

Intercontinental Exchange, Inc.
Form 10-K
February 07, 2019

UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d)
OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018

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 001-36198

Intercontinental Exchange, Inc.
(Exact name of registrant as specified in its charter)

Delaware 46-2286804
(State or other jurisdiction of (IRS Employer
incorporation or organization) Identification Number)
5660 New Northside Drive, 30328
Atlanta, Georgia (Zip Code)
(Address of principal executive offices)
(770) 857-4700
Registrant's telephone number, including area code

Securities registered pursuant to Section 12(b) of the Act:
Title of Each Class Name of Each Exchange on Which Registered
Common Stock, \$0.01 par value per share New York Stock Exchange
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 Exchange Act 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 during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

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Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

The aggregate market value of the registrant's voting and non-voting common equity held by non-affiliates computed by reference to the price at which the common equity was last sold as of the last business day of the registrant's most recently completed second fiscal quarter was \$42,085,643,250. As of February 4, 2019, the number of shares of the registrant's Common Stock outstanding was 568,498,076 shares.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information contained in the registrant's Proxy Statement for the 2019 Annual Meeting of Stockholders is incorporated herein by reference in Part III of this Annual Report on Form 10-K. The Proxy Statement will be filed with the Securities and Exchange Commission within 120 days after the end of the registrant's fiscal year to which this report relates.

Intercontinental Exchange, Inc.
 ANNUAL REPORT ON FORM 10-K
 For the Fiscal Year Ended December 31, 2018
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PART I

In this Annual Report on Form 10-K, or Annual Report, and unless otherwise indicated, the terms “Intercontinental Exchange,” “ICE,” “we,” “us,” “our,” “our company,” and “our business” refer to Intercontinental Exchange, Inc. together with consolidated subsidiaries. References to “ICE products” mean products listed on one or more of our markets.

The following discussion should be read in conjunction with our consolidated financial statements and related notes included elsewhere in this Annual Report. Due to rounding, figures in tables may not sum exactly. All references to “options” or “options contracts” in the context of our futures products refer to options on futures contracts.

Forward-Looking Statements

This Annual Report, including the sections entitled “Business,” “Legal Proceedings,” “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” contains “forward-looking statements” as defined in the Private Securities Litigation Reform Act of 1995. Any statements contained herein that are not statements of historical fact may be forward-looking statements. Any forward looking statements are based on our present beliefs and assumptions as well as the information currently available to us. Forward-looking statements may be introduced by or contain terminology such as “may,” “will,” “should,” “could,” “would,” “targets,” “goal,” “expect,” “intend,” “anticipate,” “believe,” “estimate,” “predict,” “potential,” “continue,” or the antonyms of these terms or other comparable terminology.

Forward-looking statements relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our results, levels of activity, performance, cash flows, financial position or achievements to differ materially from those expressed or implied by these statements. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance, cash flows, financial position or achievements. Accordingly, we caution you not to place undue reliance on any forward-looking statements we may make.

Factors that may affect our performance and the accuracy of any forward-looking statements include, but are not limited to, those listed below:

- conditions in global financial markets and domestic and international economic, political and social conditions;
- the impact of the introduction of or any changes in laws, regulations, rules or government policies with respect to financial markets, increased regulatory scrutiny or enforcement actions and our ability to comply with these requirements;
- volatility in commodity prices, equity prices, and price volatility of financial benchmarks and instruments such as interest rates, credit spreads, equity indices and foreign exchange rates;
- the business environment in which we operate and trends in our industry, including trading volumes, clearing, data services, fees, changing regulations, competition and consolidation;
- our ability to minimize the risks associated with operating clearing houses in multiple jurisdictions;
- our equity and options exchanges and the exchanges’ compliance with their respective regulatory and oversight responsibilities;
- the resilience of our electronic platforms and soundness of our business continuity and disaster recovery plans;
- continued high renewal rates of subscription-based data revenues;
- our ability to identify and effectively pursue, implement and integrate acquisitions and strategic alliances; and to realize the synergies and benefits of such transactions within the expected time frame;
- the performance and reliability of our trading and clearing technologies and those of third-party service providers;
- our ability to keep pace with technological developments and to ensure that the technology we utilize is not vulnerable to cybersecurity risks or other disruptive events;
- our ability to identify trends and adjust our business to benefit from such trends;
- the accuracy of our cost and other financial estimates and our belief that cash flows from operations will be sufficient to service our debt and to fund our operational and capital expenditure needs;
- our ability to maintain existing market participants and data customers, and to attract new ones, and to offer additional products and services, leverage our risk management capabilities and enhance our technology in a timely and cost-effective fashion;
- our ability to attract and retain key talent;
-

our ability to protect our intellectual property rights and to operate our business without violating the intellectual property rights of others;

potential adverse results of threatened or pending litigation and regulatory actions and proceedings; and

our ability to realize the expected benefits of our majority investment in Bakkt which could result in additional unanticipated costs and risks.

These risks and other factors include, among others, those set forth in Item 1(A) under the caption “Risk Factors” and elsewhere in this Annual Report, as well as in other filings we make with the Securities and Exchange Commission, or SEC.

Due to the uncertain nature of these factors, management cannot assess the impact of each factor on the business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements.

Any forward-looking statement speaks only as of the date on which such statement is made, and we undertake no obligation to update any of these statements to reflect events or circumstances occurring after the date of this Annual Report. New factors may emerge and it is not possible to predict all factors that may affect our business and prospects.

ITEM 1. BUSINESS

Introduction

We are a leading global operator of regulated exchanges, clearing houses and listings venues, and a provider of data services for commodity, financial, fixed income and equity markets. We operate regulated marketplaces for listing, trading and clearing of a broad array of derivatives contracts and securities across major asset classes, including energy and agricultural commodities, metals, interest rates, equities, exchange traded funds, or ETFs, credit derivatives, bonds and currencies. We also offer comprehensive data services to support the trading, investment, risk management and connectivity needs of customers around the world and across major asset classes.

Our History

In 2000, ICE was founded with the idea of transforming the energy markets by creating a marketplace that removed barriers and drove greater transparency and access. By staying close to our customers, we have expanded into new asset classes and services, while retaining a core mission of reducing friction in markets and bringing efficiency to our customers' workflows.

Today, we are a Fortune 500 company, providing a global community of market participants an array of execution venues, risk management tools, capital-raising capabilities and mission-critical data and analytics. With a leading-edge approach to developing technology, we provide trading infrastructure in major market centers around the world, offering customers the ability to manage risk and make informed decisions in the jurisdictions and asset classes of their choice. By leveraging our core strengths, we will continue to identify new ways to serve our customers and transform global markets.

Our Business Segments

Our business is conducted through two reportable business segments:

- Trading and Clearing; and
- Data and Listings.

The majority of our identifiable assets are located in the United States, or U.S. and the United Kingdom, or U.K. For a summary of our revenues, net assets and net property and equipment by geographic region, see Note 18 to our consolidated financial statements included in this Annual Report.

Trading and Clearing Segment

We provide execution and risk management services to businesses, investors and traders across major asset classes, such as commodities, interest rates, credit, foreign exchange, equities and mortgage-related products. We operate multiple trading venues, including 12 regulated exchanges and six clearing houses, which are strategically positioned in major market centers around the world, including the U.S., U.K., European Union, or EU, Canada and Singapore. The Trading and Clearing segment accounted for 49% of our consolidated revenues, or \$2.4 billion in 2018. Our Trading and Clearing business can experience moderate seasonal fluctuations, although such seasonal impacts have been somewhat negated in periods of high volume trading. Key products offered include:

Energy Futures and Options: We are a leading marketplace for global crude and refined oil. We offer trading and clearing services across a range of global benchmark contracts, including: Brent, West Texas Intermediate, or WTI, Platts Dubai, Gasoil, Heating Oil, and hundreds of additional grades. The Brent complex, which includes the ICE Brent crude futures contract, our largest contract by volume traded, is a group of related benchmarks used to price a range of traded oil products, including approximately two-thirds of the world's internationally traded crude oil. The ICE Low Sulphur Gasoil futures contract is a European diesel oil contract that serves as a middle distillate pricing benchmark for refined oil products, particularly in Europe and Asia. We also operate the world's second largest market for trading in WTI crude oil futures, as measured by the volume of contracts traded. The WTI crude futures contract is the benchmark for pricing U.S. crude oil.

Our global natural gas complex spans important trading hubs from the U.S. and Canada to Europe and Asia, underpinned by a global offering of more than 600 financially and physically-delivered natural gas contracts. We support liquidity and risk management across markets, from key delivery points in the U.S. to the U.K. NBP and European TTF futures contracts. In Asia, our Japan Korea Marker (JKM) Liquefied Natural Gas, or LNG, futures contract has become the leading LNG benchmark.

In our power markets, we offer a global suite of electric power contracts and are the largest venue for electronic power trading in the world. In addition, we operate the world's leading market for emissions trading, an important component of risk management for global corporations and energy intensive industries.

Agricultural & Metals Futures and Options: We offer benchmark futures and options contracts on the most globally relevant commodities including: sugar, coffee, cocoa and cotton, as well as key metal contracts such as

gold, silver and iron ore. Our markets provide global businesses effective price risk management tools to hedge input costs critical to the global flow of goods and services around the world.

Financial Futures and Options: Our global interest rate complex spans geographies, currencies and tenors, providing market participants with effective tools to manage global interest rate risk. We offer the largest marketplace to transact in U.K. and European interest rates, including Short Sterling, Gilts, Sterling Overnight Index Average, or SONIA, and Euribor. In addition, we recently launched one- and three-month contracts on the Secured Overnight Financing Rates, or SOFR, adding to our interest rate complex. Other Financial Futures and Options include a range of contracts on key global equity and FX benchmarks such as the MSCI® World, MSCI® Emerging Markets, MSCI® EAFE, the FTSE® 100 and the U.S. Dollar Index, or USDX®.

Cash Equities and Equity Options: Through the New York Stock Exchange, or the NYSE, we serve a broad range of global capital markets participants, including investors, traders, market makers and global corporations. With a mission to provide the most transparent, efficient and highest quality trading experience to our customers, the NYSE operates five cash equity exchange venues and two options markets, providing customers with unique optionality and choice in how they transact and manage risk.

Fixed Income and Credit: We offer electronic trade execution for credit default swap, or CDS, instruments and are the industry leader in global CDS clearing, as measured by gross notional cleared. Our fixed income execution businesses offer deep liquidity pools across multiple trading protocols, such as click-to-trade, auctions and request for quote, or RFQ, providing our customers choice in how they manage fixed income risk. Through ICE Mortgage Services, we operate the Mortgage Electronic Registration Systems, or MERS, a national electronic database that tracks changes in mortgage servicing and beneficial ownership interests in U.S. residential loans.

OTC and Other Transactions: Our over-the-counter, or OTC, energy markets comprise bilaterally-traded energy contracts. We operate our financially-settled bilateral energy markets through ICE Swap Trade and we offer electronic trading of contracts based on physically-settled natural gas, power and refined oil contracts through ICE U.S. OTC Commodity Markets.

Other Revenue: Other revenues primarily include interest income on certain clearing margin deposits, regulatory penalties and fines, fees for use of our facilities, regulatory fees charged to member organizations of our U.S. securities exchanges, designated market maker service fees, exchange membership fees and agricultural grading and certification fees.

We operate six clearing houses, each of which acts as a central counterparty that, for its clearing members, becomes the buyer to every seller and the seller to every buyer. Through this central counterparty function, our clearing houses provide financial security for each transaction for the duration of the position by limiting counterparty credit risk. Our clearing houses are responsible for providing clearing services to each of our futures exchanges and certain of our clearing houses clear contracts traded outside of our execution venues.

Mechanisms have been created, called guaranty funds, to provide partial protection in the event of a clearing member default. With the exception of ICE NGX Canada Inc., or ICE NGX, each of the ICE Clearing Houses requires that each clearing member make deposits into a guaranty fund maintained by the relevant ICE Clearing House. In addition, we have contributed \$320 million of our own cash to the guaranty funds as set forth below, and such amounts are at risk and could be used in the event of a clearing member default. Our contributions to each clearing house as of December 31, 2018 are listed below and our clearing houses are referred to herein collectively as “the ICE Clearing Houses”:

Clearing House	Products Cleared	Exchange where Executed	Location	ICE's Contribution to the
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				Guaranty Fund
ICE Clear Europe	Energy, agricultural, interest rates and equity index futures and options contracts and OTC European CDS instruments	ICE Futures Europe, ICE Futures U.S. and ICE Endex	U.K.	\$206 million
ICE Clear U.S.	Agricultural, metals, FX and equity index futures and options contracts	ICE Futures U.S.	U.S.	\$61 million

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ICE Clear Credit	North American, European, Asian-Pacific and Emerging Market CDS instruments	Creditex and third-party venues	U.S.	\$50 million
ICE Clear Netherlands	Approved to offer clearing for Dutch equity options through ICE Endex	ICE Endex	EU	\$2 million
ICE Clear Singapore	Energy, metals and financial futures products	ICE Futures Singapore	Singapore	\$1 million
ICE NGX	Physical North American natural gas, electricity and oil futures	ICE NGX	Canada	—

On January 31, 2019, we increased our contribution to ICE Clear Europe's guaranty fund by \$27 million due to changes in the size of its futures and options guaranty fund which included an increase to our exchange contribution to reflect an increase in the size of the average guaranty fund contributions.

ICE NGX maintains a guaranty fund utilizing a \$100 million letter of credit with a major Canadian bank and backed by a default insurance policy. In the event of a participant default where a participant's collateral becomes depleted, the remaining shortfall would be covered by a draw down on the letter of credit, following which ICE NGX would pay the first \$15 million in losses per its deductible and recover additional losses under the insurance policy up to \$100 million.

We previously operated ICE Clear Canada for the clearing and settlement of our canola contracts. On July 30, 2018, we transitioned the clearing of those contracts to ICE Clear U.S., after which ICE Clear Canada ceased operations.

Data and Listings Segment

We provide a range of data and listing services for global financial and commodity markets, including pricing and reference data, exchange data, analytics, feeds, index services, desktops and connectivity solutions as well as corporate and ETF listing services on our cash equity exchanges. Our Data and Listings segment generated revenues of \$2.6 billion in 2018 and accounted for 51% of our consolidated revenues. Revenues in our Data and Listings segment are largely subscription-based and recurring in nature and generally not impacted by seasonality.

Pricing and Analytics: We provide global securities evaluations, reference data, market indices, risk analytics, derivative pricing and other information designed to meet our customers' portfolio management, trading, risk management, reporting valuation and regulatory compliance needs.

We provide fixed income valuations, including independent evaluated pricing services, on nearly 2.7 million fixed income securities and other hard-to-value financial instruments each day. These instruments span approximately 145 countries and cover a wide range of financial instruments including sovereign, corporate and municipal bonds, mortgage and asset-backed securities and leveraged loans.

Our reference data complements our evaluated pricing services by offering our clients a broad range of descriptive information, covering nearly 13 million financial instruments across over 210 markets. This data is used by clients to inform risk management, support regulatory and compliance needs, create indices and improve operational efficiency. We also offer a range of multi-asset class analytics including valuation services for OTC derivatives and structured products, best execution services, ICE Liquidity Indicators™ and fixed income and equity portfolio analytics to help analyze risk and return exposures. These offerings, including our pricing and reference data, are delivered over our secure technology platforms and are used by investment professionals to simulate various market environments to help forecast performance, construct portfolios, validate investment strategies, conduct stress testing, generate dynamic risk measures, analyze asset cash flows and support regulatory compliance requirements.

We also design and distribute many of today's leading indices and benchmarks across fixed income, equity, commodity and currency markets. Our ICE Bank of America Merrill Lynch, or ICE BofAML, indices are the second largest fixed income index family in the market, serving as the performance benchmarks for nearly \$1 trillion of fund assets. Our index calculation agent services provide clients with independent and objective operational outsourcing, including design, support, maintenance, calculation and distribution of third-party indices. Our ETF valuations service provides clients with intraday calculations of indicative net asset values, or iNAVs.

ICE Benchmark Administration, or IBA, is the regulated administrator of a range of benchmarks including the London Interbank Offered Rate, or LIBOR, the ICE Swap Rate, the London Bullion Market, or LBMA Gold and Silver Price and the ISDA Standard Initial Margin Model, or SIMM, Crowdsourcing Utility. IBA has implemented processes, governance, systems and technology that enhance the transparency and security of these benchmarks and services, which are relied upon, globally.

Exchange Data and Feeds: We provide real-time, historical, and derived pricing data, order book and transaction information related to our trading venues, which span global commodity and financial markets. We publish a broad range of prices and other transaction data and related content from our electronic futures trading platform, as well as data from a broad array of third-party trading venues and news feeds through our ICE Consolidated Feed offering. In addition, we develop equity market data solutions, known as proprietary data. We package this exchange proprietary market data as real-time products and as historical products, which are used for analysis by market participants and observers. Finally, we receive a share of revenue from the National Market System Plan, or NMS Plan, consolidated data products. Under the NMS Plan, all SEC-registered securities exchanges send their trades and top-of-book quotes in exchange listed securities to a central consolidator, which then distributes the data pursuant to SEC requirements.

Desktops and Connectivity: Our Desktop and Connectivity services provide the connection to our exchanges, clearing houses and data centers. These services also facilitate the global distribution of our ICE Data Services data. We offer connectivity solutions to access markets and data through highly secure, resilient and low latency network options through our ICE Global Network, as well as global colocation services and Direct Market Access to over 150 venues. Our ICE Global Network wireless service offers one of the most extensive ultra-low latency network connectivity solutions among the New York, Chicago, Toronto and Tokyo metro areas. Our Desktop service offers a range of products and services to support commodity and energy traders, risk managers, financial advisors, wealth managers, retail traders, Investor Relations Officers and Chief Financial Officers. These applications deliver real-time financial market information and decision-support tools to help clients analyze financial markets and make investment decisions. Our robust instant messaging, or IM, system protects the privacy of clients' business information while allowing collaboration with other market participants in the industry through a secure, compliant channel.

Listings: Through our listings services, we offer corporate and ETF issuers access to the U.S. capital markets. Our listing venues allow companies to list domestic and international equity securities, corporate structured products, convertible bonds, trackers and debt securities. In 2018, the NYSE was the global leader in capital raised for the eighth consecutive year, with approximately \$125 billion raised in total initial public offering, or IPO, proceeds and follow-on offerings from over 350 transactions, almost 1.5x the capital raised by any other exchange in the world.

Product and Services Development

We leverage our customer relationships, global distribution, technology infrastructure and software development capabilities to diversify our products and services. We are continually developing, evaluating and testing new products for introduction into our markets to better serve our client base. The majority of our product development relates to evaluating new contracts or new markets based on customer demand. New contracts often must be reviewed and

approved by relevant regulators. Outside of third-party licensing costs, we typically do not incur separate, material costs for the development of new products - such costs are embedded in our normal costs of operations.

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While we primarily develop our products and services internally, we also periodically evaluate and enter into strategic partnerships and licensing arrangements to develop new products and services. We intend to continue to invest to expand our trading, clearing, data and listings offerings to serve the evolving needs of our global customer base.

Technology

Technology is a key component of our business strategy and competitive position and we regard effective execution of our technology initiatives as crucial to our sustainable business operations, market competitiveness, compliance and risk management and overall success. Our technology solutions support the entire risk management workflow: trading and clearing technology, multi-asset class analytics, risk assessment tools, robust data offerings, instant messaging capabilities and flexible connectivity and delivery solutions. Where feasible, we design and build our own systems and write our own software programs since we believe that having control over our technology allows us to be more responsive to our customers' needs, better support the dynamic nature of our business, provide the highest quality markets and deliver relevant, timely and actionable data to the markets and customers we serve.

ICE Trading Platform and Technology: The ICE trading platform supports trading in our cleared futures and options markets as well as our bilateral OTC markets. We also offer voice brokers a facility for submitting block trades for products that are eligible for clearing. Speed, reliability, resilience, capacity and security are critical performance criteria for electronic trading platforms. Connectivity to our trading platform for our markets is available through our web-based front-end, as well as multiple independent software vendors, or ISVs, and application programming interfaces, or APIs.

Clearing Technology: A broad range of trade management and clearing services are offered through the integrated technology infrastructure that serves our clearing houses. The ICE clearing systems encompass a number of integrated systems, including post-trade position management, risk management, settlement and treasury and reporting functions. A core component of our derivatives clearing houses is the risk management of clearing firm members. Our extensive technology and rules-based risk systems provide analytical tools that allow us to determine margin, evaluate credit risk and monitor trading activities as well as the overall risk of the clearing members.

NYSE Trading Platforms and Related Technology: The NYSE electronic trading platform features an open system architecture that allows users to access our system via one of the many front-end trading applications developed by ISVs. For equity options, we offer a hybrid model of electronic and open outcry trading through NYSE American Options and NYSE Arca Options. We have developed an integrated trading platform and matching engine known as NYSE Pillar and have migrated NYSE Arca Equities, NYSE American, NYSE National, and NYSE Tapes B and C to this platform. We also plan to complete the migration for our remaining U.S. cash equities and equity options markets in 2019, which currently operate on distinct platforms. This integrated platform with single specification will improve performance and reduce the complexity of operating multiple equity and options trading systems.

ICE Data Services Technology: ICE Data Services technology uses integrated platforms to capture, store and process information, perform analytics and maintain connectivity solutions using a single configurable data capture mechanism and a flexible delivery capability. Together, the platforms enable real-time processing and delivery of information, accelerate new product development and improve production reliability. Our data and analytics are delivered via real-time messaging, files, web services and other on-demand facilities and state-of-the-art front-ends. In addition, the technology underpinning our ICE Global Network supports scalable bandwidth and a wide variety of connectivity options including fiber, wireless, colocation and hosting.

- **Cybersecurity:** Cybersecurity is critical to our operations. We employ a layered defense strategy, with leading-edge security technology and processes including robust network segmentation and access control, multi-factor authentication, advanced anti-malware detection/response endpoint software, tightly-controlled Internet access, distributed denial-of-service, or DDoS, mitigation services and significant commercial and bespoke anti-phishing and behavioral detection controls. Where our services are accessible via the Internet, we have implemented additional restrictions to limit access to specific approved networks. We monitor physical threats in addition to cyber threats and continuously review and update physical security and environmental controls to secure our office and data center locations. We also

maintain cybersecurity incident response procedures that allow us to detect, alert, classify, escalate and report a cybersecurity security incident. We operate a strategy that focuses heavily on attack simulation and rapid control improvement. Further, we work closely with our peers, customers, and vendors to solve cybersecurity challenges in our industry.

Business Continuity Planning and Disaster Recovery: We maintain comprehensive business continuity and disaster recovery plans and facilities to provide nearly continuous availability of our markets and other services in the event of a business disruption or disaster. We maintain incident and crisis management plans that address responses to disruptive events at any of our locations worldwide.

Intellectual Property

We rely on a wide range of intellectual property, both owned and licensed, in connection with the operation of our various businesses. We own the rights to a large number of trademarks, service marks, domain names and trade names in the U.S., Europe and in other parts of the world. We have registered many of our trademarks in the U.S. and in certain other countries. We hold the rights to a number of patents and have made a number of patent applications in the U.S. and other countries. We also own the copyright to a variety of material. Those copyrights, some of which are registered, include software code, printed and online publications, websites, advertisements, educational material, graphic presentations and other literature, both textual and electronic. We attempt to protect our intellectual property rights by relying on trademarks, patents, copyrights, database rights, trade secrets, restrictions on disclosure and other methods.

This Annual Report also includes references to third-party trademarks, trade names and service marks. Except as otherwise expressly noted, our use or display of any such trademarks, trade names or service marks is not an endorsement or sponsorship and does not indicate any relationship between us and the parties who own such marks and names.

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Employees

As of December 31, 2018, we had a total of 5,161 employees with 1,587 employees in New York, 938 employees in Atlanta, 736 employees in the U.K. and a total of 1,900 employees across our other offices around the world. Of our total employee base, less than 1% is subject to collective bargaining agreements, and such relations are considered to be good.

Our Competitive Strengths

We believe we compete on the basis of a number of factors, including:

- depth and liquidity of markets;
- price transparency;
- reliability and speed of trade execution and processing;
- technological capabilities and innovation;
- breadth of products and services;
- rate and quality of new product developments;
- quality and stability of services;
- distribution and ease of connectivity;
- mid- and back-office service offerings, including differentiated and value-added services;
- transaction costs; and
- reputation.

We believe that we compete favorably with respect to these factors, and that our deep, liquid markets, breadth of product offerings, new product development, customer relationships and efficient, secure settlement, clearing and support services distinguish us from our competitors. We believe that to maintain our competitive position, we must continue to develop new and innovative products and services, enhance our technology infrastructure, maintain liquidity and offer competitive pricing.

We believe our key strengths include our:

Diverse and Liquid Product Offerings: Many of our futures contracts serve as global benchmarks for managing risk relating to exposure to price movements in the underlying products, including financial, energy and agricultural commodities. For example, we operate the leading market for ICE Brent crude oil futures, as measured by the volume of contracts traded in 2018. The ICE Brent Crude futures contract is the benchmark for pricing light, sweet crude oil produced and consumed outside of the U.S. It is part of the Brent complex, which forms the price reference for approximately two-thirds of the world's internationally-traded physical oil. In addition, we operate a leading market for short-term European interest rates contracts, with our principal contracts based on implied forward rates on European Money Markets Institute Euribor rates and a short-term Sterling contract based on the ICE LIBOR rate, as well as Gilts and the SONIA contract. We also offer markets in other key commodity and financial benchmarks such as: sugar, cocoa, cotton, coffee, MSCI® World, MSCI® Emerging Markets, MSCI® EAFE, the FTSE® 100 and the USDx®. In our cash equities markets, as evidenced by our leading market share, the NYSE's unique market model and technology delivers low levels of volatility and provides participants with deep liquidity.

Risk Management Expertise: We offer a range of central clearing and related risk management services to promote the liquidity and security of our markets in jurisdictions around the world to meet local regulatory and operational needs in key financial market centers. The credit and performance assurance provided by our clearing houses to clearing members is designed to substantially reduce counterparty risk and is a critical component of our exchanges' identities as reliable and secure marketplaces for global transactions. Our clearing houses are designed to protect the financial integrity of our markets by maintaining strong governance and rules, managing collateral, facilitating payments and collections, enhancing capital efficiency and limiting counterparty credit risk.

Unique Derived Data Services: Our global data services business consists of unique information derived from our various execution venues and clearing houses, as well as analytics, valuation services, reference data, desktops, indices and connectivity solutions. Our acquisitions, including of the BofAML Indices, SuperDerivatives, Interactive Data, Standard & Poor's Securities Evaluations, Inc., or SPSE, and Credit Market Analysis have served to expand our data services to better address the rising demand for independent, real-time information, which is being driven by regulation, market fragmentation, technology and data demands, passive investing and indexation. We believe our data services are relevant to our clients' business operations regardless of market volatility and price levels due to the need for continuous information and analysis.

Global Distribution: We operate multiple trading venues, including 12 regulated exchanges, as well as six clearing houses, which are strategically-positioned in major market centers around the world, including the U.S., U.K., EU, Canada and Singapore. Our ICE Global Network, which is our highly secure, resilient and low latency connectivity offering, provides connectivity to over 150 trading venues and data from over 600 third-party sources, including ICE-operated markets and data services.

Technology: Our proprietary systems are built using state-of-the-art technology and support the entire risk management workflow: trading and clearing technology, multi-asset class analytics, risk management tools, a robust data offering, instant messaging capabilities and flexible connectivity and delivery solutions. We employ a significant number of employees in technology-related activities, including product management, system architecture, software development, network engineering, server maintenance and continuity, information security, system and data performance, systems analysis, quality assurance, database administration and customer technical support. Speed, reliability, resilience, capacity and security are critical performance criteria for electronic trading platforms.

Connectivity to our trading platform for our markets is available through our web-based front-end, as well as multiple ISVs and APIs.

Competitors

The markets in which we operate are global and highly competitive. We face competition in all aspects of our business from a number of different enterprises, both domestic and international, including traditional exchanges, electronic trading platforms, data vendors and voice brokers.

Trading and Clearing Segment

In our derivatives markets, we face competition from multiple exchanges in the U.S. and globally. Some of these exchanges are consortiums formed by banks and exchanges.

We face competition from electronic trading systems, third-party clearing houses and technology firms. Additional ventures could form, or have been formed, to provide services that could potentially compete with certain services

that we provide.

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We compete with voice brokers active in the credit derivatives markets, other electronic trading platforms for derivatives, clearing houses and market data vendors. ICE Swap Trade and Creditex compete with other swap execution facilities, or SEFs, and large inter-dealer brokers in the credit derivatives market.

We face significant competition with respect to equities trading, and this competition is expected to remain intense. Our current and prospective competitors include regulated markets, dark pools and other alternative trading systems, or ATSS, market makers and other execution venues. We also face competition from large brokers and customers that may assume the role of principal and act as counterparty to orders originating from retail customers, or by matching their respective order flows through bilateral trading arrangements, including through internalization of order flow. NYSE Arca and NYSE American Options face considerable competition in the equity options markets; their principal U.S. competitors are the Cboe and Nasdaq.

Our fixed income trading venues, which include ICE Credit Trade, BondPoint, TMC Bonds, LLC, or TMC Bonds, and NYSE Bonds, compete with other electronic trading venues. Our platforms also compete for volume traded bilaterally or trading activity that is not done through an electronic venue.

Data and Listings Segment

ICE Data Services faces intense competition in all aspects of its business. We broadly compete with purchased third-party information and services from large global suppliers of financial market data. Our Exchange Data products compete with similar offerings by other exchange groups, and that competition for order flow among the exchange groups and other alternative trading venues constrains the pricing for our proprietary data products. Our Pricing and Analytics services compete with information obtained from informal industry relationships and sources, such as broker quotes as well as other index and portfolio analytics providers. Our Connectivity business competes with other extranet providers.

Our principal competitor for corporate listings in the U.S. is Nasdaq. For ETF listings, we compete with Nasdaq and Cboe Global Markets. We also face competition for foreign issuer listings from a number of stock exchanges outside the U.S. As other liquidity venues and new entrants seek exchange status, we may face more competition for trading volume and listings.

Our Growth Strategy

We seek to advance our leadership position in our markets by focusing our efforts on the following key strategies for growth:

- expand our data offerings and the markets we serve to address the rising demand for information;
- enhance our extensive trading, clearing and risk management capabilities;
- maintain leadership in our listings businesses;
- further develop our technology infrastructure and increase distribution; and
- strengthen competitive position through select acquisitions and strategic relationships.

The record consolidated revenues and futures and options trading volume we achieved in 2018 reflect our focus on the implementation and execution of our long-term growth strategy.

Expand our Data Offerings and the Markets We Serve to Address the Rising Demand for Information

With the growth of our ICE derivatives markets and NYSE equity markets, we have strengthened and enhanced our data services to meet the demand for more data solutions. Our growth has been driven by many factors, such as increased automation, regulation and demand for independent, secure, real-time information. To build on our exchange data and connectivity businesses, we have acquired multiple assets in the past two years, including Interactive Data, SPSE, which we renamed Securities Evaluations, Credit Market Analysis, TMX Atrium and BofAML's Global Research division's index business.

These assets are now part of ICE Data Services, supporting our growth strategy by expanding the markets we serve and adding new data, connectivity and valuation services to our platform. This growth allows us to serve the full trade life cycle from pre-trade, through-trading to post-trade activities. By bringing together a wide range of data and analytics as well

as delivery mechanisms through our Desktops and Connectivity business, we offer customers a comprehensive and flexible solution to address the need for more transparency, efficiency and information across their respective workflows.

We will continue to look for strategic opportunities to grow our data offerings and will also continue to pursue opportunities in markets we do not currently serve. Our recent acquisitions and new product and service offerings have allowed us to grow using a balanced approach, which is supported by an increased demand for these types of services including: portfolio management and analytics, exchange data, real time and historical trading data, pricing, reference and valuation data.

Enhance our Extensive Trading, Clearing and Risk Management Capabilities

Our derivatives customer base has grown and diversified as a result of several drivers, including the addition of new markets and products, the move toward increased risk management and counterparty credit management, mark-to-market and margining services as well as regulatory requirements. We continue to add new participants to our markets, which bring additional demand for new products and services. Our markets support price transparency and risk management, particularly in times of volatility and for products where there is less liquidity. In addition, the use of hedging, trading and risk management programs by commercial enterprises continues to rise based on the availability of technology to deliver more products, as well as the security and the capital efficiencies offered by clearing. We develop new products, but have also increased our capabilities through licenses and acquisitions of companies and intellectual property. Further, by acquiring, building and maintaining our own geographically diverse clearing operations, we are able to respond to market demand for central clearing and related risk management services across diverse geographic and regulatory jurisdictions. As new markets evolve, we intend to leverage our domain knowledge to meet additional demand for cleared products and related risk management solutions.

As requirements for regulatory compliance and capital efficiencies grow, the use of clearing, data and related post-trade services, particularly from independent data and benchmark providers also continues to grow. We intend to continue to expand our customer base by leveraging our existing relationships and our global sales and marketing team to promote participation in our markets, and by expanding our range of products and services.

Maintain Leadership in our Listings Businesses

There are over 2,200 total companies listed on the NYSE and NYSE American. We will continue to focus on enhancing our product offerings and services to retain and attract companies of all sizes and industries to our listing venues. In 2018, demand for our listing services continued to be strong in terms of new listings and secondary offerings. A total of 503 new issuers listed on NYSE markets in 2018. NYSE was the global leader in capital raised in 2018 with approximately \$125 billion raised in over 350 transactions. The NYSE listed 73 IPOs in 2018, raising total IPO proceeds of approximately \$30 billion, including the two largest U.S. IPOs of 2018. The NYSE has listed all of the last 25 U.S. IPOs greater than \$1 billion in proceeds. Our listed companies benefit from:

- a high-tech/ high-touch platform that combines technology and human judgment;
- the NYSE's proprietary hybrid trading model including access to Designated Market Makers, or DMMs, Supplemental Liquidity Providers, or SLPs, and NYSE Floor Brokers;
- the deepest pools of liquidity; and
- lower volatility and tighter spreads, particularly during times of heightened volatility.

In ETFs, as of December 31, 2018, NYSE Arca's listed ETFs had approximately \$2.7 trillion in assets under management, or AUM, representing nearly 80% of all U.S. listed ETFs. We strive to maintain our leadership position by offering ETF issuers:

- guidance through the complete listings process, including expert consultations around regulatory and legal items;
- over a decade of experience in listing more than 2,900 ETFs across a wide range of asset classes and investment strategies;
- a focus on customer service from experienced ETF professionals;
- the highest liquidity in ETFs of any exchange and some of the most narrow quoted bid / ask spreads; and
- Lead Market Maker, or LMM, and incentive programs.

Further Develop Our Technology Infrastructure and Increase Distribution

We develop and maintain our own infrastructure, electronic trading platforms, clearing systems and data and analytics platforms to ensure scalability and the delivery of technology that meets our expanding customer base's demands for price transparency, reliability, risk management and transaction efficiency. We intend to continue to increase ease of access and connectivity with our existing and prospective market participants. We develop and maintain our trading and clearing systems, as well as our data solutions and post-trade systems. We have developed and have begun rolling out a new integrated trading platform and matching engine known as NYSE Pillar that will serve each of our U.S. cash equities and equity options markets to improve performance and reduce the complexity of operating multiple trading systems. We also own and operate two data centers and offer connectivity solutions to global exchanges and content service providers via dedicated data circuits.

