition method to initially apply the standard at the January 1, 2019 adoption date. As a result, we applied the new lease standard prospectively to our leases existing or commencing on or after January 1, 2019. Comparative periods presented were not restated upon adoption. Similarly, new disclosures under the standard were made for periods beginning January 1, 2019, and not for prior comparative periods. Prior periods will continue to be reported under guidance in effect prior to January 1, 2019. In addition, we elected the package of practical expedients permitted under the transition guidance within the standard, which among other things, allowed us to not reassess contracts to determine if they contain leases, lease classification and initial direct costs. Adoption of the new standard resulted in the recording of operating lease assets of $384 million, a lease liability of $425 million, as well as the elimination of deferred rent and sublease reserves of $41 million as of January 1, 2019. The standard did not impact our statements of income and had no impact on our cash flows.

At contract inception, we determine whether a contract is or contains a lease. As of December 31, 2019, we have operating leases which are primarily real estate leases for our U.S. and European headquarters and for general office space. These leases have varying lease terms with remaining maturities ranging from 3 months to 17 years. Operating lease balances are included in operating lease assets, other current liabilities, and operating lease liabilities in our Consolidated Balance Sheets as of December 31, 2019. As of December 31, 2019, we do not have any 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 17, "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 assessed for impairment annually in the fourth quarter of our fiscal year using an October 1 measurement date, or more frequently if conditions exist that indicate that the asset 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. When testing goodwill 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 is less than its carrying amount as the basis to determine if it is necessary to perform a quantitative goodwill impairment test. When assessing goodwill for impairment, our decision to perform a qualitative impairment assessment for a reporting unit 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 over its carrying amount at the last quantitative assessment date, and the amount of time in between quantitative fair value assessments.

In performing a qualitative assessment, we consider the extent to which unfavorable events or circumstances identified, such as changes in economic, industry and market conditions or company specific events, could affect the comparison of the reporting unit's fair value with its carrying amount. If we choose not to complete a qualitative assessment for a given reporting unit, or if the initial assessment indicates that it is more likely than not that the carrying amount of a reporting unit exceeds its estimated fair value, a quantitative test is required.

The quantitative goodwill test consists of two steps:

- The first step compares the fair value of each reporting unit with its carrying amount, including goodwill. If the reporting unit's fair value exceeds its carrying amount, goodwill is not impaired.
- If the fair value of a reporting unit is less than its carrying amount, the second step of the goodwill test is performed to measure the amount of impairment, if any. An impairment is equal to the excess of the carrying amount of goodwill over its fair value.

On January 1, 2020, we adopted ASU 2017-04. See "Goodwill," of "Recent Accounting Pronouncements," below for further discussion.

We also evaluate indefinite-lived intangible assets for impairment annually in the fourth quarter of our fiscal year using an October 1 measurement date, or more frequently whenever events or changes in circumstances indicate that the fair value of the asset may be less than its carrying amount. Such evaluation includes determining the fair value of the asset and comparing the fair value of the asset with its carrying amount. If the fair value of the indefinite-lived intangible asset is less than its carrying amount, an impairment charge is recognized in an amount equal to the difference.

For indefinite-lived intangible assets impairment testing, we also have the option to first perform a qualitative assessment to determine whether it is more likely than not that the fair value of an indefinite-lived intangible asset is less than the carrying amount. If, after assessing the totality of events or circumstances, we determine that it is more likely than not that the fair value of an indefinite-lived intangible asset is less than its carrying amount, then we must perform additional testing of the asset. Otherwise, we conclude that no impairment is indicated and further testing is not performed.

There was no impairment of goodwill for the years ended December 31, 2019, 2018 and 2017 and there were no indefinite-lived intangible asset impairment charges in 2019, 2018 and 2017. Disruptions to our business and events, such as extended 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.

Valuation of 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.

We recorded pre-tax, non-cash property and equipment asset impairment charges of $24 million in 2019. See Note 8, "Property and Equipment, net," for a discussion of this charge. There were no other material impairments of finite-lived intangible assets or property and equipment recorded in 2019, 2018 or 2017.

Revenue Recognition and Transaction-Based Expenses

Revenue From Contracts With Customers

Our revenue recognition policies under Topic 606 are described in the following paragraphs.

<u>Contract Balances</u>

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 is net of allowance for doubtful accounts of $9 million as of December 31, 2019 and $13 million as of December 31, 2018. 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 listings services contracts, our performance obligations are short-term in nature and there is no significant variable consideration.

We do not have 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, we do not have a material portion of transaction price allocated to unsatisfied performance obligations that are not included in deferred revenue other than for our market technology contracts which are discussed below under "Market Technology." Deferred revenue primarily represents our contract liabilities related to our fees for annual and initial listings, market technology, corporate solutions and information services contracts. Deferred revenue is the only significant contract asset or liability as of December 31, 2019. See Note 9, "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.

<u>Revenue Recognition</u>

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 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.

The majority of our FICC trading and clearing customers are charged transaction fees, as discussed above, which are based on the volume and value of traded and cleared contracts. We also enter into annual fixed contracts with customers trading U.S. Treasury securities. The customers are charged an annual fixed fee which is billed per the agreement, on a monthly or quarterly basis. Revenues earned on fixed contracts 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.

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. cash equity trading, for Nasdaq 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. We record these credits as transaction rebates that are included in transaction-based expense 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.

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 providing access to our markets, colocation services and 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 12-month period since the customer receives and consumes the benefit as Nasdaq provides the service. We also offer broker services to financial participants in the Nordic market primarily offering technology and customized securities administration solutions. Such services and solutions primarily consist of flexible back-office systems, which allow customers to efficiently manage safekeeping, settlement and corporate actions and reporting, and include connectivity to exchanges and central securities depositories. Revenues from broker services are based on a fixed basic fee for administration or licensing, maintenance and operations, and an incremental fee depending on the number of transactions completed. Broker services revenues are generally billed and recognized monthly. As previously noted, in January 2020, management commenced an orderly wind-down of this broker services operations business. We expect this wind-down to continue through the second quarter of 2021.

Corporate Services

Listing Services

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 services (when a company qualifies to receive these services 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 corporate solutions 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 the corporate solutions services performance obligation is recognized ratably over a two-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 based on the number of outstanding shares of companies listed in the U.S. at the end of the prior year and are recognized ratably over the following 12-month period since the customer receives and consumes the benefit as Nasdaq provides the service. 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 12-month basis and are recognized ratably over the following 12-month period since the customer receives and consumes the benefit as Nasdaq provides the service.

Corporate Solutions

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

As of December 31, 2019, 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.

Information Services

Market Data

Market data revenues are earned from U.S. and European proprietary market data products. In the U.S., we also earn revenues from U.S. shared tape plans.

We earn revenues primarily based on the number of data subscribers and distributors of our data. Market data revenues are subscription-based and are recognized on a monthly basis.

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. Revenues are presented on a net basis as we are acting as an agent in this arrangement.

Market Data Revenue Sharing

The most significant component of market data revenues recorded on a net basis is the UTP Plan revenue sharing in the U.S. All indicators of principal versus agent reporting under U.S. GAAP have been considered in analyzing the appropriate presentation of the revenue sharing. However, the following are the primary indicators of net reporting:

- We are the administrator for the 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.

The exchanges that comprise Nasdaq Nordic and Nasdaq Baltic do not have any material market data revenue sharing agreements.

Index

We develop and license Nasdaq branded indexes, associated derivatives and financial products as part of our Global Index Family. We also provide index data products and custom calculation services for third-party clients. Revenues primarily include license fees from these branded indexes, associated derivatives 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.

Investment Data & Analytics

Investment data & 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 annual 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.

Market Technology

Market Technology provides technology solutions for trading, clearing, settlement, surveillance and information dissemination, as well as risk management solutions. Revenues primarily consist of software, license and support revenues, change request revenues, and SaaS revenues.

In our Market Technology business, 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.

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.

Other Revenues

Other revenues include the revenues from the BWise enterprise governance, risk and compliance software platform, which was sold in March 2019 and revenues from the Public Relations Solutions and Digital Media Services businesses which were sold in April 2018. Prior to the sale dates, these revenues were included in our Corporate Solutions business and were both subscription and transaction-based revenues.

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 employee stock options, restricted stock, and PSUs. 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. PSUs, 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 14, "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 11, “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 stock options, restricted stock, and PSUs. The fair value of stock options are estimated using the Black-Scholes option-pricing model. 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.

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 12, “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 include outside advisor fees, and other external costs directly related to proposed or closed transactions. We also incur integration costs primarily related to employee termination costs, and professional services costs incurred relating to the integrations. As of December 31, 2019, all planned integrations for our 2018 and 2017 acquisitions have been completed.

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 15, “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.

Assets Held for Sale

We classify assets or disposal groups as held for sale in the period in which all of the following criteria are met:

- management commits to a plan to sell;
- the asset or disposal group is available for immediate sale in its present condition subject only to terms that are usual and customary for sales of such assets or disposal groups;
- an active program to locate a buyer and other actions required to complete the plan to sell have been initiated;
- the sale is probable within one year;
- the asset or disposal group is being actively marketed for sale at a price that is reasonable in relation to its current fair value; and
- it is unlikely that significant changes to the plan will be made or that the plan will be withdrawn.

Assets and disposal groups classified as held for sale are measured at the lower of their carrying amount or fair value less costs to sell. Any loss resulting from this measurement is recognized in the period in which the held for sale criteria are met. Conversely, gains are not recognized until the date of sale. The fair value of an asset less any costs to sell is assessed each reporting period it remains classified as held for sale, and any change in fair value is reported as an adjustment to the carrying value of the asset, except that increases in fair value are limited to prior decreases recorded. Assets are not depreciated or amortized while they are classified as held for sale. See Note 5, "Assets and Liabilities Held For Sale," for further discussion of our assets held for sale.

Subsequent Events

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

Recent Accounting Pronouncements

Accounting Standard	Description	Effective Date	Effect on the Financial Statements or Other Significant Matters
Income Taxes In December 2019, the FASB issued ASU 2019-12, "Simplifying the Accounting for Income Taxes."	This ASU simplifies the accounting for income taxes by eliminating certain exceptions related to the approach for intraperiod tax allocation, the methodology for calculating income taxes in an interim period, and the recognition of deferred tax liabilities for outside basis differences. It also clarifies and simplifies other aspects of the accounting for income taxes.	January 1, 2021, with early adoption permitted in any annual or interim period for which financial statements have not yet been issued or made available for issuance. We early adopted this standard as of October 1, 2019.	There was no impact to the financial statements or our disclosures as a result of the adoption of this standard.
Goodwill In January 2017, the FASB issued ASU 2017-04, "Simplifying the Test for Goodwill Impairment."	This ASU simplifies how an entity is required to test goodwill for impairment and removes the second step of the goodwill impairment test, which required a hypothetical purchase price allocation if the fair value of a reporting unit is less than its carrying amount. Goodwill impairment will now be measured using the difference between the carrying amount and the fair value of the reporting unit and the loss recognized should not exceed the total amount of goodwill allocated to that reporting unit. The amendments in this ASU should be applied on a prospective basis.	January 1, 2020.	We adopted this standard on January 1, 2020. We do not anticipate a material impact on our consolidated financial statements at the time of adoption of this new standard as the carrying amounts of our reporting units have been less than their corresponding fair values in recent years. However, changes in future projections, market conditions and other factors may cause a change in the excess of fair value of our reporting units over their corresponding carrying amounts.
Financial Instruments - Credit Losses In June 2016, the FASB issued ASU 2016-13, "Measurement of Credit Losses on Financial Instruments."	This ASU changes the impairment model for certain financial instruments. The new model is a forward looking expected loss model and applies to financial assets subject to credit losses and measured at amortized cost and certain off-balance sheet credit exposures. This includes loans, held-to-maturity debt securities, loan commitments, financial guarantees and trade receivables. For available-for-sale debt securities with unrealized losses, credit losses are measured in a manner similar to previous accounting, except that the losses are recognized as allowances rather than reductions in the amortized cost of the securities.	January 1, 2020.	We adopted this standard on January 1, 2020 using the modified retrospective transition method. We recorded an immaterial non-cash cumulative effect adjustment to retained earnings on our opening consolidated balance sheet as of January 1, 2020.

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, 2019, 2018 and 2017:

	Year Ended December 31, 2019					
	Market Services	Corporate Services	Information Services	Market Technology	Other Revenues	Consolidated
	(in millions)					
Transaction-based trading and clearing, net	$ 621	$ —	$ —	$ —	$ —	$ 621
Trade management services	291	—	—	—	—	291
Listing services	—	296	—	—	—	296
Corporate solutions	—	200	—	—	—	200
Market data	—	—	398	—	—	398
Index	—	—	223	—	—	223
Investment data & analytics	—	—	158	—	—	158
Market technology	—	—	—	338	—	338
Other revenues	—	—	—	—	10	10
Revenues less transaction-based expenses	$ 912	$ 496	$ 779	$ 338	$ 10	$ 2,535

	Year Ended December 31, 2018					
	Market Services	Corporate Services	Information Services	Market Technology	Other Revenues	Consolidated
	(in millions)					
Transaction-based trading and clearing, net	$ 666	$ —	$ —	$ —	$ —	$ 666
Trade management services	292	—	—	—	—	292
Listing services	—	290	—	—	—	290
Corporate solutions	—	197	—	—	—	197
Market data	—	—	390	—	—	390
Index	—	—	206	—	—	206
Investment data & analytics	—	—	118	—	—	118
Market technology	—	—	—	270	—	270
Other revenues	—	—	—	—	97	97
Revenues less transaction-based expenses	$ 958	$ 487	$ 714	$ 270	$ 97	$ 2,526

	Year Ended December 31, 2017					
	Market Services	Corporate Services	Information Services	Market Technology	Other Revenues	Consolidated
	(in millions)					
Transaction-based trading and clearing, net	$ 590	$ —	$ —	$ —	$ —	$ 590
Trade management services	291	—	—	—	—	291
Listing services	—	267	—	—	—	267
Corporate solutions	—	192	—	—	—	192
Market data	—	—	369	—	—	369
Index	—	—	171	—	—	171
Investment data & analytics	—	—	48	—	—	48
Market technology	—	—	—	247	—	247
Other revenues	—	—	—	—	236	236
Revenues less transaction-based expenses	$ 881	$ 459	$ 588	$ 247	$ 236	$ 2,411

For the year ended December 31, 2019, approximately 65.1% of Market Services revenues were recognized at a point in time and 34.9% were recognized over time. For the year ended December 31, 2018, approximately 63.6% of Market Services revenues were recognized at a point in time and 36.4% were recognized over time. For the year ended December 31, 2017, approximately 62.7% Market Services revenues were recognized at a point in time and 37.3% recognized over time. Substantially all revenues from the Corporate Services, Information Services and Market Technology segments were recognized over time for the years ended December 31, 2019, 2018 and 2017.

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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 $9 million as of December 31, 2019 and $13 million as of December 31, 2018. 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 listings services contracts, our performance obligations are short-term in nature and there is no significant variable consideration.

We do not have 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. Excluding our market technology contracts, for contract durations that are one-year or greater, materially all of the transaction price allocated to unsatisfied performance obligations is included in deferred revenue. For our market technology contracts, the portion of transaction price allocated to unsatisfied performance obligations is shown in the table below. Deferred revenue primarily represents our contract liabilities related to our fees for annual and initial listings, market technology, corporate solutions and information services contracts. Deferred revenue is the only significant contract asset or liability as of December 31, 2019. See Note 9, "Deferred Revenue," for our discussion on deferred revenue balances, activity, and expected timing of recognition.

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Transaction Price Allocated to Remaining Performance Obligations

As stated above, for contract durations that are one-year or greater, we do not have a material portion of transaction price allocated to unsatisfied performance obligations that are not included in deferred revenue other than for our market technology contracts. For our market technology contracts, the following table summarizes the amount of the transaction price allocated to performance obligations that are unsatisfied as of December 31, 2019:

	(in millions)
2020	$ 320
2021	235
2022	108
2023	74
2024	56
2025 and thereafter	94
Total	$ 887

Market technology deferred revenue, as discussed in Note 9, "Deferred Revenue," represents consideration received that is yet to be recognized as revenue for unsatisfied performance obligations.

4. Acquisitions and Divestitures

2019 Acquisitions and Divestitures

We completed various acquisitions and divestitures in 2019. The financial results of each transaction are included in our consolidated financial statements from the date of each acquisition or divestiture.

2019 Divestitures

Divestiture of BWise

In March 2019, we sold our BWise enterprise governance, risk and compliance software platform, which was part of our Corporate Solutions business within our Corporate Services segment, to SAI Global and recognized a pre-tax gain on the sale of $27 million, net of disposal costs ($20 million after tax). The pre-tax gain is included in net gain on divestiture of businesses in the Consolidated Statements of Income for the year ended December 31, 2019.

As of December 31, 2018, the assets and liabilities of BWise were held for sale. See Note 5, "Assets and Liabilities Held For Sale," for further discussion.

Divestiture of Nordic Fund Market

In October 2019, we sold the Nordic Fund Market, an electronic mutual fund service which was a small part of our Broker Services business.

2019 Acquisitions

Acquisition of Cinnober

	Purchase Consideration	Total Net Assets Acquired	Total Net Deferred Tax Liability	Acquired Intangible Assets	Goodwill
			(in millions)		
Cinnober	$ 219	$ 18	$ (19)	$ 74	$ 146

In January 2019, we acquired Cinnober, a Swedish financial technology provider to brokers, exchanges and clearinghouses worldwide for $219 million. Cinnober is part of our Market Technology segment.

Nasdaq used cash on hand to fund this acquisition.

The amounts in the table above 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 2019, we recorded a measurement period adjustment of $4 million which resulted in a decrease to net assets acquired and an increase in goodwill and a measurement period adjustment of $5 million which resulted in a decrease to acquired intangible assets and an increase in goodwill. These adjustments relate to new information obtained during the period regarding the acquisition date fair values of an acquired equity investment and an acquired customer relationship intangible asset. These adjustments did not result in an impact to our Consolidated Statements of Income. The allocation of the purchase price for Cinnober was finalized in December 2019.

See "Intangible Assets" below for further discussion of intangible assets acquired in the Cinnober acquisition.

Acquisition of Center for Board Excellence

In October 2019, we acquired CBE, a provider of corporate governance and compliance solutions for boards of directors, CEOs, corporate secretaries and general counsels. CBE is part of our Corporate Services segment.

2018 Acquisition and Divestiture

We completed an acquisition and a divestiture in 2018. Financial results of each transaction are included in our consolidated financial statements from the date of the acquisition or divestiture.

2018 Acquisition

Acquisition of Quandl

In November 2018, we acquired Quandl, Inc., a provider of alternative and core financial data. Quandl is part of our Information Services segment.

Nasdaq used issuances of commercial paper to fund this acquisition.

2018 Divestiture

In April 2018, we sold our Public Relations Solutions and Digital Media Services businesses, which were part of our Corporate Solutions business, to West Corporation and recognized a pre-tax net gain on the sale of $33 million, net of disposal costs ($14 million after tax), which includes a post-closing working capital adjustment of $8 million ($5 million after tax) recorded in September 2018. The total net pre-tax gain is included in net gain on divestiture of businesses in the Consolidated Statements of Income for 2018.

Intangible Assets

The following table presents the details of the customer relationships intangible asset at the date of acquisition for Cinnober which was the significant acquired intangible asset for this acquisition. All acquired intangible assets with finite lives are amortized using the straight-line method.

Customer relationships (in millions)	$ 67
Discount rate used	9.5%
Estimated average useful life	13 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 rates used reflect 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 employed this rate when discounting the cash flows. The resulting discounted cash flows were then tax-effected at the applicable statutory rate.

For our acquisition of Cinnober, 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 5 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.

Pro Forma Results and Acquisition-Related Costs

The consolidated financial statements for the years ended December 31, 2019, 2018 and 2017 include the financial results of the above acquisitions from the date of each acquisition. Pro forma financial results have not been presented since these acquisitions both individually and in the aggregate 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. Assets and Liabilities Held For Sale

In 2018, we decided to sell BWise, our enterprise governance, risk and compliance software platform and this business was recorded as held for sale as of December 31, 2018. BWise was part of our Corporate Solutions business within our Corporate Services segment.

We determined that we met all of the criteria to classify the assets and liabilities of BWise as held for sale. The disposal of BWise did not represent a strategic shift that would have a major effect on our operations and financial results and was, therefore, not classified as discontinued operations. As a result of this classification, the assets and liabilities of this business were recorded at the lower of their carrying amount or fair value less costs to sell.

In March 2019, we completed the sale of BWise and recognized a pre-tax gain on the sale of $27 million, net of disposal costs ($20 million after tax). See “2019 Divestitures,” of Note 4, “Acquisitions and Divestitures,” for further discussion.

Major Classes of Assets and Liabilities Held For Sale

The carrying amounts of the major classes of assets and liabilities that were classified as held for sale at December 31, 2018 were as follows:

	December 31, 2018 (in millions)
Receivables, net	$ 13
Property and equipment, net	10
Goodwill[1]	47
Intangible assets, net[2]	16
Other assets	3
Total assets held for sale[3]	$ 89
Deferred tax liabilities	$ 4
Deferred revenue	12
Other current liabilities	4
Total liabilities held for sale[4]	$ 20

(1) The assignment of goodwill was based on the relative fair value of the disposal group and the portion of the remaining reporting unit.

(2) Primarily represents customer relationships.

(3) Included in other current assets in the Consolidated Balance Sheets as of December 31, 2018.

(4) Included in other current liabilities in the Consolidated Balance Sheets as of December 31, 2018.

6. Goodwill and Acquired Intangible Assets

Goodwill

The following table presents the changes in goodwill by business segment during the year ended December 31, 2019:

	Market Services	Corporate Services	Information Services	Market Technology	Total
			(in millions)		
Balance at December 31, 2018	$ 3,430	$ 455	$ 2,333	$ 145	$ 6,363
Goodwill acquired	—	10	—	137	147
Measurement period adjustments	—	—	—	9	9
Sale of business	(16)	—	—	—	(16)
Foreign currency translation adjustment	(72)	(5)	(50)	(10)	(137)
Balance at December 31, 2019	$ 3,342	$ 460	$ 2,283	$ 281	$ 6,366

The goodwill acquired for Corporate Services shown above relates to our acquisition of CBE and the goodwill acquired for Market Technology relates to our acquisition of Cinnober. See "2019 Acquisitions," of Note 4, "Acquisitions and Divestitures," for further discussion of these acquisitions. As of December 31, 2019, the amount of goodwill that is expected to be deductible for tax purposes in future periods related to Cinnober is $141 million.

For further discussion of the measurement period adjustments of $9 million shown above, see "2019 Acquisitions," of Note 4, "Acquisitions and Divestitures." These adjustments are included in our Consolidated Balance Sheets as of December 31, 2019.

The sale of business relates to the sale of the Nordic Fund Market, which was a small unit of our Broker Services business.

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, 2019 and 2018; however, events such as extended 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, 2019			December 31, 2018		
	Gross Amount	Accumulated Amortization	Net Amount	Gross Amount	Accumulated Amortization	Net Amount
		(in millions)			(in millions)	
Finite-Lived Intangible Assets						
Technology	$ 63	$ (19)	$ 44	$ 54	$ (15)	$ 39
Customer relationships	1,596	(532)	1,064	1,532	(456)	1,076
Other	18	(5)	13	17	(2)	15
Foreign currency translation adjustment	(159)	55	(104)	(149)	64	(85)
Total finite-lived intangible assets	$ 1,518	$ (501)	$ 1,017	$ 1,454	$ (409)	$ 1,045
Indefinite-Lived Intangible Assets						
Exchange and clearing registrations	$ 1,257	$ —	$ 1,257	$ 1,257	$ —	$ 1,257
Trade names	121	—	121	122	—	122
Licenses	52	—	52	52	—	52
Foreign currency translation adjustment	(198)	—	(198)	(176)	—	(176)
Total indefinite-lived intangible assets	$ 1,232	$ —	$ 1,232	$ 1,255	$ —	$ 1,255
Total intangible assets	$ 2,750	$ (501)	$ 2,249	$ 2,709	$ (409)	$ 2,300

Amortization expense for acquired finite-lived intangible assets was $101 million for the year ended December 31, 2019, $109 million for the year ended December 31, 2018, and $92 million for the year ended December 31, 2017. Amortization expense decreased in 2019 primarily due to certain assets becoming fully amortized in the fourth quarter of 2018, partially offset by additional amortization expense associated with acquired intangible assets in 2019. These amounts are included in depreciation and amortization expense in the Consolidated Statements of Income.

The estimated future amortization expense (excluding the impact of foreign currency translation adjustments of $104 million as of December 31, 2019) of acquired finite-lived intangible assets as of December 31, 2019 is as follows:

	(in millions)
2020	$ 105
2021	104
2022	100
2023	98
2024	97
2025 and thereafter	617
Total	$ 1,121

7. Investments

The following table presents the details of our investments:

	December 31, 2019	December 31, 2018
	(in millions)	
Trading securities	$ 291	$ 259
Available-for-sale investment securities	—	9
Financial investments	$ 291	$ 268
Equity method investments	$ 156	$ 135
Equity securities	$ 49	$ 44

Financial Investments

Trading Securities

Trading securities, which are included in financial investments in the Consolidated Balance Sheets, are primarily comprised of highly rated European government debt securities, time deposits and highly rated corporate debt, of which $169 million as of December 31, 2019 and $166 million as of December 31, 2018, are assets primarily utilized to meet regulatory capital requirements, mainly for our clearing operations at Nasdaq Clearing.

Available-for-Sale Investment Securities

As of December 31, 2018, available-for-sale investment securities, which are included in financial investments in the Consolidated Balance Sheets, were primarily comprised of commercial paper. As of December 31, 2019 and 2018, the cumulative unrealized gains and losses on these securities were immaterial.

Equity Method Investments

As of December 31, 2019 and 2018, our equity method investments primarily included our 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 material impairments were recorded to reduce the carrying value of our equity method investments for the years ended December 31, 2019, 2018 or 2017.

Net income recognized from our equity interest in the earnings and losses of these equity method investments was $84 million for the year ended December 31, 2019, $18 million for the year ended December 31, 2018, and $15 million for the year ended December 31, 2017.