Strengthen Competitive Position Through Select Acquisitions and Strategic Relationships

We were an early consolidator in global markets and we intend to continue to explore and pursue acquisitions and other strategic opportunities to strengthen our competitive position globally, broaden our product offerings and services and support the growth of our company while enhancing stockholder value as measured by return on invested capital, earnings and cash flow growth. We may enter into business combinations, make acquisitions or enter into strategic partnerships, joint ventures or other alliances, any of which may be material. In addition to growing our business, we may enter into these transactions for a variety of additional reasons, including leveraging our existing strengths to enter new markets in our industry or related industries, expanding our products and services, diversifying our business, addressing underserved markets, advancing our technology and anticipating or responding to regulatory change or potential changes in our industry or other industries.

Some of our recent key strategic transactions include:

MERS: On October 3, 2018, we completed the purchase of all remaining interests and accordingly, own 100% of MERS. On that date, we gained control of MERS and began to include MERS's results as part of our consolidated operations. MERS is now part of ICE Mortgage Services.

TMC Bonds: In July 2018, we acquired TMC Bonds. TMC Bonds is an electronic fixed income marketplace, supporting anonymous trading across multiple trading protocols in various asset classes, including municipals, corporates, treasuries, agencies and certificates of deposit.

Chicago Stock Exchange: In July 2018, we acquired CHX Holdings, Inc., the parent company of the Chicago Stock Exchange, or CHX, a full-service stock exchange, including trading, data and corporate listings services. CHX operates as a registered national securities exchange.

BondPoint: In January 2018, we acquired 100% of BondPoint from Virtu Financial, Inc. BondPoint is a leading provider of electronic fixed income trading solutions for the buy-side and sell-side offering access to centralized liquidity and automated trade execution services through its ATS.

Euroclear: In October 2017, we acquired a 4.7% stake in Euroclear. In February 2018, we acquired an additional 5.1% stake in Euroclear. Euroclear is a leading provider of post-trade services, including settlement, central securities depositories and related services for cross-border transactions across asset classes.

Our Customer Base

No single customer accounted for more than 10% of total consolidated revenues during 2018, 2017 or 2016.

Executive Officers of the Registrant

Information relating to our executive officers is included under “Executive Officers” in Part III, Item 10, “Directors, Executive Officers and Corporate Governance” of this Annual Report.

Regulation

Our markets are primarily subject to the jurisdiction of regulatory agencies in the U.S., U.K., EU, Canada and Singapore. Failure to satisfy regulatory requirements can or may give rise to sanctions by the applicable regulator. See the discussion below and Item 1(A) “Risk Factors” in this Annual Report for additional descriptions of regulatory and legislative risks and uncertainties.

Regulation of our Derivatives Business

Our regulated derivatives markets and clearing houses are based primarily in the U.S., U.K., EU, Canada and Singapore.

Our U.S. futures exchange, ICE Futures U.S., is subject to extensive regulation by the Commodity Futures Trading Commission, or CFTC, under the Commodity Exchange Act, or CEA. The CEA generally requires that futures trading in the U.S. be conducted on a commodity exchange registered as a Designated Contract Market, or DCM. As a registered DCM, ICE Futures U.S. is a self-regulatory organization, or SRO, that has implemented rules and procedures to comply with the core principles applicable to it under the CEA.

In the U.K., ICE Futures Europe is a Recognized Investment Exchange, or RIE, in accordance with the Financial Services and Markets Act 2000, or FSMA. Like U.S. regulated derivatives markets, RIEs are SROs with surveillance and compliance responsibilities.

In the EU, ICE Endex is a regulated market in the Netherlands and its derivative markets are licensed under the Dutch Financial Services Act and supervised by the Dutch National Bank, or DNB, and the Netherlands Authority for the Financial Markets, or AFM.

In Singapore, ICE Futures Singapore is an approved exchange and is supervised by the Monetary Authority of Singapore, or MAS.

ICE Clear Credit, ICE Clear U.S. and ICE NGX are regulated by the CFTC as Derivatives Clearing Organizations, or DCOs. DCOs are subject to extensive regulation by the CFTC under the CEA. The Financial Stability Oversight Council, or FSOC, has designated ICE Clear Credit as a systemically important financial market utility under Title VIII of the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act. As such, ICE Clear Credit has access to the Federal Reserve System and holds deposits of \$19.5 billion of its U.S. dollar cash in its cash accounts at the Federal Reserve as of December 31, 2018.

ICE Clear Europe, which is primarily regulated in the U.K. by the Bank of England, or BOE, as a Recognized Clearing House, or RCH, is also subject to regulation by the CFTC as a DCO. Both ICE Clear Credit and ICE Clear Europe are also regulated by the SEC as clearing agencies because they clear security-based swaps.

In the EU, ICE Clear Netherlands is an authorized central counterparty and is regulated by the DNB and AFM.

In Singapore, ICE Clear Singapore is an approved clearing house supervised by the MAS.

Regulation of our Securities Business

In our cash equities and options markets, NYSE, NYSE Arca, NYSE American, NYSE National and CHX are national securities exchanges and, as such, are SROs and subject to oversight by the SEC. Accordingly, our U.S. securities exchanges are regulated by the SEC and, in turn, are the regulators of their members. As national securities exchanges, NYSE, NYSE Arca, NYSE American, NYSE National and CHX must comply with, and enforce compliance by their members with, the Securities Exchange Act of 1934, or the Exchange Act.

Our U.S.-based execution oriented fixed income markets are operated by our two SEC-registered broker-dealers, Creditex Securities Corporation, which operates two SEC registered alternative trading systems, ICE BondPoint and ICE Credit Trade, and TMC Bonds, which operates the TMC Bonds alternative trading system. Both Creditex Securities Corporation and TMC Bonds are subject to oversight by the SEC and are members of the Financial Industry Regulatory Authority, or FINRA, and are registered with the Municipal Securities Rulemaking Board, self-regulatory organizations that regulate broker-dealers in the U.S.

Our U.K.-based execution-oriented fixed income market is operated by Creditex Brokerage, L.L.P., which is an operator of a multilateral trading facility, or MTF, and ICE Markets Limited, which acts as the matched principal counterparty to transactions arranged on the MTF operated by Creditex Brokerage. Both Creditex Brokerage and ICE Markets Limited are regulated by the U.K.'s Financial Conduct Authority, or FCA.

Regulation of our Data Business

We have U.S. subsidiaries that are registered with the SEC under the Investment Advisers Act of 1940, or the Investment Advisers Act, for their evaluated pricing services. The Investment Advisers Act imposes numerous regulatory obligations on registered investment advisers, including those relating to the management and distribution of products and services, record-keeping, compliance oversight, operational and marketing requirements, disclosure obligations and prohibitions on fraudulent activities. Investment advisers also are subject to certain state securities laws and regulations. ICE Data Services (Australia) Pty. Ltd. provides financial services in Australia and is licensed by the Australian Securities and Investment Commission, or ASIC. ICE Data Desktop Solutions (Europe) Limited provides certain financial services throughout Europe and is regulated by the FCA. ICE Data Indices, LLC applies the IOSCO Principles for Financial Benchmarks to its indices, and as a third country Benchmark Administrator in Europe, it is subject to the requirements of the European Benchmarks Regulation that regulates the provision of benchmarks, contribution of input data to benchmarks, and the use of benchmarks within the Union. See "Regulatory Changes" below for more information.

Regulatory Changes

Domestic and foreign policy makers continue to review their legal frameworks governing financial markets, and periodically change the laws and regulations that apply to our business and to our customers' businesses. Our key areas of focus on these evolving efforts are:

The harmonization of regulations globally. Global regulations are not fully harmonized and several of the regulations under the Markets in Financial Instruments Directive II, or MiFID II, are inconsistent with U.S. rules. In addition, in 2017, the CFTC announced its new agenda calling for regulatory simplification and the reduction of regulatory burdens. The CFTC is looking to restructure its rules by moving back to a more principles-based approach. As a result, there is potential for further divergence between MiFID II and U.S. rules if the U.S. makes changes to financial regulations while the EU finalizes its implementation of MiFID II.

The proposed revisions to the regulatory structure of non-EU clearing houses. In June 2017, the European Commission published a proposal to revise the current regulatory structure for non-EU clearing houses. The nature and extent of the regulation would depend on the "impact" of a non-EU clearing house's business in the EU. Details on the classification of non-EU clearing will be established by the European Commission, or EC, in cooperation with the European Securities and Markets Authority, or ESMA, and the European System of Central Banks. The proposal is in the process of legislative review by the European Parliament and the EU Member States, and is subject to change. The proposal could have an impact on our non-EU clearing houses and lead to increased regulation to the extent they are doing business in Europe.

Requirement that European exchanges and CCPs offer non-discriminatory access. The non-discriminatory access provisions of MiFID II would require our European exchanges and central counterparty, or CCP, clearing houses to offer access to third parties on commercially reasonable terms. In addition, MiFID II could require our European exchanges and CCPs to allow participants to trade and/or clear at other venues, which may encourage competing venues to offer lookalikes of our products. In June 2016, the EU approved a 12-month postponement of implementation and compliance with this provision of MiFID II to January 3, 2018. On January 3, 2018, ICE Futures Europe and ICE Clear Europe received a deferral from the FCA and the BOE, respectively, which delays the non-discriminatory access provision of MiFID II until July 3, 2020. In addition, on February 28, 2018, the AFM granted ICE Endex and ICE Clear Netherlands a deferral which delays the non-discriminatory access provisions for those entities until July 3, 2020.

Basel III capital charges. The implementation of capital charges in Basel III, particularly, the Supplemental Leverage Ratio with respect to certain clearing members of central counterparties. These new standards may impose burdensome capital requirements on our clearing members and customers that may disincentivize clearing. The Federal Reserve Board and Office of the Comptroller of the Currency have proposed rule changes to the leverage ratio requirements, but these regulations still may have an impact on our clearing members.

The review of prudential requirements for European investment firms. In December 2018 the EC published a proposal on the review of the prudential framework for investment firms, which aims to introduce more proportionate and risk-sensitive rules for investment firms. The proposal is currently in the process of legislative review by the European Parliament and the EU Member States, and is subject to change. In its current form, the proposal imposes disproportionate capital requirements on proprietary trading firms which could encourage them to withdraw from the role of providing liquidity to our markets. The proposal also includes changes to the Markets in Financial Instruments Regulation, or MiFIR, third country framework, which could have a negative impact on the ability of third country firms to access our markets in Europe.

Position limits. The adoption and implementation of position limit rules in the U.S. and the EU could have an impact on our commodities business if comparable trading venues in foreign jurisdictions are not subject to equivalent rules. Position limits became effective in the EU beginning January 2018 under MiFID II. The FCA has published certain position limits for commodity contracts. In certain cases, the position limits are lower than on U.S. trading venues and in certain cases position limits are higher than U.S. equivalent contracts. The FCA is reviewing the issued position limits. Conversely, in December 2016, the CFTC re-proposed the position limit rules. There is potential for further divergence between MiFID II and U.S. position limit rules if the U.S. makes changes to the financial regulations while the EU does not review MiFID II.

A proposed European financial transaction tax. Although a number of Member States can envisage such a tax, many details remain to be discussed and agreed, including how to assess the tax at a Member State level. Implementation of a financial transaction tax could result in a reduction in volumes and liquidity which would have a negative impact on our European operations, if adopted.

The EU Benchmark Regulation, or BMR. The regulation was adopted in June 2016 and applies from January 2018. Under the BMR, benchmarks provided by a third country benchmark administrator may be used by EU-supervised entities provided that the EC has adopted an equivalence decision or the administrator has been recognized or endorsed and the benchmarks are listed on the register established by ESMA. The BMR provides for a transition period which applies

from January 1, 2018, when the BMR enters into force, until January 1, 2020. During this period, ICE Data Indices has applied to the U.K.'s FCA for recognition, and benchmarks provided by ICE Data Indices may continue to be used by supervised entities. EU institutions are currently considering whether it would be appropriate to extend the transitional period for critical benchmarks by potentially one or two years. We are monitoring the impact to our business as a result of these discussions.

Brexit timing and implications. In March 2017, the U.K. officially triggered Article 50 and notified the EU of its intention of leaving the EU following the U.K.'s June 2016 referendum vote to leave the EU (commonly known as Brexit). The triggering of Article 50 begins the process of withdrawal from the EU, which will last two years unless extended by the unanimous decision of Member States or withdrawn by the U.K. prior to the end of the two-year withdrawal period. In November 2018, the U.K. and the 27 other countries involved in Brexit negotiations, commonly referred to as the EU27, agreed upon the terms of a withdrawal agreement which sets out the terms of the U.K.'s withdrawal from the EU and includes a transitional period until December 31, 2020, during which EU law will continue to apply in and to the U.K. The withdrawal agreement will need to be ratified by the EU and the U.K. before it can enter into force and ratification is uncertain.

Continued access by EU market participants to U.K. CCPs and exchanges. In anticipation of Brexit, in December 2018, the EC adopted an equivalence decision regarding the U.K.'s legal and supervisory arrangements for CCPs. In addition, ESMA indicated its intention to complete the recognition of U.K. CCPs pursuant to the EC equivalence decision in a timely manner. Together, the equivalence decision of the EC and the final recognition decisions of ESMA will permit EU market participants to continue clearing through U.K. CCPs, such as ICE Clear Europe, for 12 months as of March 30, 2019 in the case of a U.K. exit from the EU without a transition period. Separately, following Brexit, ICE Futures Europe will continue to be able to permit access by persons in the EU to trading on its platform, even in the absence of a transition agreement. However, the lack of an equivalence decision and corresponding transition period may result in increased costs for certain EU market participants which could impact trading on ICE Futures Europe. Additionally, ICE Futures Europe will require local permissions or exemptions in certain EU jurisdictions to permit access to persons from the relevant EU jurisdictions in the case of a U.K. exit without a transition period. The impact to our business and corresponding regulatory changes remain uncertain at this time. We are monitoring the impact to our business as a result of these discussions and are pursuing avenues to facilitate continued access for EU customers to our services in the event the U.K. exits the EU without a transition period.

The SEC Transaction Fee Pilot. In December 2018, the SEC adopted a Transaction Fee Pilot. The adoption establishes a pilot program, for at least one-year and up to two-years, that will limit the fees charged and rebates paid by our five securities exchanges in certain securities to be designated by the SEC. The SEC has not yet announced the date that this Transaction Fee Pilot will commence.

See the discussion below and Item 1(A) “- Risk Factors” in this Annual Report for additional description of regulatory and legislative risks and uncertainties.

Corporate Citizenship

We strive to create long-term value for our stockholders and meet sustainability goals for all of our stakeholders. That includes maintaining high ethical and business standards, giving back in the communities where we live and work and using our unique resources to bring together a network of the world's leading companies to learn from each other and exchange ideas on a broad range of issues, including those related to environmental, social and governance matters. Much of our approach is driven by the core values that make up our culture. During 2018, we surveyed our employees to further assess how we, as a company, are living up to our core values.

For additional information, please refer to the Corporate Citizenship section of our website at www.theice.com/esg.

Available Information

Our principal executive offices are located at 5660 New Northside Drive, 3rd Floor, Atlanta, Georgia 30328. Our main telephone number is 1-770-857-4700, and our website is www.theice.com.

We are required to file reports and other information with the SEC. A copy of this Annual Report on Form 10-K, as well as any future Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to such reports are available free of charge, on our website as soon as reasonably practicable after we file such reports with, or furnish such reports to, the SEC. A copy of these filings is also available at the SEC's website (www.sec.gov). The reference to our website address and to the SEC's website address do not constitute incorporation by reference of the

information contained on the website and should not be considered part of this report. From time to time, we may use our website and/or social media, including

Twitter, as distribution channels of material information. The website to access our Twitter account is https://twitter.com/ICE_Markets.

In addition, we have posted on our website the charters for our (i) Audit Committee, (ii) Compensation Committee, (iii) Nominating and Corporate Governance Committee and (iv) Risk Committee, as well as our Global Code of Business Conduct, which includes information regarding our whistleblower hotline information, Board of Directors Governance Principles and Board Communication Policy. We will provide a copy of these documents without charge to stockholders upon request.

ITEM 1(A). RISK FACTORS

The risks and uncertainties described below are those that we currently believe could materially adversely affect us. Other risks and uncertainties that we do not presently consider to be material or of which we are not presently aware may become important factors that affect us in the future. If any of the risks discussed below actually occur, our business, financial condition, operating results or cash flows could be materially adversely affected. Accordingly, you should carefully consider the following risk factors, as well as other information contained in or incorporated by reference in this Annual Report.

Global economic, political and financial market events or conditions may negatively impact our business.

Global economic, political and market conditions may impact our business. Adverse macroeconomic conditions, including recessions, inflation, high unemployment, government shutdowns, currency fluctuations, actual or anticipated large-scale defaults or failures or slowdown of global trade could decrease consumer and corporate confidence and reduce consumer, government and corporate spending. If our customers reduce spending, workforce, trading activity or demand for financial data as a result of challenges in the prevailing economic markets, our revenues could decline.

A significant portion of our revenues are derived from fees for transactions executed and cleared in our markets. We derived 44%, 42% and 43% of our consolidated revenues, less transaction-based expenses, from our net transaction-based revenues in 2018, 2017 and 2016, respectively. In particular, we derive a significant percentage of our net transaction-based revenues from trading in ICE Brent Crude futures and options contracts, North American natural gas futures and options contracts, sugar futures and options contracts, equity transactions and short-term interest rates contracts, including the Euribor and Short Sterling futures and options contracts. The trading volumes in our markets could decline substantially if our market participants reduce their level of trading activity for any reason, including:

- a reduction in the number of market participants that use our platform;
- a reduction in trading demand by customers or a decision to curtail or cease hedging or speculative trading;
- regulatory or legislative changes impacting our customers and financial markets;
- a prolonged decrease in volatility in the financial markets;
- heightened capital requirements or mandated reductions in leverage resulting from new regulation;
- transactions effected on any of our markets or cleared through our clearing houses being reclassified as a result of regulatory or legal requirements;
- defaults by clearing or exchange members or the inability of participants to pay out contractual obligations;
- changes to our contract specifications that are not viewed favorably by our market participants; or
- reduced access to or availability of capital required to fund trading activities.

A reduction in our overall trading volume could render our markets less attractive to market participants as a source of liquidity, which could result in further loss of trading volume and associated transaction-based revenues. A reduction in trading volumes could also result in a corresponding decrease in the demand for our market data, which would further reduce our overall revenue.

Further, NYSE's revenue increases when more companies are seeking access to public markets and stagnation or a decline in the IPO market could have an adverse effect on our revenues. The number of public companies in the U.S. has decreased significantly over the last 20 years.

A prolonged government shutdown could negatively impact our business. Our regulated exchanges and clearinghouses are required to obtain regulatory approvals from the CFTC and/or SEC in the ordinary course of

business and failure or delay to provide these approvals could adversely affect our business and our ability to introduce new products and services.

In addition, during a government shutdown, the SEC may not be able to review the registration statements that are seeking to do an initial public offering, which could have a negative impact on our listings business.

As of December 31, 2018, we own 100% of MERS, which operates a national electronic database that tracks changes in mortgage servicing and beneficial ownership interests in U.S. residential loans. If there is a continued rise in interest rates or introduction of restrictions or limits on mortgage lending that leads to a reduction in mortgage activity in the U.S., our results could be negatively impacted.

The uncertainty surrounding the terms of the U.K.'s exit from the EU, commonly referred to as Brexit, could adversely impact our business, results of operations and financial condition.

On June 23, 2016, the U.K. held a referendum in which a majority of voters approved an exit from the EU, commonly referred to as Brexit. The uncertainty surrounding the terms of Brexit, could negatively impact markets and cause weaker macroeconomic conditions that could continue for the foreseeable future. Since U.K. voters approved Brexit in June 2016, Brexit has created political and economic uncertainty and instability in the global markets (including currency and credit markets), particularly in the U.K. and EU. Political and economic uncertainty has, in the past led to, and the outcome of Brexit could lead to, certain macroeconomic conditions that adversely affect our business.

Adverse macroeconomic consequences such as deterioration in economic conditions, volatility in currency exchange rates, legal uncertainty, potentially divergent national laws and regulations as the U.K. determines which EU laws to replace or replicate and/or prohibitive laws and regulations may adversely affect both demand for our products and services and our ability to deliver our products and services into the EU. The long term effects of Brexit will depend, in part, on any agreements the U.K. makes or does not make to retain access to EU markets either during a transitional period or more permanently.

In November 2018, the EU and the U.K. agreed upon the terms of an agreement which sets out the terms of the U.K.'s withdrawal from the EU and includes a transitional period until December 31, 2020. If the agreement is not ratified by the EU and U.K. before the end of March 2019, then, absent the U.K. withdrawing its notice under Article 50 or members of the EU agreeing to extend the two-year notice period, the U.K. will leave the EU with no agreements in place beyond those temporary arrangements which have or may be put in place by the EU or individual EU Member States, and the U.K. as part of no-deal contingency efforts and those conferred by mutual membership of the World Trade Organization. Given the lack of comparable precedent, it is unclear what financial, trade and legal implications the U.K. leaving the EU with no agreements in place would have and how such withdrawal would affect us. Impacts could include access to our services by persons located in the EU being prohibited or becoming more expensive, which could negatively impact our profitability.

Our businesses and those of many of our clients have been and continue to be subject to increased legislation and regulatory scrutiny, and we face the risk of changes to this regulatory environment and business in the future. We are and will continue to be subject to extensive regulation in many jurisdictions around the world, and in particular in the U.S. and the U.K. where the largest portions of our operations are conducted. We face the risk of significant actions by regulatory and taxing authorities in all jurisdictions in which we conduct our businesses and hold investments that may affect our business, the activity of our market participants, and as a consequence, our results. Among other things, as a result of regulators and tax authorities enforcing existing laws and regulations, we could be censured, fined, prohibited from pursuing certain acquisitions or engaging in some of our business activities, subjected to limitations or conditions on our business activities, including fair, reasonable and nondiscriminatory pricing restrictions, also known as FRAND, or subjected to new or substantially higher taxes or other governmental charges in connection with the conduct of our business or with respect to our employees, including settlement payments, interest payments and penalty payments. In many cases, our activities may be subject to overlapping and divergent regulation in different jurisdictions.

There is also the risk that new laws or regulations or changes in enforcement practices applicable to our businesses or those of our clients could be imposed. This could adversely affect our ability to compete effectively with other institutions that are not affected in the same way or impact our clients' overall trading volume through our exchanges and demand for our market data and other services. The U.S. government, in particular, has indicated a goal of reforming many aspects of existing financial services regulations. Some areas identified as subject to potential change, amendment or repeal include the Dodd-Frank Act and the authorities of the Federal Reserve and FSOC, however, it is

unknown at this time to what extent new legislation will be passed into law or pending or new regulatory proposals will be adopted or modified, or the effect that such passage, adoption or modification will have, positively or negatively, on our industry or on us. There is also increasing public concern regarding data privacy and data protection and many jurisdictions have passed laws in

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this area, such as the European Union General Data Protection Regulation, and other jurisdictions are considering imposing additional restrictions. These laws and regulations are increasing in complexity and number, change frequently and increasingly conflict among the various countries in which we operate, which has resulted in greater compliance risk and cost for us.

These developments could impact our profitability in the affected jurisdictions, or even make it uneconomical for us to continue to conduct all or certain of our businesses in such jurisdictions, or could cause us to incur significant costs associated with changing our business practices, restructuring our businesses or moving all or certain of our businesses and our employees to other jurisdictions, including liquidating assets or raising capital in a manner that adversely increases our funding costs or otherwise adversely affects our stockholders and creditors. For example, the adoption and implementation of position limit rules in the U.S. and the EU could have an impact on our commodities business if comparable trading venues in foreign jurisdictions are not subject to equivalent rules. Position limits became effective in the EU beginning January 2018 and in certain cases the position limits are lower than U.S. equivalent contracts and in other cases position limits are higher than U.S. equivalent contracts. These divergent regulations may cause us to move products from one jurisdiction to another as a result of business risks and competitive challenges and could significantly increase the regulatory compliance costs for our customers, which could have a negative impact on our business.

U.S. and EU legal and regulatory developments in response to the global financial crisis, in particular the Dodd-Frank Act, EMIR, MiFID II and the BMR, have significantly altered and propose to further alter the regulatory framework within which we operate and may adversely affect our competitive position and profitability. The enacted and proposed legal and regulatory changes most likely to affect our businesses are: position limit rules in the U.S. and the EU, non-discriminatory access provisions of MiFID II, interoperability and margin rules in EMIR, enhanced regulatory capital liquidity and leverage rules in Basel III and Capital Requirements Directive IV, access rules under the BMR, the non-harmonization of margin requirements, implementation of a financial transaction tax, access to our benchmarks and maintaining our exchanges' abilities to operate as SROs with related immunity for the discharge of their regulatory functions. As the operator of global businesses, the lack of harmonization in international financial reform efforts could impact our business as our clearing houses and exchanges are subject to regulation in multiple jurisdictions.

The Dodd-Frank Act established enhanced regulatory requirements for non-bank financial institutions designated as "systemically important" by the FSOC. ICE Clear Credit has been designated as a systemically important financial market utility by the FSOC and, as a result, is subject to additional oversight by the CFTC.

In 2016, the SEC approved a plan to establish a market-wide consolidated audit trail, or CAT, to improve regulators' ability to monitor trading activity. In 2018, the first phase of implementation went live and required participants to begin reporting to the CAT, with a phased implementation of the provisions of the CAT through 2019. Due to delays in implementation and failure to implement required functionality, there is an increased risk to execution venues (which includes us) of regulatory action by the SEC. In addition to increased risk in connection with our regulatory obligations, implementation of the CAT could result in significant additional expenditures, which may not be reimbursed. Funding of the implementation and operation of the CAT is ultimately expected to be provided by both the execution venues and industry members. To date, however, funding has been provided solely by the execution venues in exchange for promissory notes expected to be repaid if industry member fees are approved by the SEC and are collected to fund the CAT. Until the SEC approves a funding model that shares the cost of the CAT between the execution venues and industry members, the execution venues may continue to incur additional significant costs, and there is a risk such funding model may result in the uncollectibility of the issued promissory notes. As of December 31, 2018, we have accrued approximately \$16 million as a receivable in connection with our portion of expenses related to the CAT implementation.

We are subject to tax laws, regulations, rulings and audits in multiple U.S. and non-U.S. jurisdictions that could have a significant impact on our business and lead to additional expenditures for us or our customers. For example, there have been discussions in various jurisdictions around financial transaction or digital service tax frameworks.

Implementation of any new or amended taxes or regulations could impact our global operations or trading volumes, if adopted.

Other enacted and proposed legal and regulatory changes not discussed above may also adversely affect our competitive position and profitability. See Item 1 “- Business - Regulation” above for additional information regarding the current and proposed laws and regulations that impact our business, including risks to our business associated with these laws and regulations.

Our business is subject to the impact of financial markets volatility, including the prices and interest rates underlying our derivative products, due to conditions that are beyond our control.

Trading volume in our markets and products is largely driven by the degree of volatility - the magnitude and frequency of fluctuations - in prices and levels of the underlying commodities, securities, indices, financial benchmarks or other instruments. Volatility increases the need to hedge price risk and creates opportunities for investment and speculative or arbitrage trading. Were there to be a sustained period of stability in the prices or levels of the underlying commodities, securities, indices, benchmarks or other instruments of our products, we could experience lower trading volumes, slower growth or declines in revenues.

Factors that are particularly likely to affect price and interest rate levels and volatility, and thus trading volumes, include:

- global and domestic economic, political and market conditions;
- concerns over inflation, deflation, legislative and regulatory changes, government fiscal and monetary policy - including actions by the Federal Reserve and other foreign monetary units governing bodies, and investor and consumer confidence levels;
- weather conditions including hurricanes and other significant events, natural and unnatural disasters like large oil spills that impact the production of commodities and, in the case of energy commodities, production, refining and distribution facilities for oil and natural gas;
- war, acts of terrorism and any unforeseen market closures or disruptions in trading;
- political developments impacting international trade, including continued uncertainty surrounding Brexit, trade disputes and increased tariffs, particularly between the U.S. and China;
- real and perceived changes in the supply and demand of commodities underlying our products, particularly energy and agricultural products, including changes as a result of technological improvements or the development of alternative energy sources; and
- credit quality of market participants, the availability of capital and the levels of assets under management.

Any one or more of these factors, which are beyond our control, may reduce trading activity, which could make our markets less attractive as a source of liquidity, and in turn could further discourage existing and potential market participants and thus accelerate a decline in the level of trading activity and potentially related services such as data or clearing. Further, lower market volatility could also result in more exchanges competing for trading volumes to maintain their growth. If any of these unfavorable conditions were to persist over a lengthy period of time and trading volumes were to decline substantially and for a long enough period, the critical mass of transaction volume necessary to support viable markets could be jeopardized. Because our cost structure is largely fixed, if demand for our current products and services decline for any reason, we may not be able to adjust our cost structure to counteract the associated decline in revenues, which would cause our net income to decline.

Systems failures in the derivatives and securities trading industry could negatively impact us.

High-profile system failures in the derivatives and securities trading industry could negatively impact our business and result in a loss of confidence in our technology and our markets, regulatory investigations, fines and penalties and business activity slowdown or interruptions. Further, regulators have imposed requirements for trading platforms that have been costly for us to implement and could result in a decrease in demand for some of our services. In particular, the SEC's Regulation Systems Compliance and Integrity, or Regulation SCI, and the CFTC's system safeguards regulations subject portions of our securities and derivatives trading platforms and other technological systems related to our clearing houses, trade repositories and the U.S. SEF to more extensive regulation and oversight. Ensuring our compliance with the requirements of Regulation SCI and the CFTC's system safeguards regulations requires significant implementation costs as well as increased ongoing administrative expenses and burdens. In addition, any expansion of the ICE systems that are determined to be in scope for Regulation SCI could result in significant additional expenditures.

Our systems and those of our third-party service providers may be vulnerable to cyber-attacks, hacking and other cyber security risks, especially in light of our role in the global financial marketplace, which could result in wrongful manipulation, disclosure or use of our information or that of a third party, or which could make our participants unable or reluctant to use our electronic platform.

The secure transmission of confidential information and the ability to reliably transact on our electronic platforms and provide financial data services are critical elements of our operations. Some of our products and services involve the

storage and transmission of proprietary information and sensitive or confidential client data, including client portfolio information. If anyone gains improper access to our electronic platforms, networks or databases, they may be able to steal, publish, delete or modify our confidential information or that of a third party. Breaches of our cybersecurity measures or the accidental loss, inadvertent disclosure or unapproved dissemination of proprietary information or sensitive or confidential data about us, our clients or our customers, including the potential loss or disclosure of such information or data could expose us, our customers or the individuals affected to a risk of loss or misuse of this information, result in litigation, regulatory action and potential liability for us, damage our brand and reputation or otherwise harm our business. Our networks and those of our participants, third-party service providers and external market infrastructures may be vulnerable to compromise, unauthorized access, security technology failure, computer viruses, social engineering, denial of service attacks, terrorism, “ransom” attacks, firewall or encryption failures or other security problems resulting in loss of data integrity, information disclosure, unavailability or fraud. The financial services industry has been targeted for purposes of political protest, activism and financial gain and our role in the global marketplace places us at greater risk than other public companies for cyber-attack and other information security threats. Further, former employees of certain companies in the financial sector have misappropriated trade secrets or stolen source code in the past, and we could be a target for such illegal acts in the future. There also may be system or network disruptions if new or upgraded systems are defective or not tested and installed properly.

Although we have not been the victim of cyber-attacks or other cyber incidents that have had a material impact on our operations or financial condition, we have from time to time experienced cybersecurity events including distributed denial of service attacks, malware infections, phishing, web attacks and other information technology incidents that are typical for a financial services company of our size. For example, we detected and responded to the exploitation of a legacy web server in September 2018. While our controls prevented the attack from establishing persistent network access or expanding laterally into additional systems, we did invoke our incident response procedures to eliminate the vector of attack and forensically confirm the limited extent of any data that was exposed. Further, we exercised our third-party incident response arrangements to independently validate our findings. While we operate an Information Security program that is designed to prevent, detect, track and mitigate cyber incidents and that has detected and mitigated such incidents in the past, we cannot assure you that these measures will be sufficient to protect our business against attacks, losses or reduced trading volume in our markets as a result of any security breach, hacking or cyber-attack. Any such attacks could result in reputational damage, cause system failures or delays that could cause us to lose customers, cause us to experience lower current and future trading volumes or incur significant liabilities or have a negative impact on our competitive position. In addition, given the increasing complexity and sophistication of the techniques used to obtain unauthorized access or disable or degrade systems, a cyber-attack could occur and persist for an extended period of time before being detected, and we may not anticipate these acts or respond adequately or timely. The extent of a particular cyber incident and the steps that we may need to take to investigate the incident may not be immediately clear, and it may take a significant amount of time before such investigation can be completed and full and reliable information about the incident is known. While such an investigation is ongoing, we may not necessarily know the extent of the harm or how best to remediate it, which may compound damages before the incident is discovered or remediated. Additionally, as threats continue to evolve and increase, and as the regulatory environment related to information security, data collection and use, and privacy becomes increasingly rigorous, we may be required to devote significant additional resources to modify and enhance our security controls and to identify and remediate any security vulnerabilities, which could adversely impact our net income.

Owning clearing houses exposes us to risks, including risks related to defaults by clearing members, risks related to investing margin and guaranty funds and the cost of operating the clearing houses.

There are risks inherent in operating clearing houses, including exposure to the market and counterparty risk of clearing members, market liquidity risks, defaults by clearing members and risks associated with custody and investing margin or guaranty fund assets provided by clearing members to our clearing houses, which could subject our business to substantial losses. For example, clearing members have transferred an aggregate amount of cash in ICE Clear Europe relating to margin and guaranty funds of \$30.9 billion as of December 31, 2018 and a total of \$64.0 billion for all of our clearing houses as of December 31, 2018. ICE Clear Europe and ICE Clear U.S. use third-party investment managers for investment of cash assets and may add or change the investment managers from time to time. To the extent available, ICE Clear Credit holds the U.S. dollar cash and U.S. Treasuries that clearing members transfer

to satisfy their original margin and guaranty fund requirements at its account at the Federal Reserve. With respect to other clearing member cash posted, ICE Clear Credit currently self-manages and uses external investment managers to invest such cash margin and guaranty fund deposits.

We have an obligation to return margin payments and guaranty fund contributions to clearing members to the extent that the relevant member's risk based on its open contracts to the clearing house is reduced. If a number of clearing members

substantially reduce their open interest or default, the concentration of risks within our clearing houses will be spread among a smaller pool of clearing members, which would make it more difficult to absorb and manage risk in the event of a further clearing member's default.

Although our clearing houses have policies and procedures to help ensure that clearing members can satisfy their obligations, such policies and procedures may not succeed in preventing losses after a member's or counterparty's default. In addition, although we believe that we have carefully analyzed the process for setting margins and our financial safeguards, it is a complex process and there is no guarantee that our procedures will adequately protect us from the risks of clearing these products. We cannot assure you that these measures and safeguards will be sufficient to protect us from a default or that we will not be materially and adversely affected in the event of a significant default. We have contributed our own capital to the front of the guaranty fund of the clearing houses that could be used in the event of a default. Furthermore, the default of any one of the clearing members could subject our business to substantial losses and cause our customers to lose confidence in the guaranty of our clearing houses.

A decline in the value of securities held as margin or guaranty fund contributions by our clearing houses or default by a sovereign government issuer could pose additional risks of default by clearing members.

Our clearing houses hold a substantial amount of assets as margin or guaranty fund contributions, which comprise U.S. and other sovereign treasury securities. As of December 31, 2018, our clearing houses held \$54.3 billion of non-cash margin or guaranty fund contributions in U.S. and other sovereign treasury securities: \$41.5 billion of this amount was comprised of U.S. Treasury securities, \$1.8 billion of French Treasury securities, \$1.7 billion of German Treasury securities, \$1.2 billion of Italian Treasury securities, \$1.4 billion of U.K. Treasury securities, and \$6.6 billion of other European, Japanese and Tri-Party Treasury securities. Sovereign treasury securities have historically been viewed as one of the safest and most liquid securities for clearing houses to hold due to the perceived credit worthiness of major governments. However, the markets for such securities have experienced significant volatility during the past decade and as of late due to on-going financial challenges in some of the major European countries and the U.S. government's negotiations regarding taxation, spending cuts and raising the debt ceiling, which is the maximum amount of debt that the U.S. government can legally incur. In addition, if there is a collapse of the euro, our clearing houses would face significant expenses in changing their systems and such an event could cause a credit contraction and major swings in asset prices and exchange rates. To mitigate this risk, our clearing houses currently apply a discount or "haircut" to the market values for all sovereign securities held as margin or guaranty fund contributions; however, market conditions could change more quickly than we adjust the amount of the haircuts and the haircuts could be insufficient in the event of a sudden market event.

Notwithstanding the current intraday margin and valuation checks conducted by our clearing houses and our policies and practices to limit exposures, our clearing houses will need to continue to monitor the volatility and value of sovereign treasury securities. If the value of these securities declines significantly, our clearing houses will need to collect additional margin or guaranty fund contributions from their clearing members, which may be difficult for the members to supply in a time of financial stress affected by an actual or threatened default by a sovereign government. In addition, our clearing houses may be required to impose a more significant discount on the value of sovereign treasury securities posted as margin or guaranty fund contributions if there is uncertainty regarding the future value of these securities, which would trigger the need for additional margin or guaranty fund contributions by the clearing members. If a clearing member cannot supply the additional margin or guaranty fund contributions, which may include cash in a currency acceptable to the clearing house, the clearing house would deem the clearing member in default. If any clearing members default as a result of the reduction in the value of margin or guaranty fund contributions, our clearing houses and trading business could suffer substantial losses as a result of the loss of any capital that has been contributed to the clearing house's guaranty funds and a loss of confidence by clearing members in the clearing house, resulting in a reduction in volumes of future cleared transactions.

Further, our clearing houses invest large sums through reverse repo transactions in connection with their clearing operations and hold sovereign securities as security in connection with such investment transactions. In the event that a reverse repo counterparty defaults, the value of the sovereign securities we hold as collateral might not be sufficient to cover our losses. Our clearing houses may also make demand deposits with banks that are secured only to the value of Federal Deposit Insurance Corporation, or FDIC, insurance or other national deposit guarantee schemes, which is small, and therefore, the deposits may in significant part be lost in the event one of these banks becomes insolvent.

Owning and operating equity and options exchanges exposes us to additional risks, including the regulatory responsibilities to which these businesses are subject.

Owning and operating equity and options exchanges for which the revenues are primarily derived from trading activity, market data and listing fees, exposes us to additional risks. Adverse economic conditions and regulatory changes similar to those discussed above, including changes to the number of exchanges that are permitted to conduct closing auctions, could result in decreased trading volume on our exchanges, discourage market participants from listing on our equity and options exchanges or cause them to forgo new offerings. Any of these could reduce our revenues, including market data revenue.

Our exchanges are operated as for-profit businesses but have certain regulatory responsibilities that must be fulfilled. Specifically, our exchanges are responsible for enforcing listed company compliance with applicable listing standards, overseeing regulatory policy determinations, rule interpretation and regulation-related rule development and conducting trading reviews. Any failure by one of our exchanges with self-regulatory responsibility to comply with, and enforce compliance by their members, with exchange rules and securities laws could significantly harm our reputation, prompt regulatory scrutiny, result in the payment of fines or penalties and adversely affect our business, financial condition and operating results.

We must allocate significant resources to fulfill our self-regulatory responsibilities. The for-profit exchanges' goal of maximizing stockholder value might contradict the exchanges' self-regulatory responsibilities. The listing of our common stock on the NYSE could potentially create a conflict between the exchange's regulatory responsibilities to vigorously oversee the listing and trading of securities, on the one hand, and our commercial and economic interest, on the other hand. While we have structural protections to minimize these potential conflicts, we cannot be sure that such measures will be successful.

Further, changes in the rules and operations of our securities markets must be reviewed and approved by the SEC. Approval of such changes by the SEC cannot be guaranteed and the SEC could delay either the approval process or the initiation of the public comment process. Any denial or delay in approving changes could have an adverse effect on our business, financial condition and operating results.

Our compliance and risk management methods, as well as our fulfillment of our regulatory obligations, might not be effective, which could lead to enforcement actions by our regulators.

Our ability to comply with complex and changing laws and rules 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. Regulators periodically review our exchanges' ability to self-regulate and our compliance with a variety of laws and regulations including self-regulatory standards. In particular, certain of our businesses associated with the NYSE Group are subject to public notice procedures prior to making changes in operations, policies and procedures. If we fail to comply with any of these obligations, regulators could take a variety of actions that could impair our ability to conduct our business.

Our acquisitions expose us to new regulatory requirements. For example, as a result of our acquisitions of Interactive Data and Securities Evaluations, we operate two SEC-registered investment advisers. Investment advisers are subject to significant regulatory obligations under the Investment Advisers Act. Prior to these acquisitions, none of our businesses were registered under the Investment Advisers Act. Compliance with the Investment Advisers Act and other regulatory requirements gives rise to costs and expenses that may be material. In addition, our acquisition of the BondPoint ATS in January 2018 exposes us to increased exposure to regulatory scrutiny from the SEC and FINRA and our acquisition of TMC Bonds in July 2018 exposes us to regulatory scrutiny from FINRA.

Our regulators have broad enforcement powers to censure, fine, issue cease-and-desist orders or prohibit us from engaging in some of our businesses. We will continue to face the risk of significant intervention by regulatory authorities, including extensive examination and surveillance activity. Any such matters may result in material adverse consequences to our financial condition, operating results or ability to conduct our business, including adverse judgments, settlements, fines, penalties, injunctions, restrictions on our business activities or other relief. Our involvement in any such matters, even if the matters are ultimately determined in our favor, could also cause significant harm to our reputation and divert management attention from the operation of our business. Further, any settlement, consent order or adverse judgment in connection with any formal or informal proceeding or investigation by government or regulatory agencies may result in additional litigation, investigations or proceedings as other litigants and government or regulatory agencies begin independent reviews of the same businesses or activities. Finally, the implementation of new legislation or regulations, or changes in or unfavorable interpretations of existing

regulations by courts or regulatory bodies, could require us to incur significant compliance costs and impede our ability to remain competitive and grow our business.

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We face intense competition.

We face intense competition in all aspects of our business and our competitors, both domestic and international, are numerous. We currently compete with:

regulated, diversified futures exchanges globally that offer trading in a variety of asset classes similar to those offered by us, such as energy, agriculture, equity and equity index, credit, and interest rate derivatives markets and foreign exchange;

exchanges offering listing and trading of cash equities, ETFs, closed-end funds and other structured products similar to those offered by us;

market data and information vendors;

interdealer brokers active in the global credit derivatives markets;

existing and newly formed electronic trading platforms, service providers and other exchanges;

other clearing houses; and

consortiums of our customers, members or market participants that may pool their trading activity to establish new exchanges, trading platforms or clearing facilities.

Trends towards the globalization of capital markets have resulted in greater mobility of capital, greater international participation in markets and increased competition among markets in different geographical areas. Competition in the market for derivatives trading and clearing and in the market for cash equity listings, trading and execution have intensified as a result of consolidation, as the markets become more global in connection with the increase in electronic trading platforms and the desire by existing exchanges to diversify their product offerings. Finally, many of our competitors are our largest customers or are owned by our customers and may prioritize their internalization and ATS businesses ahead of their exchange-based market making business.

We also face pricing competition in many areas of our business. A decline in our fees due to competitive pressure, the inability to successfully launch new products or the loss of customers due to competition could lower our revenues, which would adversely affect our profitability. For example, ICE Data Services' business has benefited from a high renewal rate in its subscription-based business, but we cannot assure you that this will continue. We also cannot assure you that we will be able to continue to expand our product offerings, modify the pricing for our products or retain our current customers or attract new customers. If we are not able to compete successfully, our business could be materially impacted, including our ability to remain as an operating entity.

We may have difficulty executing our growth strategy and maintaining our growth effectively.

We have achieved a tremendous amount of growth since becoming a public company in 2005. Our growth is highly dependent on customer demand for our core products and services, favorable economic conditions and our ability to invest in our personnel, facilities, infrastructure and financial and management systems and controls. Adverse economic conditions could reduce customer demand for our products and services, which may place a significant strain on our management and resources and could force us to defer existing or future planned opportunities. We regularly evaluate our existing operations, service capacity and business efficiencies and, as a result of such evaluations, we may undertake strategic initiatives outside of and within our businesses. In addition, we may not be successful in executing on our strategies to support our growth organically or through acquisitions, other investments or strategic alliances.

Failure to evolve our benchmarks and indices in a manner that maintains the relevance of the benchmark or index, damage to our reputation resulting from our administration of LIBOR or other benchmarks and indices and the potential replacement of LIBOR could adversely affect our business.

We operate multiple global benchmark products and indices across our asset classes and a significant portion of our volume is based on these products. To ensure continued trading in our benchmark products and indices, we must be able to demonstrate that our products are not readily subject to manipulation and we must continue to evolve our products to maintain their relevance. Our subsidiary, IBA, is the administrator for various benchmarks, including LIBOR. IBA's administration of LIBOR is the result of the LIBOR scandal, which was a series of fraudulent actions taken by banks that were submitting false LIBOR rates to profit from trades, or to give the impression that the banks were more creditworthy than they were. Any failures, negative publicity or lawsuits resulting from our administration of LIBOR or other benchmarks could result in a loss of confidence in the administration of these benchmarks and could harm our business and our reputation.

In January 2019, we were named as a defendant in two virtually identical proposed class action lawsuits regarding the administration of LIBOR that allege that we and 18 multinational banks engaged in a conspiracy to set the LIBOR benchmark at artificially low levels. Also, in July 2017, the FCA announced the desire to phase out the use of LIBOR by the end of 2021. There is currently no definitive information regarding the future utilization of LIBOR or of any particular replacement rate. The Federal Reserve, in conjunction with the Alternative Reference Rates Committee, a steering committee comprised of large U.S. financial institutions, announced replacement of U.S. dollar LIBOR with a new index calculated by short-term repurchase agreements, backed by U.S. Treasury securities called the SOFR. The first publication of SOFR was released in April 2018. Whether or not SOFR attains market traction as a LIBOR replacement tool remains in question and the future of LIBOR at this time is uncertain. As a result, it is not possible to predict the effect of any changes, establishment of alternative references rates or other reforms to LIBOR that may be enacted in the U.K. or elsewhere. The elimination of LIBOR or any other changes or reforms to the determination or supervision of LIBOR could have an adverse impact on our business, financial condition and operating results.

We may not be successful in offering new products or technologies or in identifying opportunities.

We intend to launch new products and services and continue to explore and pursue other opportunities to strengthen our business and grow our company. We may spend substantial time and money developing new product offerings or improving current product offerings. If these offerings are not successful, we may miss a potential market opportunity and not be able to recover the costs of such initiatives. Obtaining any required regulatory approval associated with these offerings may also result in delays or restrictions on our ability to benefit fully from these offerings. Further, we may seek to enter into or increase our presence in markets that already possess established competitors who may enjoy the protection of high barriers to entry. Introducing or maintaining our offerings in certain countries may also be subject to a number of other risks, including currency exchange rate risk, difficulties enforcing agreements or collecting receivables, longer payment cycles, compliance with the laws or regulations of these countries, and political and regulatory uncertainties.

In addition, in light of consolidation in the exchange, data services and clearing sectors and competition for opportunities, we may be unable to identify strategic opportunities or we may be unable to negotiate or finance any future acquisition successfully. Our competitors could merge, making it more difficult for us to find appropriate entities to acquire or merge with and making it more difficult to compete in our industry due to the increased resources of our merged competitors. Also, offering new products and pursuing acquisitions requires substantial time and attention of our management team, which could prevent them from successfully overseeing other initiatives that are necessary for our success.

We have made substantial progress toward developing and deploying new technology platforms to improve our equity exchange business and data services business. We may experience disruptions or encounter unexpected challenges in deploying these new systems. Further, the costs to complete the remaining work may exceed our current expectations. Any significant cost increases or disruptions to product quality, sales effectiveness or client service or to our other business operations could have an adverse effect on our business, financial condition and operating results.

If we are unable to keep up with rapid changes in technology and client preferences, we may not be able to compete effectively.

To remain competitive, we must continue to enhance and improve the responsiveness, functionality, accessibility and reliability of our electronic platforms and our proprietary and acquired technology. The financial services industry is characterized by rapid technological change, change in use patterns, change in client preferences, frequent product and service introductions and the emergence of new industry standards and practices. These changes could render our existing proprietary technology uncompetitive or obsolete. We are in the process of implementing a new trading technology system at NYSE and if there are trading disruptions or if the new system has inadequate performance, we could suffer material losses, incur reputational damage or be subject to heightened regulatory scrutiny.

Further, we use some open-source software in our technology, most often as small components within a larger product or service, to augment algorithms, functionalities or libraries we create, and we may use more open-source software in the future. Open-source code is also contained in some third-party software we rely on. We could be subject to suits by parties claiming breach of the terms of the license for such open-source software. The terms of many open-source licenses are ambiguous and have not been interpreted by U.S. or other courts, and these licenses could be construed in a manner that imposes unanticipated conditions or restrictions on our ability to commercialize our products and

services.

We cannot assure you that we will successfully implement new technologies or adapt our proprietary technology to our clients' requirements or emerging industry standards in a timely and cost-effective manner. Any failure to remain abreast

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of industry standards in technology and to be responsive to client preferences could cause our market share to decline and negatively impact our results.

Our business may be harmed by computer and communication systems failures and delays.

Our business depends on the integrity, reliability and security of our infrastructure which is highly dependent on our computer and communication systems. We support and maintain many of the systems that comprise our electronic platforms and our failure to monitor or maintain these systems, or to find replacements for defective components within a system in a timely and cost-effective manner when necessary, could have a material adverse effect on our ability to conduct our business. Our customers rely on us for the delivery of time-sensitive, up-to-date and high-quality financial market data, analytics and related solutions. Our timely, reliable delivery of high-quality products and services is subject to an array of technical production processes that enable our delivery platforms to leverage an extensive range of content databases. Our redundant systems or disaster recovery plans may prove to be inadequate in the event of a systems failure or cybersecurity breach. Our systems, or those of our third-party providers, may fail or be shut down or, due to capacity constraints, may operate slowly, causing one or more of the following:

- unanticipated disruption in service to our participants;
- slower response time and delays in our participants' trade execution and processing;
- failed settlement by participants to whom we provide trade confirmation or clearing services;
- incomplete or inaccurate accounting, recording or processing of trades;
- failure to complete the clearing house margin settlement process resulting in significant financial risk;
- distribution of inaccurate or untimely market data to participants who rely on this data in their trading activity; and
- financial loss to us or those who depend on our systems and data.

We could experience system failures due to power or telecommunications failures, human error on our part or on the part of our vendors or participants, natural disasters, fire, sabotage, hardware or software malfunctions or defects, computer viruses, cyber-attacks, intentional acts of vandalism or terrorism and similar events. If any one or more of these situations were to arise, they could result in damage to our business reputation and participant dissatisfaction with our electronic platform, which could prompt participants to trade elsewhere or expose us to litigation or regulatory sanctions. As a consequence, our business, financial condition and operating results could suffer materially. Our regulated business operations generally require that our trade execution and communications systems be able to handle anticipated present and future peak trading volume. Heavy use of computer systems during peak trading times or at times of unusual market volatility could cause those systems to operate slowly or even to fail for periods of time. However, we cannot assure you that our estimates of future trading volume will be accurate or that our systems will always be able to accommodate actual trading volume without failure or degradation of performance.

Although many of our systems are designed to accommodate additional volume and products and services without redesign or replacement, we will need to continue to make significant investments in additional hardware and software and telecommunications infrastructure to accommodate the increases in volume of order and trading transaction traffic and to provide processing and clearing services to third parties. If we cannot increase the capacity and capabilities of our systems to accommodate an increasing volume of transactions and to execute our business strategy, our ability to maintain or expand our businesses could be adversely affected.

We currently have a substantial amount of outstanding indebtedness which could adversely affect our financial condition and operations and restrict our ability to engage in additional transactions or satisfy our debt service obligations.

As of December 31, 2018, we had \$7.4 billion of outstanding debt. This level of indebtedness could have important consequences to our business, including making it more difficult to satisfy our debt service obligations, increasing our vulnerability to general adverse economic and industry conditions, limiting our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate and restricting us from pursuing certain business opportunities. As we use our available resources to reduce and refinance our consolidated debt, our flexibility in planning for, or reacting to, changes in our business and the industry in which we operate and our ability to pursue future business opportunities may be further restrained. In addition, the terms of our debt facilities contain affirmative and negative covenants, including a leverage ratio test and certain limitations on the incurrence of additional debt or

the creation of

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liens and other matters. Further, a portion of our outstanding debt has been in commercial paper, which is subject to interest rate changes. Rising interest rates will result in an increase in our interest expense.

Our long-term and short-term debt is currently rated by Moody's Investor Services and Standard & Poor's. These ratings agencies regularly evaluate us and our credit ratings based on a number of quantitative and qualitative factors, including our financial strength and conditions affecting the financial services industry generally. Our credit ratings remain subject to change at any time, and it is possible that a ratings agency may take action to downgrade our credit ratings in the future. In particular, our inability to sustain reduced debt on a consolidated basis may result in a downgrade of our credit ratings. A significant downgrade of our credit ratings could impact customers' willingness to use our clearing houses, make parties less willing to do business with us, and could negatively impact our ability to access the capital markets and increase the cost of our commercial paper and any future debt funding we may obtain. We may fail to complete or realize the anticipated cost savings, growth opportunities and synergies and other benefits anticipated from our recent acquisitions and future acquisitions, which could adversely affect the value of our common stock.

We have completed many acquisitions and plan to continue to pursue acquisitions and joint ventures. The success of our acquisitions will depend, in part, on our ability to integrate these businesses into our existing operations and realize anticipated cost savings, revenue synergies and growth opportunities. We generally set aggressive timelines for realizing savings, which assumes we successfully undertake a variety of actions (including, but not limited to, integrating technology, eliminating redundancies and effecting organizational restructurings) that are themselves subject to a variety of risks and may be subject to regulatory approvals that we do not control. The process of integrating acquired companies is time consuming and could disrupt each company's ongoing businesses, produce unforeseen regulatory and operating difficulties (including inconsistencies in standards, controls, procedures and policies that adversely affect relationships with market participants, regulators and others), require substantial resources and expenditures and divert the attention of management from the ongoing operation of the business. There is a risk, however, that we may not integrate these acquired companies in a manner that permits our expected cost savings and revenue synergies to be fully realized in the time periods expected, or at all. In addition, a variety of factors, including but not limited to regulatory conditions, governmental competition approvals, currency fluctuations and difficulty integrating technology platforms, may adversely affect our ability to complete our acquisitions or realize our anticipated cost savings and synergies.

We may also not realize anticipated growth opportunities and other benefits from strategic investments or strategic joint ventures or alliances that we have entered into or may enter into for a number of reasons, including regulatory or government approvals or changes, global market changes, contractual obligations, competing products and, in some instances, our lack of or limited control over the management of the business. Further, strategic initiatives that have historically been successful may not continue to be successful due to competitive threats, changing market conditions or the inability for the parties to extend the relationship into the future.

As a result of any future acquisition, we may issue additional shares of our common stock that dilute our stockholders' ownership interest, expend cash, incur debt, assume actual and contingent liabilities, inherit existing or pending litigation or create additional expenses related to amortizing intangible assets. Further, we cannot assure you that any such financing or equity investments will be available with terms that will be favorable to us, or available at all. Fluctuations in foreign currency exchange rates may adversely affect our financial results.

Since we conduct operations in several different countries, including the U.S., U.K., EU and Canada, substantial portions of our revenues, expenses, assets and liabilities are denominated in U.S. dollars, pounds sterling, euros and Canadian dollars. Because our consolidated financial statements are presented in U.S. dollars, we must translate non-U.S. dollar denominated revenues, income and expenses, as well as assets and liabilities, into U.S. dollars at exchange rates in effect during or at the end of each reporting period. Therefore, increases or decreases in the value of the U.S. dollar against the other currencies may affect our net operating revenues, operating income and the value of balance sheet items denominated in foreign currencies.

External events such as Brexit and the negotiations regarding the terms thereof, the passage of U.S. taxation reform legislation and recent actions of the U.S. administration under President Donald Trump each have caused, and may continue to cause, significant volatility in currency exchange rates, especially among the U.S. dollar, the British pound sterling and the euro. If global economic and market conditions, or economic conditions in the U.K., EU, the U.S. or

other

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key markets remain uncertain or deteriorate further, the value of the pound sterling and euro and the global credit markets may further weaken. General financial instability in countries in the EU could have a contagion effect on the region and contribute to the general instability and uncertainty in the EU. Events that adversely affect our U.K. and EU clients and suppliers could in turn have a materially adverse effect on our international business results and our operating results.

For additional information on our foreign currency exchange rate risk, refer to “- Foreign Currency Exchange Rate Risk” in Item 7A “- Quantitative and Qualitative Disclosures About Market Risk, which is included in this Annual Report.”

We may be required to recognize impairments of our goodwill, other intangible assets or investments.

The determination of the value of goodwill and other intangible assets requires the use of estimates and assumptions that affect our consolidated financial statements. As of December 31, 2018, we had goodwill of \$13.1 billion and net other intangible assets of \$10.5 billion relating to our acquisitions and our purchase of trademarks and Internet domain names from various third parties.

Our equity investments, including our investments in Euroclear and Coinbase Global, Inc., among others, are now subject to valuation under ASU 2016-01. In accordance with ASU 2016-01, we will only adjust the fair value of these investments if and when there is an observable price change in an orderly transaction of a similar or identical investment or indication of impairment, and any change in the fair value will be recognized in net income.

We cannot assure you that we will not experience future events that may result in asset impairments. An impairment of the value of our existing goodwill, other intangible assets and other investments and assets could have a significant negative impact on our future operating results.

For additional information on our goodwill, other intangible assets and investments, refer to Notes 3, 4 and 8 to our consolidated financial statements and “- Critical Accounting Policies - Goodwill and Other Identifiable Intangible Assets” in Item 7 “- Management’s Discussion and Analysis of Financial Condition and Results of Operations,” which are included in this Annual Report.

We may face liability for content contained in our data products and services.

We may be subject to claims for breach of contract, defamation, libel, copyright or trademark infringement, fraud or negligence or based on other theories of liability, in each case relating to the data, articles, commentary, ratings, information or other content we distribute in our financial data services. If such data or other content or information that we distribute has errors, is delayed or has design defects, we could be subject to liability or our reputation could suffer. We could also be subject to claims based upon the content that is accessible from our corporate website or those websites that we own and operate through links to other websites. 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 for significant amounts. Any such claim, even if the outcome were ultimately favorable to us, could involve a significant commitment of our management, personnel, financial and other resources. Such claims and lawsuits could have a material adverse effect on our business, financial condition and operating results and a negative impact on our reputation.

In addition, we license and redistribute data and content from various third parties and the terms of these licenses change frequently. Our third-party data and content suppliers may audit our use of and our clients’ use of and payment for data and content from time to time in the ordinary course of business, including audits currently underway. Such third-party data and content suppliers may assert that we or our clients owe additional amounts under the terms of the applicable license agreements, that we inappropriately distributed the third-party data or that we or our clients used the data or content in a manner that exceeded the scope of the applicable license agreement or without a license agreement. We have and expect to continue to spend and allocate resources to develop and acquire the use of technology and other intellectual property rights to manage these risks and track third-party data usage, but we cannot be assured that we will not incur liability. We may incur costs to investigate any allegations and may be required to pay damages to or make unexpected settlement payments to these data and content suppliers and these costs and payments could be material.

A failure to protect our intellectual property rights, or allegations that we have infringed the intellectual property rights of others, could adversely affect our business.

Our business is dependent on proprietary technology and other intellectual property that we own or license from third parties, including trademarks, service marks, trade names, trade secrets, copyrights and patents. We cannot assure you

that the steps that we have taken or will take in the future will prevent misappropriation of our proprietary technology or intellectual property. Additionally, we may be unable to detect the misappropriation or unauthorized use of our proprietary technology and intellectual property. Our failure to adequately protect our proprietary technology and intellectual property could harm our reputation and affect our ability to compete effectively. Further, we may need to resort to litigation to enforce our intellectual property rights, which may require significant financial and managerial resources. As a result, we may choose not to enforce our infringed intellectual property rights, depending on our strategic evaluation and judgment regarding the best use of our resources, the relative strength of our intellectual property portfolio and the recourse available to us.

In addition, our competitors, as well as other companies and individuals, may have obtained, and may be expected to obtain in the future, patent and intellectual property rights related to the types of products and services we offer or plan to offer. We cannot assure you that we are or will be aware of all patents and intellectual property rights that may pose a risk of infringement by our products and services. As a result, we may face allegations that we have infringed the intellectual property rights of third parties which may be costly for us to defend against. If one or more of our products or services is found to infringe patents and intellectual property rights held by others, we may be subject to lawsuits or required to stop developing or marketing the products or services, obtain licenses to develop and market the products or services from the holders of the patents and intellectual property or redesign the products or services in such a way as to avoid infringing the patents. We also could be required to pay damages if we were found to infringe patents held by others, which could materially adversely affect our business, financial condition and operating results. We cannot assess the extent to which we may be required in the future to obtain licenses with respect to patents held by others, whether such licenses would be available or, if available, whether we would be able to obtain such licenses on commercially reasonable terms. If we were unable to obtain such licenses, we may not be able to redesign our products or services at a reasonable cost to avoid infringement, which could materially adversely affect our business, financial condition and operating results.

Regulatory changes or court rulings may have an adverse impact on our ability to derive revenue from market data and connectivity fees.

Regulatory developments or court rulings in the U.S. could reduce the amount of revenue that we obtain from market data and connectivity fees. With respect to our U.S. equities and equity options exchanges, our ability to assess fees for market data products and certain connectivity fees are subject to review by the SEC. There continues to be opposing industry viewpoints and litigation as to the extent that our U.S. equities and equity options exchanges should be able to charge for market data and market access, and the manner in which we set such exchange fees could be reassessed. In October 2018, the SEC unanimously issued an opinion setting aside certain market data fees imposed by NYSE Arca, Inc. and Nasdaq Stock Market LLC which were challenged by the Securities Industry and Financial Markets Association, or SIFMA, finding that the exchanges had not met their statutory obligation to demonstrate that the fees were consistent with the Exchange Act (i.e., that these fees are fair and reasonable and not unreasonably discriminatory). Simultaneously the SEC remanded over 400 market data fee and other filings back to the exchanges and the national market system plans for consideration under the standards set out in the SIFMA order and an earlier order issued by the SEC relating to a separate litigation matter.

If new constraints are placed on our ability to charge for market data, it could have a negative impact on our revenues. We cannot predict whether, or in what form, any regulatory or other changes will take effect or their impact on our business. A determination by the SEC or a court, for example, that the SEC must link market data fees to marginal costs, take a more active role in the market data rate-setting process, or reduce the current levels of market data fees, could have an adverse effect on our market data revenues.

Separately, our European exchanges are currently authorized to sell trade information on a non-discriminatory basis at a reasonable cost. This regulatory position could be modified or interpreted by the European Commission or future European court decisions in a manner that could have an adverse effect on our European market data revenues.

We rely on third-party providers and other suppliers for a number of services that are important to our business. An interruption or cessation of an important service, data or content supplied by any third party, or the loss of an exclusive license, could have a material adverse effect on our business.

We depend on a number of suppliers, such as online service providers, hosting service and software providers, data processors, software and hardware vendors, banks, local and regional utility providers, and telecommunications

companies for elements of our trading, clearing, data services and other systems. We rely on access to certain data used in our business through licenses with third parties, and we rely on a large international telecommunications company for

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the provision of hosting services. We also depend on third-party suppliers for data and content, including data received from certain competitors, clients, various government and public record services and financial institutions, used in our products and services. Some of this data is exclusive to particular suppliers and may not be obtained from other suppliers. In addition, our data suppliers could enter into exclusive contracts with our competitors without our knowledge. The general trend toward industry consolidation may increase the risk that these services may not be available to us in the future. If these companies were to discontinue providing services to us for any reason or fail to provide the type of service agreed to, we would likely experience significant disruption to our business and may be subject to litigation by our clients or increased regulatory scrutiny or regulatory fines. Our third-party data suppliers perform audits on us from time to time in the ordinary course of business to determine if data we license for redistribution has been properly accounted for in accordance with the terms of the applicable license agreement. As a result of these audits, we may incur additional expenses.

Many of our clients also rely on third parties to provide them with systems necessary to access our trading platform. If these companies were to discontinue providing services to our clients for any reason, we may experience a loss of revenue associated with our clients' inability to transact with our businesses. We hold exclusive licenses to list various index futures and contracts. In the future, litigation or regulatory action may limit the right of owners to grant exclusive licenses for index futures and contracts trading to a single exchange, and our competitors may succeed in providing economically similar products in a manner or jurisdiction not otherwise covered by our exclusive license. MiFID II introduced a harmonized approach to the licensing of services relating to commodity derivatives across Europe and the legislation requires open access to any benchmarks (a benchmark is an index or other measure used to determine the value of a financial instrument, for example, LIBOR or the S&P 500) used in Europe. If unlicensed trading of any index product where we hold an exclusive license were permitted, we could lose trading volume for these products which would adversely affect our revenues associated with the license and the related index products. We are subject to significant litigation and liability risks.

Many aspects of our business, and the businesses of our participants, involve substantial risks of liability. These risks include, among others, potential liability from disputes over terms of a trade and the claim that a system failure or delay caused monetary loss to a participant or that an unauthorized trade occurred. For example, dissatisfied market participants that have traded on our electronic platform or those on whose behalf such participants have traded, may make claims regarding the quality of trade execution, or allege improperly confirmed or settled trades, abusive trading practices, security and confidentiality breaches, mismanagement or even fraud against us or our participants. In addition, because of the ease and speed with which sizable trades can be executed on our electronic platform, participants can lose substantial amounts by inadvertently entering trade orders or by entering them inaccurately. A large number of significant error trades could result in participant dissatisfaction and a decline in participant willingness to trade in our electronic markets.

In addition, we are subject to on-going legal disputes that could result in the payment of fines, penalties or damages and could expose us to additional liability in the future. For example, on December 19, 2017, the U.S. Court of Appeals for the Second Circuit, or the Second Circuit, issued its decision in *City of Providence v. BATS Global Markets et al.* Two of our subsidiaries, New York Stock Exchange LLC and NYSE Arca, Inc., are defendants in this case. In vacating the district court's dismissal of this lawsuit and remanding for further proceedings, the Second Circuit concluded in part that the defendant securities exchanges are not immune from the claims in this case because absolute immunity is available to an SRO, like the New York Stock Exchange LLC and NYSE Arca, Inc., only when they carry out regulatory functions. Although our exchanges will continue to have other defenses available to them in securities litigation cases (including in this matter), limitations on the doctrine of absolute immunity could result in an increased exposure to litigation, and to increased liability and/or other legal expenses. Additionally, in January 2019, two virtually identical proposed class action lawsuits were filed in the U.S. District Court for the Southern District of New York, asserting that various ICE entities, including ICE Benchmark Administration, engaged in an alleged conspiracy with the LIBOR panel banks to set the LIBOR benchmark at artificially low levels, for the alleged purpose and effect of depressing payments by those banks to persons who engaged in interest rate transactions with the banks from February 2014 to the present. While ICE intends to vigorously defend these matters, their outcome cannot be determined and adverse rulings could impact our financial condition and continued administration of the LIBOR benchmark.

Further, we could incur significant expenses defending claims, even those without merit, which could adversely affect our business, financial condition and operating results. An adverse resolution of any lawsuit or claim against us, including those we are involved with due to acquisition activity, may require us to pay substantial damages or impose restrictions on how we conduct business, either of which could adversely affect our business, financial condition and operating results. In addition, we may have to establish accruals for those matters in circumstances when a loss contingency is considered

probable and the related amount is reasonably estimable. Any such accruals may be adjusted as circumstances change. See Note 15 to our consolidated financial statements and related notes, which are included elsewhere in this Annual Report, for a summary of our legal proceedings and claims.

We may be at greater risk from terrorism than other companies.

Given our prominence in the global securities industry and the location of many of our properties and personnel in U.S. and European financial centers, including lower Manhattan, we may be more likely than other companies to be a direct target of, or an indirect casualty of, attacks by terrorists or terrorist organizations, or other extremist organizations that employ threatening or harassing means to achieve their social or political objectives.

It is impossible to predict the likelihood or impact of any terrorist attack on the securities industry generally or on our business. In the event of an attack or a threat of an attack, our security measures and contingency plans may be inadequate to prevent significant disruptions in our business, technology or access to the infrastructure necessary to maintain our business. Damage to our facilities due to terrorist attacks may be significantly in excess of insurance coverage, and we may not be able to insure against some damage at a reasonable price or at all. The threat of terrorist attacks may also negatively affect our ability to attract and retain employees. In addition, terrorist attacks may cause instability or decreased trading in the securities markets, including trading on exchanges. Any of these events could adversely affect our business, financial condition and operating results.

Damage to our reputation could damage our business.

Our business is highly competitive and our customers typically have options on where to conduct their business. Our management team and business operations benefit from being highly regarded in our industry. Maintaining our reputation is critical to attracting and retaining customers and investors and for maintaining our relationships with our regulators. Negative publicity regarding our company or actual, alleged or perceived issues regarding our products or services, operations, risk management, compliance with regulations or management team could give rise to reputational risk which could significantly harm our existing business and business prospects.

Owning and operating voice broker and electronic fixed income brokerage businesses exposes us to additional risk, and these businesses are largely dependent on general market conditions.

Our voice broker business provides brokerage services to clients in the form of agency transactions in commodity products. In agency transactions, customers pay transaction fees for trade execution services in which we connect buyers and sellers who settle their transactions directly. In connection with our fixed income business, our broker-dealers operate in both an agency and in a matched principal capacity (also known as “risk-less principal”). When trading as matched principal, we agree to buy instruments from one customer and sell them to another customer. The amount of the fee generally depends on the spread between the buy and sell price of the security that is brokered on our platforms. With respect to matched principal transactions, a counterparty to a matched principal transaction may fail to fulfill its obligations, or we may face liability for an unmatched trade. We also face the risk of not being able to collect transaction or subscription- based fees for brokerage and related services that we provide to our customers.