The change for the year ended December 31, 2019 compared with the same period in 2018 is primarily due to an increase in income recognized from our investment in OCC. Following the disapproval of the OCC capital plan in February 2019, described below, OCC suspended customer rebates and dividends to owners, including the unpaid dividend on 2018 results which Nasdaq expected to receive in March 2019. We were not able to determine the impact of the disapproval of the OCC capital plan on OCC's 2018 net income until March 2019, when OCC's 2018 financial statements were made available to us. As a result, in March 2019, we recognized an additional $36 million of income relating to our share of OCC's net income for the year ended December 31, 2018. We also recognized our share of OCC's net income of $48 million for the year ended December 31, 2019.

OCC Capital Plan

In March 2015, OCC implemented a capital plan under which the options exchanges that are OCC’s stockholders contributed $150 million of new equity capital to OCC, committed to make future replenishment capital contributions under certain circumstances, and received commitments regarding future dividend payments and related matters. Nasdaq PHLX and ISE each contributed $30 million of new equity capital under the OCC capital plan. OCC adopted specific policies with respect to fees, customer refunds and stockholder dividends, which envisioned an annual dividend equal to the portion of OCC’s after-tax income that exceeded OCC’s capital requirements after payment of refunds to OCC’s clearing members (such refunds were generally 50% of the portion of OCC’s pre-tax income that exceeded OCC’s capital requirements). In 2018, 2017 and 2016, OCC disbursed annual dividends under the capital plan and Nasdaq, as the beneficial owner of shares held by Nasdaq PHLX and ISE, received $13 million in 2018 and $10 million in 2017.

In February 2016, after the SEC approved the rule change establishing the OCC capital plan, certain industry participants appealed that approval in the U.S. Court of Appeals. In February 2019, on remand from the Court of Appeals, the SEC disapproved the OCC rule change that established the capital plan. OCC began a phased return of capital contributed under the capital plan, and we received $44 million in February 2019, and the remaining $16 million in November 2019. As a result of the SEC's disapproval of the rule change, we are also released from any future capital replenishment obligations under the 2015 capital plan.

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 primarily 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 during the years ended December 31, 2019, 2018 and 2017. As of December 31, 2019 and 2018, our equity securities represent various strategic investments made through our corporate venture program and as of December 2019, also include investments acquired through various acquisitions.

In December 2018, we sold our 5.0% ownership interest in LCH for $169 million in cash. As a result of the sale, we recognized a pre-tax gain of $118 million ($93 million after tax). The gain is included in gain on sale of investment security in the Consolidated Statements of Income for the year ended December 31, 2018.

8. Property and Equipment, net

The following table presents our major categories of property and equipment, net:

	Year Ended December 31, 2019	Year Ended December 31, 2018
	(in millions)	
Data processing equipment and software	$ 565	$ 526
Furniture, equipment and leasehold improvements	305	274
Total property and equipment	870	800
Less: accumulated depreciation and amortization	(486)	(424)
Total property and equipment, net	$ 384	$ 376

Depreciation and amortization expense for property and equipment was $89 million for the year ended December 31, 2019, $101 million for the year ended December 31, 2018, and $96 million for the year ended December 31, 2017. These amounts are included in depreciation and amortization expense in the Consolidated Statements of Income.

In 2019, we recorded pre-tax, non-cash property and equipment asset impairment charges of $24 million related to capitalized software that was retired. This charge is included in restructuring charges in the Consolidated Statements of Income. See Note 21, “Restructuring Charges,” for a discussion of our 2019 restructuring plan. There were no other material impairments of property and equipment recorded in 2019, 2018 or 2017.

As of December 31, 2019 and 2018, we did not own any real estate properties.

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9. 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, 2019 are reflected in the following table:

	Initial Listing Revenues	Annual Listings Revenues	Corporate Solutions Revenues	Information Services Revenues	Market Technology Revenues	Other[(1)]	Total
				(in millions)			
Balance at December 31, 2018	$ 66	$ 4	$ 36	$ 80	$ 75	$ 20	$ 281
Deferred revenue billed in the current period, net of recognition	30	2	41	62	34	9	178
Revenue recognized that was included in the beginning of the period	(26)	(4)	(36)	(59)	(40)	(13)	(178)
Translation adjustment	(1)	—	—	(1)	(3)	(2)	(7)
Balance at December 31, 2019	$ 69	$ 2	$ 41	$ 82	$ 66	$ 14	$ 274

(1) Primarily includes deferred revenue from listing of additional shares fees. In the U.S., these fees will continue to run-off as a result of the implementation of our all-inclusive annual fee. Listing of additional shares fees are included in our Listing Services business.

As of December 31, 2019, we estimate that our deferred revenue will be recognized in the following years:

	Initial Listing Revenues	Annual Listings Revenues	Corporate Solutions Revenues	Information Services Revenues	Market Technology Revenues	Other[(1)]	Total
				(in millions)			
Fiscal year ended:							
2020	$ 26	$ 2	$ 39	$ 80	$ 54	$ 10	$ 211
2021	19	—	2	2	12	3	38
2022	11	—	—	—	—	1	12
2023	8	—	—	—	—	—	8
2024 and thereafter	5	—	—	—	—	—	5
Total	$ 69	$ 2	$ 41	$ 82	$ 66	$ 14	$ 274

(1) Other primarily includes revenues from U.S. listing of additional shares fees which are included in our Listing Services business.

The timing of recognition of our deferred market technology revenues 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.

10. Debt Obligations

The following table presents the changes in the carrying amount of our debt obligations during the year ended December 31, 2019:

	December 31, 2018	Additions	Payments, Accretion and Other	December 31, 2019
		(in millions)		
Short-term debt:				
Commercial paper	$ 275	$ 4,678	$ (4,562)	$ 391
Senior unsecured floating rate notes repaid on March 22, 2019	500	—	(500)	—
5.55% senior unsecured notes repaid on May 1, 2019[1]	599	—	(599)	—
$400 million senior unsecured term loan facility repaid on June 28, 2019 (average interest rate of 4.00% for the period January 1, 2019 through June 28, 2019)	100	—	(100)	—
Total short-term debt	1,474	4,678	(5,761)	391
Long-term debt:				
3.875% senior unsecured notes due June 7, 2021	686	—	(15)	671
4.25% senior unsecured notes due June 1, 2024	497	—	—	497
1.75% senior unsecured notes due May 19, 2023	682	—	(14)	668
3.85% senior unsecured notes due June 30, 2026	496	—	1	497
1.75% senior unsecured notes due March 28, 2029	—	665	—	665
$1 billion senior unsecured revolving credit facility due April 25, 2022	(4)	15	(13)	(2)
Total long-term debt	2,357	680	(41)	2,996
Total debt obligations	$ 3,831	$ 5,358	$ (5,802)	$ 3,387

(1) Balance was reclassified to short-term debt as of March 31, 2019.

Commercial Paper Program

Our U.S. dollar commercial paper program is supported by our 2017 Credit Facility which provides liquidity support for the repayment of commercial paper issued through the commercial paper program. See "2017 Credit Facility" below for further discussion of our 2017 Credit Facility. The effective interest rate of commercial paper issuances fluctuates as short term interest rates and demand fluctuate. The fluctuation of these rates due to market conditions may impact our interest expense.

As of December 31, 2019, commercial paper notes in the table above reflect the aggregate principal amount, less the unamortized discount which is being accreted through interest expense over the life of the applicable notes. The original maturities of these notes range from 17 days to 45 days and as of December 31, 2019, the weighted-average maturity is 13 days with the weighted-average effective interest rate being 2.05% per annum.

Senior Unsecured Notes

Our senior unsecured notes were all 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, 2019, 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, Accretion and Other" column also includes the impact of foreign currency translation. Our senior unsecured notes are general unsecured obligations of ours and rank equally with all of our existing and future unsubordinated obligations and they 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.

Upon a change of control triggering event (as defined in the various note indentures), 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.

Senior Unsecured Floating Rate Notes

In March 2019, we used net proceeds from the sale of commercial paper and cash on hand and repaid all of our 2019 Notes.

Nasdaq issued the 2019 Notes in September 2017. The 2019 Notes paid interest quarterly in arrears at a rate equal to the three-month U.S. dollar LIBOR as determined at the beginning of each quarterly period plus 0.39% per annum until March 22, 2019.

Early Extinguishment of 5.55% Senior Unsecured Notes Due 2020

Nasdaq issued the 2020 Notes in January 2010. The 2020 Notes paid interest semiannually at a rate of 5.55% per annum.

In May 2019, we primarily used the net proceeds from the 2029 Notes to repay in full and terminate our 2020 Notes. For further discussion of the 2029 Notes, see “1.75% Senior Unsecured Notes Due 2029” below. In connection with the early extinguishment of the 2020 Notes, we recorded a charge of $11 million, which primarily included a make-whole redemption price premium. This charge is included in general, administrative and other expense in the Consolidated Statements of Income for the year ended December 31, 2019.

3.875% Senior Unsecured Notes Due 2021

In February 2020, we issued a redemption notice to redeem all €600 million aggregate principal amount outstanding of our 2021 Notes, in accordance with the redemption provisions in the indenture governing the 2021 Notes. Upon completion of the redemption, no 2021 Notes will remain outstanding.

Nasdaq issued the 2021 Notes in June 2013. The 2021 Notes pay interest annually at a rate of 3.875% per annum.

Nasdaq will primarily use the net proceeds from the sale of the 2030 Notes to redeem the 2021 Notes and for other general corporate purposes. For further discussion of the 2030 Notes, see “0.875% Senior Unsecured Notes Due 2030” below.

The 2021 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 $15 million noted in the “Payments, Accretion and Other” column in the table above primarily reflects the translation of the 2021 Notes into U.S. dollars and is recorded in accumulated other comprehensive loss within stockholders’ equity in the Consolidated Balance Sheets as of December 31, 2019.

4.25% Senior Unsecured Notes Due 2024

In May 2014, Nasdaq issued the 2024 Notes. The 2024 Notes pay interest semiannually at a rate of 4.25% per annum until June 1, 2024 and such rate may vary with Nasdaq’s debt rating up to a rate not to exceed 6.25%.

1.75% Senior Unsecured Notes Due 2023

In May 2016, Nasdaq issued the 2023 Notes. The 2023 Notes pay interest annually at a rate of 1.75% per annum until May 19, 2023 and such rate may vary with Nasdaq’s debt rating up to a rate not to exceed 3.75%.

The 2023 Notes have been designated as a hedge of our net investment in certain foreign subsidiaries to mitigate the foreign exchange rate risk associated with certain investments in these subsidiaries. The decrease in the carrying amount of $14 million noted in the “Payments, Accretion and Other” column in the table above primarily reflects the translation of the 2023 Notes into U.S. dollars and is recorded in accumulated other comprehensive loss within stockholders’ equity in the Consolidated Balance Sheets as of December 31, 2019.

3.85% Senior Unsecured Notes Due 2026

In June 2016, Nasdaq issued the 2026 Notes. The 2026 Notes pay interest semiannually at a rate of 3.85% per annum until June 30, 2026 and such rate may vary with Nasdaq’s debt rating up to a rate not to exceed 5.85%.

1.75% Senior Unsecured Notes Due 2029

In April 2019, Nasdaq issued the 2029 Notes. The 2029 Notes pay interest annually in arrears, beginning on March 28, 2020 at a rate of 1.75% per annum until March 28, 2029 and such rate may vary with Nasdaq’s debt rating up to a rate not to exceed 3.75%. The 2029 Notes may be redeemed by Nasdaq at any time, subject to a make-whole amount. The proceeds from the 2029 Notes, approximately $665 million after deducting the underwriting discount and expenses of the offering, were primarily used to redeem the 2020 Notes. For further discussion of the 2020 Notes, see “Early Extinguishment of 5.55% Senior Unsecured Notes Due 2020” above.

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 translation impact of the 2029 Notes into U.S. dollars was immaterial as of December 31, 2019.

0.875% Senior Unsecured Notes Due 2030

In February 2020, Nasdaq issued the 2030 Notes. The 2030 Notes pay interest annually in arrears, beginning on February 13, 2021 and may be redeemed by Nasdaq at any time, subject to a make-whole amount. The proceeds from the 2030 Notes, approximately $648 million after deducting the underwriting discount and expenses of the offering, will primarily be used to redeem the 2021 Notes and for other general corporate purposes. For further discussion of the 2021 Notes, see “3.875% Senior Unsecured Notes Due 2021” above.

The 2030 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.

Credit Facilities

Early Extinguishment of 2016 Credit Facility

In March 2016, Nasdaq entered into the 2016 Credit Facility. Under our 2016 Credit Facility, borrowings bore interest on the principal amount outstanding at a variable interest rate based on either the LIBOR or the base rate (or other applicable rate with respect to non-dollar borrowings), plus an applicable margin that varied with Nasdaq’s debt rating.

In June 2019, we used proceeds from issuances of commercial paper to repay in full and terminate our 2016 Credit Facility.

2017 Credit Facility

In April 2017, Nasdaq entered into the 2017 Credit Facility. The 2017 Credit Facility consists of a $1 billion five-year revolving credit facility (with sublimits for non-dollar borrowings, swingline borrowings and letters of credit), which replaced a former credit facility. Nasdaq intends to use funds available under the 2017 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 2017 Credit Facility at any time in whole or in part, without penalty.