Our success largely depends on key personnel, including our senior management. Because competition for our key employees is intense, we may not be able to attract, retain and develop the highly skilled employees we need to support our business. The loss of senior management or other key personnel could harm our business.

Our future performance depends, in large part, on the continued services of our senior management and other key personnel, including our ability to attract, retain and motivate key personnel. 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 management, 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. The loss of the services of any of our senior management or other key personnel, or our inability to attract highly qualified senior management and other key personnel, could harm our business. 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.

We are a holding company and depend on our subsidiaries for dividends, distributions and other payments. We are a legal entity separate and distinct from our operating subsidiaries. Our principal source of cash flow, including cash flow to pay dividends to our stockholders, principal and interest on our outstanding debt or repurchase shares of our common stock, is dividends from our subsidiaries. There are statutory and regulatory limitations on the payment of dividends by certain of our subsidiaries to us. If our subsidiaries are unable to make dividend payments to us and sufficient cash or liquidity is not otherwise available, we may not be able to make dividend payments to our stockholders, principal and interest payments on our outstanding debt or repurchase shares of our common stock, which could have a material adverse effect on our business, financial condition and operating results. Provisions of our organizational documents and Delaware law may delay or deter a change of control of ICE. Our organizational documents contain provisions that may have the effect of discouraging, delaying or preventing a change of control of, or unsolicited acquisition proposals for, ICE. These provisions make a change of control less likely, which may be contrary to the desires of certain of our stockholders. Many of these provisions are required by relevant regulators in connection with our ownership and operation of U.S. and European equity exchanges. For example, our organizational documents include provisions that generally restrict any person (either alone or together with its related persons) from (i) voting or causing the voting of shares of stock representing more than 10% of our outstanding voting capital stock (including as a result of any agreement by any other persons not to vote shares of stock) or (ii) beneficially owning shares of stock representing more than 20% of the outstanding shares of any class or series of our capital stock. Further, our organizational documents generally limit the ability of stockholders to call special stockholders' meetings or act by written consent, and generally authorize our Board of Directors, without stockholder approval, to issue and fix the rights and preferences of one or more series of preferred stock. In addition, provisions of Delaware law may have a similar effect, such as provisions limiting the ability of certain interested stockholders, as defined under Delaware law, from causing the merger or acquisition of a corporation against the wishes of the Board of Directors.

RISKS TO OUR BUSINESS RELATED TO OUR INVESTMENT IN AND OPERATION OF BAKKT

We may not realize the expected benefits of our majority investment in Bakkt and the investment may introduce additional risks to our business due to its newly developed and evolving business model.

On August 3, 2018, we formed a new company, Bakkt, LLC, along with a group of organizations. We have a majority ownership interest in Bakkt. Bakkt intends to create an integrated platform that enables consumers and institutions to transact in digital assets and plans to include regulated trading, clearing and custodial solutions for digital assets. Due to our majority ownership interest in Bakkt, we have increased financial and reputational risks if there is a failure to launch or if the launch of this new business is unsuccessful. Also, there can be no assurance that we will receive the necessary regulatory approvals and support from customers to launch Bakkt as planned or that Bakkt will operate as anticipated or that we will realize the expected return on our investment. We regularly evaluate our existing operations, service capacity and business efficiencies and, as a result of such evaluations, we may undertake strategic initiatives outside of and within our businesses. As a result, it may take longer than expected for us to realize the expected returns from this investment or such returns may ultimately be less than anticipated. Furthermore, our investment in Bakkt entails numerous risks, including risks relating to Bakkt's ability to:

- manage the complexity of its business model to stay current with the industry;
- successfully enter categories and markets in which it may have limited or no prior experience;
- apply distributed ledger technology to a global ecosystem for digital assets;
- successfully develop and integrate Bakkt products, systems or personnel into its business operations; and
- establish the trading volume in Bakkt's Bitcoin futures contract, or any subsequent products released by Bakkt.

As digital assets and blockchain technologies become more widely available, Bakkt expects the services and products associated with them to continue to develop and evolve. As a result, from time to time, Bakkt may add, modify or discontinue certain aspects of its business model relating to the product mix and service offerings. Future additions and modifications to Bakkt's business will increase the complexity of its business and place significant strain on our and Bakkt's management, personnel, operations, systems, technical performance, financial resources and internal financial control and reporting functions. We cannot offer any assurance that these or any other additions or modifications will be successful or will not result in harm to Bakkt's or our business.

Distributed ledger technology is relatively new and we believe that the application of distributed ledger technology to a global ecosystem for digital assets is novel to the proposed Bakkt systems and, accordingly, we have limited experience applying distributed ledger technology to a global ecosystem for digital assets. The creation and operation of an exchange for the transfer of digital assets utilizing a distributed ledger to enable consumers and institutions to confirm that the blockchain underlying these digital assets has not been altered is subject to potential technical, legal and regulatory constraints. Any problems that Bakkt encounters with the operation of the Bakkt systems, including technical, legal and regulatory problems, could have a material adverse effect on its business and plan of operations. Hiring qualified and experienced personnel in this specialized technology space is difficult due to the high level of competition and scarcity of experience. Bakkt may have difficulty finding, hiring and integrating qualified employees. This could put a strain on existing ICE employees and delay the work that these employees are performing for ICE and ICE's subsidiaries. In addition, any potential issues or major decisions involving Bakkt may divert the attention of management and resources from matters that are core or critical to ICE's business.

We anticipate that, at the time of its launch, Bakkt will be dependent solely on trading volume from one product offering, Bakkt's Bitcoin futures contract, for its clearing and transaction fee revenues and profits. Failure to establish the trading volume in Bakkt's Bitcoin futures contract, or any subsequent products released by Bakkt, would negatively impact Bakkt's business, financial condition and operating results and, consequently, our majority ownership interest in Bakkt.

Digital currency custodial solutions and related technology, including Bakkt's systems and custodial arrangements, are subject to risks related to a loss of funds due to theft of cryptocurrencies, employee or vendor sabotage, security and cybersecurity risks, system failures and other operational issues and a lack of sufficient insurance, which could cause damage to our reputation and brand and Bakkt's reputation and brand.

Bakkt's systems and custodial solutions involve the processing, storage and transmission of cryptocurrencies and data. While Bakkt will contractually limit the amount of exposure it will have in the event that the cryptocurrencies are stolen or misappropriated, we cannot guarantee that these limits will protect us from additional liability and other damage. The theft or misappropriation of cryptocurrencies held in custody by Bakkt would likely result in financial loss, reputational damage, potential lack of trust from our customers in other business lines, negative press coverage and diversion of management's time and focus. The secure storage and transmission of cryptocurrencies and data over networks will be a critical element of Bakkt's operations. Despite the defensive measures Bakkt may take, these threats may come from external factors such as governments, organized crime, hackers and other third parties such as outsourced or infrastructure-support providers and application developers, or may originate internally from an employee or service provider to whom Bakkt has granted access to its systems.

Cryptocurrency transactions are irrevocable and stolen or incorrectly transferred cryptocurrencies may be irretrievable. Once a transaction has been verified and recorded in a block that is added to the blockchain, an incorrect transfer of a cryptocurrency generally will not be reversible and Bakkt may not be capable of seeking compensation for any such transfer or theft. It is possible that, through computer or human error, or through theft or criminal action, the cryptocurrency could be transferred in incorrect amounts or to unauthorized third parties, or to uncontrolled accounts. Such events would have a material adverse effect on the ability of Bakkt to continue as a going concern, which would have a material adverse effect on our majority ownership interest in Bakkt.

Although the cryptocurrencies held by Bakkt are insured, Bakkt may lose cryptocurrencies valued in excess of the insurance policy without any recourse. Unlike bank accounts or accounts at some other financial institutions, in the event of loss or loss of utility value, there is no public insurer, such as the Securities Investor Protection Corporation or the FDIC, to offer recourse to Bakkt or to any investor and the misappropriated cryptocurrencies cannot easily be traced to the bad actor.

Further, when cryptocurrency custodial solutions or transfer venues (whether involving Bakkt systems or others) experience system failures or other operational issues, such events could result in a reduction in cryptocurrency prices or confidence and impact the success of Bakkt and have a material adverse effect on the ability of Bakkt to continue as a going concern.

Regulatory changes or actions may alter the nature of our majority ownership interest in Bakkt or restrict the use of cryptocurrencies in a manner that adversely affects Bakkt's business, prospects or operations and, consequently, our majority ownership interest in Bakkt.

As cryptocurrencies have grown in both popularity and market size, governments around the world have reacted differently to cryptocurrencies, with certain governments deeming them illegal and others allowing their use and trade. Ongoing and future regulatory actions may impact the ability of Bakkt to continue to operate and such actions could affect the ability

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of Bakkt to continue as a going concern, which would have a material adverse effect on the business, prospects or operations of Bakkt and, consequently, our majority ownership interest in Bakkt.

The CFTC designated bitcoin as a commodity, and as such, exchange-traded derivatives involving bitcoin are subject to the CFTC's jurisdiction and enforcement powers. Although the CFTC has suggested it is not particularly focused on pursuing such enforcement at this time, and in fact there may be some limits on its ability to do so without a specific connection to commodities derivatives markets, in the event that the CFTC does pursue such enforcement and ultimately shuts down an exchange on which Bakkt's Bitcoin futures contract is traded, it may have a significant adverse impact on Bakkt's business and plan of operations and, consequently, our majority ownership interest in Bakkt.

Governments may in the future curtail or outlaw the acquisition, use or redemption of cryptocurrencies. Ownership of, holding or trading in cryptocurrencies may then be considered illegal and subject to sanction. Governments may also take regulatory action that may increase the cost and/or subject cryptocurrency companies to additional regulation.

ITEM 1 (B). UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

The net book value of our property was \$1.2 billion as of December 31, 2018. Our intellectual property is described under the heading in Item 1 “- Business -Technology” and “-Business-Intellectual Property.” In addition to our intellectual property, our other primary assets include buildings, computer equipment, corporate aircraft, software, and internally developed software. We own an array of computers and related equipment.

Our headquarters and principal executive offices are located in Atlanta, Georgia and New York, New York. We currently occupy 273,000 square feet of office space in Atlanta in a building that we own that serves as our Atlanta headquarters. Our New York headquarters are located at 11 Wall Street, where we occupy 370,000 square feet of office space in a building we own. In total, we maintain approximately 2.7 million square feet in offices primarily throughout the U.S., U.K., EU, Asia, Israel and Canada. Generally, our properties are not earmarked for use by a particular business segment. Our principal offices consist of the properties described below.

Location Leased Lease Expiration Approximate Size

5660 New Northside Owned Drive Atlanta, Georgia	N/A		273,000 sq. ft.
11 Wall Street New Owned York, New York	N/A		370,000 sq. ft.
Basildon, Owned U.K.	N/A		539,000 sq. ft.
Mahwah, Leased New Jersey	2028		396,000 sq. ft.
60 Codman Hill Leased Road Boxborough, Massachusetts	2019		100,000 sq. ft.

55 East 52 nd Street New York, New York 32 Crosby Drive Bedford, Massachusetts Milton	Leased 2028	93,000 sq. ft.
Gate London, U.K. Fitzroy House London, U.K. 100 Church Street New York, New York 132 Menachem Begin Rd Tel Aviv, Israel 353 North Clark Street Chicago, Illinois	Leased 2024	70,000 sq. ft.
Leased 2025	68,000 sq. ft.	
Leased 2024	65,000 sq. ft.	
Leased 2022	65,000 sq. ft.	
Leased 2027	57,000 sq. ft.	

In addition to the above, we currently lease an aggregate of 520,000 square feet of administrative, sales and disaster preparedness facilities in various cities around the world. We believe that our facilities are adequate for our current operations and that we will be able to obtain additional space as and when it is needed.

ITEM 3. LEGAL PROCEEDINGS

We are subject to legal proceedings, claims and investigations that arise in the ordinary course of our business. We establish accruals for those matters in circumstances when a loss contingency is considered probable and the related amount is reasonably estimable. Any such accruals may be adjusted as circumstances change. Assessments of losses are inherently subjective and involve unpredictable factors. We do not believe that the resolution of these legal matters, including the matters described in this Annual Report, will have a material adverse effect on our consolidated financial condition, results of operations, or liquidity. It is possible, however, that future results of operations for any particular quarterly or annual period could be materially and adversely affected by any developments relating to the legal proceedings, claims and investigations. See Note 15 to the consolidated financial statements in Part II, Item 8 of this Annual Report for a summary of our legal proceedings and claims.

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

Approximate Number of Holders of Common Stock

As of February 4, 2019, there were approximately 512 holders of record of our common stock. Our common stock trades on the New York Stock Exchange under the ticker symbol "ICE."

Dividends

Our Board of Directors has adopted a quarterly dividend declaration policy providing that the declaration of any dividends will be determined quarterly by the Board or audit committee of the Board of Directors taking into account such factors as our evolving business model, prevailing business conditions and our financial results and capital requirements, without a predetermined annual net income payout ratio. The declaration of dividends is subject to the discretion of our Board of Directors, and may be affected by various factors, including our future earnings, financial condition, capital requirements, share repurchase activity, levels of indebtedness, credit ratings and other considerations our Board of Directors deem relevant.

Equity Compensation Plan Information

The following provides information about our common stock that has been or may be issued under our equity compensation plans as of December 31, 2018:

- Intercontinental Exchange, Inc. 2018 Employee Stock Purchase Plan
- Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan
- Intercontinental Exchange, Inc. 2013 Omnibus Employee Incentive Plan
- Intercontinental Exchange, Inc. 2013 Omnibus Non-Employee Director Incentive Plan
- Intercontinental Exchange, Inc. 2009 Omnibus Incentive Plan
- Intercontinental Exchange, Inc. 2003 Restricted Stock Deferral Plan for Outside Directors
- Intercontinental Exchange, Inc. 2000 Stock Option Plan
- NYSE Omnibus Incentive Plan As Amended and Restated

The 2000 Stock Option Plan was retired in May 2009, upon adoption of the 2009 Omnibus Incentive Plan, which was retired in May 2013 upon adoption of the 2013 Omnibus Employee Incentive Plan. The 2013 Omnibus Employee Incentive Plan was retired in May 2017 upon adoption of the 2017 Omnibus Employee Incentive Plan. No future grants will be made from the retired plans. No future grants will be made to legacy NYSE employees under the NYSE Omnibus Incentive Plan. All future grants to employees will be made under the Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan

and to directors under the Intercontinental Exchange, Inc. 2013 Omnibus Non-Employee Director Incentive Plan. All purchases made pursuant to the Employee Stock Purchase Plan are made from the 2018 Employee Stock Purchase Plan.

Plan Category	Number of securities to be issued upon exercise of outstanding options and rights (in thousands) (a)	Weighted average exercise price of outstanding options (b)	Number of securities available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders ⁽¹⁾	8,867	(1)\$ 46.44	(1)36,619
Equity compensation plans not approved by security holders ⁽²⁾	89	(2)—	(2)—
TOTAL	8,956	\$ 46.44	36,619

The 2000 Stock Option Plan was approved by our stockholders in June 2000. The 2009 Omnibus Incentive Plan was approved by our stockholders in May 2009. The 2013 Omnibus Employee Incentive Plan and the 2013 Omnibus Non-Employee Director Incentive Plan were approved by our stockholders in May 2013. The stockholders of NYSE approved the NYSE Amended and Restated Omnibus Incentive Plan in April 2013. The (1) 2017 Omnibus Employee Incentive Plan was approved by our stockholders in May 2017. Of the 8.9 million securities to be issued upon exercise, 3.6 million are options with a weighted average exercise price of \$46.44 and the remaining 5.3 million securities are restricted stock shares that do not have an exercise price. The 2018 Employee Stock Purchase Plan was approved by stockholders in May 2018.

This category includes the 2003 Restricted Stock Deferral Plan for Outside Directors. All of the 89,000 securities (2) to be issued are restricted stock shares that do not have an exercise price. For more information concerning these plans, see Note 11 to our consolidated financial statements, which are included in this Annual Report.

Stock Repurchases

The table below sets forth the information with respect to purchases made by or on behalf of ICE or any “affiliated purchaser” (as defined in Rule 10b-18(a)(3) under the Exchange Act) of our common stock during the three months ended December 31, 2018.

Period (2018)	Total number of shares purchased (in thousands)	Average price paid per share	Total number of shares purchased as part of publicly announced plans or programs (in thousands)	Approximate dollar value of shares that may yet be purchased under the plans or programs (in millions)
October 1 - October 31	1,522	\$74.37	15,916	\$28
November 1 - November 30	341	\$77.77	16,257	\$2
December 1 - December 31	—	N/A	16,257	\$2
Total	1,863	\$74.99	16,257	\$2

In September 2018, our Board of Directors approved an aggregate of \$2.0 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2019. Refer to Note 12 to our consolidated financial statements, included in this Annual Report, for additional details on our stock repurchase plans.

ITEM 6. SELECTED FINANCIAL DATA

The following tables present our selected consolidated financial data as of and for the dates and periods indicated. We derived the financial data set forth below for the years ended December 31, 2018, 2017 and 2016 and as of December 31, 2018 and 2017 from our audited consolidated financial statements, which are included in this Annual Report. We derived the financial data for 2015 and 2014 and as of December 31, 2016, 2015 and 2014 from our audited consolidated financial statements, which are not included in this Annual Report. The selected consolidated financial data presented below is not indicative of our future results for any period. It should be read in conjunction with our consolidated financial statements and related notes and Item 7, “- Management’s Discussion and Analysis of Financial Condition and Results of Operations” included in this Annual Report.

	Year Ended December 31,				
	2018	2017	2016	2015	2014
(In millions, except for per share data)					
Consolidated Statement of Income Data ⁽¹⁾					
Revenues:					
Transaction and clearing, net ⁽²⁾	\$3,483	\$3,131	\$3,384	\$3,228	\$3,144
Data services	2,115	2,084	1,978	871	691
Listings	444	426	432	405	367
Other revenues	234	202	177	178	150
Total revenues	6,276	5,843	5,971	4,682	4,352
Transaction-based expenses ⁽²⁾	1,297	1,205	1,459	1,344	1,260
Total revenues, less transaction-based expenses	4,979	4,638	4,512	3,338	3,092
Operating expenses:					
Compensation and benefits	994	946	953	611	592
Professional services	131	121	137	139	181
Acquisition-related transaction and integration costs ⁽³⁾	34	36	80	88	129
Technology and communication	432	397	374	203	188
Rent and occupancy	68	69	70	57	78
Selling, general and administrative	151	155	116	116	143
Depreciation and amortization	586	535	610	374	333
Total operating expenses	2,396	2,259	2,340	1,588	1,644
Operating income	2,583	2,379	2,172	1,750	1,448
Other income (expense), net ⁽⁴⁾	(63)	147	(129)	(97)	(41)
Income from continuing operations before income tax expense (benefit)	2,520	2,526	2,043	1,653	1,407
Income tax expense (benefit) ⁽⁵⁾	500	(28)	586	358	402
Income from continuing operations	2,020	2,554	1,457	1,295	1,005
Income (loss) from discontinued operations, net of tax ⁽⁶⁾	—	—	—	—	11
Net income	\$2,020	\$2,554	\$1,457	\$1,295	\$1,016
Net income attributable to non-controlling interest	(32)	(28)	(27)	(21)	(35)
Net income attributable to ICE ⁽⁷⁾	\$1,988	\$2,526	\$1,430	\$1,274	\$981
Basic earnings (loss) per share attributable to ICE common stockholders:					
Continuing operations	\$3.46	\$4.29	\$2.40	\$2.29	\$1.70
Discontinued operations ⁽⁶⁾	—	—	—	—	0.02
Basic earnings per share	\$3.46	\$4.29	\$2.40	\$2.29	\$1.72
Basic weighted average common shares outstanding ⁽⁷⁾	575	589	595	556	570
Diluted earnings (loss) per share attributable to ICE common stockholders:					
Continuing operations	\$3.43	\$4.25	\$2.39	\$2.28	\$1.69
Discontinued operations ⁽⁶⁾	—	—	—	—	0.02
Diluted earnings per share	\$3.43	\$4.25	\$2.39	\$2.28	\$1.71
Diluted weighted average common shares outstanding ⁽⁷⁾	579	594	599	559	573
Dividend per share	\$0.96	\$0.80	\$0.68	\$0.58	\$0.52

We acquired several companies during the periods presented and have included the financial results of these (1) companies effective from the respective acquisition dates. Refer to Note 3 to our consolidated financial statements, included in this Annual Report, for more information on these acquisitions.

Our transaction and clearing fees are presented net of rebates paid to our customers. We also report (2) transaction-based expenses relating to Section 31 fees and payments made for routing services and to certain U.S. equities liquidity providers. For a discussion of these rebates, see Item 7 “- Management’s Discussion and Analysis of

Financial Condition and Results of Operations - Segment Reporting - Trading and Clearing Segment” included in this Annual Report.

Acquisition-related transaction and integration costs include fees for investment banking advisors, lawyers, accountants, tax advisors and public relations firms, deal-related bonuses to certain of our employees, as well as costs associated with credit facilities and other external costs directly related to acquisitions and other strategic opportunities. We incurred integration costs during 2018, 2017, 2016 and 2015 relating to our Interactive Data acquisition and during 2016, 2015 and 2014 relating to our NYSE acquisition, primarily related to employee termination costs, lease terminations costs, costs incurred relating to the IPO of Euronext, transaction-related bonuses and professional services costs incurred relating to the integrations.

Other income (expense), net during 2018 includes a \$110 million gain on our initial investment value in MERS recorded on October 3, 2018, the date we completed our acquisition, interest expense of \$244 million and interest income of \$22 million. Other income (expense), net during 2017 includes a \$167 million realized net investment gain in connection with our sale of Cetip and a \$110 million net gain on our divestiture of Trayport, interest expense of \$187 million and interest income of \$8 million. Refer to Notes 3 and 4 to our consolidated financial statements and related notes, which are included in this Annual Report, for more information.

The income tax benefit in 2017 and lower income tax expense in 2015 are primarily due to the deferred tax benefit associated with future U.S. income tax rate reductions of \$764 million in 2017 and the deferred tax benefit associated with future U.K. income tax rate reductions along with certain favorable settlements with various taxing authorities of \$75 million in 2015. See Item 7 “- Management’s Discussion and Analysis of Financial Condition and Results of Operations - Consolidated Income Tax Provision” included in this Annual Report for more information on these items.

During 2014, we sold 100% of our wholly-owned subsidiary, Euronext, in connection with Euronext’s IPO, and we sold our entire interest in three companies that comprised the former NYSE Technologies (NYFIX, Metabit and Wombat). We treated the sale of these entities as discontinued operations for all periods presented from their acquisition on November 13, 2013 to their dispositions.

The weighted average common shares outstanding increased in 2016 primarily due to the stock issued for the Interactive Data and Trayport acquisitions and increased in 2014 primarily due to stock issued for the NYSE acquisition. We issued 211.9 million shares of our common stock to NYSE stockholders, 32.3 million shares of our common stock to Interactive Data stockholders and 12.6 million shares of our common stock to Trayport stockholders, weighted to show these additional shares outstanding for all periods after the respective acquisition dates.

	As of December 31,				
	2018	2017	2016	2015	2014
	(In millions)				
Consolidated Balance Sheet Data					
Cash and cash equivalents	\$ 724	\$ 535	\$ 407	\$ 627	\$ 652
Margin deposits, guaranty funds and delivery contracts receivable ⁽¹⁾	63,955	51,222	55,150	51,169	47,458
Total current assets	66,692	53,562	57,133	53,313	50,232
Goodwill and other intangible assets, net ⁽²⁾	23,547	22,485	22,711	22,837	16,315
Total assets	92,791	78,264	82,003	77,987	68,254
Margin deposits, guaranty funds and delivery contracts payable ⁽¹⁾	63,955	51,222	55,150	51,169	47,458
Total current liabilities	66,108	54,175	58,617	54,743	50,436
Short-term and long-term debt ⁽²⁾	7,441	6,100	6,364	7,308	4,277
Equity ⁽²⁾	17,231	16,985	15,775	14,840	12,392

(1) Clearing members of our clearing houses are required to deposit original margin and variation margin and for our clearing houses other than ICE NGX, to make deposits to a guaranty fund. The cash deposits made to these margin accounts and to the guaranty fund are recorded in the consolidated balance sheet as current assets with corresponding current liabilities to the clearing members that deposited them. We also account for the physical

delivery of our energy contracts for ICE NGX following its acquisition in December 2017. Refer to Note 14 to our consolidated financial statements, included in this Annual Report, for more information on these items.

The increases in our equity, goodwill and other intangible assets, and debt as of December 31, 2015 primarily (2)relates to our acquisition of Interactive Data. Refer to Notes 3, 8 and 10 to our consolidated financial statements, included in this Annual Report, for more information on these items.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements for many reasons. See the factors set forth under the heading "Forward Looking Statements" at the beginning of Part 1 of this Annual Report and in Item 1(A) under the heading "Risk Factors." The following discussion is qualified in its entirety by, and should be read in conjunction with, the more detailed information contained in Item 6 "Selected Financial Data" and our consolidated financial statements included in this Annual Report.

Overview

We are a leading global operator of regulated exchanges, clearing houses and listings venues, and a provider of data services for commodity, financial, fixed income and equity markets. We operate regulated marketplaces for listing, trading and clearing of a broad array of derivatives contracts and securities across major asset classes, including energy and agricultural commodities, metals, interest rates, equities, ETFs, credit derivatives, bonds and currencies. We also offer comprehensive data services to support the trading, investment, risk management and connectivity needs of customers around the world and across asset classes.

Our exchanges include derivative exchanges in the U.S., U.K., EU, Canada and Singapore, and cash equities, equity options and bond exchanges in the U.S. We also operate OTC markets for physical energy, fixed income and CDS trade execution. To serve global derivatives markets, we operate central counterparty, or CCP, clearing houses in the U.S., U.K., EU, Canada and Singapore. We offer a range of data services for global financial and commodity markets, including pricing and reference data, exchange data, analytics, feeds, index services, desktops and connectivity solutions. Through our markets, clearing houses, listings and data services, we provide comprehensive solutions for our customers through liquid markets, benchmark products, access to capital markets and related services to support their ability to manage risk and raise capital. Our business is currently conducted as two reportable business segments, our Trading and Clearing segment and our Data and Listings segment, and the majority of our identifiable assets are located in the U.S., U.K. and Canada.

Recent Developments

U.S. Tax Cuts and Jobs Act of 2017, or TCJA

In December 2017, the TCJA was signed into law. It reduced the U.S. federal corporate income tax rate from 35% to 21%. Many of the tax provisions under the TCJA became effective January 1, 2018, including the new rate and complex international tax provisions. Given the complexity of these international provisions and certain potential unintended consequences that are under debate at both the federal and state level, certain federal and state guidance has been issued and further guidance is anticipated, but the likelihood and timing of such guidance remains uncertain. See "- Consolidated Income Tax Provision" below.

Acquisitions

On January 2, 2018, we acquired BondPoint from Virtu Financial, Inc. for \$400 million in cash. BondPoint is a provider of electronic fixed income trading solutions for the buy-side and sell-side, offering access to centralized liquidity and automated trade execution services through its ATS and provides trading services to more than 500 financial services firms.

On July 18, 2018, we acquired CHX Holdings, Inc., the parent company of CHX, a full-service stock exchange, including trading, data and corporate listings services. CHX operates as a registered national securities exchange.

On July 23, 2018, we acquired TMC Bonds for \$700 million in cash. The cash consideration is gross of \$15 million cash held by TMC Bonds on the date of acquisition. TMC Bonds is an electronic fixed income marketplace, supporting anonymous trading across multiple protocols in various asset classes, including municipals, corporates, treasuries, agencies and certificates of deposit.

On October 3, 2018, we completed the purchase of the remaining equity interests in MERS and accordingly now have 100% ownership. On that date, we gained control of MERS, now part of ICE Mortgage Services, began to include its results as

part of our consolidated operations, and recorded a \$110 million gain on our initial investment value as other non-operating income.

Launch of Bakkt

On December 19, 2018, we and non-ICE limited partners funded the newly-formed entity, Bakkt, LLC, or Bakkt. Bakkt was formed to create an integrated platform that enables consumers and institutions to transact in digital assets. The Bakkt ecosystem is designed to include regulated trading, clearing and custodial solutions for digital assets, which will be supported by ICE Futures U.S. and ICE Clear U.S. The first traded contract targeted for launch will be a Bakkt Bitcoin physically delivered daily futures contract to provide price discovery. The custodial solution will establish new protocols for managing the specific security and settlement requirements of digital currencies. In addition, there will be a separate guaranty fund. It is also expected that Bakkt will offer additional solutions to expand the range of uses for digital assets.

Investment in Euroclear

During 2017, we purchased a 4.7% stake in Euroclear valued at €276 million in cash (\$327 million). Upon purchasing this stake, we agreed to participate on the Euroclear Board of Directors. During the same period, we negotiated an additional purchase which closed on February 21, 2018, following regulatory approval. This provided us with an additional 5.1% stake in Euroclear for a purchase price of €246 million in cash (\$304 million). As of December 31, 2018, we own a 9.8% stake in Euroclear for a total investment of \$631 million. Euroclear is a provider of post-trade services, including settlement, central securities depositories and related services for cross-border transactions across asset classes. Refer to Note 4 to our consolidated financial statements, included elsewhere in this Annual Report, for more information.

Purchase of Non-Controlling Interests

For consolidated subsidiaries in which our ownership is less than 100% and for which we have control over the assets, liabilities and management of the entity, the outside stockholders' interests are shown as non-controlling interest in our consolidated financial statements. As of December 31, 2017, non-controlling interest consisted of the operating results of our CDS clearing subsidiaries in which non-ICE limited partners held a 29.9% ownership interest. During September 2018, we purchased a 3.2% ownership interest from a non-ICE limited partner and the remaining other limited partners hold a 26.7% ownership interest as of December 31, 2018.

Consolidated Financial Highlights

The following summarizes our results and significant changes in our consolidated financial performance for the periods presented (dollars in millions, except per share amounts):

	Year Ended			Year Ended			Change	
	December 31,		Change	December 31,		Change		
	2018	2017			2017		2016	
Revenues, less transaction-based expenses	\$4,979	\$4,638	7 %	\$4,638	\$4,512	3 %		
Operating expenses	\$2,396	\$2,259	6 %	\$2,259	\$2,340	(3) %		
Adjusted operating expenses ⁽¹⁾	\$2,071	\$1,947	6 %	\$1,947	\$1,955	— %		
Operating income	\$2,583	\$2,379	9 %	\$2,379	\$2,172	10 %		
Adjusted operating income ⁽¹⁾	\$2,908	\$2,691	8 %	\$2,691	\$2,557	5 %		
Operating margin	52 %	51 %	1 pt	51 %	48 %	3 pts		
Adjusted operating margin ⁽¹⁾	58 %	58 %	—	58 %	57 %	1 pt		
Other income (expense), net	\$(63)	147	n/a	147	(129)	n/a		
Income tax expense (benefit)	\$500	\$(28)	n/a	\$(28)	\$586	n/a		
Effective tax rate	20 %	(1) %	21 pts	(1) %	29 %	(30) pts		
Net income attributable to ICE	\$1,988	\$2,526	(21) %	\$2,526	\$1,430	77 %		
Adjusted net income attributable to ICE ⁽¹⁾	\$2,077	\$1,764	18 %	\$1,764	1,673	5 %		
Diluted earnings per share attributable to ICE common stockholders	\$3.43	\$4.25	(19) %	\$4.25	\$2.39	78 %		
Adjusted diluted earnings per share attributable to ICE common stockholders ⁽¹⁾	\$3.59	\$2.97	21 %	\$2.97	\$2.79	6 %		
Cash flows from operating activities	\$2,533	\$2,085	21 %	\$2,085	\$2,149	(3) %		

⁽¹⁾ The adjusted figures exclude items that are not reflective of our ongoing core operations and business performance. Adjusted net income attributable to ICE and adjusted diluted earnings per share attributable to ICE common stockholders, are presented net of taxes. These adjusted numbers are not calculated in accordance with GAAP. See “- Non-GAAP Financial Measures” below.

Revenues, less transaction-based expenses, increased \$341 million in 2018 from 2017. The increase in revenues includes \$26 million in favorable foreign exchange effects arising from the weaker U.S. dollar in 2018 from 2017. Revenues, less transaction-based expenses, increased \$126 million in 2017 from 2016. The increase in revenues includes \$22 million in unfavorable foreign exchange effects arising from the strengthening U.S. dollar in 2017 from 2016.

Operating expenses increased \$137 million in 2018 from 2017. The increase in operating expenses includes \$11 million in unfavorable foreign exchange effects arising from the weaker U.S. dollar in 2018 from 2017.

Operating expenses decreased \$81 million in 2017 from 2016. The decrease in operating expenses includes \$13 million in favorable foreign exchange effects arising from the strengthening U.S. dollar in 2017 from 2016.

In connection with our acquisition of MERS, we recorded a \$110 million gain in other income during 2018. In connection with Cetip's merger with BM&FBOVESPA S.A., now B3, we recognized a \$167 million net realized investment gain in other income, net in 2017. We also recognized a net gain of \$110 million in connection with our divestiture of Trayport in other income (expense), net in 2017.

Excluding the 2017 deferred tax benefit from the U.S. tax law changes, the 2018 effective tax rate is lower than the 2017 effective tax rate due to the TCJA, which reduced the U.S. federal corporate income tax rate from 35% to 21% effective January 1, 2018, tax benefits from our acquisition of MERS, deferred tax benefits from the U.S. tax rate reduction resulting from changes in estimates and additional tax benefits associated with our sale of Trayport.

The 2017 effective tax rate is lower than the 2016 effective tax rate due to a \$764 million deferred tax benefit associated with the enactment of the TCJA in 2017.

Business Environment and Market Trends

Our business environment has been characterized by:

- globalization of exchanges, customers and competitors;
- lower interest rates and financial markets uncertainty;
- rising demand for speed, data, data capacity and connectivity by market participants, necessitating increased investment in technology;
- evolving and disparate regulation across multiple jurisdictions;
- increasing focus on capital and cost efficiencies; and
- consolidation and increasing competition among global markets for trading, clearing and listings.

Price volatility increases the need to hedge risk and creates demand among market participants for the exchange of risk through trading and clearing. Market liquidity is one of the primary market attributes for attracting and maintaining customers and is an important indicator of a market's strength. In addition, the ability to evolve existing products to serve emerging needs, develop new products and respond to competitive dynamics in pricing, exclusivity and consolidation is important to our business.

Recent changes with regard to global financial reform have emphasized the importance of transparent markets, centralized clearing and access to data, all of which are important aspects of our product offering. However, some of the proposed rules have yet to be implemented and some rules that have already been partially implemented are being reconsidered. In addition, some of the global regulations have not been fully harmonized and several of the MiFID II regulations are inconsistent with U.S. rules. As the evolution continues, legislative and regulatory actions may change the way we conduct our business and may create uncertainty for market participants, which could affect trading volumes or demand for market data. As a result, it is difficult to predict all of the effects that the legislation and its implementing regulations will have on us. As discussed more fully in Item 1 "- Business - Regulation" included in this Annual Report, Brexit, the implementation of MiFID II and other regulations may result in operational, regulatory and/or business risk.

In recent years, low interest rates and uncertainty in the financial markets continued to reflect the impact of a relatively slow economic recovery. Lower growth in Asia and the EU may also continue to affect global financial markets. In addition, economic and regulatory uncertainty, coupled with periods of high market volatility around geopolitical events, low interest rates and low natural gas prices, has affected our clients' activities in recent years. The duration of these trends will determine the continued impact on our business.

We have diversified our business so that we are not dependent on volatility or trading activity in any one asset class. In addition, we have increased our portion of non-transaction and clearing revenues from 39% in 2014 to 56% in 2018. This non-transaction revenue includes data services and listings.

Many of the data products we sell and services we provide are required for our clients' business operations regardless of market volatility or shifts in business profitability levels. We anticipate that there will continue to be growth in the financial information services sector driven by a number of global trends, including the following:

- increasing global regulatory demands;
- greater use of fair value accounting standards and reliance on independent valuations;
- greater emphasis on risk management;
- market fragmentation driven by regulatory changes;
- the move to passive investing and indexation;
- ongoing growth in the size and diversity of financial markets;
- increased automation of fixed income and other less automated markets;
- the development of new data products;
- the demand for greater data capacity and connectivity;
- new entrants; and
- increasing demand for outsourced services by financial institutions.

We continue to focus on our strategy to grow each of our revenue streams, as well as on our company-wide expense reduction initiatives and our synergies in connection with our acquisitions in order to mitigate these uncertainties and to build on our growth opportunities by leveraging our proprietary data, clearing and markets.

Segment Results

Our business is conducted through two reportable business segments:

- Trading and Clearing, which comprises our transaction-based execution and clearing businesses; and
- Data and Listings, which comprises our subscription-based data services and securities listings businesses.

While revenues are recorded specifically in the segment in which they are earned or to which they relate, a significant portion of our operating expenses are not solely related to a specific segment because the expenses serve functions that are necessary for the operation of both segments. We use a pro-rata revenue approach as the allocation method for the expenses that do not relate solely to one segment. Further, we did not allocate expenses to specific revenue streams within these segments since such an allocation is not reasonably possible. Our two segments do not engage in intersegment transactions.

Trading and Clearing Segment

The following presents selected statements of income data for our Trading and Clearing segment (dollars in millions):

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(1) The adjusted numbers in the charts above are calculated by excluding items that are not reflective of our cash operations and core business performance. As a result, these adjusted numbers are not calculated in accordance with U.S. GAAP. See “- Non-GAAP Financial Measures” below.

	Year Ended			Year Ended		
	December 31,		Change	December 31,		Change
	2018	2017		2017	2016	
Revenues:						
Energy futures and options contracts	\$965	\$909	6 %	\$909	\$865	5 %
Agricultural and metals futures and options contracts	251	216	16	216	228	(5)
Financial futures and options contracts	354	326	9	326	318	2
Cash equities and equity options	1,624	1,491	9	1,491	1,780	(16)
Fixed income and credit	240	139	72	139	143	(2)
OTC and other transactions	49	50	(2)	50	50	1
Transaction and clearing, net	3,483	3,131	11	3,131	3,384	(7)
Other revenues	234	202	16	202	177	14
Revenues	3,717	3,333	12	3,333	3,561	(6)
Transaction-based expenses	1,297	1,205	8	1,205	1,459	(17)
Revenues, less transaction-based expenses	2,420	2,128	14	2,128	2,102	1
Other operating expenses	686	592	16	592	573	3
Depreciation and amortization	215	187	16	187	243	(23)
Acquisition-related transaction and integration costs	10	2	n/a	2	10	(83)
Operating expenses	911	781	17	781	826	(6)
Operating income	\$1,509	\$1,347	12 %	\$1,347	\$1,276	6 %

Transaction and Clearing Revenues

Our transaction and clearing revenues are reported on a net basis, except for the NYSE transaction-based expenses discussed below, and consist of fees collected from our derivatives, fixed income, cash equities and equity options trading and derivatives clearing. In our derivatives markets, we earn transaction and clearing revenues from both counterparties to each contract that is traded and/or cleared, and in our equity and equity options markets, we receive trade execution fees as well as routing fees related to orders in our markets which are routed to other markets for execution.

Rates per-contract, or RPC, are driven by the number of contracts or securities traded and the fees charged per contract, net of certain rebates. Our per-contract transaction and clearing revenues will depend upon many factors, including, but not limited to, market conditions, transaction and clearing volume, product mix, pricing, applicable revenue sharing and market making agreements, and new product introductions. Because transaction and clearing revenues are generally assessed on a per-contract basis, revenues and profitability fluctuate with changes in contract volume and due to product mix.

In 2018, 2017 and 2016, 20%, 20% and 19%, respectively, of our Trading and Clearing segment revenues, less transaction-based expenses, were billed in pounds sterling or euros. Due to the fluctuations of the pound sterling and euro over the last two years compared to the U.S. dollar, our Trading and Clearing segment revenues, less transaction-based expenses, were higher by \$18 million in 2018 from 2017, and were lower by \$14 million in 2017 from 2016.

Our transaction and clearing revenues are presented net of rebates. We recorded rebates of \$844 million, \$749 million and \$674 million in 2018, 2017 and 2016, respectively. We offer rebates in certain of our markets primarily to support market liquidity and trading volume by providing qualified participants in those markets a discount to the applicable commission rate. Such rebates are calculated based on volumes traded. The increase in the rebates is due primarily to an increase in the number of participants in the rebate programs offered on various contracts, an increase in our traded volume and an increase in the number of rebate programs.

Energy Futures and Options Contracts: Total energy volume and revenues increased 1% and 6%, respectively, in 2018 from 2017, and increased 8% and 5%, respectively, in 2017 from 2016. Revenues increased in 2018 from 2017 due to a higher mix of gasoil, emissions and TTF gas volumes, which have a higher average RPC than other energy products. Total oil volume increased 3% in 2018 from 2017, and increased 14% in 2017 from 2016. ICE Brent crude futures and options volume was flat in 2018 from 2017, and increased 15% in 2017 from 2016. ICE WTI crude futures and options volume increased 5% in 2018 from 2017, and increased 14% in 2017 from 2016. The volume increases were primarily due to increased oil price volatility related to shifting supply and demand dynamics globally; broader market volatility in oil products, equities and foreign exchange rates; acts of central governments; outcomes of elections; and uncertainty around the Organization of Petroleum Exporting Countries, or OPEC, policy. Our record gasoil futures and options volume in 2018 increased 11% from 2017, and increased 13% in 2017 from 2016. Gasoil futures and options increased during 2018 and 2017 primarily due to increased demand for distillates, strong economic activity in Europe and Asia and regulatory uncertainty.

Our global natural gas futures and options volume decreased 4% in 2018 from 2017, and decreased 1% in 2017 from 2016. The volume decrease in 2018 from 2017 was primarily due to lower U.S. price volatility reducing our commercial customers' need to hedge the Henry Hub contract, and depressed gas prices driven by a continued surplus of natural gas during 2018 as compared to 2017. Our 2018 Henry Hub natural gas volume decrease was partially offset by increased volumes in our North American basis market and TTF gas in Europe. Our record TTF gas volumes in 2018 were driven by changing natural gas dynamics due to the continued globalization of natural gas. Emission futures and options volumes increased 73% in 2018 from 2017, and increased 1% in 2017 from 2016. Our record emissions volumes in 2018 were driven by higher carbon prices and supply-demand dynamics impacted by regulatory uncertainty.

Agricultural and Metals Futures and Options Contracts: Total volume and revenues in our agricultural and metals futures and options markets increased 15% and 16%, respectively, in 2018 from 2017, and decreased 7% and 5%, respectively, in 2017 from 2016. Volume in our largest agricultural contract, sugar futures and options, increased 20% in 2018 from 2017, and decreased 10% in 2017 from 2016. Other agricultural and metal futures and options volume increased 11% in 2018 from 2017, and decreased 4% in 2017 from 2016. The increases in agricultural volumes to record levels in 2018 were primarily driven by price volatility resulting from shifting supply and demand dynamics. The decreases in agricultural volume in 2017 were primarily driven by the reduced price volatility in 2017 compared to the higher price volatility in 2016.

Financial Futures and Options Contracts: Interest rates futures and options volume and revenue increased 14% and 19%, respectively, in 2018 from 2017, and increased 27% and 9%, respectively, in 2017 from 2016. Our record level interest rate futures and options volume in 2018 was driven by expectations for heightened central bank activity during 2018, coupled with geopolitical uncertainty in the U.K. and Europe. Interest rates futures and options revenues were \$230 million, \$193 million and \$177 million in 2018, 2017 and 2016, respectively.

Other financial futures and options volume decreased 9% in 2018 from 2017, and decreased 19% in 2017 from 2016. The decrease was primarily due to the termination of our exclusive license to list futures and options contracts on the Russell® indices. Excluding the futures and options contracts on the Russell® indices, other financial futures and options volume increased 18% in 2018 from 2017. Other financial futures and options revenues were \$124 million, \$133 million and \$141 million in 2018, 2017 and 2016, respectively.

Cash Equities and Equity Options: Cash equities handled volume increased 14% in 2018 from 2017, primarily due to higher total U.S. equity volumes driven by heightened volatility in the U.S. equity markets coupled with the May

2018 commencement of trading of NYSE National and the July 2018 acquisition of CHX. Cash equities handled volume decreased 17% in 2017 from 2016, primarily due to reduced U.S. equities market volatility during 2017 as compared to 2016. Cash equities revenues, net of transaction-based expenses, were \$220 million, \$196 million, and \$223 million in 2018, 2017 and 2016, respectively.

Equity options volume increased 43% in 2018 from 2017 primarily due to heightened volatility in the U.S. equity markets, as well as increased market share in 2018 due to greater volatility. Equity options volume decreased 13% in 2017 from 2016 primarily due to lower U.S. equity market volatility and the restructuring of the NYSE American Options business. Equity options revenues, net of transaction-based expenses, were \$107 million, \$90 million and \$98 million in 2018, 2017 and 2016, respectively.

Fixed Income and Credit: CDS clearing revenues were \$139 million, \$113 million and \$107 million in 2018, 2017 and 2016, respectively. The notional value of CDS cleared was \$16.4 trillion, \$11.5 trillion and \$11.5 trillion, in 2018, 2017 and 2016, respectively. Buy-side participation at our U.S. CDS clearing house, ICE Clear Credit, reached record levels in terms of number of participants and notional cleared due to increased participation from both U.S. and European buy-side customers due to greater regulatory certainty, depth of liquidity, the breadth of products offered, and cost efficient margining in the U.S. relative to Europe. Fixed income and credit also includes revenues from ICE Bonds, which includes ICE BondPoint, TMC Bonds, ICE Credit Trade and ICE Mortgage Services.

OTC and Other Transactions: OTC and other transactions include revenues from our OTC energy business and other trade confirmation services.

Other Revenues: Other revenues primarily include interest income on certain clearing margin deposits, regulatory penalties and fines, fees for use of our facilities, regulatory fees charged to member organizations of our U.S. securities exchanges, designated market maker service fees, exchange membership fees and agricultural grading and certification fees. The increase in other revenues in 2018 from 2017 is primarily due to increased interest income earned on certain clearing margin deposits, as well as a \$5 million settlement received by NYSE Regulation from ING Financial Markets, LLC, or ING, following an investigation into improper conduct by ING's lending desk from 2007 to 2015. The 2018 increase was partially offset by a \$6 million breakup fee received in August 2017 related to the termination of the derivatives clearing agreement with Euronext Group N.V.'s, or Euronext, under which ICE Clear Netherlands was to provide clearing of Euronext's financial and commodity derivatives.

Selected Operating Data

The following charts and table present trading activity in our futures and options markets by commodity type based on the total number of contracts traded, as well as futures and options rate per contract (in millions, except for percentages and rate per contract amounts):

Volume
and Rate
per
Contract

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	Year Ended			Year Ended		
	December			December		
	31,			31,		
	2018	2017	Change	2017	2016	Change
Number of contracts traded (in millions):						
Energy futures and options	692	685	1 %	685	635	8 %
Agricultural and metals futures and options	107	94	15	94	101	(7)
Financial futures and options	710	647	10	647	564	15
Total	1,509	1,426	6 %	1,426	1,300	10 %

	Year Ended			Year Ended		
	December			December		
	31,			31,		
	2018	2017	Change	2017	2016	Change
Average Daily Volume of contracts traded (in millions):						
Energy futures and options	2,747	2,731	1 %	2,731	2,521	8 %
Agricultural and metals futures and options	427	374	14	374	399	(6)
Financial futures and options	2,770	2,536	9	2,536	2,205	15
Total	5,944	5,641	5 %	5,641	5,125	10 %

	Year Ended			Year Ended		
	December			December		
	31,			31,		
	2018	2017	Change	2017	2016	Change
Rate per contract:						
Energy futures and options	\$1.39	\$1.33	5 %	\$1.33	\$1.36	(2)%
Agricultural and metals futures and options	\$2.34	\$2.30	2 %	\$2.30	\$2.27	1 %
Financial futures and options	\$0.49	\$0.49	— %	\$0.49	\$0.54	(10)%

Open interest is the aggregate number of contracts (long or short) that clearing members hold either for their own account or on behalf of their clients. Open interest refers to the total number of contracts that are currently “open,” – in other words, contracts that have been traded but not yet liquidated by either an offsetting trade, exercise, expiration, or assignment. Open interest is also a measure of the future activity remaining to be closed out in terms of the number of contracts that members and their clients continue to hold in the particular contract and by the number of contracts held for each contract month listed by the exchange. The following charts and table present our year-end open interest for our futures and options contracts (in thousands, except for percentages):

Open
Interest

	As of December 31, 2018			As of December 31, 2017		
		2017	Change	2017	2016	Change
Open interest — in thousands of contracts:						
Energy futures and options	35,019	33,906	3 %	33,906	32,096	6 %
Agricultural and metals futures and options	3,643	3,391	7 %	3,391	3,920	(14)
Financial futures and options	29,061	24,025	21 %	24,025	19,413	24
Total	67,723	61,322	10 %	61,322	55,429	11 %

The following charts and tables present selected cash and equity options trading data. All trading volume below is presented as average net daily trading volume and is single counted:

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	Year Ended December 31, 2018			Year Ended December 31, 2017			Year Ended December 31, 2016		
			Change				Change		
NYSE cash equities (shares in millions):									
NYSE listed (Tape A) issues:									
Handled volume	1,150	1,086	6	%	1,086	1,269	(14)	%	
Matched volume	1,140	1,077	6	%	1,077	1,256	(14)	%	
Total NYSE listed consolidated volume	3,647	3,434	6	%	3,434	3,918	(12)	%	
Share of total matched consolidated volume	31.3	% 31.4	% (0.1) pts		31.4	% 32.1	% (0.7) pts		
NYSE Arca, NYSE American and regional listed (Tape B) issues:									
Handled volume	369	289	27	%	289	372	(22)	%	
Matched volume	359	281	28	%	281	360	(22)	%	
Total NYSE Arca, NYSE American and regional listed consolidated volume	1,435	1,188	21	%	1,188	1,536	(23)	%	
Share of total matched consolidated volume	25.0	% 23.7	% 1.3 pts		23.7	% 23.4	% 0.2 pts		
Nasdaq listed (Tape C) issues:									
Handled volume	215	145	48	%	145	186	(22)	%	
Matched volume	203	136	49	%	136	177	(23)	%	
Total Nasdaq listed consolidated volume	2,253	1,921	17	%	1,921	1,907	1	%	
Share of total matched consolidated volume	9.0	% 7.1	% 1.9 pts		7.1	% 9.3	% (2.2) pts		
Total cash handled volume	1,734	1,521	14	%	1,521	1,828	(17)	%	
Total cash market share matched	23.2	% 22.8	% 0.4 pts		22.8	% 24.4	% (1.5) pts		
NYSE equity options (contracts in thousands):									
NYSE equity options volume	3,386	2,375	43	%	2,375	2,719	(13)	%	
Total equity options volume	18,217	14,697	24	%	14,697	14,391	2	%	
NYSE share of total equity options	18.6	% 16.2	% 2.4 pts		16.2	% 18.9	% (2.7) pts		

Revenue capture or rate per contract:

Cash equities rate per contract (per 100 shares)	\$0.050	\$0.051	(2)	%	\$0.051	\$0.049	6	%
Equity options rate per contract	\$0.12	\$0.15	(17)	%	\$0.15	\$0.14	5	%

Handled volume represents the total number of shares of equity securities, ETFs and crossing session activity internally matched on our exchanges or routed to and executed on an external market center. Matched volume represents the total number of shares of equity securities, ETFs and crossing session activity executed on our exchanges.

For NYSE cash equities, market share increased in 2018 due to increased equity market volatility, the commencement of trading on NYSE National and the acquisition of CHX. NYSE cash equities market share declined during 2017 due to historically low volatility driving more trading to off-exchange trading venues, particularly dark-pools. For NYSE equity options, 2018 market share improved due to greater equity market volatility and decreased in 2017 due to a strategic focus on maximizing revenues in an extremely competitive environment.

Transaction-Based Expenses

Our equities and equity options markets pay fees to the SEC pursuant to Section 31 of the Exchange Act. Section 31 fees are recorded on a gross basis as a component of transaction and clearing fee revenue. These Section 31 fees are assessed to recover the government's costs of supervising and regulating the securities markets and professionals. We, in turn, collect corresponding activity assessment fees from member organizations clearing or settling trades on the

equities and options exchanges, and recognize these amounts in our transaction and clearing revenues when invoiced. The activity assessment fees are designed to equal the Section 31 fees. As a result, activity assessment fees and the corresponding Section 31 fees do not have an impact on our net income, although the timing of payment by us may vary from collections. The fees we collect are included in cash at the time of receipt and we remit the amounts to the SEC semi-annually as required. The total amount is included in accrued liabilities and was \$105 million as of December 31, 2018.

We make liquidity payments to cash and options trading customers, as well as routing charges made to other exchanges included in transaction-based expenses. We incur routing charges when we do not have the best bid or offer in the market for a security that a customer is trying to buy or sell on one of our securities exchanges. In that case, we route the customer's order to the external market center that displays the best bid or offer. The external market center charges us a fee per share (denominated in tenths of a cent per share) for routing to its system. We record routing charges on a gross basis as a component of transaction and clearing fee revenue.

Operating Expenses, Operating Income and Operating Margin

Our Trading and Clearing segment operating expenses increased \$130 million in 2018 from 2017, and decreased \$45 million in 2017 from 2016, partially related to the \$33 million Creditex customer relationship intangible asset impairment expense recorded in 2016. See “- Consolidated Operating Expenses” below for a discussion of the significant changes in our operating expenses. Our Trading and Clearing segment operating income increased \$162 million in 2018 from 2017, and increased \$71 million in 2017 from 2016. Trading and Clearing segment operating margins were 62%, 63% and 61% in 2018, 2017 and 2016, respectively. The operating income increases in the last two years were driven by the revenue increases discussed above.

Our Trading and Clearing segment adjusted operating expenses were \$824 million, \$714 million and \$716 million in 2018, 2017 and 2016, respectively. Our Trading and Clearing segment adjusted operating income was \$1.6 billion, \$1.4 billion and \$1.4 billion in 2018, 2017 and 2016, respectively. Our Trading and Clearing segment adjusted operating margins were 66% in 2018, 2017 and 2016. See “- Non-GAAP Financial Measures” below.

Data and Listings Segment

The following charts and table present our selected statements of income data for our Data and Listings segment (dollars in millions):

(1) The adjusted numbers in the charts above are calculated by excluding items that are not reflective of our cash operations and core business performance. As a result, these adjusted numbers are not calculated in accordance with U.S. GAAP. See “- Non-GAAP Financial Measures” below.

	Year Ended December 31, 2018			Year Ended December 31, 2017			Year Ended December 31, 2016		
			Change			Change			Change
Revenues:									
Pricing and analytics	\$1,043	\$970	7 %	\$970	\$858	13 %			
Exchange data and feeds	670	632	6	632	602	5			
Desktops and connectivity	402	482	(17)	482	518	(7)			
Data services	2,115	2,084	1	2,084	1,978	5			
Listings	444	426	4	426	432	(1)			
Revenues	2,559	2,510	2	2,510	2,410	4			
Other operating expenses	1,090	1,096	(1)	1,096	1,077	2			
Acquisition-related transaction and integration costs	24	34	(29)	34	70	(52)			
Depreciation and amortization	371	348	6	348	367	(5)			
Operating expenses	1,485	1,478	—	1,478	1,514	(2)			
Operating income	\$1,074	\$1,032	4 %	\$1,032	\$896	15 %			

Data Services Revenues

Our Data and Listings segment represents subscription-based, or recurring, revenues from data services and listings services offered across our trading and clearing businesses and ICE Data Services. Through ICE Data Services, we generate revenues from a range of global financial and commodity markets, including pricing and reference data, exchange data, analytics, feeds, index services, desktops and connectivity solutions. Through NYSE, NYSE American and NYSE Arca, we generate listings revenue related to the provision of listings services for public companies and ETFs, and related corporate actions for listed companies.

In 2018, 2017 and 2016, 8%, 10% and 12%, respectively, of our Data and Listings segment revenues were billed in pounds sterling or euros (all relating to our data services revenues). As the pound sterling or euro exchange rate changes, the U.S. equivalent of revenues denominated in foreign currencies changes accordingly. Due to the weakening of the U.S. dollar compared to the pound sterling and euro during 2018, our data services revenues were higher by \$7 million in 2018 than in 2017. Due to the weakening of the pound sterling and euro compared to the U.S. dollar during 2017, our data services revenues were lower by \$8 million in 2017 than in 2016.

Our data services revenues are primarily subscription-based and increased 1% in 2018 from 2017, and increased 5% in 2017 from 2016. The increases in revenues in both 2018 and 2017 were primarily due to the strong retention rate of

existing customers, the addition of new customers, increased purchases by existing customers and increases in pricing of our products, partially offset by the divestitures of IDMS in March 2017 and Trayport in December 2017 within our desktop and connectivity business. The increase in revenue in 2017 from 2016 was also partially due to our acquisitions of TMX Atrium in May 2017 and BofAML's Global Research division's index business in October 2017 and the impact of foreign currency translation.

Pricing and Analytics: Our pricing and analytics revenues increased 7% in 2018 from 2017 and increased 13% in 2017 from 2016. The increases in revenue were driven by the strong retention rate of existing customers, the addition of new customers, increased purchases by existing customers, increases in pricing of our products and the acquisition and further distribution of the ICE BofAML Indices.

Exchange Data and Feeds: Our exchange data and feeds revenues increased 6% in 2018 from 2017 and increased 5% in 2017 from 2016. The increases in revenues were driven by the strong retention rate of existing customers, the addition of new customers, increased purchases by existing customers and a larger share of the NMS Plan revenue.

Desktops and Connectivity: Our desktop and connectivity revenues decreased 17% in 2018 from 2017 and decreased 7% in 2017 from 2016 driven primarily by the divestitures of IDMS and Trayport in 2017.

Annual Subscription Value, or ASV, represents, at a point in time, the data services revenues subscribed for the succeeding 12 months. ASV does not include new sales, contract terminations or price changes that may occur during that 12-month period. ASV also does not include certain data services revenue streams that are not subscription-based. Revenue from ASV businesses has historically represented approximately 90% of our data revenues. Thus, while it is an indicative forward-looking metric, it does not provide a growth forecast of the next 12 months of data services revenues.

As of December 31, 2018, ASV was \$1.922 billion, which increased 6.1% compared to the ASV as of December 31, 2017. This does not adjust for year-over-year foreign exchange fluctuations or impacts of acquisitions. Underpinning this growth is strength in our pricing & analytics business.

Listings Revenues

Listings revenues in our securities markets arise from fees applicable to companies listed on our cash equities exchanges - original listing fees and annual listing fees. Original listing fees consist of two components: initial listing fees and fees related to corporate actions. Initial listing fees, subject to a minimum and maximum amount, are based on the number of shares that a company initially lists. All listings fees are billed upfront and the identified performance obligations are satisfied over time. Revenue related to the investor relations performance obligation is recognized ratably over a two-year period, with the remaining revenue recognized ratably over time as customers continue to list on our exchanges, which is generally estimated to be over a period of up to nine years for NYSE and up to five years for NYSE Arca and NYSE American.

In addition, we earn corporate actions-related listing fees in connection with actions involving the issuance of new shares, such as stock splits, rights issues and sales of additional securities, as well as mergers and acquisitions.

Listings fees related to other corporate actions are considered contract modifications of our listing contracts and are recognized ratably over time as customers continue to list on our exchanges, which is generally estimated to be a period of six years for NYSE and three years for NYSE Arca and NYSE American.

Our listings revenues increased 4% in 2018 from 2017 and decreased 1% in 2017 from 2016 due to changes in market conditions for IPOs.

Operating Expenses, Operating Income and Operating Margin

Our Data and Listings segment operating expenses increased \$7 million in 2018 from 2017, and decreased \$36 million in 2017 from 2016. See “- Consolidated Operating Expenses” below for a discussion of the significant changes in our operating expenses. Our Data and Listings segment operating income increased \$42 million in 2018 from 2017, and increased \$136 million in 2017 from 2016. Our Data and Listings segment operating margins were 42%, 41% and 37% in 2018, 2017 and 2016, respectively. The operating income and operating margin increases during 2018 and 2017 were driven by the revenue increases discussed above.

Our Data and Listings segment adjusted operating expenses were \$1.2 billion in 2018, 2017 and 2016. Our Data and Listings segment adjusted operating income was \$1.3 billion, \$1.3 billion and \$1.2 billion in 2018, 2017 and 2016, respectively. Our Data and Listings segment adjusted operating margins were 51%, 51% and 49% in 2018, 2017 and 2016, respectively. See “- Non-GAAP Financial Measures” below.

Consolidated Operating Expenses

The following presents our consolidated operating expenses (dollars in millions):

	Year Ended			Year Ended		
	December 31,		Change	December 31,		Change
	2018	2017		2017	2016	
Compensation and benefits	\$994	\$946	5 %	\$946	\$953	(1)%
Professional services	131	121	8	121	137	(12)
Acquisition-related transaction and integration costs	34	36	(5)	36	80	(56)
Technology and communication	432	397	9	397	374	6
Rent and occupancy	68	69	(2)	69	70	(1)
Selling, general and administrative	151	155	(3)	155	116	34
Depreciation and amortization	586	535	10	535	610	(12)
Total operating expenses	\$2,396	\$2,259	6 %	\$2,259	\$2,340	(3)%

The majority of our operating expenses do not vary directly with changes in our volume and revenues, except for certain technology and communication expenses and a portion of our compensation expense that is tied directly to our data sales or overall financial performance.

We expect our operating expenses to increase in absolute terms in future periods in connection with our acquisitions and growth of our business, and to vary from year-to-year based on the type and level of our acquisitions, our integrations and other investments.

In 2018, 2017 and 2016, 13%, 14% and 18%, respectively, of our operating expenses were incurred in pounds sterling or euros. Due to the weakening of the U.S. dollar compared to the pound sterling and euro in 2018, our consolidated operating expenses were higher by \$12 million in 2018 than in 2017. Due to the weakening of the pound sterling and euro as compared to the U.S. dollar in 2017, our consolidated operating expenses were lower by \$14 million in 2017 than in 2016. See Item 7(A) “- Quantitative and Qualitative Disclosures About Market Risk - Foreign Currency Exchange Rate Risk” below for additional information.

Compensation and Benefits Expenses

Compensation and benefits expense is our most significant operating expense and includes non-capitalized employee wages, bonuses, non-cash or stock compensation, certain severance costs, benefits and employer taxes. The bonus component of our compensation and benefits expense is based on both our financial performance and the individual employee performance. The performance-based restricted stock compensation expense is also based on our financial performance. Therefore, our compensation and benefits expense will vary year-to-year based on our financial performance and fluctuations in the number of employees.

As of December 31, 2018, we had 5,161 employees, compared to 4,952 and 5,631 as of December 31, 2017 and December 31, 2016, respectively. Our employee headcount increased in 2018 from 2017 primarily due to new employees related to the acquisitions of BondPoint in January 2018, CHX Holdings, Inc. and TMC Bonds in July 2018 and MERS in October 2018, partially offset by continued employee terminations associated with our integration of Interactive Data. Our employee headcount decreased in 2017 from 2016 primarily due to the divestitures in 2017 of IDMS, Trayport and NYSE Governance Services, and employee terminations in connection with our integration of Interactive Data, partially offset by new employees related to the acquisitions of ICE NGX and TMX Atrium in 2017. See “- Recent Developments” above.

Our compensation and benefits expenses increased in 2018 from 2017 primarily due to employee severance and retention costs and a net increase in our employee headcount, partially offset by a decrease in non-cash compensation expense. We incurred employee severance and retention costs of \$41 million, \$21 million and \$10 million in 2018, 2017 and 2016, respectively. The decrease in compensation and benefits expenses in 2017 from 2016 was minimal. Non-cash compensation expenses recognized in our consolidated financial statements for employee stock options and restricted stock were \$130 million, \$135 million and \$123 million in 2018, 2017 and 2016, respectively. The decrease in non-cash compensation expenses in 2018 from 2017 was primarily related to a change in ICE’s non-cash incentive plans that reduced the overall amount of non-cash incentives awarded. The increase in non-cash compensation expenses in 2017 from 2016 primarily relates to the integration of the Interactive Data employees into the ICE non-cash incentive plans.

Professional Services Expenses

This expense includes fees for consulting services received on strategic and technology initiatives, temporary labor, as well as regulatory, legal and accounting fees, and may fluctuate as a result of changes in consulting and technology services, temporary labor, and regulatory, accounting and legal proceedings.

Professional services expenses increased in 2018 from 2017 primarily due to consulting and legal fees related to software development consulting costs. Professional services expenses decreased in 2017 from 2016 primarily due to the continued reduction in professional services and contractors at NYSE. We eliminated or replaced certain contractor positions with full-time employees at NYSE in 2016. In addition, during 2016, we recorded a credit from a third-party service provider related to fees charged in a prior period. Legal fees, which are included in professional services expenses, primarily related to class action lawsuits in which NYSE was a defendant. These decreases were partially offset by professional services expenses incurred by Interactive Data, Trayport, Securities Evaluations and Credit Market Analysis.

Acquisition-Related Transaction and Integration Costs

In 2018, we incurred \$34 million in acquisition-related transaction and integration costs, primarily relating to employee terminations and lease terminations in connection with our our integrations of Interactive Data, Securities Evaluations and

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Credit Market Analysis, professional services costs from our 2018 acquisitions, and a \$5 million banker success fee in connection with our acquisition of TMC Bonds. The integration of Interactive Data was completed by June 30, 2018. In 2017, we incurred \$36 million in acquisition-related transaction and integration costs, primarily relating to our integrations of Interactive Data, Securities Evaluations and Credit Market Analysis and our acquisitions of BondPoint, TMX Atrium, the ICE BofAML Indices and NYSE National. Of this amount, \$11 million was primarily related to the acquisitions. We incurred \$25 million for Interactive Data, Securities Evaluations and Credit Market Analysis integration costs relating to employee and lease termination costs and professional services costs.

In 2016, we incurred \$80 million in acquisition-related transaction and integration costs primarily relating to our integrations of Interactive Data and NYSE, legal and professional fees related to the Trayport CMA review, our investment in MERS, our acquisitions of Securities Evaluations and Credit Market Analysis, and various other potential and discontinued acquisitions. Of this amount, \$41 million was primarily related to the acquisitions and other transaction costs. We incurred \$39 million for Interactive Data and NYSE integration costs during 2016, primarily relating to employee and lease termination costs and professional services costs. The integration of NYSE was completed in 2016 and no NYSE integration costs were incurred after 2016.

We expect to continue to explore and pursue various potential acquisitions and other strategic opportunities to strengthen our competitive position and support our growth. As a result, we may incur acquisition-related transaction costs in future periods. See “- Non-GAAP Financial Measures” below.

Technology and Communication Expenses

Technology support services consist of costs for running our wholly-owned data centers, hosting costs paid to third-party data centers, and maintenance of our computer hardware and software required to support our technology and cybersecurity. These costs are driven by system capacity, functionality and redundancy requirements.

Communication expenses consist of costs for network connection for our electronic platforms, telecommunications costs, and fees paid for access to external market data. This expense also includes licensing and other fee agreement expenses which may be impacted by growth in electronic contract volume, our capacity requirements, changes in the number of telecommunications hubs and connections with customers to access our electronic platforms directly.

Technology and communications expenses increased in 2018 from 2017, primarily due to \$17 million in data center migrations, hardware support upgrades and cybersecurity investments, \$11 million in increased costs related to our recent acquisitions, net of divestitures, and \$7 million in increased costs for external market data content acquisition and revenue share agreements related to our product offering. Technology and communications expenses increased in 2017 from 2016, primarily due to \$14 million in increased hardware support upgrades and cybersecurity investments, and \$10 million in costs related to our recent acquisitions, net of divestitures.

Rent and Occupancy Expenses

Rent and occupancy expense relates to leased and owned property and includes rent, maintenance, real estate taxes, utilities and other related costs. We have significant operations located in and around Atlanta, New York and London with smaller offices located throughout the world. See Item 2 “- Properties” above for additional information regarding our leased and owned property.

Excluding the impact of the acquisitions, rent and occupancy expenses decreased the last two years primarily due to reduced rent and occupancy costs realized from the continued consolidation of our Atlanta, New York and London office locations.

Selling, General and Administrative Expenses

Selling, general and administrative expenses include marketing, advertising, public relations, insurance, bank service charges, dues and subscriptions, travel and entertainment, non-income taxes and other general and administrative costs.

Selling, general and administrative expenses decreased in 2018 from 2017, primarily due to \$14 million in accruals relating to SEC investigations and inquiries made during 2017. Selling, general and administrative expenses increased in 2017 from 2016, primarily due to the acquisitions of Securities Evaluations and Credit Market Analysis and \$14 million in accruals relating to SEC investigations and inquiries. Excluding the impact of acquisitions and the SEC investigations and inquiries, selling, general and administrative expenses decreased the last two years primarily due to lower marketing expenses. Refer to Note 15 to our consolidated financial statements, included elsewhere in this Annual Report, for more information on the SEC investigations and inquiries.

Depreciation and Amortization Expenses

Depreciation and amortization expense results from depreciation of long-lived assets such as buildings, leasehold improvements, planes, furniture, fixtures and equipment over their estimated useful lives. This expense includes amortization of intangible assets obtained in our acquisitions of businesses, as well as on various licensing agreements, over their estimated useful lives. Intangible assets subject to amortization consist primarily of customer relationships, trading products with finite lives and technology. This expense also includes amortization of internally-developed and purchased software over its estimated useful life.

We recorded amortization expenses on intangible assets acquired as part of our acquisitions, as well as on other intangible assets, of \$289 million, \$272 million and \$323 million in 2018, 2017 and 2016, respectively. Amortization expense increased in 2018 from 2017, as a result of ICE NGX, BondPoint, TMC Bonds, the ICE BofAML Indices, MERS and TMX Atrium intangible assets. In addition, in 2018, we recorded a \$4 million impairment loss on exchange registration intangible assets related to our closure of ICE Futures Canada and ICE Clear Canada as amortization expense. This increase in amortization expense was partially offset by a decrease in amortization recorded on our Russell license intangible assets in 2018 from 2017 due to these assets becoming fully amortized, and amortization expense recorded in 2017 as a result of the net loss of \$6 million on the sale of NYSE Governance Services.