As of December 31, 2019, no amounts were outstanding on the 2017 Credit Facility. The $2 million balance represents unamortized debt issuance costs which are being accreted through interest expense over the life of the credit facility. Of the $1 billion that is available for borrowing, $392 million provides liquidity support for the commercial paper program and for a letter of credit. As such, as of December 31, 2019, the total remaining amount available under the 2017 Credit Facility was $608 million excluding the amounts that support the commercial paper program and letter of credit. See "Commercial Paper Program" above for further discussion of our commercial paper program.

Under our 2017 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 LIBOR or the base rate (as defined in the 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 0.125% to 0.4%, 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 both the years ended December 31, 2019 and 2018.

The 2017 Credit Facility contains financial and operating covenants. Financial covenants include a minimum interest expense coverage ratio and 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 events of default, including cross-defaults to our material indebtedness.

The 2017 Credit Facility includes an option for Nasdaq to increase the available aggregate amount by up to $500 million, subject to the consent of the lenders funding the increase and certain other conditions.

Other Credit Facilities

We also have credit facilities primarily related to our Nasdaq Clearing operations in order to provide further liquidity. These credit facilities, which are available in multiple currencies, totaled $203 million as of December 31, 2019 and $234 million as of December 31, 2018 in available liquidity, of which $15 million was utilized as of December 31, 2019 and none of which was utilized as of December 31, 2018.

Debt Covenants

As of December 31, 2019, we were in compliance with the covenants of all of our debt obligations.

Transition from LIBOR

Nasdaq is currently evaluating the impact of the transition from LIBOR as an interest rate benchmark to other potential alternative reference rates. Currently, Nasdaq has debt instruments in place that reference LIBOR-based rates. As of December 31, 2019, we do not have material risk exposure to LIBOR through our outstanding debt instruments. The transition from LIBOR is estimated to take place in 2021 and Nasdaq will continue to actively assess the related opportunities and risks involved in this transition.

11. Retirement Plans

Defined Contribution Savings Plan

We sponsor a 401(k) 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 included in compensation and benefits expense in the Consolidated Statements of Income was $13 million for the year ended December 31, 2019, $14 million for the year ended December 31, 2018, and $13 million for the year ended December 31, 2017.

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 and was $20 million for the year ended December 31, 2019, $22 million for the year ended December 31, 2018, and $21 million for the year ended December 31, 2017.

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. The fair value of our U.S. defined-benefit pension plans' assets was $110 million as of December 31, 2019 and $94 million as of December 31, 2018 and the benefit obligation was $110 million as of December 31, 2019 and $94 million as of December 31, 2018. As a result, the U.S. defined-benefit pension plans are fully funded as of December 31, 2019 and 2018. During 2019, we did not make any contributions to our U.S. defined-benefit pension plans and contributed $22 million in 2018. For our SERP and other post-retirement benefit plans, the net underfunded liability was $33 million as of December 31, 2019 and $28 million as of December 31, 2018. 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, 2019, accumulated other comprehensive loss for the Nasdaq Benefit Plans was $25 million reflecting an unrecognized net loss of $32 million, partially offset by an income tax benefit of $7 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)			
2020	$ 8	$ 7	$ —	$ 15
2021	6	2	—	8
2022	7	2	—	9
2023	7	2	—	9
2024	8	2	—	10
2025 through 2029	40	9	1	50
	$ 76	$ 24	$ 1	$ 101

12. Share-Based Compensation

We have a share-based compensation program for employees and non-employee directors. Share-based awards granted under this program include stock options, restricted stock (consisting of restricted stock units), and PSUs. For accounting purposes, we consider PSUs to be a form of restricted stock.

Summary of Share-Based Compensation Expense

The following table shows the total share-based compensation expense resulting from equity awards and the 15.0% discount for the ESPP for the years ended December 31, 2019, 2018 and 2017 in the Consolidated Statements of Income:

	Year Ended December 31, 2019	2018	2017
	(in millions)		
Share-based compensation expense before income taxes	$ 79	$ 69	$ 70
Income tax benefit	(21)	(19)	(29)
Share-based compensation expense after income taxes	$ 58	$ 50	$ 41

In addition to the above, we recorded excess tax benefits of $5 million in 2019, $9 million in 2018 and $40 million in 2017. The benefit was included in income tax expense.

Common Shares Available Under Our Equity Plan

As of December 31, 2019, we had approximately 10.4 million shares of common stock authorized for future issuance under our Equity Plan.

Restricted Stock

We grant restricted stock to most active 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 generally vest 25.0% on the second anniversary of the grant date, 25.0% on the third anniversary of the grant date, and 50.0% 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, 2019, 2018 and 2017:

	Restricted Stock: Number of Awards	Weighted-Average Grant Date Fair Value
Unvested balances at December 31, 2016	2,560,578	$ 45.92
Granted	737,864	$ 67.48
Vested	(1,102,823)	$ 38.56
Forfeited	(207,119)	$ 52.29
Unvested balances at December 31, 2017	1,988,500	$ 57.34
Granted	550,544	$ 81.66
Vested	(702,832)	$ 48.64
Forfeited	(252,837)	$ 63.86
Unvested balances at December 31, 2018	1,583,375	$ 68.62
Granted	605,033	$ 85.03
Vested	(548,588)	$ 61.45
Forfeited	(153,064)	$ 73.99
Unvested balances at December 31, 2019	1,486,756	$ 77.38

As of December 31, 2019, $58 million of total unrecognized compensation cost related to restricted stock is expected to be recognized over a weighted-average period of 1.7 years.

PSUs

PSUs are based on performance measures that impact the amount of shares that each recipient will receive upon vesting. We have two performance-based long-term PSU programs for certain officers, a one-year performance-based program and a three-year cumulative performance-based program that focuses on TSR.

One-Year PSU Program

The grant date fair value of PSUs under the one-year performance-based program is 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 receives a target grant of PSUs, but may receive 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 is 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.

During 2019, grants of PSUs with a one-year performance period exceeded the applicable performance parameters. As a result, an additional 26,780 units above the original target were granted in the first quarter of 2020.

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 payout 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 payout 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 2017 with a three-year performance period exceeded the applicable performance parameters. As a result, an additional 43,684 units above the original target were granted in the first quarter of 2020 and are 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:

	Year Ended December 31,	
	2019	2018
Weighted-average risk free interest rate[1]	2.26%	2.36%
Expected volatility[2]	16.5%	18.7%
Weighted-average grant date share price	$89.00	$ 86.24
Weighted-average fair value at grant date	$97.65	$116.86

(1) 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.

(2) 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, 2019, 2018 and 2017:

	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 balances at December 31, 2016	378,766	$ 52.55	1,314,668	$ 63.18
Granted[(1)]	197,075	$ 65.51	803,712	$ 55.57
Vested	(202,073)	$ 49.93	(1,079,925)	$ 42.83
Forfeited	(40,764)	$ 55.92	(28,497)	$ 87.86
Unvested balances at December 31, 2017	333,004	$ 61.39	1,009,958	$ 78.18
Granted[(1)]	177,831	$ 80.97	484,075	$ 90.92
Vested	(170,257)	$ 58.49	(655,204)	$ 64.08
Forfeited	(26,347)	$ 61.83	(1,079)	$ 81.57
Unvested balances at December 31, 2018	314,231	$ 74.01	837,750	$ 96.57
Granted[(1)]	179,599	$ 83.56	397,553	$ 96.55
Vested	(147,984)	$ 70.64	(431,751)	$ 93.25
Forfeited	(28,595)	$ 75.43	(6,101)	$103.29
Unvested balances at December 31, 2019	317,251	$ 80.87	797,451	$ 98.31

(1) Includes target awards granted and certain additional awards granted based on overachievement of performance parameters.

As of December 31, 2019, $11 million of total unrecognized compensation cost related to the one-year PSU program is expected to be recognized over a weighted-average period of 1.4 years. For the three-year PSU program, $29 million of total unrecognized compensation cost is expected to be recognized over a weighted-average period of 1.3 years.

Stock Options

In January 2017 and in connection with her appointment, our CEO received 268,817 performance-based non-qualified stock options which vested one-third annually over a three-year period, with each vesting contingent upon the achievement of annual performance parameters. Compensation cost equal to the grant date fair value is recognized over the vesting period. On February 25, 2020, Nasdaq's management compensation committee and board of directors determined that the performance goal for 2019 was met, resulting in the settlement of 89,606 stock options, the final one-third of the grant. There were no stock option awards granted during the years ended December 31, 2019 and 2018.

The weighted-average grant date fair value for the 2017 grant was $66.68. We estimated the fair value of this stock option award using the Black-Scholes valuation model using the following assumptions:

Expected life (in years)	6
Weighted-average risk free interest rate	2.1%
Expected volatility	25.6%
Dividend yield	1.92%

Our computation of expected life was based on an estimate of the average length of time between option grant and exercise. The interest rate for periods within the expected life of the award was based on the U.S. Treasury yield curve in effect at the time of grant. Our computation of expected volatility was an estimate of the future upward/downward fluctuations in the underlying share price. We used Nasdaq's historical volatility for the trailing 6-year period as of the grant date. Our computation of dividend yield was based on annualized dividends expressed as a percentage of share price.

Summary of Stock Option Activity

A summary of stock option activity for the years ended December 31, 2019, 2018 and 2017 is as follows:

	Number of Stock Options	Weighted-Average Exercise Price
Outstanding at December 31, 2016	1,406,371	$ 22.32
Granted	268,817	66.68
Exercised	(1,102,830)	21.98
Forfeited	(978)	21.33
Outstanding at December 31, 2017	571,380	$ 43.84
Exercised	(118,094)	24.44
Forfeited	(4,320)	26.11
Outstanding at December 31, 2018	448,966	$ 49.25
Exercised	(69,699)	20.84
Forfeited	(165)	25.28
Outstanding at December 31, 2019	379,102	$ 54.32
Exercisable at December 31, 2019	289,496	$ 50.50

We received net cash proceeds of $2 million from the exercise of 69,699 stock options for the year ended December 31, 2019, received net cash proceeds of $3 million from the exercise of 118,094 stock options for the year ended December 31, 2018 and received net cash proceeds of $24 million from the exercise of 1,102,830 stock options for the year ended December 31, 2017.

The following table summarizes significant ranges of outstanding and exercisable stock options as of December 31, 2019:

	Outstanding				Exercisable			
Range of Exercise Prices	Number of Stock Options	Weighted-Average Remaining Contractual Term (in years)	Weighted-Average Exercise Price	Aggregate Intrinsic Value (in millions)	Number of Stock Options	Weighted-Average Remaining Contractual Term (in years)	Weighted-Average Exercise Price	Aggregate Intrinsic Value (in millions)
$ 18.67 - $ 25.28	110,285	1.04	$ 24.20	$ 9	110,285	1.04	$ 24.20	$ 9
$ 66.68	268,817	7.01	66.68	11	179,211	7.01	66.68	7
Total	379,102	5.27	$ 54.32	$ 20	289,496	4.73	$ 50.50	$ 16

The aggregate intrinsic value in the above table represents the total pre-tax intrinsic value (i.e., the difference between our closing stock price on December 31, 2019 of $107.10 and the exercise price, times the number of shares), which would have been received by the option holders had the option holders exercised their stock options on that date. This amount can change based on the fair market value of our common stock. The total number of in-the-money stock options exercisable as of December 31, 2019 was 0.3 million and the weighted-average exercise price was $50.50. As of December 31, 2018, 0.3 million outstanding stock options were exercisable and the weighted-average exercise price was $37.51.

The total pre-tax intrinsic value of stock options exercised was $6 million during 2019, $7 million during 2018, and $54 million during 2017.

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ESPP

We have an ESPP under which approximately 1.7 million shares of our common stock have been reserved for future issuance as of December 31, 2019. 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. The following table summarizes employee activity and expenses associated with the ESPP for the years ended December 31, 2019, 2018 and 2017.

	Year Ended December 31,		
	2019	2018	2017
Number of shares purchased	229,172	205,785	235,859
Weighted-average price of shares purchased	$ 73.79	$ 66.79	$ 58.26
Compensation expense	$ 4	$ 3	$ 3

13. Nasdaq Stockholders' Equity

Common Stock

As of December 31, 2019, 300,000,000 shares of our common stock were authorized, 171,075,011 shares were issued and 165,094,440 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 person 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. When treasury shares are reissued, they are recorded at the average cost of the treasury shares acquired. We held 5,980,571 shares of common stock in treasury as of December 31, 2019 and 5,544,321 shares as of December 31, 2018, 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, 2019, the aggregate authorized amount under the existing share repurchase program, which includes an additional $500 million authorized by the board in October 2019, is $632 million.

These purchases may be made from time to time at prevailing market prices in open market purchases, privately-negotiated transactions, block purchase techniques or otherwise, as determined by our management. The purchases are primarily funded from existing cash balances. The share repurchase program may be suspended, modified or discontinued at any time. The share repurchase program has no defined expiration date.

The following is a summary of our share repurchase activity, reported based on settlement date, for the year ended December 31, 2019 and 2018:

	Year Ended December 31,	
	2019	2018
Number of shares of common stock repurchased	2,053,855	4,508,426
Average price paid per share	$ 97.37	$ 87.43
Total purchase price (in millions)	$ 200	$ 394

As discussed above in "Common Stock in Treasury, at Cost," shares repurchased under our share repurchase program are currently retired and cancelled.