The decrease in the amortization expenses recorded on the intangible assets in 2017 from 2016 is primarily due to a reduction in amortization expenses recorded on intangible assets which became fully amortized (primarily related to certain of the NYSE intangible assets) and the divestitures of Trayport and NYSE Governance Services, partially offset by amortization expenses recorded on the Securities Evaluations, Credit Market Analysis, ICE NGX and TMX Atrium intangible assets. In 2016, we recorded an impairment of the Creditex customer relationship intangible asset of \$33 million, which was recorded in depreciation and amortization expenses. In 2016, we sold certain of Creditex's U.S. voice brokerage operations to Tullett Prebon and discontinued Creditex's U.K. voice brokerage operations. We continue to operate Creditex's electronically traded markets and systems, post-trade connectivity platforms and intellectual property.

We recorded depreciation expenses on our fixed assets of \$293 million, \$257 million and \$254 million in 2018, 2017 and 2016, respectively, with the increase in 2018 primarily due to depreciation resulting from increased software development.

Consolidated Non-Operating Income (Expense)

Income and expenses incurred through activities outside of our core operations are considered non-operating. The following tables present our non-operating income (expenses) (dollars in millions):

	Year Ended			Year Ended		
	December 31,	December 31,	Change	December 31,	December 31,	Change
	2018	2017		2017	2016	
Other income (expense):						
Interest income	\$22	\$8	174 %	\$8	\$3	135 %
Interest expense	\$(244)	\$(187)	31 %	\$(187)	\$(178)	5 %
Other income, net	159	326	(51)	326	46	n/a
Total other income (expense), net	\$(63)	\$147	n/a	\$147	\$(129)	n/a
Net income attributable to non-controlling interest	\$(32)	\$(28)	12 %	\$(28)	\$(27)	5 %

Interest Income

We recognized interest income on our investments of \$22 million, \$8 million and \$3 million during 2018, 2017 and 2016, respectively. Interest income increased in 2018 from 2017 primarily due to a rise in short-term interest rates on various investments.

Interest Expense

Interest expense increased in 2018 from 2017, primarily due to an increase in the principal and coupon of our bond refinancing in August 2018, as well as a rise in short-term interest rates impacting our Commercial Paper Program. Interest expense increased in 2017 from 2016, primarily due to interest expense that we recognized relating to our bond refinancing in August 2017, partially offset by the September 2017 repayment of \$850 million of 2.00% senior

unsecured fixed rate notes that were due in October 2017. See “- Debt” below.

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Other income, net

In December 2017, we sold Trayport to TMX Group for £550 million (\$733 million). We recognized a net gain of \$110 million on the divestiture of Trayport, which was recorded as other income in 2017.

In connection with Cetip's merger with BM&FBOVESPA S.A., now B3, and its subsequent sale, we recognized a \$176 million realized investment gain in other income in 2017 and \$9 million in foreign exchange losses and transaction expenses in other expense in 2017. We recognized dividend income received relating to our investment in Cetip in other income, which was \$5 million and \$17 million in 2017 and 2016, respectively. We no longer receive dividends from Cetip subsequent to its sale in the first quarter of 2017.

We account for our investments in The Options Clearing Corporation, or OCC, and MERS until our October 2018 acquisition of MERS, as equity method investments. We recognized \$46 million, \$36 million and \$25 million in equity income related to these investments during 2018, 2017 and 2016, respectively, as other income. Prior to October 2018, we owned a majority stake in MERS and treated it as an equity method investment because we did not have the ability to control its operations. On October 3, 2018, we completed the purchase of all remaining interests of MERS and subsequently own 100% of MERS. On that date, we gained control of MERS, began to include MERS's results as part of our consolidated operations and recognized a \$110 million gain on our initial investment value in MERS as other income. MERS is now part of ICE Mortgage Services.

In connection with our equity investment in Euroclear, we recognized dividend income of \$15 million in 2018, which is included in other income.

In connection with our adoption of ASU 2017-07, we are recognizing the other components of net benefit cost of our defined

benefit plans in the income statement as non-operating income on a full retrospective basis. The combined net periodic (expense) benefit of these plans was (\$8 million) and \$9 million in 2018 and 2017, respectively.

We incurred foreign currency transaction losses of \$2 million, \$4 million and \$1 million in 2018, 2017 and 2016, respectively. This was primarily attributable to the fluctuations of the pound sterling and euro relative to the U.S. dollar. Foreign currency gains and losses are recorded in other income, net, when the settlement of foreign currency assets, liabilities and payables that occur through our foreign operations that are received in non-functional currencies due to the increase or decrease in the period-end foreign currency exchange rates between periods. See Item 7A "- Quantitative and Qualitative Disclosures About Market Risk - Foreign Currency Exchange Rate Risk" included elsewhere in this Annual Report for more information on these items.

Non-controlling Interest

For consolidated subsidiaries in which our ownership is less than 100%, and for which we have control over the assets, liabilities and management of the entity, the outside stockholders' interests are shown as non-controlling interest in our consolidated financial statements. As of December 31, 2016, non-controlling interests included those related to the operating results of our CDS clearing subsidiaries in which non-ICE limited partners held a 42.5% net profit sharing interest; ICE Endex in which Gasunie held a 21% ownership interest; and ICE Clear Netherlands in which ABN AMRO Clearing held a 25% ownership interest.

In 2017, we purchased both Gasunie's 21% interest in ICE Endex and ABN AMRO Clearing's 25% interest in ICE Clear Netherlands. Subsequent to these acquisitions, we own 100% of ICE Endex and ICE Clear Netherlands and no longer include any non-controlling interest related to either company in our consolidated financial statements. In addition, in 2017, we purchased 12.6% of the net profit sharing interest in our CDS clearing subsidiaries from several non-ICE limited partners and the remaining partners held a 29.9% net profit sharing interest in our CDS clearing subsidiaries as of December 31, 2017.

During September 2018, we purchased a 3.2% interest in a non-ICE limited partner of our CDS clearing subsidiaries, and the remaining non-ICE limited partners hold a 26.7% ownership interest as of December 31, 2018. As of December 31, 2018, there are no other non-controlling interests included in our consolidated financial statements, other than that related to the non-ICE partners in Bakkt. Refer to Note 3 to our consolidated financial statements contained elsewhere in this Annual Report.

In December 2018, Bakkt, LLC, or Bakkt, a newly formed entity, was capitalized with \$183 million in initial funding by us as majority owner, along with a group of other minority investors. We hold a call option over these interests subject to certain terms, similarly the non-ICE partners in Bakkt hold a put option to require us to repurchase their

interests subject to certain

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terms. These minority interests are reflected as redeemable non-controlling interests in temporary equity within our consolidated balance sheet.

Consolidated Income Tax Provision

Consolidated income tax expense (benefit) was \$500 million, (\$28 million) and \$586 million in 2018, 2017 and 2016, respectively. The change in consolidated income tax expense (benefit) between years is primarily due to the tax impact of changes in our pre-tax income and the changes in our effective tax rate each year. Our effective tax rate was 20%, (1)% and 29% in 2018, 2017 and 2016, respectively. The effective tax rate in 2018 is lower than the federal statutory rate primarily due to the enactment of the TCJA which reduced the U.S. corporate income tax rate from 35% to 21% effective January 1, 2018. The 2018 effective tax rate was further reduced due to tax benefits from the acquisition of MERS, deferred tax benefits from changes in estimates and additional tax benefits associated with our sale of Trayport in 2017. See “- Recent Developments” above. The effective tax rates in 2017 and 2016 are lower than the federal statutory rate primarily due to favorable U.S. and U.K. tax law changes and favorable foreign income tax rate differentials, partially offset by state income taxes. Favorable foreign income tax rate differentials result primarily from lower income tax rates in the U.K. and various other lower tax jurisdictions as compared to the historical income tax rates in the U.S.

The reductions in U.S. and U.K. corporate income tax rates resulted in deferred tax benefits in the respective periods of enactment. The impact of the deferred tax benefits for the U.S. and U.K. corporate income tax rate reductions in 2017 and 2016 lowered the effective tax rates by 30% and 2%, respectively, and resulted in deferred tax benefits of \$764 million and \$34 million, respectively.

The decrease in the effective tax rate in 2017 from 2016, is primarily due to the deferred tax benefit associated with the future U.S. income tax rate reduction and tax benefits associated with a divestiture in the second quarter of 2017, partially offset by the deferred tax benefit from the U.K. corporate income tax reduction in the third quarter of 2016, additional tax expense from an Illinois corporate income tax rate increase enacted in the third quarter of 2017, and an income tax expense increase due to a relatively higher U.S. mix of income in 2017. See Note 13 to our consolidated financial statements and related notes, which are included in this Annual Report, for additional information on these tax items.

Quarterly Results of Operations

The following quarterly unaudited consolidated statements of income data have been prepared on substantially the same basis as our audited consolidated financial statements and include all adjustments, consisting only of normal recurring adjustments, necessary for the fair presentation of our consolidated results of operations for the quarters presented. The historical results for any quarter do not necessarily indicate the results expected for any future period. This unaudited condensed consolidated quarterly data should be read together with our consolidated financial statements and related notes included in this Annual Report. The following table sets forth quarterly consolidated statements of income data (in millions):

	Three Months Ended,							
	December 31, 2018	September 30, 2018	June 30, 2018	March 31, 2018	December 31, 2017	September 30, 2017	June 30, 2017	March 31, 2017
Revenues:								
Energy futures and options contracts	\$257	\$ 223	\$250	\$235	\$ 227	\$ 223	\$231	\$228
Agricultural and metals futures and options contracts	54	58	74	65	49	49	62	56
Financial futures and options contracts	92	77	94	91	72	82	89	83
Cash equities and equity options	462	335	389	438	365	355	390	381
Fixed income and credit	83	56	45	56	32	37	33	37
OTC and other transactions	13	11	12	13	13	12	12	13
Total transaction and clearing, net	961	760	864	898	758	758	817	798
Pricing and analytics	264	263	262	254	248	242	242	238
Exchange data and feeds	174	168	164	164	160	156	161	155
Desktops and connectivity	101	99	100	102	117	120	118	127

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Total data services	539	530	526	520	525	518	521	520
Listings	112	112	111	109	104	105	109	108
Other revenues	65	61	55	53	54	54	49	45
Total revenues	1,677	1,463	1,556	1,580	1,441	1,435	1,496	1,471
Transaction-based expenses	369	263	310	355	295	289	316	305
Total revenues, less transaction-based expenses	1,308	1,200	1,246	1,225	1,146	1,146	1,180	1,166

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	Three Months Ended,							
	December 31, 2018	September 30, 2018	June 30, 2018	March 31, 2018	December 31, 2017	September 30, 2017	June 30, 2017	March 31, 2017
Compensation and benefits	262	251	241	240	229	234	236	247
Professional services	40	32	29	30	27	30	32	32
Acquisition-related transaction and integration costs	1	6	15	12	9	4	9	14
Technology and communication	112	107	108	105	103	99	97	98
Rent and occupancy	18	17	16	17	17	17	17	18
Selling, general and administrative	42	37	39	33	38	38	38	41
Depreciation and amortization	157	148	143	138	131	128	142	134
Total operating expenses	632	598	591	575	554	550	571	584
Operating income	676	602	655	650	592	596	609	582
Other income (expense), net ⁽¹⁾	62	(48)	(44)	(33)	79	(33)	(42)	143
Income tax expense (benefit) ⁽²⁾	119	89	149	143	(568)	186	140	214
Net income	\$619	\$ 465	\$462	\$474	\$ 1,239	\$ 377	\$427	\$511
Net income attributable to non-controlling interest	(8)	(7)	(7)	(10)	(6)	(6)	(8)	(8)
Net income attributable to Intercontinental Exchange, Inc.	\$611	\$ 458	\$455	\$464	\$ 1,233	\$ 371	\$419	\$503

⁽¹⁾ Other income (expense), net includes the following: a \$110 million gain in connection with our acquisition of MERS (see “- Recent Developments” above); a \$110 million gain on our sale of Trayport for the three months ended December 31, 2017; and in connection with the Cetip merger and its subsequent sale, \$9 million in foreign tax losses and transaction expenses for the three months ended June 30, 2017 and a \$176 million realized investment gain for the three months ended March 31, 2017.

⁽²⁾ The decrease in the income tax expenses for the three months ended December 31, 2017 is primarily due to a \$764 million deferred tax benefit associated with future U.S. income tax reductions, and the decrease for the three months ended June 30, 2017 is primarily due to the tax benefit associated with a divestiture. See “- Consolidated Income Tax Provision” above.

Liquidity and Capital Resources

Below are charts that reflect our capital allocation. The acquisition and integration costs in the chart below includes cash paid for acquisitions, net of cash received for divestitures, cash paid for investments, cash paid for non-controlling interest and redeemable non-controlling interest, and the acquisition-related transaction and integration costs, net of divestitures, in each year.

We have financed our operations, growth and cash needs primarily through income from operations and borrowings under our various debt facilities. Our principal capital requirements have been to fund capital expenditures, working capital, strategic acquisitions and investments, stock repurchases, dividends and the development of our technology platforms. We believe that our cash on hand and cash flows from operations will be sufficient to repay our outstanding debt, but we may also need to incur additional debt or issue additional equity securities in the future. See “- Future Capital Requirements” below.

See “- Recent Developments” above for a discussion of the acquisitions and investments that we made during 2018. These acquisitions and investments were initially funded from borrowing under our Commercial Paper Program along with cash flows from operations and subsequently refinanced with our 2018 debt issuance.

Our Commercial Paper Program enables us to borrow efficiently at reasonable short-term interest rates and provides us with the flexibility to de-lever using our strong annual cash flows from operating activities whenever our leverage becomes elevated as a result of investment or acquisition activities. We repaid a net amount of \$283 million under our Commercial Paper Program during 2018.

Upon maturity of our commercial paper and to the extent old issuances are not repaid by cash on hand, we are exposed to the rollover risk of not being able to issue new commercial paper. To mitigate this risk, we maintain an undrawn back-stop bank revolving credit facility for an aggregate amount equaling at any time the amount issued under our Commercial Paper Program. If we were not able to issue new commercial paper, we have the option of drawing on the back-stop revolving

facility. However, electing to do so would result in higher interest expense. For a discussion of our Commercial Paper Program and other indebtedness, see “- Debt” below.

Consolidated cash and cash equivalents were \$724 million and \$535 million as of December 31, 2018 and 2017, respectively. We had \$1.1 billion and \$1.0 billion in short-term and long-term restricted cash and cash equivalents as of December 31, 2018 and 2017, respectively. We consider all short-term, highly-liquid investments with original maturity dates of three months or less to be cash equivalents. We classify all investments with original maturity dates in excess of three months but less than one year as short-term investments and all investments that we intend to hold for more than one year as long-term investments. Short-term and long-term investments are included in other current and other non-current assets, respectively. Cash and cash equivalents that are not available for general use, either due to regulatory requirements or through restrictions in specific agreements, are classified as restricted cash and cash equivalents and investments.

As of December 31, 2018, the amount of unrestricted cash held by our non-U.S. subsidiaries was \$253 million. Due to U.S. tax reform, a significant amount of 2018 current-year undistributed earnings within our non-U.S. subsidiaries (in excess of their unrestricted cash balance) have been subject to the Global Intangible Low-Taxed Income provisions under the TCJA. Accordingly, these earnings have been subject to immediate U.S. income taxation and any non-U.S. unrestricted cash balances can be distributed to the U.S. in the future with no material additional income tax consequences.

Our cash and cash equivalents and financial investments are managed as a global treasury portfolio of non-speculative financial instruments that are readily convertible into cash, such as overnight deposits, term deposits, money market funds, mutual funds for treasury investments, short duration fixed income investments and other money market instruments, thus ensuring high liquidity of financial assets. We may invest a portion of our cash in excess of short-term operating needs in investment-grade marketable debt securities, including government or government-sponsored agencies and corporate debt securities.

Repurchases of our common stock may be made from time to time on the open market, through established trading plans, in privately-negotiated transactions or otherwise, in accordance with all applicable securities laws, rules and regulations. In 2018, 2017 and 2016, we repurchased 16.3 million shares, 15.0 million shares and 0.9 million shares, respectively, of our outstanding common stock at a cost of \$1.2 billion, \$949 million and \$50 million, respectively. The shares repurchased are held in treasury stock and were completed on the open market and under Rule 10b5-1 trading plans.

From time to time, we enter into Rule 10b5-1 trading plans, as authorized by our Board of Directors, to govern some or all of the repurchases of our shares of common stock. The timing and extent of future repurchases that are not made pursuant to a Rule 10b5-1 trading plan will be at our discretion and will depend upon many conditions. In making a determination regarding any stock repurchases, management considers multiple factors, including overall stock market conditions, our common stock price movements, the remaining amount authorized for repurchases by our Board of Directors, the potential impact of a stock repurchase program on our corporate debt ratings, our expected free cash flow and working capital needs, our current and future planned strategic growth initiatives, and other potential uses of our cash and capital resources.

In August 2016, our Board of Directors approved an aggregate of \$1.0 billion for future repurchases of our common stock with no fixed expiration date. In September 2017, our Board of Directors approved an aggregate of \$1.2 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2018. In September 2018, our Board of Directors approved an aggregate of \$2.0 billion for future repurchases of our common stock with no fixed expiration date that became effective January 1, 2019. We expect this authorization to provide us with capacity for buybacks over six quarters and flexibility to act opportunistically. We expect funding for any share repurchases to come from our operating cash flow or borrowings under our Commercial Paper Program or our debt facilities.

We may discontinue stock repurchases at any time and may amend or terminate a Rule 10b5-1 trading plan at any time. The approval of our Board of Directors for the share repurchases does not obligate us to acquire any particular amount of our common stock. In addition, our Board of Directors may increase or decrease the amount of capacity we have for repurchases from time to time.

Cash Flow

The following table presents the major components of net changes in cash, cash equivalents, and restricted cash and cash equivalents (in millions):

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	Year Ended December 31,		
	2018	2017	2016
Net cash provided by (used in):			
Operating activities	\$2,533	\$2,085	\$2,149
Investing activities	(1,755)	92	(860)
Financing activities	(463)	(1,971)	(1,462)
Effect of exchange rate changes	(11)	12	(24)
Net increase (decrease) in cash, cash equivalents, and restricted cash and cash equivalents	\$304	\$218	\$(197)

In the fourth quarter of 2017, we adopted a new accounting standard, FASB ASU 2016-18, which requires that the changes in the total cash, cash equivalents, and restricted cash and cash equivalents be reflected in the statement of cash flows. As a result, we no longer present transfers between cash and cash equivalents and restricted cash and cash equivalents in our statement of cash flows. We have reclassified changes in restricted cash from cash flows provided by (used in) investing activities, to the total change in beginning and end-of-year total changes. Our statements of cash flows for 2018, 2017 and 2016 reflect this change.

Operating Activities

Net cash provided by operating activities primarily consists of net income adjusted for certain non-cash items, including depreciation and amortization and the effects of changes in working capital.

The \$448 million increase in net cash provided by operating activities in 2018 from 2017, is primarily a result of the increase in our net income excluding our net non-cash adjustments, fluctuations in our working capital, less cash paid for income taxes in 2018 than in 2017, and a \$136 million contribution that was made to our pension plan in 2017.

The non-cash adjustments include our MERS investment gain of \$110 million during 2018, as well as our deferred tax benefit of \$764 million due to tax reform, our gain on the sale of our Cetip investment of \$114 million and our Trayport gain of \$110 million during 2017. The \$136 million contribution to our pension plan in 2017 allowed us to reach 99% funding of our pension obligation and allowed us to immunize the liability against future market fluctuations. For additional information on our pension plan, refer to Note 16 to our consolidated financial statements. The \$64 million decrease in net cash provided by operating activities in 2017 from 2016 is primarily due to the \$136 million pension plan contribution in 2017, compared to a \$10 million contribution in 2016.

Investing Activities

Consolidated net cash provided by (used in) investing activities in 2018, 2017 and 2016 primarily relates to cash paid for acquisitions, cash received from divestitures, net cash received from the sale of our investment in Cetip, purchases of investments, proceeds from term deposits, and changes in capital expenditures and capitalized software development costs.

We paid cash for acquisitions, net of the cash of the companies acquired, of \$1.2 billion, \$423 million and \$425 million, in 2018, 2017 and 2016, respectively, primarily relating to the BondPoint, TMC Bonds and MERS acquisitions during 2018, the ICE NGX, Shorcan Energy, now named CalRock Brokers, Inc., or CalRock, the ICE BofAML indices and TMX Atrium acquisitions during 2017, and the Securities Evaluations and Credit Market Analysis acquisitions during 2016. In 2017, we received \$761 million relating to the sales of Trayport, IDMS and NYSE Governance Services and we received net cash proceeds from the sale of our investment in Cetip of \$438 million. We made cash investments of \$306 million, \$327 million and \$70 million during 2018, 2017 and 2016, respectively, in Euroclear, MERS and OCC. See “- Recent Developments” above for more details on our 2018 acquisitions, divestitures and investments.

We had capital expenditures of \$134 million, \$220 million and \$250 million in 2018, 2017 and 2016, respectively, and we had capitalized software development expenditures of \$146 million, \$137 million and \$115 million in 2018, 2017 and 2016, respectively. The capital expenditures primarily relate to hardware and software purchases to continue the development and expansion of our electronic platforms, data services and clearing houses and leasehold improvements associated with the new and renovated office spaces in Atlanta, New York and London. The software development expenditures primarily relate to the continued development and expansion of our electronic trading platforms, data services and clearing houses.

Financing Activities

Consolidated net cash used in financing activities in 2018 primarily relates to \$1.2 billion in repurchases of common stock, \$600 million in repayments of our October 2018 Senior Notes, \$555 million in dividend payments to our stockholders, \$283

million in net repayments under our Commercial Paper Program, and \$80 million in cash payments related to treasury shares received for restricted stock tax payments and stock options exercises, partially offset by \$2.2 billion in net proceeds from our Senior Notes issued in 2018 (the 2023, 2028 and 2048 Senior Notes). See “- Debt” below.

Consolidated net cash used in financing activities in 2017 primarily relates to \$984 million in net proceeds from the 2022 Senior Notes and 2027 Senior Notes offerings, \$850 million in repayments of the NYSE Notes, \$409 million in net repayments under our Commercial Paper Program, \$949 million in repurchases of common stock, \$476 million in dividend payments to our stockholders, \$174 million in acquisitions of non-controlling interest and redeemable non-controlling interest and \$88 million in cash payments related to treasury shares received for restricted stock tax payments and stock options exercises.

Consolidated net cash used in financing activities in 2016 primarily relates to \$949 million in net repayments under our Commercial Paper Program, \$409 million in dividend payments to our stockholders, \$54 million in cash payments related to treasury shares received for restricted stock tax payments and stock options exercises and \$50 million in repurchases of common stock.

Debt

Our total debt, including short-term and long-term debt, consisted of the following:

	As of	
	December 31,	
	2018	2017
	(in millions)	
Debt:		
Short-term debt:		
Commercial Paper	\$951	\$1,233
2018 Senior Notes (2.50% senior unsecured notes due October 15, 2018)	—	600
Total short-term debt	951	1,833
Long-term debt:		
2020 Senior Notes (2.75% senior unsecured notes due December 1, 2020)	1,246	1,244
2022 Senior Notes (2.35% senior unsecured notes due September 15, 2022)	496	495
2023 Senior Notes (3.45% senior unsecured notes due September 21, 2023)	397	—
2023 Senior Notes (4.00% senior unsecured notes due October 15, 2023)	793	791
2025 Senior Notes (3.75% senior unsecured notes due December 1, 2025)	1,243	1,242
2027 Senior Notes (3.10% senior unsecured notes due September 15, 2027)	496	495
2028 Senior Notes (3.75% senior unsecured notes due September 21, 2028)	591	—
2048 Senior Notes (4.25% senior unsecured notes due September 21, 2048)	1,228	—
Total long-term debt	6,490	4,267
Total debt	\$7,441	\$6,100

The following summarizes significant developments and changes associated with our debt:

Amended Credit Facility

We have a \$3.4 billion senior unsecured revolving credit facility, pursuant to a credit agreement with Wells Fargo Bank, N.A., as primary administrative agent, issuing lender and swing-line lender, Bank of America, N.A., as syndication agent, backup administrative agent and swing-line lender, and the lenders party thereto. On August 9, 2018, we extended the final maturity date of the credit facility from August 18, 2022 to August 9, 2023, and made certain other changes, herein referred to as the Amended Credit Facility.

The Amended Credit Facility includes an option for us to propose an increase in the aggregate amount available for borrowing by up to \$975 million, subject to the consent of the lenders funding the increase and certain other conditions. No amounts were outstanding under the Amended Credit Facility as of December 31, 2018. As of December 31, 2018, of the \$3.4 billion that is currently available, \$951 million is required to back-stop the amount outstanding under our Commercial Paper Program, and \$105 million is required to support certain broker-dealer subsidiary commitments. The amount required to backstop the amounts outstanding under the Commercial Paper Program will fluctuate as we increase or decrease our commercial paper borrowings. The remaining \$2.3 billion is available for working capital and general corporate purposes including, but not limited to, acting as a back-stop to

future increases in the amounts outstanding under the Commercial Paper Program.

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Commercial Paper Program

We have a U.S. dollar commercial paper program, or the Commercial Paper Program. It is currently backed by the borrowing capacity available under the Amended Credit Facility, as described above. The effective interest rate of commercial paper issuances does not materially differ from short-term interest rates (such as USD LIBOR), which fluctuate due to market conditions and as a result may impact our interest expense.

We repaid a net amount of \$283 million of outstanding commercial paper during 2018 using cash flows from operations and cash proceeds received from our 2018 bond issuance. We repaid \$409 million of net notes outstanding under the program during 2017 primarily using cash proceeds received from the sales of Cetip and Trayport. These reductions were partially offset by notes we issued under the program during 2017, the proceeds of which were used to fund acquisitions and investments and repurchase our common stock. We used net proceeds from notes issued under the program during 2016 for the acquisitions of Securities Evaluations and Credit Market Analysis and for general corporate purposes. We repaid a portion of the amounts outstanding under the program during 2018, 2017 and 2016 with cash flows from operations.

Commercial paper notes of \$951 million with original maturities ranging from two to 77 days were outstanding as of December 31, 2018 with a weighted average interest rate of 2.48% per annum, and a weighted average maturity of 12 days. Commercial paper notes of \$1.2 billion with original maturities ranging from two to 64 days were outstanding as of December 31, 2017 with a weighted average interest rate of 1.49% per annum, and a weighted average maturity of 18 days.

Senior Notes

Newly-Issued Senior Notes: In August 2018, we issued \$2.25 billion in new aggregate unsecured fixed-rate senior notes, including \$400 million, 3.45% notes due in 2023, or the 2023 Senior Notes, \$600 million, 3.75% notes due in 2028, or the 2028 Senior Notes, and \$1.25 billion, 4.25% notes due in 2048, or the 2048 Senior Notes, and together with the 2023 Senior Notes and the 2028 Senior Notes, the Newly-Issued Senior Notes.

We used the proceeds from the offering for general corporate purposes, including to fund the redemption of the \$600 million, 2.50% Senior Notes due October 2018 and to refinance all of our issuances under our Commercial Paper Program that resulted from acquisitions and investments in the last year. See “- Recent Developments” above.

2022 and 2027 Senior Notes: In August 2017, we issued \$1.0 billion in aggregate unsecured fixed-rate senior notes, including \$500 million, 2.35% notes due September 2022, or the 2022 Senior Notes, and \$500 million, 3.10% notes due September 2027, or the 2027 Senior Notes. We used the majority of the proceeds from the offering to fund the redemption in September 2017 of \$850 million, 2.00% senior unsecured fixed-rate NYSE Notes prior to the October 2017 maturity date.

2020 and 2025 Senior Notes: In November 2015, we issued \$2.5 billion in aggregate senior unsecured fixed rate notes, including \$1.25 billion, 2.75% notes due November 2020, or the 2020 Senior Notes, and \$1.25 billion, 3.75% notes due November 2025, or the 2025 Senior Notes. We used the proceeds from the offering, together with \$1.6 billion of borrowings under our Commercial Paper Program, to finance the cash portion of the purchase price of Interactive Data.

October 2023 Senior Notes: In October 2013, we issued \$800 million, 4.00% senior unsecured fixed-rate notes due October 2023, or the October 2023 Senior Notes. We used the net proceeds from the October 2023 Senior Notes to finance a portion of the purchase price of the acquisition of NYSE.

Committed Repo and Committed FX Facilities

To provide a tool to address the liquidity needs of our clearing houses and manage the liquidation of margin and guaranty fund deposits held in the form of cash and high quality sovereign debt, ICE Clear Europe, ICE Clear Credit and ICE Clear U.S. have entered into Committed Repurchase Agreement Facilities, or Committed Repo. Additionally, ICE Clear Credit has entered into Committed FX Facilities to support these liquidity needs. As of December 31, 2018 the following facilities were in place:

ICE Clear Europe: \$1.2 billion in Committed Repo to finance U.S. dollar, euro and pound sterling deposits.

ICE Clear Credit: \$300 million in Committed Repo to finance U.S. dollar and euro deposits, €250 million in Committed Repo to finance euro deposits, and €1.9 billion in Committed FX Facilities to finance euro payment obligations.

ICE Clear US: \$250 million in Committed Repo to finance U.S. dollar deposits.

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Future Capital Requirements

Our future capital requirements will depend on many factors, including the rate of growth across our Trading and Clearing and Data and Listings segments, strategic plans and acquisitions, available sources for financing activities, required and discretionary technology and clearing initiatives, regulatory requirements, the timing and introduction of new products and enhancements to existing products, the geographic mix of our business and potential stock repurchases.

We currently expect to incur capital expenditures (including operational and real estate capital expenditures) and to incur software development costs that are eligible for capitalization ranging in the aggregate between \$290 million and \$320 million in 2019, which we believe will support the enhancement of our technology, business integration and the continued growth of our businesses.

In September 2018, our Board of Directors approved an aggregate of \$2.0 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2019. We expect this authorization to provide us with capacity for buybacks over six quarters and flexibility to act opportunistically. Refer to Note 12 to our consolidated financial statements, included in this Annual Report, for additional details on our stock repurchase plans. Our Board of Directors has adopted a quarterly dividend policy providing that dividends will be approved quarterly by the board or its Audit Committee taking into account factors such as our evolving business model, prevailing business conditions and our financial results and capital requirements, without a predetermined net income payout ratio. During 2018, we paid cash dividends of \$0.96 per share of our common stock in the aggregate, including quarterly dividends of \$0.24 per share, for an aggregate payout of \$555 million, which includes the payment of dividend equivalents on unvested employee restricted stock units. Refer to Note 12 to our consolidated financial statements included in this Annual Report, for details on the amounts of our quarterly dividend payouts for the last three years. For the first quarter of 2019, we announced a \$0.275 per share dividend payable on March 29, 2019 to stockholders of record as of March 15, 2019.

As of December 31, 2018, we had \$7.4 billion in outstanding debt. We currently also have a \$3.4 billion Amended Credit Facility, of which \$2.3 billion is available for general corporate purposes as previously described. Other than the facilities discussed above for the ICE Clearing Houses, the Amended Credit Facility and our Commercial Paper Program are currently the only significant agreements or arrangements that we have for liquidity and capital resources with third parties. In the event of any strategic acquisitions, mergers or investments, or if we are required to raise capital for any reason or desire to return capital to our stockholders, we may incur additional debt, issue additional equity to raise necessary funds, repurchase additional shares of our common stock or pay a dividend. However, we cannot provide assurance that such financing or transactions will be available or successful, or that the terms of such financing or transactions will be favorable to us. See “-Risk Factors” and “- Debt” above.

Non-GAAP Measures

We use certain financial measures internally to evaluate our performance and make financial and operational decisions that are presented in a manner that adjusts from their equivalent GAAP measures or that supplement the information provided by our GAAP measures. We use these adjusted results because we believe they more clearly highlight trends in our business that may not otherwise be apparent when relying solely on GAAP financial measures, since these measures eliminate from our results specific financial items that have less bearing on our core operating performance. We use these measures in communicating certain aspects of our results and performance, including in this Annual Report, and believe that these measures, when viewed in conjunction with our GAAP results and the accompanying reconciliation, can provide investors with greater transparency and a greater understanding of factors affecting our financial condition and results of operations than GAAP measures alone. In addition, we believe the presentation of these measures is useful to investors for making period-to-period comparisons of results because the adjustments to GAAP are not reflective of our core business performance.

These financial measures are not presented in accordance with, or as an alternative to, GAAP financial measures and may be different from non-GAAP measures used by other companies. We encourage investors to review the GAAP financial measures included in this Annual Report, including our consolidated financial statements, to aid in their analysis and understanding of our performance and in making comparisons.

The table below outlines our adjusted operating expenses, adjusted operating income, adjusted operating margin, adjusted net income attributable to ICE common stockholders and adjusted earnings per share, which are non-GAAP measures that are calculated by making adjustments for items we view as not reflective of our cash operations and core business

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performance. These measures, including the adjustments and their related income tax effect and other tax adjustments (in millions, except for percentages and per share amounts), are as follows:

	Trading and Clearing Segment			Data and Listings Segment			Consolidated			
	Year Ended December 31, 2018	2017	2016	Year Ended December 31, 2018	2017	2016	Year Ended December 31, 2018	2017	2016	
Total revenues, less transaction-based expenses	\$2,420	\$2,128	\$2,102	\$2,559	\$2,510	\$2,410	\$4,979	\$4,638	\$4,512	
Operating expenses	911	781	826	1,485	1,478	1,514	2,396	2,259	2,340	
Less: Interactive Data and NYSE transaction and integration costs and 6 acquisition-related success fees	—	—	1	24	31	45	30	31	46	
Less: Amortization of acquisition-related intangibles	73	53	72	214	208	230	287	261	302	
Less: Accruals relating to investigations and inquiries	—	14	—	—	—	—	—	14	—	
Less: Employee severance costs related to Creditex U.K. brokerage operations	—	—	4	—	—	—	—	—	4	
Less: Creditex customer relationship intangible asset impairment	—	—	33	—	—	—	—	—	33	
Less: Impairment on divestiture of NYSE Governance Services	—	—	—	—	6	—	—	6	—	
Less: Impairment of exchange registration intangible assets on closure of ICE Futures Canada and ICE Clear Canada	4	—	—	—	—	—	4	—	—	
Less: Employee severance costs related to ICE Futures Canada and ICE Clear Canada operations	4	—	—	—	—	—	4	—	—	
Adjusted operating expenses	\$824	\$714	\$716	\$1,247	\$1,233	\$1,239	\$2,071	\$1,947	\$1,955	
Operating income	\$1,509	\$1,347	\$1,276	\$1,074	\$1,032	\$896	\$2,583	\$2,379	\$2,172	
Adjusted operating income	\$1,596	\$1,414	\$1,386	\$1,312	\$1,277	\$1,171	\$2,908	\$2,691	\$2,557	
Operating margin	62	% 63	% 61	% 42	% 41	% 37	% 52	% 51	% 48	%
Adjusted operating margin	66	% 66	% 66	% 51	% 51	% 49	% 58	% 58	% 57	%

Net income attributable to ICE common stockholders	\$1,988	\$2,526	\$1,430
Add: Interactive Data and NYSE transaction and integration costs and acquisition-related success fees	30	31	46
Add: Amortization of acquisition-related intangibles	287	261	302
Less: Gain on acquisition of MERS	(110)	—	—
Add: Accruals relating to investigations and inquiries	—	14	—
Add: Employee severance costs related to Creditex U.K. brokerage operations	—	—	4
Add: Creditex customer relationship intangible asset impairment	—	—	33
Add: Impairment on divestiture of NYSE Governance Services	—	6	—
Add: Impairment of exchange registration intangible assets on closure of ICE Futures Canada and ICE Clear Canada	4	—	—
Add: Employee severance costs related to ICE Futures Canada and ICE Clear Canada operations	4	—	—
Less: Gain on divestiture of Trayport, net	1	(110)	—
Less: Cetip investment gain, net	—	(167)	—
Less: Income tax effect for the above items	(98)	(43)	(143)
Less: Deferred tax adjustments from U.S. tax rate reduction	(11)	(764)	—
Add/(Less): Deferred tax adjustments on acquisition-related intangibles	(5)	10	(22)

Add/(Less): Other tax adjustments	(13)	—	23
Adjusted net income attributable to ICE common stockholders	\$2,077	\$1,764	\$1,673
Basic earnings per share attributable to ICE common stockholders	\$3.46	\$4.29	\$2.40
Diluted earnings per share attributable to ICE common stockholders	\$3.43	\$4.25	\$2.39
Adjusted basic earnings per share attributable to ICE common stockholders	\$3.61	\$2.99	\$2.81
Adjusted diluted earnings per share attributable to ICE common stockholders	\$3.59	\$2.97	\$2.79
Basic weighted average common shares outstanding	575	589	595
Diluted weighted average common shares outstanding	579	594	599

Acquisition-related transaction costs are included as part of our core business expenses, except for those that are directly related to the announcement, closing, financing or termination of a transaction. However, we adjust for the acquisition-related transaction and integration costs relating to Interactive Data and NYSE given the sizes of these acquisitions. The integration of NYSE was completed by June 2016 and the integration of Interactive Data was completed by June 2018. Amortization of acquisition-related intangibles are included in non-GAAP adjustments as excluding these non-cash expenses provides greater clarity regarding our financial strength and stability of cash operating results.