Other Repurchases of Common Stock

During the year ended December 31, 2019, we repurchased 436,250 shares of our common stock in settlement of employee tax withholding obligations arising from the vesting of restricted stock and PSUs.

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, 2019 and 2018, no shares of preferred stock were issued or outstanding.

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Cash Dividends on Common Stock

During 2019, our board of directors declared the following cash dividends:

Declaration Date	Dividend Per Common Share	Record Date	Total Amount Paid	Payment Date
			(in millions)	
January 29, 2019	$ 0.44	March 15, 2019	$ 73	March 29, 2019
April 23, 2019	0.47	June 14, 2019	77	June 28, 2019
July 23, 2019	0.47	September 13, 2019	78	September 27, 2019
October 22, 2019	0.47	December 13, 2019	77	December 27, 2019
			$ 305	

The total amount paid of $305 million was recorded in retained earnings in the Consolidated Balance Sheets at December 31, 2019.

In January 2020, the board of directors approved a regular quarterly cash dividend of $0.47 per share on our outstanding common stock. The dividend is payable on March 27, 2020 to shareholders of record at the close of business on March 13, 2020. The estimated amount of this dividend is $78 million. Future declarations of quarterly dividends and the establishment of future record and payment dates are subject to approval by the board of directors.

Our board of directors maintains a dividend policy with the intention to provide stockholders with regular and growing dividends over the long term as earnings and cash flow grow.

14. Earnings Per Share

The following table sets forth the computation of basic and diluted earnings per share:

	Year Ended December 31, 2019	Year Ended December 31, 2018	Year Ended December 31, 2017
Numerator:	(in millions, except share and per share amounts)		
Net income attributable to common shareholders	$ 774	$ 458	$ 729
Denominator:			
Weighted-average common shares outstanding for basic earnings per share	164,931,628	165,349,471	166,364,299
Weighted-average effect of dilutive securities:			
Employee equity awards[(1)]	1,679,922	1,988,610	2,861,892
Contingent issuance of common stock[(2)]	358,611	353,218	358,840
Weighted-average common shares outstanding for diluted earnings per share	166,970,161	167,691,299	169,585,031
Basic and diluted earnings per share:			
Basic earnings per share	$ 4.69	$ 2.77	$ 4.38
Diluted earnings per share	$ 4.63	$ 2.73	$ 4.30

(1) PSUs, 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.

(2) See "Non-Cash Contingent Consideration," of Note 19, "Commitments, Contingencies and Guarantees," for further discussion.

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, 2019, 2018 and 2017.

15. Fair Value of Financial Instruments

The following tables present our financial assets and financial liabilities that are measured at fair value on a recurring basis as of December 31, 2019 and 2018.

	December 31, 2019				December 31, 2018			
	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3
	(in millions)				(in millions)			
Assets at Fair Value								
Debt securities:								
European government	$ 157	$ 157	$ —	$ —	$ 134	$ 134	$ —	$ —
Time deposits	57	—	57	—	30	—	30	—
Corporate	34	—	34	—	41	—	41	—
State owned enterprises and municipalities	24	—	24	—	14	—	14	—
Swedish mortgage bonds	19	—	19	—	40	—	40	—
Total debt securities	$ 291	$ 157	$ 134	$ —	$ 259	$ 134	$ 125	$ —
Available-for-sale investment securities:								
Commercial paper	$ —	$ —	$ —	$ —	$ 9	$ —	$ 9	$ —
Total assets at fair value	$ 291	$ 157	$ 134	$ —	$ 268	$ 134	$ 134	$ —
Liabilities at Fair Value								
Other financial instruments	$ —	$ —	$ —	$ —	$ 112	$ —	$ 112	$ —
Total liabilities at fair value	$ —	$ —	$ —	$ —	$ 112	$ —	$ 112	$ —

Liabilities at Fair Value

Our Level 2 other financial instruments at December 31, 2018 include a liability associated with Nasdaq Clearing's requirement to fulfill the settlement of certain contracts of a defaulted member. The fair value of this guarantee was $112 million as of December 31, 2018 and is included in other current liabilities in the Consolidated Balance Sheets. Collateral of $112 million as of December 31, 2018 was recorded in other current assets which offsets this liability. See Note 16, "Clearing Operations," for further discussion of default fund contributions and margin deposits.

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, 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 7, "Investments," for further discussion.

We also consider our debt obligations to be financial instruments. The fair value of our debt obligations, utilizing discounted cash flow analyses for our floating rate debt and prevailing market rates for our fixed rate debt, was $3.6 billion as of December 31, 2019 and $3.9 billion as of December 31, 2018. 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 approximates the carrying value since the rates of interest on this short-term debt approximate market rates as of December 31, 2019. 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 10, "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, 2019 and 2018, there were no non-financial assets measured at fair value on a non-recurring basis.

16. 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 four member sponsored default funds: one related to financial markets, one related to commodities markets, one related to the seafood market, and a mutualized fund. 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. Simultaneously, a mutualized default fund provides capital efficiencies to Nasdaq Clearing's members with regard to total regulatory capital required. See "Default Fund Contributions" below for further discussion of Nasdaq Clearing's default fund. Power of assessment and a liability waterfall also have been implemented. See "Power of Assessment" and "Liability Waterfall" below for further discussion. These requirements align risk between Nasdaq Clearing and its clearing members.

Nasdaq Commodities Clearing Default

In September 2018, a member of the Nasdaq Clearing commodities market defaulted due to 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. The default resulted in an initial loss of $133 million. In accordance with the liability waterfall, the first $8 million of the loss was allocated to Nasdaq Clearing's junior capital and the remainder was allocated on a pro-rata basis to the commodities clearing members' default funds. In September 2018, these funds were replenished.

In December 2018, we initiated a capital relief program. The capital relief program was a voluntary program open to each commodities default fund participant; each such participant who agreed to the capital relief program received a proportion of the funds made available under the capital relief program as reflected by their proportionate share of the aggregate of the clearing members' default fund replenishments. As of December 31, 2019, we have disbursed substantially all of the $23 million offered through the program. In addition to the capital relief program, we are pursuing recovery of assets from the defaulted member which will be allocated back to default fund participants.

As a result of the default, a liability of $112 million as of December 31, 2018 was recorded in other current liabilities and collateral of $112 million as of December 31, 2018 was recorded in other current assets in the Consolidated Balance Sheets in order to allow Nasdaq Clearing to fulfill the settlement of certain contracts of the defaulted member arising from the default management process. We had established mitigating positions. As of December 31, 2019, these contracts and mitigating positions have either expired or were sold to a third party together with associated collateral. The collateral and liability were previously included in default funds and margin deposits.

Default Fund Contributions and Margin Deposits

As of December 31, 2019, clearing member default fund contributions and margin deposits were as follows:

	December 31, 2019		
	Cash Contributions	Non-Cash Contributions	Total Contributions
		(in millions)	
Default fund contributions	$ 387	$ 183	$ 570
Margin deposits	2,609	3,544	6,153
Total	$ 2,996	$ 3,727	$ 6,723

Of the total default fund contributions of $570 million, Nasdaq Clearing can utilize $458 million as capital resources in the event of a counterparty default. The remaining balance of $112 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 European government debt securities with original maturities of 90 days or less, reverse repurchase agreements, supranationals and state owned enterprise debt securities. Investments in reverse repurchase agreements are secured with highly rated government securities with maturity dates that range from 7 days to 10 days. 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 $2,996 million as of December 31, 2019 and $4,742 million on as of December 31, 2018, in accordance with its investment policy as follows:

	December 31, 2019	December 31, 2018
	(in millions)	
Demand deposits	$ 1,328	$ 3,094
Central bank certificates	896	1,017
European government debt securities	508	380
Reverse repurchase agreements	116	166
Supranationals and state owned enterprise debt securities	148	85
Total	$ 2,996	$ 4,742

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 held in cash or invested by Nasdaq Clearing, in accordance with its investment policy, either in highly rated government debt securities, time deposits, central bank certificates or reverse repurchase agreements with highly rated government debt securities as collateral. 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, 2019, Nasdaq Clearing committed capital totaling $147 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 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, 2019.

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 100.0% 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 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 $34 million as of December 31, 2019;
- 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;
- senior capital contributed to each specific market by Nasdaq Clearing, calculated in accordance with clearinghouse rules, which totaled $21 million as of December 31, 2019; and
- mutualized default fund, which includes capital contributions of the clearing members on a pro-rata basis.

If additional funds are needed after utilization of the liability waterfall, 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.

In addition to the capital held to withstand counterparty defaults described above, Nasdaq Clearing also has committed capital of $92 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 includes the market value of derivative contracts outstanding prior to netting:

	December 31, 2019
	(in millions)
Commodity and seafood options, futures and forwards[1][2][3]	$ 267
Fixed-income options and futures[1][2]	602
Stock options and futures[1][2]	114
Index options and futures[1][2]	65
Total	$ 1,048

(1) 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.

(2) We determined the fair value of our futures contracts based upon quoted market prices and average quoted market yields.

(3) We determined the fair value of our forward contracts using standard valuation models that were based on market-based observable inputs including LIBOR rates and the spot price of the underlying instrument.

Derivative Contracts Cleared

The following table includes the total number of derivative contracts cleared through Nasdaq Clearing for the years ended December 31, 2019 and 2018:

	December 31, 2019	December 31, 2018
Commodity and seafood options, futures and forwards[1][2]	542,557	1,649,912
Fixed-income options and futures	21,464,522	22,839,794
Stock options and futures	23,777,980	24,978,684
Index options and futures	47,595,114	49,038,297
Total	93,380,173	98,506,687

(1) The total volume in cleared power related to commodity contracts was 842 Terawatt hours (TWh) for the year ended December 31, 2019 and 1,067 TWh for the year ended December 31, 2018.

(2) As discussed elsewhere in this Form 10-K, in November 2019, Nasdaq sold the core assets of NFX to a third-party and the freight contracts with open interest are being migrated from NFX to other exchanges.

The outstanding contract value of resale and repurchase agreements was $0.3 billion as of December 31, 2019 and $0.5 billion as of December 31, 2018. The total number of contracts cleared was 6,627,103 for the year ended December 31, 2019 and was 9,223,246 for the year ended December 31, 2018.

17. Leases

As discussed in "Leases," of Note 2, "Summary of Significant Accounting Policies," effective January 1, 2019, we adopted ASU 2016-02 using the optional transition method. As a result, we applied the new lease standard prospectively to our leases existing or commencing on or after January 1, 2019. Comparative periods presented were not restated upon adoption. Similarly, new disclosures under the standard were made for periods beginning January 1, 2019, and not for prior comparative periods. Prior periods will continue to be reported under guidance in effect prior to January 1, 2019.

We have operating leases which are primarily real estate leases for our U.S. and European headquarters 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, 2019
		(in millions)
Assets:		
Operating lease assets	Operating lease assets	$ 346
Liabilities:		
Current lease liabilities	Other current liabilities	$ 61
Non-current lease liabilities	Operating lease liabilities	331
Total lease liabilities		$ 392

The following table summarizes Nasdaq's lease cost:

	Year Ended December 31, 2019
	(in millions)
Operating lease cost(1)	$ 79
Variable lease cost	23
Sublease income	(5)
Total lease cost	$ 97

(1) Includes 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 sheet.

	December 31, 2019
	(in millions)
2020	$ 77
2021	67
2022	46
2023	43
2024	35
Thereafter	240
Total lease payments	508
Less: interest(1)	(116)
Present value of lease liabilities(2)	$ 392

(1) Calculated using the interest rate for each lease.
(2) Includes the current portion of $61 million.

Total lease payments in the above table exclude $128 million of legally binding minimum lease payments for leases signed but not yet commenced primarily related to the expansion of our world headquarters. These leases will commence in 2020 with a lease term of 16 years.

The following table provides information related to Nasdaq's lease term and discount rate:

	December 31, 2019
Weighted-average remaining lease term (in years)	10.4
Weighted-average discount rate	4.6%

The following table provides supplemental cash flow information related to Nasdaq's operating leases:

	Year Ended December 31, 2019
	(in millions)
Cash paid for amounts included in the measurement of operating lease liabilities	$ 78
Lease assets obtained in exchange for new operating lease liabilities	$ 26

Disclosures Related to Periods Prior to the Adoption of ASU 2016-02 are as follows:

Rental expense for operating leases was $82 million in 2018 and $83 million in 2017, which are net of immaterial amounts of sublease income. As of December 31, 2018, future minimum lease payments under non-cancelable operating leases, which are net of immaterial sublease income, were as follows:

Year ending December 31:	(in millions)
2019	$ 75
2020	69
2021	62
2022	44
2023	42
Thereafter	345
Total minimum lease payments	$ 637

18. Income Taxes

The Tax Cuts and Jobs Act was enacted in December 2017 and included a number of changes to previous U.S. tax laws that impacted Nasdaq, most notably a reduction of the U.S. corporate income tax rate from 35 percent to 21 percent for tax years beginning after December 31, 2017. We recognized a non-cash provisional tax benefit of $89 million for the year ended December 31, 2017, substantially all of which reflects the estimated impact associated with the remeasurement of our net U.S. deferred tax liability at the lower U.S. federal corporate income tax rate. In accordance with Staff Accounting Bulletin No.118, during the fourth quarter of 2018, we completed our accounting for the tax effects of the act, finalizing our analysis of the act and subsequent guidance issued by the U.S. Internal Revenue Service. As a result, we recorded a $290 million non-cash tax charge, reducing deferred tax assets relating to foreign currency translation.