In addition, we also include the following items as non-GAAP adjustments, as each of these are not considered a part of our core business operations:

2018: the gain recognized on our initial majority investment in MERS in connection with our acquisition of 100% of the remaining MERS interests;

2018: the impairment loss on exchange registration intangible assets and employee severance costs related to the closure of ICE Futures Canada and ICE Clear Canada;

2017: the net gain on the divestiture of Trayport, and in 2018, a subsequent adjustment to reduce of the gain on the divestiture;

2017: the realized investment gain and the foreign exchange loss and transaction expenses on the sale of our investment in Cetip;

2017: accruals relating to investigations and inquiries;

2017: the NYSE Governance Services net impairment loss on its divestiture; and

2016: the Creditex U.K. voice brokerage severance costs related to its discontinuance and the Creditex customer relationship intangible asset impairment loss.

The tax items in non-GAAP adjustments are either the tax impacts of the pre-tax non-GAAP adjustments or tax items as described below that are not in the normal course of business and are not indicative of our core business performance. The following tax-related items are included as non-GAAP adjustments:

The income tax effects relating to all non-GAAP adjustments;

Deferred tax adjustments on acquisition-related intangibles; including the impact of U.S. state tax law changes and apportionment updates, as well as foreign tax law changes which resulted in deferred tax (benefit) expense of (\$5 million), \$10 million and (\$22 million) in 2018, 2017 and 2016, respectively. In addition, deferred tax adjustments on acquisition-related intangibles include \$34 million of deferred tax benefits due to U.K. corporate income tax rate reductions in 2016;

Deferred tax benefits of \$11 million and \$764 million in 2018 and 2017, respectively, resulting from changes in estimates as a result of the enactment of the TCJA which reduced the corporate income tax rate from 35% to 21%;

2018: Other tax adjustments including a \$17 million tax benefit on the sale of Trayport offset by an audit settlement for a pre-acquisition period in connection with our acquisition of NYSE in 2013; and

2016: Other tax adjustments including a \$15 million valuation allowance on Singapore pre-acquisition net operating losses and other deferred tax assets and an \$8 million deferred tax adjustment with respect to our OCC equity method investment.

For additional information on these items, refer to our consolidated financial statements included in this Annual Report and “- Recent Developments,” “- Consolidated Operating Expenses,” “- Consolidated Non-Operating Income (Expenses)” and “-Consolidated Income Tax Provision” above.

Off-Balance Sheet Arrangements

We do not have any relationships with unconsolidated entities or financial partnerships, often referred to as structured finance or special purpose entities.

Contractual Obligations and Commercial Commitments

The following presents our contractual obligations (which we intend to fund from existing cash as well as cash flow from operations) and commercial commitments as of December 31, 2018 (in millions):

	Payments Due by Period				
	Total	Less Than 1 Year	1-3 Years	4-5 Years	After 5 Years
Contractual Obligations:					
Short-term and long-term debt and interest	\$ 10,143	\$ 1,192	\$ 2,371	\$ 1,522	\$ 5,058
Operating lease obligations	417	64	121	99	133
Purchase obligations	298	222	70	6	—
Total contractual cash obligations	\$ 10,858	\$ 1,478	\$ 2,562	\$ 1,627	\$ 5,191

Purchase obligations include our estimate of the minimum outstanding obligations under agreements to purchase goods or services that we believe are enforceable and legally binding and that specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancellable at any time without penalty. We have excluded from the contractual obligations and commercial commitments listed above \$64.0 billion in cash margin deposits, guaranty funds and delivery contracts payable. Clearing members of our clearing houses are required to deposit original margin and variation margin and to make deposits to a guaranty fund. The cash deposits made to these margin accounts and to the guaranty fund are recorded in the consolidated balance sheet as current assets with corresponding current liabilities to the clearing members that deposited them. ICE NGX administers the physical delivery of energy trading contracts. It has an equal and offsetting claim to and from its respective participants on opposite sides of the physically-settled contract, each of which is reflected as a delivery contract receivable with an offsetting delivery contract payable. See Note 14 to our consolidated financial statements included in this Annual Report for additional information on our clearing houses and the margin deposits, guaranty funds and delivery contracts payable.

We have also excluded unrecognized tax benefits, or UTBs. As of December 31, 2018, our cumulative UTBs were \$98 million. Interest and penalties related to UTBs were \$28 million as of December 31, 2018. We are under examination by various tax authorities. We are unable to make a reasonable estimate of the periods of cash settlement because it is not possible to reasonably predict the amount of tax, interest and penalties, if any, that might be assessed by a tax authority or the timing of an assessment or payment. It is also not possible to reasonably predict whether or not the applicable statutes of limitations might expire without us being examined by any particular tax authority. See note 13 to our consolidated financial statements for additional information on our UTBs.

As of December 31, 2018, in connection with our acquisition of NYSE, we have obligations related to our pension and other benefit programs. The date of payment under these obligations cannot be determined and have been excluded from the table above. See note 16 to our consolidated financial statements for additional information on our pension and other benefit programs.

We have a 40% ownership in OCC. Under the OCC's capital plan, the OCC stockholders have committed to contribute up to \$200 million in equity capital if certain capital thresholds are breached, including up to \$80 million to be contributed by NYSE, which has also been excluded from the table above.

In 2016, the SEC approved a plan to establish a market-wide consolidated audit trail, or CAT, to improve regulators' ability to monitor trading activity. In 2018, the first phase of implementation went live and required participants to begin reporting to the CAT, with a phased implementation of the provisions of the CAT through 2019. Funding of the implementation and operation of the CAT is ultimately expected to be provided by both the execution venues and industry members. To date, however, funding has been provided solely by the execution venues in exchange for promissory notes expected to be repaid if industry member fees are approved by the SEC and are collected to fund the CAT.

New and Recently Adopted Accounting Pronouncements

Refer to Note 2 to our consolidated financial statements included in this Annual Report for information on the new and recently adopted accounting pronouncements that are applicable to us.

Critical Accounting Policies

We have identified the policies below as critical to our business operations and the understanding of our results of operations. The impact of, and any associated risks related to, these policies on our business operations is discussed throughout “-

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Management's Discussion and Analysis of Financial Condition and Results of Operations." For a detailed discussion on the application of these and other accounting policies, see Note 2 to our consolidated financial statements included in this Annual Report.

Our discussion and analysis of our financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with U.S. GAAP. The preparation of financial statements in conformity with these accounting principles requires us to make estimates and assumptions that affect the reported amount of assets and liabilities, and the disclosure of contingent assets and liabilities, at the date of our financial statements and the reported amounts of revenues and expenses during the reporting period.

We base our estimates and judgments on our historical experience and other factors that we believe to be reasonable under the circumstances when we make these estimates and judgments and re-evaluate them on a periodic basis. Based on these factors, we make estimates and judgments about, among other things, the carrying values of assets and liabilities that are not readily apparent from market prices or other independent sources and about the recognition and characterization of our revenues and expenses. The values and results based on these estimates and judgments could differ significantly under different assumptions or conditions and could change materially in the future.

We believe that the following critical accounting policies, among others, affect our more significant judgments and estimates used in the preparation of our consolidated financial statements and could materially increase or decrease our reported results, assets and liabilities.

Goodwill and Other Identifiable Intangible Assets

Assets acquired and liabilities assumed in connection with our acquisitions are recorded at their estimated fair values. Goodwill represents the excess of the purchase price of an acquired company over the fair value of its identifiable net assets, including identified intangible assets. We recognize specifically identifiable intangibles, such as customer relationships, trademarks, technology, trading products, data, exchange registrations, trade names and licenses when a specific right or contract is acquired. Our determination of the fair value of the intangible assets and whether or not these assets may be impaired following their acquisition requires us to apply significant judgments and make significant estimates and assumptions regarding future cash flows. If we change our strategy or if market conditions shift, our judgments and estimates may change, which may result in adjustments to recorded asset balances. Intangible assets with finite useful lives are amortized over their estimated useful lives whereas goodwill and intangible assets with indefinite useful lives are not.

In performing the allocation of the acquisitions' purchase price to assets and liabilities, we consider, among other factors, the intended use of the acquired assets, analysis of past financial performance and estimates of future performance of the acquired business. At the acquisition date, a preliminary allocation of the purchase price is recorded based upon a preliminary valuation performed with the assistance of a third-party valuation specialist. We continue to review and assess our estimates, assumptions and valuation methodologies during the measurement period provided by GAAP, which ends as soon as we receive the information about facts and circumstances that existed as of the acquisition date or we learn that more information is not obtainable, which usually does not exceed one year from the date of acquisition. Accordingly, these estimates and assumptions are subject to change, which could have a material impact on our consolidated financial statements.

We allocate goodwill to reporting units based on the reporting unit expected to benefit from the business combination. We have identified four reporting units: our Futures reporting unit, our Data and Listings reporting unit, our Cash Equities reporting unit, and our Fixed Income and CDS reporting unit.

Our goodwill and other indefinite-lived intangible assets are evaluated for impairment annually in our fiscal fourth quarter or more frequently if conditions exist that indicate that the value may be impaired. We test our goodwill for impairment at the reporting unit level. These impairment evaluations are performed by comparing the carrying value of the goodwill or other indefinite-lived intangibles to its estimated fair value.

Goodwill impairment testing consists of a two-step methodology. The initial step requires us to determine the fair value of each reporting unit and compare it to the carrying value, including goodwill and other intangible assets, of such reporting unit. If the fair value exceeds the carrying value, no impairment loss is recognized and the second step, which is a calculation of the impairment, is not performed. However, if the carrying value exceeds its fair value, an impairment charge is recorded equal to the extent that the carrying amount of goodwill exceeds its implied fair value. For annual goodwill impairment testing, we have the option to first perform 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, including goodwill and other intangible assets. If we conclude that this is the case, we must perform the two-step methodology described above. Otherwise, we can skip the two-step methodology and do not need to perform any further testing. For annual indefinite-lived intangible asset impairment testing, we also have

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the option to first perform a qualitative assessment to determine whether it is more likely than not that the fair value of the indefinite-lived intangible assets is less than its carrying amount.

Application of the impairment test requires judgment, including the identification of reporting units, assignment of assets and liabilities to reporting units, assignment of goodwill to reporting units, and determination of the fair value of each reporting unit. We have historically determined the fair value of our reporting units based on various valuation techniques, including discounted cash flow analysis and a multiple of earnings approach. In assessing whether goodwill and other intangible assets are impaired, we must make estimates and assumptions regarding future cash flows, long-term growth rates of our business, operating margins, discount rates, weighted average cost of capital and other factors to determine the fair value of our assets. These estimates and assumptions require management's judgment, and changes to these estimates and assumptions, as a result of changing economic and competitive conditions, could materially affect the determination of fair value and/or impairment.

The cash flows employed in the discounted cash flow analysis are based on our most recent budgets and business plans and, when applicable, various growth rates have been assumed for years beyond the current business plan period. Future events could cause us to conclude that indicators of impairment exist for goodwill or other intangible assets. Impairment may result from, among other things, deterioration in the performance of our business, adverse market conditions, adverse changes in applicable laws and regulations, competition, or the sale or disposition of a reporting unit. Any resulting impairment loss could have a material adverse impact on our financial condition and results of operations.

We are also required to evaluate other finite-lived intangible assets and property and equipment for impairment by first determining whether events or changes in circumstances indicate that the carrying value of these assets to be held and used may not be recoverable. If impairment indicators are present, then an estimate of undiscounted future cash flows produced by these long-lived assets is compared to the carrying value of those assets to determine if the asset is recoverable. If an asset is not recoverable, the loss is measured as the difference between fair value and carrying value of the impaired asset. Fair value of these assets is based on various valuation techniques, including discounted cash flow analysis.

Income Taxes

We are subject to income taxes in the U.S., U.K. and other foreign jurisdictions where we operate. The determination of our provision for income taxes and related accruals, deferred tax assets and liabilities requires the use of significant judgment, estimates, and the interpretation and application of complex tax laws. We recognize a current tax liability or tax asset for the estimated taxes payable or refundable on tax returns for the current year. We recognize deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement carrying amounts and the tax bases of our assets and liabilities. We establish valuation allowances if we believe that it is more likely than not that some or all of our deferred tax assets will not be realized. Deferred tax assets and liabilities are measured using current enacted tax rates in effect for the years in which those temporary differences and carryforwards are expected to reverse.

SEC Staff Accounting Bulletin No. 118, or SAB 118, provided guidance for companies that had not completed their accounting for the income tax effects of the TCJA in the period of enactment, allowing for a measurement period of up to one year after the enactment date to finalize the recording of the related tax impacts. As of December 31, 2018, we have completed our accounting for the tax effects of the enactment of the TCJA. We reaffirmed our position that we were not subject to transition tax under the TCJA as of December 31, 2017. In addition, we concluded that the \$764 million of deferred tax benefit recorded in the 2017 financial statements was a reasonable estimate of the TCJA's impact on our deferred tax and no further adjustments are necessary.

The FASB Staff also provided additional guidance to address the accounting for the effects of the provisions related to the taxation of Global Intangible Low-Taxed Income noting that companies should make an accounting policy election to recognize deferred taxes for temporary basis differences expected to reverse in future years or to include the tax expense in the year it is incurred. We have completed our analysis of the effects of these provisions and have made a policy election to recognize such taxes as current period expenses when incurred.

We do not recognize a tax benefit unless we conclude that it is more likely than not that the benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, we recognize a tax benefit measured at the largest amount of the tax benefit that, in our judgment, is

greater than 50 percent likely to be realized. We recognize accrued interest and penalties related to uncertain income tax positions as income tax expense in the consolidated statements of income.

We operate within multiple domestic and foreign taxing jurisdictions and are subject to audit in these jurisdictions by domestic and foreign tax authorities. These audits include questions regarding our tax filing positions, including the timing and amount of deductions taken and the allocation of income among various tax jurisdictions. We record accruals for the estimated

outcomes of these audits, and the accruals may change in the future due to new developments in each matter. At any point in time, many tax years are subject to or in the process of being audited by various taxing authorities. To the extent our estimates of settlements change or the final tax outcome of these matters is different from the amounts recorded, such differences will impact the income tax provision in the period in which such determinations are made. Our income tax expense includes changes in our estimated liability for exposures associated with our various tax filing positions. Determining the income tax expense for these potential assessments requires management to make assumptions that are subject to factors such as proposed assessments by tax authorities, changes in facts and circumstances, issuance of new regulations, and resolution of tax audits.

We believe the judgments and estimates discussed above are reasonable. However, if actual results are not consistent with our estimates or assumptions, we may be exposed to losses or gains that could be material.

ITEM 7 (A). QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

As a result of our operating and financing activities, we are exposed to market risks such as interest rate risk, foreign currency exchange rate risk and credit risk. We have implemented policies and procedures designed to measure, manage, monitor and report risk exposures, which are regularly reviewed by the appropriate management and supervisory bodies.

Interest Rate Risk

We have exposure to market risk for changes in interest rates relating to our cash and cash equivalents, short-term and long-term restricted cash, short-term and long-term investments and indebtedness. As of December 31, 2018 and 2017, our cash and cash equivalents, short-term and long-term restricted cash and cash equivalents, and short-term and long-term investments were \$2.0 billion and \$1.6 billion, respectively, of which \$275 million and \$293 million, respectively, were denominated in pounds sterling, euros or Canadian dollars. The remaining cash and cash equivalents, and short-term and long-term restricted cash and cash equivalents are denominated in U.S. dollars. We do not use our investment portfolio for trading or other speculative purposes. A hypothetical decrease in long-term interest rates to zero basis points would decrease annual pre-tax earnings by \$25 million as of December 31, 2018, assuming no change in the amount or composition of our cash and cash equivalents and short-term and long-term restricted cash and cash equivalents.

As of December 31, 2018, we had \$7.4 billion in outstanding debt, of which \$6.5 billion relates to our senior notes, which bear interest at fixed interest rates. The remaining amount outstanding of \$951 million relates to the Commercial Paper Program, which bears interest at fluctuating rates and, therefore, subjects us to interest rate risk. A hypothetical 100 basis point increase in long-term interest rates relating to the amounts outstanding under the Commercial Paper Program as of December 31, 2018 would decrease annual pre-tax earnings by \$10 million, assuming no change in the volume or composition of our outstanding indebtedness and no hedging activity. See Item 7 “- Management’s Discussion and Analysis of Financial Condition and Results of Operations - Debt” included in this Annual Report.

The interest rates on our Commercial Paper Program are currently evaluated based upon current maturities and market conditions. The weighted average interest rate on our Commercial Paper Program increased from 1.49% as of December 31, 2017 to 2.48% as of December 31, 2018. The increase in the Commercial Paper Program weighted average interest rate was primarily due to the decisions by the U.S. Federal Reserve in March 2018, June 2018, September 2018, and in December 2018 to increase the federal funds short-term interest rate by an aggregate 100 basis points to 2.50%. The effective interest rate of commercial paper issuance will continue to fluctuate based on the movement in short-term interest rates along with shifts in supply and demand within the commercial paper market.

Foreign Currency Exchange Rate Risk

As an international business, we are subject to foreign currency exchange rate risk. We may experience gains or losses from foreign currency transactions in the future given that a significant part of our assets and liabilities are recorded in pounds sterling, Canadian dollars or euros, and a significant portion of our revenues and expenses are recorded in pounds sterling or euros. Certain assets, liabilities, revenues and expenses of foreign subsidiaries are denominated in the local functional currency of such subsidiaries. Our exposure to foreign denominated earnings in 2018 and 2017 is presented by primary foreign currency in the following table (dollars in millions, except exchange rates):

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	Year Ended December 31, 2018		Year Ended December 31, 2017		
	Pound Sterling	Euro	Pound Sterling	Euro	
Average exchange rate to the U.S. dollar in the current year period	\$1.3356	\$1.1813	\$1.2890	\$1.1297	
Average exchange rate to the U.S. dollar in the same period in the prior year	\$1.2890	\$1.1297	\$1.3603	\$1.1075	
Average exchange rate increase (decrease)	4	% 5	% (5))% 2	%
Foreign denominated percentage of:					
Revenues, less transaction-based expenses	9	% 5	% 10	% 4	%
Operating expenses	11	% 2	% 12	% 3	%
Operating income	7	% 7	% 9	% 6	%
Impact of the currency fluctuations ⁽¹⁾ on:					
Revenues, less transaction-based expenses	\$16	\$10	\$(26)) \$4	
Operating expenses	\$9	\$2	\$(14)) \$1	
Operating income	\$7	\$8	\$(12)) \$3	

(1) Represents the impact of currency fluctuation for the year compared to the same period in the prior year. We have a significant part of our assets, liabilities, revenues and expenses recorded in pounds sterling or euros. In 2018, 2017 and 2016, 14%, 15% and 15%, respectively, of our consolidated revenues, less transaction-based expenses, were denominated in pounds sterling or euros, and 13%, 14%, and 18%, respectively, of our consolidated operating expenses were denominated in pounds sterling or euros. As the pound sterling or euro exchange rate changes, the U.S. equivalent of revenues and expenses denominated in foreign currencies changes accordingly. Foreign currency transaction risk related to the settlement of foreign currency denominated assets, liabilities and payables occur through our operations, which are received in or paid in pounds sterling, Canadian dollars, or euros, due to the increase or decrease in the foreign currency exchange rates between periods. We incurred foreign currency transaction losses of \$2 million, \$4 million and \$1 million in 2018, 2017 and 2016, respectively. The foreign currency transactions losses were primarily attributable to the fluctuations of the pound sterling and euro relative to the U.S. dollar. A 10% adverse change in the underlying foreign currency exchange rates as of December 31, 2018, assuming no change in the composition of the foreign currency denominated assets, liabilities and payables and assuming no hedging activity, would result in no additional foreign currency gain or loss. We entered into foreign currency hedging transactions during 2018, 2017 and 2016 as economic hedges to help mitigate a portion of our foreign exchange risk exposure and may enter into additional hedging transactions in the future to help mitigate our foreign exchange risk exposure. Although we may enter into additional hedging transactions in the future to help mitigate our foreign exchange risk exposure, these hedging arrangements may not be effective, particularly in the event of imprecise forecasts of the levels of our non-U.S. denominated assets and liabilities. We have foreign currency translation risk equal to our net investment in our foreign subsidiaries. The financial statements of these subsidiaries are translated into U.S. dollars using a current rate of exchange, with gains or losses included in the cumulative translation adjustment account, a component of equity. Our exposure to the net investment in foreign currencies is presented by primary foreign currencies in the table below (in millions):

	As of December 31, 2018			
	Position in sterling	Position in dollars	Position in Canadian dollars	Position in euros
Assets	£822	C\$ 2,057		€ 136
of which goodwill represents	638	413		92
Liabilities	78	1,651		40
Net currency position	£744	C\$ 406		€ 96
Net currency position, in \$USD	\$950	\$ 298		\$ 110

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Negative impact on consolidated equity of a 10% decrease in foreign currency exchange rates	\$95	\$	30	\$	11
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As of December 31, 2018 and 2017, the portion of our equity attributable to accumulated other comprehensive loss from foreign currency translation was \$227 million and \$136 million, respectively. In 2018, 2017 and 2016, currency exchange rate differences had a positive/(negative) impact of (\$91 million), \$209 million and (\$300 million), respectively, on our

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consolidated equity. The decrease in 2018 is primarily due to the decrease in the pound sterling/U.S. dollar exchange rate to 1.2756 as of December 31, 2018 (from 1.3510 as of December 31, 2017) due to the weakening of the pound sterling as compared to the U.S. dollar. The increase in 2017 is primarily due to the increase in the pound sterling/U.S. dollar exchange rate to 1.3510 as of December 31, 2017 (from 1.2336 as of December 31, 2016) due to the strengthening pound sterling as compared to the U.S. dollar. The future impact on our business relating to the U.K. leaving the EU and the corresponding regulatory changes are uncertain at this time, including future impacts on currency exchange rates.

Credit Risk

We are exposed to credit risk in our operations in the event of a counterparty default. We limit our exposure to credit risk by rigorously selecting the counterparties with which we make our investments, monitoring them on an ongoing basis and executing agreements to protect our interests.

Clearing House Cash Deposit Risks

The ICE Clearing Houses hold material amounts of clearing member cash and cash equivalent deposits which are held or invested primarily to provide security of capital while minimizing credit, market and liquidity risks. Refer to Note 14 to our consolidated financial statements for more information on the ICE Clearing Houses' cash and cash equivalent deposits, which were \$64.0 billion as of December 31, 2018. While we seek to achieve a reasonable rate of return which may generate interest income for our clearing members, we are primarily concerned with preservation of capital and managing the risks associated with these deposits. As the ICE Clearing Houses may pass on interest revenues (minus costs) to the clearing 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 a clearing house has the ability to hold cash collateral at a central bank, the clearing house utilizes its access to the central bank system to minimize credit risk exposures. Credit risk is monitored by using exposure limits depending on ratings assigned by rating agencies as well as the nature and maturity of transactions. Our investment objective is to invest in securities that preserve principal while maximizing yields, without significantly increasing risk. We seek to substantially mitigate credit risk associated with investments by placing them with governments, well-capitalized financial institutions and other creditworthy counterparties.

An ongoing review is performed to evaluate changes in the financial status of counterparties. In addition to the intrinsic creditworthiness of counterparties, our policies require diversification of counterparties (banks, financial institutions, bond issuers and funds) so as to avoid a concentration of risk.

Liquidity Risk: Liquidity risk is the risk a clearing house 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 clearing houses monitor liquidity requirements closely and maintain funds and assets in a manner which minimizes the risk of loss or delay in the access by the clearing house to such funds and assets. For example, holding funds with a central bank where possible or making only short term investments such as overnight reverse repurchase agreements serves to reduce liquidity risks.

Interest Rate Risk: Interest rate risk is the risk that interest rates rise and cause the value of securities we hold or invest in to decline. If we were required to sell securities prior to maturity, and interest rates had risen, the sale might be made at a loss relative to the carrying value. Our clearing houses seek to manage this risk by making short term investments. For example, where possible and in accordance with regulatory requirements, the clearing houses invest cash pursuant to overnight reverse repurchase agreements or term reverse repurchase agreements with short dated maturities. In addition, the clearing house investment guidelines allow for direct purchases of high quality sovereign debt (for example, U.S. Treasury securities) and supranational debt instruments (Euro cash deposits only) with short dated maturities.

Security Issuer Risk: Security issuer risk is the risk that an issuer of a security defaults on the payment when the security matures or debt is serviced. This risk is mitigated by limiting allowable investments under the reverse repurchase agreements to high quality sovereign or government agency debt and limiting any direct investments to high quality sovereign debt instruments.

Investment Counterparty Risk: Investment counterparty risk is the risk that a reverse repurchase agreement counterparty might become insolvent and, thus, fail to meet its obligations to our clearing houses. We mitigate this risk by only engaging in transactions with high credit quality counterparties and by limiting the acceptable collateral to securities of high quality issuers. When engaging in reverse repurchase agreements, our clearing houses take

delivery of the securities underlying the reverse repurchase arrangement in custody accounts under clearing house

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control. Additionally, the securities purchased subject to reverse repurchase have a market value greater than the reverse repurchase amount. The typical haircut for high quality sovereign debt is 2% of the reverse repurchase amount which provides additional excess collateral. Thus, in the event that a reverse repurchase counterparty defaults on its obligation to repurchase the underlying reverse repurchase securities, our clearing house will have possession of a security with a value potentially greater than the counterparty's obligation.

The ICE Clearing Houses may use third-party investment advisors who make investments subject to the guidelines provided by each clearing house. Such advisors do not hold clearing member cash or cash equivalent deposits or the underlying investments. Clearing house property is held in custody accounts under clearing house control with credit worthy custodians including JPMorgan Chase Bank N.A., Citibank N.A., BNY Mellon, BMO Harris N.A. and Euroclear Bank Brussels (for non-U.S. dollar deposits). The ICE Clearing Houses employ (or may employ) multiple investment advisors and custodians to ensure that in the event a single advisor or custodian is unable to fulfill its role, additional advisors or custodians are available as alternatives.

Cross-Currency Margin Deposit Risk: Each of the ICE Clearing Houses may permit posting of cross-currency collateral to satisfy margin requirements (for example, accepting margin deposits denominated in U.S. dollars to secure a Euro margin obligation). The ICE Clearing Houses mitigate the risk of a currency value exposure by applying a "haircut" to the currency posted as margin at a level viewed as sufficient to provide financial protection during periods of currency volatility. Cross-currency balances are marked-to-market on a daily basis. Should the currency posted to satisfy margin requirements decline in value, the clearing member is required to increase its margin deposit on a same-day basis.

Impact of Inflation

We have not been adversely affected by inflation as technological advances and competition have generally caused prices for the hardware and software that we use for our electronic platforms to remain constant. In the event of inflation, we believe that we will be able to pass on any price increases to our participants, as the prices that we charge are not governed by long-term contracts.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA
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REPORT OF MANAGEMENT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

Our management is responsible for the preparation and integrity of the consolidated financial statements appearing in our Annual Report on Form 10-K. The financial statements were prepared in conformity with generally accepted accounting principles appropriate in the circumstances and, accordingly, include certain amounts based on our best judgments and estimates.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Rule 13a-15(f) and 15d-a5(f) under the Securities Exchange Act of 1934 (“Exchange Act”). Our internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of the consolidated financial statements. Our internal control over financial reporting is supported by a program of internal audits and appropriate reviews by management, written policies and guidelines, careful selection and training of qualified personnel and a written Global Code of Business Conduct adopted by our Board of Directors, applicable to all of our directors and all officers and all of our employees.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements and even when determined to be effective, can only provide reasonable assurance with respect to financial statement preparation and presentation. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”) in Internal Control - Integrated Framework (2013 framework). Based on our assessment, management believes that we maintained effective internal control over financial reporting as of December 31, 2018.

Our independent auditors, Ernst & Young LLP, a registered public accounting firm, are appointed by the Audit Committee, subject to ratification by our stockholders. Ernst & Young LLP has audited and reported on our consolidated financial statements and the effectiveness of our internal control over financial reporting. The reports of our independent registered public accounting firm are contained in this Annual Report.

/s/ Jeffrey C. Sprecher	/s/ Scott A. Hill
Jeffrey C. Sprecher	Scott A. Hill
Chairman of the Board and	Chief Financial Officer
Chief Executive Officer	

February 7, 2019

February 7, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM
ON INTERNAL CONTROL OVER FINANCIAL REPORTING

To the Stockholders and the Board of Directors of Intercontinental Exchange, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Intercontinental Exchange, Inc. and Subsidiaries' internal control over financial reporting as of December 31, 2018, 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, Intercontinental Exchange, Inc. and Subsidiaries (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, 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, 2018 and 2017, and the related consolidated statements of income, comprehensive income, changes in equity, accumulated other comprehensive income (loss) and redeemable non-controlling interest, and cash flows for each of the three years in the period ended December 31, 2018, and the related notes, and our report dated February 7, 2019 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 "Report of Management 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

Atlanta, Georgia

February 7, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM
ON FINANCIAL STATEMENTS

To the Stockholders and the Board of Directors of Intercontinental Exchange, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Intercontinental Exchange, Inc. and Subsidiaries (the Company) as of December 31, 2018 and 2017, and the related consolidated statements of income, comprehensive income, changes in equity, accumulated other comprehensive income (loss) and redeemable non-controlling interest, and cash flows for each of the three years in the period ended December 31, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, 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, 2018, 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 7, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB. We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company’s auditor since 2002.

Atlanta, Georgia

February 7, 2019

Intercontinental Exchange, Inc. and Subsidiaries

Consolidated Balance Sheets

(In millions, except per share amounts)

	As of December	
	31,	2017
	2018	2017
Assets:		
Current assets:		
Cash and cash equivalents	\$724	\$535
Short-term restricted cash and cash equivalents	818	769
Customer accounts receivable, net of allowance for doubtful accounts of \$7 and \$6, respectively	953	903
Margin deposits, guaranty funds and delivery contracts receivable	63,955	51,222
Prepaid expenses and other current assets	242	133
Total current assets	66,692	53,562
Property and equipment, net	1,241	1,246
Other non-current assets:		
Goodwill	13,085	12,216
Other intangible assets, net	10,462	10,269
Long-term restricted cash and cash equivalents	330	264
Other non-current assets	981	707
Total other non-current assets	24,858	23,456
Total assets	\$92,791	\$78,264
Liabilities and Equity:		
Current liabilities:		
Accounts payable and accrued liabilities	\$521	\$462
Section 31 fees payable	105	128
Accrued salaries and benefits	280	227
Deferred revenue	135	125
Short-term debt	951	1,833
Margin deposits, guaranty funds and delivery contracts payable	63,955	51,222
Other current liabilities	161	178
Total current liabilities	66,108	54,175
Non-current liabilities:		
Non-current deferred tax liability, net	2,337	2,298
Long-term debt	6,490	4,267
Accrued employee benefits	204	243
Other non-current liabilities	350	296
Total non-current liabilities	9,381	7,104
Total liabilities	75,489	61,279
Commitments and contingencies		
Redeemable non-controlling interest in consolidated subsidiaries	71	—
Equity:		
Intercontinental Exchange, Inc. stockholders' equity:		
Preferred stock, \$0.01 par value; 100 authorized; none issued or outstanding	—	—
Common stock, \$0.01 par value; 1,500 authorized; 604 and 569 shares issued and outstanding at December 31, 2018, respectively, and 600 and 583 shares issued and outstanding at December 31, 2017, respectively	6	6
Treasury stock, at cost; 35 and 17 shares, respectively	(2,354)	(1,076)
Additional paid-in capital	11,547	11,392

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Retained earnings	8,317	6,858
Accumulated other comprehensive loss	(315)	(223)
Total Intercontinental Exchange, Inc. stockholders' equity	17,201	16,957
Non-controlling interest in consolidated subsidiaries	30	28
Total equity	17,231	16,985
Total liabilities and equity	\$92,791	\$78,264

See accompanying notes.

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Intercontinental Exchange, Inc. and Subsidiaries
Consolidated Statements of Income
(In millions, except per share amounts)

	Year Ended December 31,		
	2018	2017	2016
Revenues:			
Transaction and clearing, net	\$3,483	\$3,131	\$3,384
Data services	2,115	2,084	1,978
Listings	444	426	432
Other revenues	234	202	177
Total revenues	6,276	5,843	5,971
Transaction-based expenses:			
Section 31 fees	357	372	389
Cash liquidity payments, routing and clearing	940	833	1,070
Total revenues, less transaction-based expenses	4,979	4,638	4,512
Operating expenses:			
Compensation and benefits	994	946	953
Professional services	131	121	137
Acquisition-related transaction and integration costs	34	36	80
Technology and communication	432	397	374
Rent and occupancy	68	69	70
Selling, general and administrative	151	155	116
Depreciation and amortization	586	535	610
Total operating expenses	2,396	2,259	2,340
Operating income	2,583	2,379	2,172
Other income (expense):			
Interest income	22	8	3
Interest expense	(244)	(187)	(178)
Other income, net	159	326	46
Other income (expense), net	(63)	147	(129)
Income before income tax expense (benefit)	2,520	2,526	2,043
Income tax expense (benefit)	500	(28)	586
Net income	\$2,020	\$2,554	\$1,457
Net income attributable to non-controlling interest	(32)	(28)	(27)
Net income attributable to Intercontinental Exchange, Inc.	\$1,988	\$2,526	\$1,430
Earnings per share attributable to Intercontinental Exchange, Inc. common stockholders:			
Basic	\$3.46	\$4.29	\$2.40
Diluted	\$3.43	\$4.25	\$2.39
Weighted average common shares outstanding:			
Basic	575	589	595
Diluted	579	594	599
Dividend per share	\$0.96	\$0.80	\$0.68

See accompanying notes.