Income Before Income Tax Provision

The following table presents the domestic and foreign components of income before income tax provision:

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Domestic	$ 691	$ 636	$ 556
Foreign	328	428	316
Income before income tax provision	$ 1,019	$ 1,064	$ 872

Income Tax Provision

The income tax provision consists of the following amounts:

	Year Ended December 31,		
	2019	2018	2017
	(in millions)		
Current income taxes provision:			
Federal	$ 120	$ 103	$ 51
State	40	56	17
Foreign	50	146	68
Total current income taxes provision	210	305	136
Deferred income taxes provision (benefit):			
Federal	27	185	(16)
State	7	116	24
Foreign	1	—	(1)
Total deferred income taxes provision	35	301	7
Total income tax provision	$ 245	$ 606	$ 143

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, 2019, the cumulative amount of undistributed earnings in these subsidiaries is $260 million. Given our intent 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, 2019, 2018 and 2017 is as follows:

	Year Ended December 31,		
	2019	2018	2017
Federal income tax provision at the statutory rate	21.0 %	21.0 %	35.0 %
State income tax provision, net of federal effect	4.1 %	3.7 %	2.6 %
Change in deferred taxes due to U.S. tax law changes	— %	27.0 %	(9.9)%
Excess tax benefits related to employee share-based compensation	(0.5)%	(0.7)%	(4.0)%
Non-U.S. subsidiary earnings	0.3 %	0.1 %	(6.0)%
Tax credits and deductions	(0.2)%	(0.2)%	(1.0)%
Change in unrecognized tax benefits	(0.1)%	4.7 %	(0.8)%
Other, net	(0.6)%	1.4 %	0.5 %
Actual income tax provision	24.0 %	57.0 %	16.4 %

The majority of the decrease in our effective tax rate in 2019 compared to 2018 and the increase in our effective tax rate in 2018 compared to 2017 was the result of the remeasurement of our U.S. deferred tax inventory from the Tax Cuts and Jobs Act. The higher effective tax rate in 2018 was also impacted by the reversal of certain Swedish tax benefits recorded in prior years.

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.

Deferred Income Taxes

The temporary differences, which give rise to our deferred tax assets and (liabilities), consisted of the following:

	December 31, 2019	December 31, 2018
	(in millions)	
Deferred tax assets:		
Deferred revenues	$ 10	$ 19
Foreign net operating loss	4	23
State net operating loss	2	4
Compensation and benefits	32	33
Federal benefit of uncertain tax positions	6	17
Operating lease liabilities	101	—
Other	20	25
Gross deferred tax assets	175	121
Less: valuation allowance	—	(23)
Total deferred tax assets, net of valuation allowance	$ 175	$ 98
Deferred tax liabilities:		
Amortization of software development costs and depreciation	(42)	(41)
Amortization of acquired intangible assets	(495)	(498)
Investments	(37)	(34)
Unrealized gains	(31)	—
Operating lease assets	(89)	—
Other	(32)	(22)
Gross deferred tax liabilities	(726)	(595)
Net deferred tax liabilities	$ (551)	$ (497)
Reported as:		
Non-current deferred tax assets[(1)]	$ 1	$ 4
Deferred tax liabilities, net	(552)	(501)
Net deferred tax liabilities	$ (551)	$ (497)

(1) Included in other non-current assets in the Consolidated Balance Sheets.

As of December 31, 2019, we did not recognize a valuation allowance against Nasdaq's deferred tax assets. Based on all available positive and negative evidence, we believe the sources of future taxable income are sufficient to realize the entire deferred tax asset inventory. The valuation allowance as of December 31, 2018, is related to net operating losses, or NOLs, in the United Kingdom and the Netherlands, which were recorded on entities that were divested or liquidated in 2019.

As of December 31, 2019, 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	Amount	Expiration Date
	(in millions)	
Foreign NOL	$ 4	No expiration
State NOL	2	2025-2036

Unrecognized Tax Benefits

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows:

	Year Ended December 31, 2019	2018	2017
	(in millions)		
Beginning balance	$ 52	$ 45	$ 48
Additions as a result of tax positions taken in prior periods	10	28	2
Additions as a result of tax positions taken in the current period	1	6	5
Reductions related to settlements with taxing authorities	(10)	(23)	—
Reductions as a result of lapses of the applicable statute of limitations	(5)	(4)	(10)
Ending balance	$ 48	$ 52	$ 45

We had $48 million of unrecognized tax benefits as of December 31, 2019, $52 million as of December 31, 2018, and $45 million as of December 31, 2017 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 were $3 million for the year ended December 31, 2019, $2 million for 2018, and $1 million for 2017. Accrued interest and penalties, net of tax effect were $12 million as of December 31, 2019 and $10 million as of December 31, 2018.

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. Federal income tax returns for the years 2008 through 2016 are currently under examination by the Internal Revenue Service and we are subject to examination by the Internal Revenue Service for 2017 and 2018. Several state tax returns are currently under examination by the respective tax authorities for the years 2007 through 2018. Non-U.S. tax returns are subject to examination by the respective tax authorities for the years 2013 through 2018. 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.

The Swedish Tax Agency disallowed certain interest expense deductions for the years 2013 - 2018. We appealed this decision to the Lower Administrative Court which denied our appeal in 2018. During 2018, we further appealed to the Administrative Court of Appeal, however, we were no longer able to assert that we were more than likely to be successful and, as such, we recorded a related tax expense. In November 2019, the Administrative Court of Appeal upheld the disallowance of these deductions. As we have not recognized any benefits related to the disallowed deductions and we have paid the related assessments from the Swedish Tax Agency, the decision of the Administrative Court of Appeal does not impact our consolidated financial statements.

19. 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 16, "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 $11 million as of December 31, 2019 and $12 million as of December 31, 2018. As discussed in "Other Credit Facilities," of Note 10, "Debt Obligations," we also have credit facilities primarily related to our Nasdaq Clearing operations, which are available in multiple currencies, and totaled $203 million as of December 31, 2019 and $234 million as of December 31, 2018, in available liquidity, of which $15 million was utilized as of December 31, 2019 and none of which was utilized as of December 31, 2018.

Execution Access is an introducing broker which operates the trading platform for our Fixed Income business to trade in U.S. Treasury securities. Execution Access has a clearing arrangement with Industrial and Commercial Bank of China Financial Services LLC, or ICBC. As of December 31, 2019, we have contributed $15 million of clearing deposits to ICBC in connection with this clearing arrangement. These deposits are recorded in other current assets in our Consolidated Balance Sheets. Some of the trading activity in Execution Access is cleared by ICBC through the Fixed Income Clearing Corporation, with ICBC acting as agent. Execution Access assumes the counterparty risk of clients that do not clear through the Fixed Income Clearing Corporation. Counterparty risk of clients exists for Execution Access between the trade date and the settlement date of the individual transactions, which is at least one business day (or more, if specified by the U.S. Treasury issuance calendar). Counterparties that do not clear through the Fixed Income Clearing Corporation are subject to a credit due diligence process and may be required to post collateral, provide principal letters, or provide other forms of credit enhancement to Execution Access for the purpose of mitigating counterparty risk. Daily position trading limits are also enforced for such counterparties.

We believe that the potential for us to be required to make payments under these arrangements is mitigated through the pledged collateral and our risk management policies. Accordingly, no contingent liability is recorded in the Consolidated Balance Sheets for these arrangements. However, no guarantee can be provided that these arrangements will at all times be sufficient.

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 16, "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.

Non-Cash Contingent Consideration

As part of the purchase price consideration of a prior acquisition, we have agreed to future annual issuances of 992,247 shares of Nasdaq common stock which approximated certain tax benefits associated with the transaction. Such contingent future issuances of Nasdaq common stock will be issued annually through 2027 if Nasdaq's total gross revenues equal or exceed $25 million in each such year. The contingent future issuances of Nasdaq common stock are subject to anti-dilution protections and acceleration upon certain events.

Escrow Agreements

In connection with prior acquisitions, we entered into escrow agreements to secure the payment of post-closing adjustments and to ensure other closing conditions. As of December 31, 2019, these escrow agreements provide for future payment by us of up to an aggregate of $9 million, which is included in other current liabilities in the Consolidated Balance Sheets.

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

Litigation

As previously disclosed, we are named as one of many defendants in City of Providence v. BATS Global Markets, Inc., et al., 14 Civ. 2811 (S.D.N.Y.), which was filed on April 18, 2014 in the United States District Court for the Southern District of New York. The district court appointed lead counsel, who filed an amended complaint on September 2, 2014. The amended complaint names as defendants seven national exchanges, as well as Barclays PLC, which operated a private alternative trading system. On behalf of a putative class of securities traders, the plaintiffs allege that the defendants engaged in a scheme to manipulate the markets through high-frequency trading; the amended complaint asserts claims against us under Section 10(b) of the Exchange Act and Rule 10b-5, as well as under Section 6(b) of the Exchange Act. The plaintiffs seek injunctive and monetary relief of an unspecified amount. We filed a motion to dismiss the amended complaint on November 3, 2014. In response, the plaintiffs filed a second amended complaint on November 24, 2014, which names the same defendants and alleges essentially the same violations. We then filed a motion to dismiss the second amended complaint on January 23, 2015. On August 26, 2015, the district court entered an order dismissing the second amended complaint in its entirety. The plaintiffs appealed the judgment of dismissal to the United States Court of Appeals for the Second Circuit (although opting not to appeal the dismissal with respect to Barclays PLC or the dismissal of claims under Section 6(b) of the Exchange Act). On December 19, 2017, the Second Circuit issued an opinion vacating the district court's judgment of dismissal and remanding to the district court for further proceedings. On May 18, 2018, the exchanges filed a motion to dismiss the amended complaint, raising issues not addressed in the proceedings to date. On May 28, 2019, the district court denied the exchanges' renewed motion to dismiss. On June 17, 2019, the exchanges filed a motion to certify the district court's order for immediate review by the Second Circuit and on July 16, 2019, the district court denied the motion. Given the preliminary nature of the proceedings, we are unable to estimate what, if any, liability may result from this litigation. However, we believe that the claims are without merit and will continue to litigate vigorously.

Nasdaq Commodities Clearing Default

During September 2018, a clearing member of Nasdaq Clearing's commodities market was declared in default. We have been cooperating fully with the SFSA in the associated regulatory audits. While we are currently unable to predict the final outcome of this matter, it could include penalties, such as a fine. We do not expect this matter will have a material impact on our consolidated financial statements. See "Nasdaq Commodities Clearing Default," of Note 16, "Clearing Operations," for further information on this event.

SEC Decisions

In recent years, certain industry groups have challenged the level of fees that U.S. exchanges charge for market data and connectivity. We have defeated two challenges in federal appeals court pertaining to market data and an additional challenge at the administrative level within the SEC. However, in October 2018, the SEC reversed that administrative decision and found that Nasdaq had not met a burden of demonstrating that certain challenged fees were fair and reasonable; we estimate that this decision will reduce our annual revenues by approximately $1 million. Nasdaq has appealed this decision to the U.S. Court of Appeals for the District of Columbia Circuit. In addition, the SEC remanded a series of additional challenges to market data and connectivity fees back to Nasdaq for further consideration. Nasdaq has also appealed this decision to the U.S. Court of Appeals for the District of Columbia Circuit. We are unable to predict the outcome or the timing of the ultimate resolution of these matters.

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 18, "Income Taxes," for further discussion.

20. Business Segments

We manage, operate and provide our products and services in four business segments: Market Services, Corporate Services, Information Services and Market Technology. See Note 1, "Organization and Nature of Operations," for further discussion of our reportable segments.

Our management allocates resources, assesses performance and manages these businesses as four 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, 2019, 2018 and 2017:

	Market Services	Corporate Services	Information Services	Market Technology	Corporate Items	Consolidated
			(in millions)			
Year Ended December 31, 2019						
Total revenues	$ 2,639	$ 496	$ 779	$ 338	$ 10	$ 4,262
Transaction-based expenses	(1,727)	—	—	—	—	(1,727)
Revenues less transaction-based expenses	912	496	779	338	10	2,535
Depreciation and amortization	74	34	52	$ 30	—	190
Operating income (loss)	516	178	490	54	(221)	1,017
Purchase of property and equipment	30	27	30	40	—	127
Year Ended December 31, 2018						
Total revenues	$ 2,709	$ 487	$ 714	$ 270	$ 97	$ 4,277
Transaction-based expenses	(1,751)	—	—	—	—	(1,751)
Revenues less transaction-based expenses	958	487	714	270	97	2,526
Depreciation and amortization	95	36	51	21	7	210
Operating income (loss)	544	155	460	34	(165)	1,028
Purchase of property and equipment	28	29	17	37	—	111
Year Ended December 31, 2017						
Total revenues	$ 2,418	$ 459	$ 588	$ 247	$ 236	$ 3,948
Transaction-based expenses	(1,537)	—	—	—	—	(1,537)
Revenues less transaction-based expenses	881	459	588	247	236	2,411
Depreciation and amortization	95	40	26	14	13	188
Operating income (loss)	481	149	418	57	(114)	991
Purchase of property and equipment	59	41	10	34	—	144

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 shown 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 September 2019, we initiated a restructuring plan. See Note 21, "Restructuring Charges," for a discussion of the plan. We believe performance measures excluding restructuring charges provide management with a useful representation of our segments' ongoing activity in each period.

Clearing default loss: For 2018, we recorded a $31 million charge related to a default of a Nasdaq Clearing commodities member that occurred in September 2018. See "Nasdaq Commodities Clearing Default," of Note 16, "Clearing Operations," for further discussion of the default. We have included this charge as we believe it is non-recurring, as there has never been another loss due to member default in our clearinghouse, and should be excluded when evaluating the ongoing operating performance of the Market Services segment. Any expenses associated with the evaluation and enhancement of processes and procedures relating to our clearing business will be reflected within the Market Services segment.

2019 and 2018 divestitures: We have included in corporate items the revenues and expenses of BWise and the Public Relations Solutions and Digital Media Services businesses which were part of the Corporate Solutions business within our Corporate Services segment as BWise was sold in March 2019 and the Public Relations Solutions and Digital Media Services businesses were sold in April 2018. See "2019 Divestitures," and "2018 Divestiture," of Note 4, "Acquisitions and Divestitures," for further discussion.

Other significant 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. For 2019, other significant items included loss on extinguishment of debt, a provision for notes receivable associated with the funding of technology development for the CAT, and a tax reserve for certain prior year examinations which are recorded in general, administrative and other expense in the Consolidated Statements of Income, and certain litigation costs which are recorded in professional and contract services expense in the Consolidated Statements of Income. For 2018, other significant items included certain litigation costs which are recorded in professional and contract services expense in the Consolidated Statements of Income and charges related to uncertain positions pertaining to sales and use tax and VAT which are recorded in general, administrative and other expense in the Consolidated Statements of Income. For 2017, other significant items included loss on extinguishment of debt which is recorded in general, administrative and other expense in the Consolidated Statements of Income.

Accordingly, we do not allocate these costs for purposes of disclosing segment results because they do not contribute to a meaningful evaluation of a particular segment's ongoing operating performance.

* * * * * *

A summary of our corporate items is as follows:

	Year Months Ended December 31,		
	2019	**2018**	**2017**
		(in millions)	
Revenues - divested businesses	$ 10	$ 97	$ 236
Expenses:			
Amortization expense of acquired intangible assets	101	109	92
Merger and strategic initiatives expense	30	21	44
Restructuring charges	39	—	—
Clearing default loss	—	31	—
Provision for notes receivable	20	—	—
Extinguishment of debt	11	—	10
Expenses - divested businesses	8	83	200
Other	22	18	4
Total expenses	231	262	350
Operating loss	$ (221)	$ (165)	$ (114)

For further discussion of our segments' results, see "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations-Segment Operating Results."

Geographic Data

The following table presents total revenues and property and equipment, net by geographic area for 2019, 2018 and 2017. 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
	(in millions)	
2019:		
United States	$ 3,409	$ 250
All other countries	853	134
Total	$ 4,262	$ 384
2018:		
United States	$ 3,379	$ 224
All other countries	898	152
Total	$ 4,277	$ 376
2017:		
United States	$ 3,081	$ 247
All other countries	867	153
Total	$ 3,948	$ 400

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 2019, 2018 and 2017.

21. Restructuring Charges

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 re-alignment of certain business areas. In connection with these restructuring efforts, we are retiring certain elements of our marketplace infrastructure and technology product offerings as we implement NFF and other technologies internally and externally. This represents a fundamental shift in our strategy and technology as well as executive re-alignment. As a result of these actions, we expect to incur $70 million to $80 million in pre-tax charges over a two year period related primarily to non-cash items such as asset impairments, accelerated depreciation as well as third-party consulting costs. Severance and employee-related charges also will be incurred. Restructuring charges are recorded on restructuring plans that have been committed to by management and are, in part, based upon management’s best estimates of future events.

The following table presents a summary of the 2019 restructuring plan charges in the Consolidated Statements of Income for the year ended December 31, 2019 which primarily consisted of asset impairment charges mainly related to capitalized software that was retired.

	Year Ended December 31, 2019
	(in millions)
Asset impairments	$ 24
Severance and employee-related costs	8
Accelerated depreciation	2
Contract terminations	2
Consulting services	2
Other	1
Total restructuring charges	$ 39

Exhibit 4.12

**DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE
SECURITIES EXCHANGE ACT OF 1934**

Nasdaq, Inc. (the "Company") has five 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) 0.875% Senior Notes due 2030;

(3) 1.75% Senior Notes due 2029;

(4) 1.750% Senior Notes due 2023; and

(5) 3.875% Senior Notes due 2021.

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 r 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' Agreements

On December 16, 2010, we entered into a stockholders' agreement with Investor AB. We are obligated by the terms of the stockholders' agreement to nominate and generally use best efforts to cause the election to our board of directors one individual designated by Investor AB, subject to certain conditions.

On February 27, 2008, we entered into a stockholders' agreement with Borse Dubai Limited, or Borse Dubai, which was amended on February 19, 2009. Subject to certain conditions, we are obligated by the terms of the stockholders' agreement to nominate and generally use best efforts to cause the election to our board of directors one individual designated by Borse Dubai.

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 0.875% 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.

"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 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).

"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 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").

"<u>Change of Control</u>" 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 "<u>Group</u>") 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 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, 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.

Description of the 1.750% Senior Notes Due 2023

The 1.750% Senior Notes due 2023 (the "2023 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 third supplemental indenture dated as of May 20, 2016 (the "supplemental indenture" and, together with the base indenture, the "indenture").

We issued €600 million aggregate principal amount of the 2023 Notes on May 17, 2016.

This summary is subject to, and qualified in its entirety by reference to, all the provisions of the 2023 Notes and the indenture, including definitions of certain terms used therein.

General

The 2023 Notes:

- are senior unsecured obligations of ours;
- rank equally with all of our other senior unsecured indebtedness from time to time outstanding, all indebtedness under our senior credit facility and our term loan credit agreement;
- are structurally subordinated 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 collateral securing any such indebtedness and other obligations.

The 2023 Notes were issued in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

Principal, Maturity and Interest

The 2023 Notes bear interest at a rate of 1.750% per year. Interest on the 2023 Notes is payable annually in arrears on May 19 of each year, beginning on May 19, 2017, 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 2023 Notes (or the settlement date if no interest has been paid or duly provided for on the 2023 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 2023 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 2023 Notes mature on May 19, 2023. On the maturity date of the 2023 Notes, the holders will be entitled to receive 100% of the principal amount of such 2023 Notes. The 2023 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 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 2023 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.

Interest Rate Adjustment

The interest rate payable on the 2023 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 2023 Notes.

Ranking

The 2023 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 2023 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 Notes constitute a separate series of debt securities under the indenture, initially limited to €600 million. Under the indenture, we may, without the consent of the holders of the 2023 Notes, issue additional 2023 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 2023 Notes are not fungible with the 2023 Notes offered hereby (or any other tranche of additional Notes) for U.S. federal income tax purposes, then such additional 2023 Notes will have different ISIN and/or Common Code numbers than the 2023 Notes (and any such other tranche of additional 2023 Notes). The 2023 Notes and any additional 2023 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 2023 Notes, as well as any additional 2023 Notes that we may issue by reopening such series, will vote or take action as a single class.

Redemption

Optional Redemption

The 2023 Notes will be redeemable, in whole 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 2023 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 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 February 19, 2023 (three months before their maturity date), the 2023 Notes will be redeemable, as a 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 2023 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 2023 Notes to be redeemed. Once notice of redemption is mailed, the 2023 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 2023 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 2023 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 2023 Notes, and such 2023 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 2023 Notes, and any of such 2023 Notes are not represented by a global note, then the trustee will select the particular 2023 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 2023 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 2023 Notes, unless we have exercised our right to redeem the 2023 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 2023 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 2023 Notes repurchased plus accrued and unpaid interest, if any, on the 2023 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 (as such term is defined in the indenture) event 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 2023 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 2023 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 2023 Notes will have specified rights if an Event of Default (as defined below) occurs.

The term "Event of Default" in respect of the 2023 Notes means any of the following:

(1) we do not pay interest on any of the 2023 Notes within 30 days of its due date;

(2) we fail to pay the principal (or premium, if any) of any 2023 Note, when such principal becomes due and payable, at maturity, upon acceleration, upon redemption or otherwise;

(3) failure by us to comply with our covenant obligations;

(4) we remain in breach of a covenant or warranty in respect of the indenture or 2023 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 2023 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 2023 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 2023 Notes has occurred, the trustee or the holders of at least 25% in principal amount of the 2023 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 2023 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 2023 Notes may also waive certain past defaults under the indenture with respect to the 2023 Notes on behalf of all of the holders of the 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 2023 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 2023 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 2023 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 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 2023 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 2023 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 2023 Notes. Some types of changes require the approval of each holder of 2023 Notes, some require approval by a vote of a majority of the holders of the 2023 Notes, and some changes do not require any approval at all.

<u>Description of the 3.875% Senior Notes due 2021</u>

The 3.875% Senior Notes due 2021 (the "<u>2021 Notes</u>") 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 supplemental indenture to be dated as of June 7, 2013 (the "supplemental indenture" and, together with the base indenture, the "indenture").

We issued €600 million aggregate principal amount of the 2021 Notes on June 4, 2013.

This summary is subject to, and qualified in its entirety by reference to, all the provisions of the 2021 Notes and the indenture, including definitions of certain terms used therein.

General

The 2021 Notes:

- are senior unsecured obligations of ours;
- will rank equally with all of our other senior unsecured indebtedness from time to time outstanding and all indebtedness under our senior credit facility;
- structurally subordinated to all existing and future obligations of our subsidiaries including claims with respect to trade payables;
- are effectively subordinated in right of payment to all of our existing and future secured indebtedness to the extent of the collateral securing any such indebtedness.

The 2021 Notes were issued in minimum denominations of €100,000 and integral multiples of €1,000 in excess thereof.

Principal, Maturity and Interest

The 2021 Notes bear interest at a rate of 3.875% per year. Interest on the 2021 Notes will be payable annually in arrears on June 7 of each year, beginning on June 7, 2014, 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 2021 Notes (or the settlement date if no interest has been paid or duly provided for on the 2021 Notes), to but excluding the next date on which interest is paid or duly provided for. Interest on the 2021 Notes will accrue from and including the settlement date and will be paid to holders of record on the June 6 immediately before the applicable interest payment date.

The 2021 Notes will mature on June 7, 2021. On the maturity date of the 2021 Notes, the holders will be entitled to receive 100% of the principal amount of such Notes. The 2021 Notes will not have the benefit of any sinking fund.

If any interest payment date falls on a day that is not a business day, then payment of interest may be made on the next succeeding business day and no interest will accrue because of such delayed payment. With respect to the 2021 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 2021 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.

Interest Rate Adjustment

The interest rate payable on the 2021 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 such 2021 Notes.

Ranking

The 2021 Notes are general unsecured obligations of ours and rank equally with all of our existing and future unsubordinated obligations.

Holders of any secured indebtedness will have claims that are prior to your claims as holders of the 2021 Notes, to the extent of the value of the assets securing such indebtedness, in the event of any bankruptcy, liquidation or similar proceeding.

Further Issues

The 2021 Notes constitute a separate series of debt securities under the indenture. Under the indenture, we may, without the consent of the holders of the 2021 Notes, "reopen" such series and issue additional 2021 Notes from time to time in the future, but only if such additional 2021 Notes are issued with less than a de minimis amount of original issue discount or are issued as part of a "qualified reopening" for U.S. federal income tax purposes. 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 2021 Notes, as well as any additional 2021 Notes that we may issue by reopening such series, will vote or take action as a single class.

Redemption

Optional Redemption

The 2021 Notes will be redeemable, in whole 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 2021 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 2021 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 40 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.

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 2021 Notes to be redeemed. Once notice of redemption is mailed, the 2021 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 2021 Notes (or portion thereof).

If money sufficient to pay the redemption price of all of the Notes (or portions thereof) to be redeemed on the redemption date is deposited with the trustee or paying agent on or before the redemption date and certain other conditions are satisfied, then on and after such redemption date, interest will cease to accrue on the 2021 Notes (or such portion thereof) called for redemption.

"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 2021 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 2021 Notes, and such 2021 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 2021 Notes, and any of such 2021 Notes are not represented by a global note, then the trustee will select the particular 2021 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 2021 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 2021 Notes, unless we have exercised our right to redeem the 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 2021 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 2021 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 2021 Notes; or (2) was nominated 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, 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, 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 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 2021 Notes will have specified rights if an Event of Default (as defined below) occurs.

The term "Event of Default" in respect of the 2021 Notes means any of the following:

(1) we do not pay interest on any of the 2021 Notes within 30 days of its due date;

(2) we fail to pay the principal (or premium, if any) of any 2021 Note, when such principal becomes due and payable, at maturity, upon acceleration, upon redemption or otherwise;

(3) failure by us to comply with our covenant obligations;

(4) we remain in breach of a covenant or warranty in respect of the indenture or 2021 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 2021 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 2021 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 2021 Notes has occurred, the trustee or the holders of at least 25% in principal amount of the 2021 Notes may declare the entire unpaid principal amount of (and premium, if any), and all the accrued interest on, such 2021 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 2021 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 2021 Notes may also waive certain past defaults under the indenture with respect to the 2021 Notes on behalf of all of the holders of the 2021 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 2021 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 2021 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 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 2021 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 2021 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.

Modification of the Indenture and Waiver of Rights of Holders

Under certain circumstances, we can make changes to the indenture and the 2021 Notes. Some types of changes require the approval of each holder of 2021 Notes affected, some require approval by a vote of a majority of the holders of the 2021 Notes, and some changes do not require any approval at all.

Exhibit 21.1

Subsidiaries and Affiliates of Nasdaq, Inc.*

As of February 14, 2020

U.S. Entities

1. A.S.A.P. Advisor Services, Inc (organized in New York)
2. BoardVantage, Inc (organized in Delaware)
3. Boston Stock Exchange Clearing Corporation (organized in Massachusetts)
4. Channel Capital Group Inc. (organized in Delaware)
5. Cinnober Americas Inc. (organized in New York)
6. Consolidated Securities Source LLC (organized in Delaware)
7. Content Services, LLC (organized in Delaware) -
8. Curzon Street Acquisition, LLC (organized in Delaware)
9. Directors Desk, LLC (organized in Delaware)
10. Dorsey, Wright & Associates, LLC (organized in Virginia)
11. ETC Acquisition Corp. (organized in Delaware)
12. eVestment Alliance Holdings, Inc. (organized in Delaware)
13. eVestment Alliance Holdings, LLC (organized in Georgia)
14. eVestment Alliance, LLC (organized in Georgia)
15. eVestment, Inc. (organized in Delaware)
16. ExactEquity, LLC (organized in Delaware)
17. Execution Access, LLC (organized in Delaware)
18. FinQloud LLC (organized in Delaware)
19. FINRA/Nasdaq Trade Reporting Facility LLC (organized in Delaware)
20. FTEN, Inc. (organized in Delaware)
21. Fundspire, Inc. (organized in Delaware)
22. Global Network Content Services, LLC (organized in Florida)
23. GlobeNewswire, Inc. (organized in California)
24. Granite Redux, Inc. (organized in Delaware)
25. GraniteBlock, Inc. (organized in Delaware)
26. Inet Futures Exchange, LLC (organized in Delaware)
27. International Securities Exchange Holdings, Inc. (organized in Delaware)
28. ISE ETF Ventures LLC (organized in Delaware)
29. Kleos Managed Services Holdings, LLC (organized in Delaware)
30. Kleos Managed Services, L.P. (organized in Delaware)
31. Longitude LLC (organized in Delaware)
32. Nasdaq BX, Inc. (organized in Delaware)
33. Nasdaq Capital Markets Advisory LLC (organized in Delaware)
34. Nasdaq Commodities Clearing LLC (organized in Delaware)
35. Nasdaq Corporate Services, LLC (organized in Delaware)
36. Nasdaq Corporate Solutions, LLC (organized in Delaware)
37. NASDAQ Energy Futures, LLC (organized in Delaware)
38. Nasdaq Execution Services, LLC (organized in Delaware)
39. NASDAQ Futures, Inc. (organized in Delaware)
40. Nasdaq GEMX, LLC (organized in Delaware)
41. NASDAQ Global, Inc. (organized in Delaware)
42. Nasdaq Governance Solutions, Inc. (organized in Delaware)
43. Nasdaq Information, LLC (organized in Delaware)
44. Nasdaq International Market Initiatives, Inc. (organized in Delaware)
45. Nasdaq ISE, LLC (organized in Delaware)
46. Nasdaq MRX, LLC (organized in Delaware)
47. NASDAQ OMX (San Francisco) Insurance LLC (organized in Delaware)

48. NASDAQ OMX BX Equities LLC (organized in Delaware)
49. Nasdaq PHLX LLC (organized in Delaware)
50. Nasdaq Technology Services, LLC (organized in Delaware)
51. Norway Acquisition LLC (organized in Delaware)
52. NPM Securities, LLC (organized in Delaware)
53. OneReport, Inc, (organized in Vermont)
54. Operations & Compliance Network, LLC (organized in Delaware)
55. Public Plan IQ Limited Liability Company (organized in New Jersey)
56. SecondMarket Labs, LLC (organized in Delaware)
57. SecondMarket Solutions, Inc. (organized in Delaware)
58. SMTX, LLC (organized in Delaware)
59. Strategic Financial Solutions, LLC (organized in Nevada)
60. Sybenetix Inc. (organized in Delaware)
61. The Center for Board Evaluations, Inc. (organized in North Carolina)
62. The Nasdaq Options Market LLC (organized in Delaware)
63. The NASDAQ Private Market, LLC (organized in Delaware)
64. The Nasdaq Stock Market LLC (organized in Delaware)
65. The Stock Clearing Corporation of Philadelphia (organized in Pennsylvania)
66. U.S. Exchange Holdings, Inc. (organized in Delaware)

Non-U.S. Subsidiaries

1. 2157971 Ontario Ltd. (organized in Canada)
2. AB Nasdaq Vilnius (organized in Lithuania) (96.35% owned, directly or indirectly, by Nasdaq, Inc.)
3. AS eCSD Expert (organized in Estonia)
4. AS Pensionikeskus AS (organized in Estonia)
5. BoardVantage (UK) Limited (organized in the United Kingdom)
6. Cinetics AB (organized in Sweden)
7. Cinnober AB (organized in Sweden)
8. Cinnober Financial Technology AB (organized in Sweden)
9. Cinnober Financial Technology North AB (organized in Sweden)
10. Curzon Street Holdings Limited (organized in the United Kingdom)
11. Ensoleillement Inc. (organized in Canada)
12. eVestment Alliance (UK) Limited (organized in the United Kingdom)
13. eVestment Alliance Australia Pty Ltd (organized in Australia)
14. eVestment Alliance Hong Kong Limited (organized in Hong Kong)
15. Indxis Ltd (organized in the United Kingdom)
16. Irisium AB (organized in Sweden)
17. LLC "SYBENETIX UKRAINE" (organized in Ukraine)
18. Longitude S.A. (organized in Luxembourg)
19. Marketwire China Holding (HK) Ltd. (organized in Hong Kong)
20. Minium Financial Technology AB (organized in Sweden)
21. Minium Financial Technology Ltd (organized in the United Kingdom)
22. Nasdaq (Asia Pacific) Pte. Ltd. (organized in Singapore)
23. Nasdaq AB (organized in Sweden)
24. Nasdaq Australia Holding Pty Ltd (organized in Australia)
25. Nasdaq Broker Services AB (organized in Sweden)
26. Nasdaq Canada Inc. (organized in Canada)
27. Nasdaq Clearing AB (organized in Sweden)
28. Nasdaq Copenhagen A/S (organized in Denmark)
29. Nasdaq Corporate Solutions (India) Private Limited (organized in India)
30. Nasdaq Corporate Solutions International Limited (organized in the United Kingdom)
31. Nasdaq CSD Iceland hf. (organized in Iceland)
32. Nasdaq CSD SE (organized in Latvia)
33. Nasdaq CXC Limited (organized in Canada)
34. Nasdaq Exchange and Clearing Services AB (organized in Sweden)
35. Nasdaq France SAS (organized in France)
36. Nasdaq Germany GmbH (organized in Germany)
37. Nasdaq Helsinki Ltd (organized in Finland)
38. Nasdaq Holding AB (organized in Sweden)
39. Nasdaq Holding Denmark A/S (organized in Denmark)
40. Nasdaq Holding Luxembourg Sárl (organized in Luxembourg)
41. Nasdaq Iceland hf. (organized in Iceland)
42. Nasdaq International Ltd (organized in the United Kingdom)
43. Nasdaq Korea Ltd. (organized in South Korea)
44. Nasdaq Ltd (organized in Hong Kong)
45. Nasdaq NLX Ltd (organized in the United Kingdom)
46. Nasdaq Nordic Ltd (organized in Finland)
47. NASDAQ OMX Europe Ltd (organized in the United Kingdom)
48. Nasdaq Oslo ASA (organized in Norway)
49. Nasdaq Pty Ltd (organized in Australia)
50. Nasdaq Riga, AS (organized in Latvia) (92.98% owned, directly or indirectly, by Nasdaq, Inc.)

51. Nasdaq Stockholm AB (organized in Sweden)
52. Nasdaq Tallinn AS (organized in Estonia)
53. Nasdaq Technology (Japan) Ltd (organized in Japan)
54. Nasdaq Technology AB (organized in Sweden)
55. Nasdaq Technology Canada Inc. (organized in Canada)
56. Nasdaq Technology Energy Systems AS (organized in Norway)
57. Nasdaq Technology Italy Srl (organized in Italy)
58. Nasdaq Teknoloji Servisi Limited Sirketi (organized in Turkey)
59. Nasdaq Treasury AB (organized in Sweden)
60. Nasdaq Vilnius Services UAB (organized in Lithuania)
61. Nasdaq Wizer Solutions AB (organized in Sweden)
62. Nasdaq Wizer Vilnius UAB (organized in Lithuania)
63. OMX Netherlands B.V. (organized in the Netherlands)
64. OMX Netherlands Holding B.V. (organized in the Netherlands)
65. OMX Treasury Euro AB (organized in Sweden) (99.9% owned, directly or indirectly, by Nasdaq, Inc.)
66. OMX Treasury Euro Holding AB (organized in Sweden)
67. PerTrac Financial Solutions Hong Kong Limited (organized in Hong Kong)
68. Quandl, Inc.(organized in Canada)
69. RF Nordic Express AB (organized in Sweden) (50.1% owned, directly or indirectly, by Nasdaq, Inc.)
70. Shareholder.com B.V. (organized in the Netherlands)
71. Simplitium Ltd (organized in the United Kingdom)
72. SMARTS (Asia) Ltd (organized in China)
73. SMARTS Broker Compliance Pty Ltd (organized in Australia)
74. SMARTS Market Surveillance Pty Ltd (organized in Australia)
75. Sybenetix Limited (organized in the United Kingdom)
76. TopQ Software Limited (organized in the United Kingdom)
77. Whittaker & Garnier Limited (organized in the United Kingdom)

* The list of subsidiaries does not include not-for-profit entities or foreign branches of particular subsidiaries

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. 333-224489) of Nasdaq, Inc.,

(2) Registration Statement (Form S-8 No. 333-225218) pertaining to Nasdaq, Inc. Equity Incentive Plan,

(3) Registration Statement (Form S-8 No. 333-196838) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Equity Incentive Plan,

(4) Registration Statement (Form S-8 No. 333-167724) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Employee Stock Purchase Plan,

(5) Registration Statement (Form S-8 No. 333-167723) pertaining to Nasdaq, Inc. (f/k/a The NASDAQ OMX Group, Inc.) Equity Incentive Plan,

(6) Registration Statement (Form S-8 No. 333-110602) pertaining to The Nasdaq Stock Market, Inc. Equity Incentive Plan,

(7) Registration Statement (Form S-8 No. 333-106945) pertaining to the Employment Agreement with Robert Greifeld of The Nasdaq Stock Market, Inc.,

(8) Registration Statement (Form S-8 No. 333-76064) pertaining to The Nasdaq Stock Market, Inc. 2000 Employee Stock Purchase Plan,

(9) Registration Statement (Form S-8 No. 333-72852) pertaining to The Nasdaq Stock Market, Inc. 2000 Employee Stock Purchase Plan, and

(10) Registration Statement (Form S-8 No. 333-70992) pertaining to The Nasdaq Stock Market, Inc. Equity Incentive Plan;

of our reports dated February 25, 2020, 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, 2019.

New York, New York
February 25, 2020

Exhibit 24.1

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all men by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Joan C. Conley, 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, 2019, 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 24, 2020.

/s/ Melissa M. Arnoldi
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all men by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Joan C. Conley, 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, 2019, 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 24, 2020.

/s/ Charlene T. Begley
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
NASDAQ, INC.

Know all men by these presents, that the undersigned, a director of Nasdaq, Inc., a Delaware corporation, hereby constitutes and appoints John A. Zecca and Joan C. Conley, 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, 2019, 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 24, 2020.

/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 24, 2020.

/s/ Essa Kazim
Signature

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IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 24, 2020.

/s/ Thomas A. Kloet
Signature

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/s/ John D. Rainey
Signature

POWER OF ATTORNEY
ANNUAL REPORT ON FORM 10-K
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/s/ Michael R. Splinter
Signature

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/s/ Jacob Wallenberg
Signature

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ANNUAL REPORT ON FORM 10-K
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/s/ Lars R. Wedenborn
Signature

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ANNUAL REPORT ON FORM 10-K
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IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of February 24, 2020.

/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: President and Chief Executive Officer

Date: February 25, 2020

Exhibit 31.2

CERTIFICATION

I, Michael Ptasznik, 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/ Michael Ptasznik
Name:	Michael Ptasznik
Title:	Executive Vice President, Corporate Strategy and Chief Financial Officer

Date: February 25, 2020

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, 2019 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), Adena T. Friedman, as President and Chief Executive Officer of the Company, and Michael Ptasznik, as Executive Vice President, Corporate Strategy 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 or his 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:	President and Chief Executive Officer
Date:	February 25, 2020
	/s/ Michael Ptasznik
Name:	Michael Ptasznik
Title:	Executive Vice President, Corporate Strategy and Chief Financial Officer
Date:	February 25, 2020

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.