Intercontinental Exchange, Inc. and Subsidiaries
 Consolidated Statements of Comprehensive Income
 (In millions)

	Year Ended December 31,		
	2018	2017	2016
Net income	\$2,020	\$2,554	\$1,457
Other comprehensive income (loss):			
Foreign currency translation adjustments, net of tax expense (benefit) of (\$1), (\$6) and (\$22) for 2018, 2017 and 2016, respectively, and net impact of \$1 from adoption of ASU 2018-02 in 2018	(91)	133	(300)
Change in fair value of available-for-sale securities	—	68	134
Reclassification of realized gain on available-for-sale investment to other income	—	(176)	—
Reclassification of foreign currency translation loss on sale of Trayport to other expense	—	76	—
Employee benefit plan net gains (losses), net of tax expense of \$9, \$8 and \$7 in 2018, 2017 and 2016, respectively, and net impact of \$25 from adoption of ASU 2018-02 in 2018	(1)	20	10
Other comprehensive income (loss)	(92)	121	(156)
Comprehensive income	\$1,928	\$2,675	\$1,301
Comprehensive income attributable to non-controlling interest	(32)	(28)	(27)
Comprehensive income attributable to Intercontinental Exchange, Inc.	\$1,896	\$2,647	\$1,274

See accompanying notes.

Intercontinental Exchange, Inc. and Subsidiaries
 Consolidated Statements of Changes in Equity, Accumulated Other Comprehensive Income (Loss)
 and Redeemable Non-Controlling Interest
 (In millions)

	Intercontinental Exchange, Inc. Stockholders' Equity				Additional Paid-in Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)	Non- Controlling Interest Consolidated Subsidiaries	Total Equity	Redeemable Non-controlling Interest
	Common Stock Shares	Treasury Stock Value	Common Stock Shares	Treasury Stock Value						
Balance, as of January 1, 2016	628	\$ 6	(34)	\$(1,448)	\$12,290	\$4,161	\$ (188)	\$ 32	\$14,853	\$ 35
Other comprehensive loss	—	—	—	—	—	—	(156)	—	(156)	—
Exercise of common stock options	1	—	—	—	22	—	—	—	22	—
Treasury shares retired in connection with stock split	(35)	—	35	1,512	(1,142)	(370)	—	—	—	—
Repurchases of common stock	—	—	(1)	(50)	—	—	—	—	(50)	—
Payments relating to treasury shares	—	—	(1)	(54)	—	—	—	—	(54)	—
Stock-based compensation	—	—	—	—	136	—	—	—	136	—
Issuance of restricted stock	2	—	—	—	—	—	—	—	—	—
Adjustment to redemption value	—	—	—	—	—	(2)	—	—	(2)	1
Distributions of profits	—	—	—	—	—	—	—	(19)	(19)	(3)
Dividends paid to stockholders	—	—	—	—	—	(409)	—	—	(409)	—
Net income attributable to non-controlling interest	—	—	—	—	—	(27)	—	24	(3)	3
Net income	—	—	—	—	—	1,457	—	—	1,457	—
Balance, as of December 31, 2016	596	6	(1)	(40)	11,306	4,810	(344)	37	15,775	36
Other comprehensive income	—	—	—	—	—	—	121	—	121	—
Exercise of common stock options	—	—	—	—	17	—	—	—	17	—
Repurchases of common stock	—	—	(15)	(949)	—	—	—	—	(949)	—
Payments relating to treasury shares	—	—	(1)	(88)	—	—	—	—	(88)	—
Stock-based compensation	—	—	—	—	152	—	—	—	152	—
Issuance of restricted stock	4	—	—	1	(1)	—	—	—	—	—
Acquisition of non-controlling interest	—	—	—	—	(82)	—	—	(10)	(92)	—
Distributions of profits	—	—	—	—	—	—	—	(26)	(26)	—
Dividends paid to stockholders	—	—	—	—	—	(476)	—	—	(476)	—
Redeemable non-controlling interest	—	—	—	—	—	(2)	—	—	(2)	(37)

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Net income attributable to non-controlling interest	—	—	—	—	—	(28)	—	27	(1)	1
Net income	—	—	—	—	—	2,554	—	—	2,554	—
Balance, as of December 31, 2017	600	6	(17)	(1,076)	11,392	6,858	(223)	28	16,985	—
Other comprehensive loss	—	—	—	—	—	—	(66)	—	(66)	—
Exercise of common stock options	1	—	—	—	32	—	—	—	32	—
Repurchases of common stock	—	—	(16)	(1,198)	—	—	—	—	(1,198)	—
Payments relating to treasury shares	—	—	(2)	(80)	—	—	—	—	(80)	—
Stock-based compensation	—	—	—	—	146	—	—	—	146	—
Issuance of restricted stock	3	—	—	—	—	—	—	—	—	—
Changes in non-controlling interest	—	—	—	—	(23)	—	—	(2)	(25)	—
Distributions of profits	—	—	—	—	—	—	—	(28)	(28)	—
Dividends paid to stockholders	—	—	—	—	—	(555)	—	—	(555)	—
Redeemable non-controlling interest	—	—	—	—	—	—	—	—	—	71
Impact of adoption of ASU 2018-02 to reclassify items stranded in other comprehensive income	—	—	—	—	—	26	(26)	—	—	—
Net income attributable to non-controlling interest	—	—	—	—	—	(32)	—	32	—	—
Net income	—	—	—	—	—	2,020	—	—	2,020	—
Balance, as of December 31, 2018	604	\$ 6	(35)	\$(2,354)	\$ 11,547	\$ 8,317	\$ (315)	\$ 30	\$ 17,231	\$ 71

See accompanying notes.

Intercontinental Exchange, Inc. and Subsidiaries
 Consolidated Statements of Changes in Equity, Accumulated Other Comprehensive Income (Loss)
 and Redeemable Non-Controlling Interest — (Continued)
 (In millions)

	As of December 31,		
	2018	2017	2016
Accumulated other comprehensive loss was as follows:			
Foreign currency translation adjustments	\$(227)	\$(136)	\$(345)
Fair value of available-for-sale securities	—	—	108
Comprehensive income from equity method investment	2	2	2
Employee benefit plans adjustments	(90)	(89)	(109)
Accumulated other comprehensive loss	\$(315)	\$(223)	\$(344)

See accompanying notes.

Intercontinental Exchange, Inc. and Subsidiaries
Consolidated Statements of Cash Flows
(In millions)

	Year Ended December 31,		
	2018	2017	2016
Operating activities			
Net income	\$2,020	\$2,554	\$1,457
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	586	535	610
Stock-based compensation	130	135	124
Deferred taxes	27	(654)	120
Cetip realized investment gain, net	—	(114)	—
Trayport gain, net	—	(110)	—
Gain on acquisition of remaining MERS interest	(110)	—	—
Other	(24)	(22)	(6)
Changes in assets and liabilities:			
Customer accounts receivable	(44)	(135)	(65)
Other current and non-current assets	(45)	(24)	7
Section 31 fees payable	(33)	(2)	14
Deferred revenue	1	8	28
Other current and non-current liabilities	25	(86)	(140)
Total adjustments	513	(469)	692
Net cash provided by operating activities	2,533	2,085	2,149
Investing activities			
Capital expenditures	(134)	(220)	(250)
Capitalized software development costs	(146)	(137)	(115)
Proceeds from sale of Cetip, net	—	438	—
Cash paid for acquisitions, net of cash acquired	(1,246)	(423)	(425)
Cash received from divestitures	—	761	—
Purchases of investments	(306)	(327)	(70)
Proceeds from investments	77	—	—
Net cash provided by (used in) investing activities	(1,755)	92	(860)
Financing activities			
Proceeds from debt facilities, net	2,213	984	—
Repayments of debt facilities	(600)	(850)	—
Repayments of commercial paper, net	(283)	(409)	(949)
Repurchases of common stock	(1,198)	(949)	(50)
Dividends to stockholders	(555)	(476)	(409)
Payments relating to treasury shares	(80)	(88)	(54)
Acquisition of non-controlling interest and redeemable non-controlling interest	(35)	(174)	—
Proceeds from issuance of redeemable non-controlling interest	71	—	—
Other	4	(9)	—
Net cash used in financing activities	(463)	(1,971)	(1,462)
Effect of exchange rate changes on cash, cash equivalents, and restricted cash and cash equivalents	(11)	12	(24)
Net increase (decrease) in cash, cash equivalents, and restricted cash and cash equivalents	304	218	(197)
Cash, cash equivalents, and restricted cash and cash equivalents at beginning of year	1,568	1,350	1,547

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Cash, cash equivalents, and restricted cash and cash equivalents at end of year	\$1,872	\$1,568	\$1,350
Supplemental cash flow disclosure			
Cash paid for income taxes	\$533	\$594	\$460
Cash paid for interest	\$202	\$171	\$170
Supplemental non-cash investing and financing activity			
Treasury stock retirement	\$—	\$—	\$1,512
See accompanying notes.			

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Intercontinental Exchange, Inc. and Subsidiaries

Notes to Consolidated Financial Statements

1. Description of Business

Nature of Business and Organization

We are a leading global operator of regulated exchanges, clearing houses and listings venues, and a provider of data services for commodity, financial, fixed income and equity markets. We operate regulated marketplaces for listing, trading and clearing a broad array of derivatives contracts and securities across major asset classes, including energy and agricultural commodities, metals, interest rates, equities, exchange-traded funds, or ETFs, credit derivatives, bonds and currencies. We also offer comprehensive data services to support the trading, investment, risk management and connectivity needs of customers around the world and across asset classes.

Our exchanges include derivative exchanges in the United States, or U.S., United Kingdom, or U.K., European Union or EU, Canada and Singapore, and cash equities, equity options and bond exchanges in the U.S. We also operate over-the-counter, or OTC, markets for physical energy, fixed income, and credit default swaps, or CDS, trade execution. To serve global derivatives markets, we operate central counterparty clearing houses, or CCPs, in the U.S., U.K., EU, Canada and Singapore (Note 14). We offer a range of data services for global financial and commodity markets, including pricing and reference data, exchange data, analytics, feeds, index services, desktops and connectivity solutions. Through our markets, clearing houses, listings and data services, we provide comprehensive solutions for our customers through liquid markets, benchmark products, access to capital markets, and related services to support their ability to manage risk and raise capital. Our business is currently conducted as two reportable segments, our Trading and Clearing segment and our Data and Listings segment, and the majority of our identifiable assets are located in the U.S. and U.K. (Note 18).

2. Summary of Significant Accounting Policies

Basis of Presentation

The accompanying consolidated financial statements have been prepared by us in accordance with U.S. generally accepted accounting principles, or U.S. GAAP. These statements include the accounts of our wholly-owned and controlled subsidiaries. For consolidated subsidiaries in which our ownership is less than 100% and for which we have control over the assets and liabilities and the management of the entity, the outside stockholders' interests are shown as non-controlling interests (Note 3).

All intercompany balances and transactions between us and our wholly-owned and controlled subsidiaries have been eliminated in consolidation. As discussed in Note 3, the financial results of companies we acquire are included from the acquisition dates and the results of companies we sold are included up to the disposition dates. The accounting policies used to prepare these financial statements are the same as those used to prepare the consolidated financial statements in prior years except as described in these footnotes or for the adoption of new standards as outlined below.

Use of Estimates

Preparing financial statements in conformity with U.S. GAAP requires us to make certain estimates and assumptions that affect the amounts reported in our consolidated financial statements and accompanying disclosures. Actual amounts could differ from those estimates.

Comprehensive Income

Other comprehensive income includes changes in fair value of net investment hedges, foreign currency translation adjustments, comprehensive income from equity method investments, and amortization of the difference in the projected benefit obligation and the accumulated benefit obligation associated with benefit plan liabilities, net of tax. Prior to the January 1, 2018 adoption of Accounting Standards Update, or ASU, No. 2016-01, see "-Recently Adopted Accounting Pronouncements" below, other comprehensive income included changes in unrealized gains and losses on financial instruments classified as available-for-sale.

Segment and Geographic Information

We operate and present our results based on our two business segments: the Trading and Clearing segment that comprises our transaction-based execution and clearing businesses and the Data and Listings segment that comprises our subscription-based data services and securities listings businesses. This presentation is reflective of how our chief

operating decision maker reviews and operates our business. The majority of our identifiable assets are located in the U.S and U.K.

Cash and Cash Equivalents

We consider all short-term, highly liquid investments with original maturities at the purchase date of three months or less to be cash equivalents.

Short-Term and Long-Term Restricted Cash and Cash Equivalents

We classify all cash and cash equivalents that are not available for immediate or general business use by us as restricted in the accompanying consolidated balance sheets (Note 6). This includes amounts set aside due to regulatory requirements, earmarked for specific purposes, or restricted by specific agreements. We also invest a portion of funds in excess of short-term operating needs in term deposits and investment-grade marketable debt securities, including government or government sponsored agencies and corporate debt securities. These are classified as cash equivalents, are short-term in nature and carrying amount approximates fair value.

Investments

We have made various investments in the equity securities of other companies. We also invest in mutual funds and fixed income securities. These investments are carried at fair value, with changes in fair value, whether realized or unrealized, recognized in net income.

Investments in equity securities, or equity investments, are carried at fair value, with changes in fair value, whether realized or unrealized, recognized in net income. Fair value is determined using quoted prices in active markets for identical securities, when available. For those investments that do not have readily determinable fair market values, such as those which are not publicly-listed companies, we have made a fair value policy election under ASU No. 2016-01, Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities, or ASU 2016-01, discussed further below. The election requires us to only adjust the fair value of such investments if and when there is an observable price change in an orderly transaction of a similar or identical investment, with any change in fair value recognized in net income. Investments that we intend to hold for more than one year are classified as other non-current assets in the accompanying consolidated balance sheets. See “Recently Adopted Accounting Pronouncements” below for the new financial instruments accounting standard and its impact on the accounting for our investments.

When we do not have a controlling financial interest in an entity but exercise significant influence over the entity’s operating and financial policies, such investments are accounted for using the equity method and included in other non-current assets. We recognize dividends when declared as a reduction in the carrying value of our equity method investments.

Margin Deposits, Guaranty Funds and Delivery Contracts Receivable and Payable

Original margin, variation margin and guaranty funds held by our clearing houses may be in the form of cash, government obligations, certain agency debt, letters of credit or gold (Note 14). Government, agency and corporate securities held for margin purposes are recorded at an amount that approximates fair value. Cash and cash equivalent original margin, variation margin and guaranty fund deposits are reflected as current assets and current liabilities. The amount of margin deposits on hand will fluctuate over time as a result of, among other things, the extent of open positions held at any point in time by market participants in contracts and the margin rates then in effect for such contracts. Changes in our margin accounts are not reflected in our consolidated statements of cash flows. Non-cash and cash equivalent original margin and guaranty fund deposits are not reflected in the accompanying consolidated balance sheets as the risks and rewards of these assets remain with the clearing members unless the clearing houses have sold or re-pledged the assets or in the event of a clearing member default, where the clearing member is no longer entitled to redeem the assets. Any income, gain or loss accrues to the clearing members.

ICE NGX, which we acquired in December 2017, owns a clearing house which administers the physical delivery of energy trading contracts. It serves as an intermediary counterparty to both the buyer and seller. When physical delivery has occurred and/or settlement amounts have been determined, an asset is recorded as a delivery contract receivable and an offsetting payable is recorded for the amounts owed to or due from the contract participants.

Amounts recorded at period-end represent receivables and payables for deliveries that have occurred but for which payment has not been received or made. There is no impact on our consolidated statements of income as an equal amount is recognized as

both an asset and a liability. ICE NGX also records unsettled variation margin equal to the fair value of open energy trading contracts as of the balance sheet date.

Property and Equipment

Property and equipment is recorded at cost, reduced by accumulated depreciation (Note 7). Depreciation and amortization is computed using the straight-line method based on estimated useful lives of the assets, or in the case of leasehold improvements, the shorter of the initial lease term or the estimated useful life of the improvement. We review the remaining estimated useful lives at each balance sheet date and make adjustments whenever events or changes in circumstances indicate that the remaining useful lives have changed. Gains on disposals are included in other income and losses on disposals are included in depreciation expense. Maintenance and repair costs are expensed as incurred.

Allowance for Doubtful Accounts

The allowance for doubtful accounts is maintained at a level that we believe to be sufficient to absorb probable losses in our accounts receivable portfolio. The allowance is based on several factors, including a continuous assessment of the collectability of each account. In circumstances where a specific customer's inability to meet its financial obligations is known, 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 allowance for doubtful accounts when collection efforts cease. A reconciliation of the beginning and ending amount of allowance for doubtful accounts is as follows for 2018, 2017 and 2016 (in millions):

	Year Ended		
	December 31,		
	2018	2017	2016
Beginning balance of allowance for doubtful accounts	\$6	\$7	\$2
Bad debt expense	8	4	5
Charge-offs	(7)	(5)	—
Ending balance of allowance for doubtful accounts	\$7	\$6	\$7

Bad debt expense in the table above is based on our historical collection experiences and our assessment of the collectability of specific accounts. Charge-offs in the table above represent the write-off of uncollectible receivables, net of recoveries. These amounts also include the impact of foreign currency translation adjustments.

Software Development Costs

We capitalize costs related to software we develop or obtain for internal use. The costs capitalized include both internal and external direct and incremental costs. General and administrative costs related to developing or obtaining such software are expensed as incurred. Development costs incurred during the preliminary or maintenance project stages are expensed as incurred. Costs incurred during the application development stage are capitalized and amortized using the straight-line method over the useful life of the software, generally not exceeding three years (except for certain ICE Data Services and NYSE platforms, which have seven-year useful lives). Amortization begins only when the software becomes ready for its intended use.

Accrued Employee Benefits

We have a defined benefit pension plan and other postretirement benefit plans, or collectively the "benefit plans," covering certain of our U.S. operations. The benefit accrual for the pension plan is frozen. We recognize the funded status of the benefit plans in our consolidated balance sheets, measure the fair value of plan assets and benefit obligations as of the date of our fiscal year-end, and provide additional disclosures in the footnotes (Note 16). Benefit plan costs and liabilities are dependent on assumptions used in calculating such amounts. These are provided by a third-party and include discount rates, health care cost trend rates, benefits earned, interest cost, expected return on assets, mortality rates and other factors. Actual results that differ from the assumptions are accumulated and amortized over future periods and, therefore, generally affect recognized expense and the recorded obligation in future periods. However, certain of these unrecognized amounts are recognized when triggering events occur, such as when a settlement of pension obligations in excess of total interest and service costs occurs. While we believe that the assumptions used are appropriate, differences in actual experience or changes in assumptions may affect our pension and other post-retirement obligations and future expense recognized.

Goodwill and Indefinite-Lived Intangible Assets

Goodwill represents the excess of the purchase price of our acquisitions over the fair value of identifiable net assets acquired, including other identified intangible assets (Note 8). We recognize specifically identifiable intangibles when a specific right or contract is acquired. With the assistance of third-party valuation specialists, goodwill has been allocated to our reporting units for purposes of impairment testing based on the portion of synergy, cost savings and other expected future cash flows expected to benefit the reporting units at the time of the acquisition. The reporting units identified for our goodwill testing are the Futures, Data and Listings, Cash Equities and Credit Default Swap reporting units. Goodwill impairment testing is performed annually at the reporting unit level in the fiscal fourth quarter or more frequently if conditions exist that indicate that it may be impaired.

We also evaluate indefinite-lived intangible assets for impairment annually in our fiscal fourth quarter or more frequently if conditions exist that indicate that an asset may be impaired.

For both goodwill and indefinite-lived impairment testing, we have the option to first perform a qualitative assessment to determine whether it is more likely than not that the fair value of a reporting unit or indefinite lived intangible asset is less than its carrying amount. If we conclude that this is the case, we must perform additional testing of the asset or reporting unit. Otherwise, no further testing is necessary. If the fair value of the goodwill or indefinite-lived intangible asset is less than its carrying value, an impairment loss is recognized in earnings in an amount equal to the difference. Other than the net loss of \$6 million on the divestiture of NYSE Governance Services as discussed in Note 3, we did not record an impairment charge related to goodwill or indefinite-lived intangible assets during 2018, 2017 or 2016.

Impairment of Long-Lived Assets and Finite-Lived Intangible Assets

We review our property and equipment and finite-lived intangible assets for impairment whenever events or changes in circumstances indicate that the carrying amount may not be fully recoverable. When these indicators exist, we project undiscounted net future cash flows over the remaining life of such assets. If the sum of the projected cash flows is less than the carrying amount, an impairment would exist, measured based upon the difference between the carrying amount and the fair value of the assets. Finite-lived intangible assets are generally amortized using the straight-line method or an accelerated method over the lesser of their contractual or estimated useful lives.

During the third quarter of 2016, we discontinued Creditex's U.K. voice brokerage operations and an impairment of the asset was recorded for \$33 million as amortization expense.

Derivatives and Hedging Activity

Periodically, we may use derivative financial instruments to manage exposure to changes in currency exchange rates. All derivatives are recorded at fair value. We generally do not designate these derivatives as hedges for accounting purposes. Accordingly, changes in fair value are recognized in income.

From time to time, we may also hedge the impact of currency translation arising from certain of our non-U.S. investments by designating as hedges all or a portion of certain financial liabilities denominated in the same currency as the investments. We entered into foreign currency hedging transactions during 2018, 2017 and 2016 as economic hedges to help mitigate a portion of our foreign exchange risk exposure. The gains and losses on these transactions were not material during these years.

Intellectual Property

All costs related to internally developed patents and trademarks are expensed as incurred. All costs related to purchased patents, trademarks and internet domain names are recorded as other intangible assets and are amortized using a straight-line method over their estimated useful lives. All costs related to licensed patents are capitalized and amortized using a straight-line method over the term of the license.

Income Taxes

We recognize income taxes under the liability method. We recognize a current tax liability or tax asset for the estimated taxes payable or refundable on tax returns for the current year. We recognize deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the financial statement carrying amounts and the tax bases of assets and liabilities. We establish valuation allowances if we believe that it is more likely than not that some or all of our deferred tax assets will not be realized. Deferred tax assets and liabilities are measured using current enacted

tax rates in effect. We do not recognize a tax benefit unless we conclude that it is more likely than not that the benefit will be sustained on audit by the taxing authority based solely on the technical merits of the associated tax position. If the recognition threshold is met, we recognize a tax benefit measured at the largest amount of the tax benefit that, in our judgment, is greater than 50 percent likely to be realized. We recognize accrued interest and penalties related to uncertain tax positions as a component of income tax expense.

We are subject to tax in numerous domestic and foreign jurisdictions primarily based on our operations in these jurisdictions. Significant judgment is required in assessing the future tax consequences of events that have been recognized in our financial statements or tax returns. Fluctuations in the actual outcome of these future tax consequences could have a material impact on our financial position or results of operations.

During 2018, we completed our accounting for the tax effects of the enactment of the Tax Cuts and Jobs Act, or TCJA. We reaffirmed our position that we were not subject to transition tax as of December 31, 2017 under the TCJA. In addition, we concluded that the \$764 million of deferred tax benefit recorded in the 2017 income tax provision was a reasonable estimate of the TCJA's effects on our deferred tax balances.

The Financial Accounting Standards Board, or FASB, Staff also provided additional guidance to address the accounting for the effects of the provisions related to the taxation of Global Intangible Low-Taxed Income noting that companies should make an accounting policy election to recognize deferred taxes for temporary basis differences expected to reverse as Global Intangible Low-Taxed Income in future years or to include the tax expense in the year it is incurred. We have completed our analysis of the effects of these provisions and have made a policy election to recognize such taxes as current period expenses when incurred.

We use a portfolio approach with respect to pension, postretirement benefits plan obligations and currency translation matters when we determine the timing and extent to which stranded income tax effects from items that were previously recorded in accumulated other comprehensive income are released.

Revenue Recognition

Our revenues primarily consist of transaction and clearing fee revenues for transactions executed and/or cleared through our global electronic derivatives trading and clearing platforms and cash equities trading as well as revenues related to our data services fees and listing fees. We recognize revenue when we transfer promised goods or services to customers in an amount that reflects the consideration to which we expect to be entitled in exchange for those goods or services. We enter into contracts that can include various combinations of products and services, which are generally capable of being distinct and accounted for as separate performance obligations. We also evaluate all contracts in order to determine appropriate gross versus net revenue reporting.

Substantially all of our revenues are considered to be revenues from contracts with customers. The related accounts receivable balances are recorded in our balance sheets as customer accounts receivable. We do not have obligations for warranties, returns or refunds to customers, other than the rebates, which are settled each period and therefore, do not result in variable consideration. We do not have significant revenue recognized from performance obligations that were satisfied in prior periods, and we do not have any transaction price allocated to unsatisfied performance obligations other than in our deferred revenue. Certain judgments and estimates are used in the identification and timing of satisfaction of performance obligations and the related allocation of transaction price. We believe that these represent a faithful depiction of the transfer of services to our customers.

Deferred revenue represents our contract liabilities related to our annual, original and other listings revenues as well as certain data services, clearing services and other revenues. Deferred revenue is our only significant contract asset or liability. See Note 9 for our discussion of deferred revenue balances, activity, and expected timing of recognition.

We have elected not to provide disclosures about transaction price allocated to unsatisfied performance obligations if contract durations are less than one year, or if we are not required to estimate the transaction price. For all of our contracts with customers, except for listings and certain data and clearing services, our performance obligations are short term in nature and there is no significant variable consideration. In addition, we have elected the practical expedient of excluding sales taxes from transaction prices. We have assessed the costs incurred to obtain or fulfill a contract with a customer and determined them to be immaterial.

See “Recently Adopted Accounting Pronouncements” below for the new revenue recognition accounting standard and its impact on our revenues.

Activity Assessment Fees and Section 31 Fees

We pay the Securities and Exchange Commission, or SEC, fees pursuant to Section 31 of the Securities Exchange Act of 1934 for transactions executed on our U.S. equities and options exchanges. These Section 31 fees are designed to recover the costs to the government for supervising and regulating the securities markets and securities professionals. We (or the OCC on our behalf), in turn, collect activity assessment fees, which are included in transaction and clearing fees in the accompanying consolidated statements of income, from member organizations clearing or settling trades on the U.S. equities and options exchanges and recognize these amounts as revenue when invoiced. Fees received are included in cash at the time of receipt and, as required by law, the amount due to the SEC is remitted semi-annually and recorded as an accrued liability until paid. The activity assessment fees are designed so that they are equal to the Section 31 fees paid by us to the SEC. As a result, Section 31 fees do not have an impact on our net income.

Stock-Based Compensation

We currently sponsor stock option plans, restricted stock plans and our Employee Stock Purchase Plan, or ESPP, to provide additional and incentive-based compensation to our employees and directors (Note 11). Stock options and restricted stock are granted at the discretion of the Compensation Committee of the Board of Directors. We measure and recognize compensation expense for all share-based payment awards, including employee stock options, restricted stock and shares purchased under the ESPP based on estimated fair values on the date of grant. The value of the portion of the award that is ultimately expected to vest is recognized as stock-based compensation expense over the requisite service period.

We use the Black-Scholes pricing model to value stock option awards as well as shares purchased as part of our ESPP. The values estimated by the model are affected by the price of our stock as well as subjective variables that include assumed interest rates, our expected dividend yield, our expected share price volatility over the term of the awards and actual and projected employee stock option exercise behavior. Under our ESPP, employees may purchase shares of our common stock at a price equal to 85% of the lesser of the fair market value of the stock on the first or the last trading day of each offering period. We record compensation expenses related to the 15% discount given to our participating employees.

Treasury Stock

We record treasury stock activities under the cost method whereby the cost of the acquired stock is recorded as treasury stock (Note 12). We retired all of our outstanding treasury shares effective October 27, 2016, the record date of our 5-for-1 stock split which was reflected in our results retroactively. Our accounting policy upon the formal retirement of treasury stock is to deduct the par value from common stock and to reflect any excess of cost over par value as a deduction from additional paid-in capital (to the extent created by previous issuances of the shares) and retained earnings.

Credit Risk and Significant Customers

Our clearing houses are exposed to credit risk as a result of maintaining clearing member cash deposits at various financial institutions (Note 14). Cash deposit accounts are established at large, highly-rated financial institutions and entered into so that they restrict the rights of offset or imposition of liens by the banks. We also limit our risk of loss by holding the majority of the cash deposits in cash accounts at the Federal Reserve Bank of Chicago, high quality short-term sovereign debt reverse repurchase agreements with several different counterparty banks or direct investments in short-term high quality sovereign and supranational debt issues primarily with original maturities of less than three months. While we seek to achieve a reasonable rate of return which may generate interest income for our clearing members, we are primarily concerned with preservation of capital and managing the risks associated with these deposits. As the clearing houses may pass on interest revenues, minus costs, to the members, this could include negative or reduced yield due to market conditions.

When engaging in reverse repurchase agreements, our clearing houses take delivery of the underlying securities in custody accounts under clearing house control. Additionally, the securities purchased have a market value greater than the reverse repurchase amount. The typical haircut received for high quality sovereign debt is 2% of the reverse repurchase amount. Thus, in the event that a reverse repurchase counterparty defaults on its obligation to repurchase the underlying reverse repurchase securities, our clearing house will have possession of securities with a value potentially greater than the reverse repurchase counterparty's obligation to the clearing house.

ICE Clear Credit, a systemically important financial market utility as designated by the Financial Stability Oversight Council, maintains a U.S. dollar account at the Federal Reserve Bank of Chicago as of December 31, 2018. ICE Clear Europe

maintains a euro-denominated account at the De Nederlandsche Bank, or DNB, the central bank of the Netherlands, as well as a pounds sterling-denominated account at the Bank of England, or BOE, the central bank of the U.K. These accounts provide the flexibility for ICE Clear Europe to place euro- and pounds sterling-denominated cash margin securely at national banks, in particular during periods when liquidity in the euro and pounds sterling repo markets may temporarily become contracted. Such accounts are intended to decrease ICE Clear Credit and ICE Clear Europe's custodial, liquidity and operational risk as compared to alternative custodial and investment arrangements.

Our futures businesses have minimal credit risk as the majority of their transaction revenues are currently cleared through our clearing houses. Our accounts receivable related to market data revenues, cash trading, listing revenues, technology revenues, CDS transaction revenues and bilateral OTC energy transaction revenues subjects us to credit (collection) risk, as we do not require these customers to post collateral. We limit our risk of loss by terminating access to trade, remain listed or receive data for entities with delinquent accounts. The concentration of risk on accounts receivable is also mitigated by the large number of entities comprising our customer base.

Our accounts receivable are stated at the billed amount. Excluding clearing members, there were no individual accounts receivable balances greater than 10% of total consolidated accounts receivable as of December 31, 2018 or December 31, 2017. No single customer accounted for more than 10% of total consolidated revenues during 2018, 2017 or 2016.

Leases

We expense rent from non-cancellable operating leases, net of sublease income, using a straight-line method based on future minimum lease payments. The net costs are included in rent and occupancy expenses and technology and communication expenses in the accompanying consolidated statements of income (Note 15).

Acquisition-Related Transaction and Integration Costs

We incur incremental costs relating to our completed and potential acquisitions and other strategic opportunities. This includes fees for investment banking advisors, lawyers, accountants, tax advisors and public relations firms, deal-related bonuses to certain of our employees, as well as costs associated with credit facilities and other external costs directly related to the proposed or closed transactions.

The acquisition-related transaction and integration costs incurred during 2018 primarily relate to employee termination and lease termination costs related to our Interactive Data acquisition, professional services costs resulting from our 2018 acquisitions and a \$5 million banker success fee in connection with our acquisition of TMC Bonds. The acquisition-related transaction and integration costs incurred during 2017 primarily relate to costs incurred for our Interactive Data integration, legal and professional fees related to the Trayport CMA review, and various other costs incurred for our other acquisitions that closed during 2017. The acquisition-related transaction and integration costs incurred during 2016 primarily relate to costs incurred for our Interactive Data and NYSE integrations, legal and professional fees related to the Trayport CMA review, our investment in MERSCORP Holdings, Inc., owner of Mortgage Electronic Registrations Systems, Inc., or collectively MERS, our acquisition of S&P Securities Evaluations and Credit Market Analysis, and various other potential and discontinued acquisitions. The integration of NYSE was completed by June 30, 2016, and the integration of Interactive Data was completed by June 30, 2018.

Fair Value of Financial Instruments

Fair value is the price that would be received from selling an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants at the measurement date. Our financial instruments consist primarily of certain short-term and long-term assets and liabilities, customer accounts receivable, margin deposits and guaranty funds, equity investments, and short-term and long-term debt (Note 17).

The fair value of our financial instruments is measured based on a three-level hierarchy:

• Level 1 inputs — quoted prices for identical assets or liabilities in active markets.

• Level 2 inputs — observable inputs other than Level 1 inputs such as quoted prices for similar assets and liabilities in active markets or inputs other than quoted prices that are directly observable.

• Level 3 inputs — unobservable inputs supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

Foreign Currency Translation Adjustments and Foreign Currency Transaction Gains and Losses

Our functional and reporting currency is the U.S. dollar. We have exposure to foreign currency translation gains and losses arising from our net investment in certain U.K., continental European, Asian and Canadian subsidiaries. The revenues, expenses and financial results of these subsidiaries are recorded in the functional currency of the countries that these subsidiaries are located in, which are primarily pounds sterling and euros. The financial statements of these subsidiaries are translated into U.S. dollars using a current rate of exchange, with gains or losses, net of tax as applicable, included in the cumulative translation adjustment account, a component of equity. As of December 31, 2018 and 2017, the portion of our equity attributable to accumulated other comprehensive loss from foreign currency translation adjustments was \$227 million and \$136 million, respectively.

We have foreign currency transaction gains and losses related to the settlement of foreign currency denominated assets, liabilities and payables that occur through our operations. These transaction gains and losses are due to the increase or decrease in the foreign currency exchange rates between periods. Forward contracts on foreign currencies are entered into to manage the foreign currency exchange rate risk. Gains and losses from foreign currency transactions are included in other income (expense) in the accompanying consolidated statements of income and resulted in net losses of \$2 million, \$4 million and \$1 million in 2018, 2017 and 2016, respectively.

Earnings Per Common Share

Basic earnings per common share is calculated using the weighted average common shares outstanding during the year. Common equivalent shares from stock options and restricted stock awards, using the treasury stock method, are included in the diluted per share calculations unless the effect of inclusion would be antidilutive (Note 19).

Recently Adopted Accounting Pronouncements

The FASB has issued Accounting Standards Codification, or ASC, Topic 606, Revenue from Contracts with Customers, and ASC 340-40, Other Assets and Deferred Costs - Contracts with Customers, collectively referred to as ASC 606. ASC 606 provides guidance outlining a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers. ASC 606 superseded prior revenue recognition guidance and requires us to recognize revenue when we transfer promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. ASC 606 requires enhanced disclosures, including (i) revenue recognition policies used to identify performance obligations to customers and (ii) the use of significant judgments in measurement and recognition.

On January 1, 2018, we adopted ASC 606 retrospectively and restated each prior period presented. Our adoption of ASC 606 accelerated the timing of recognition of a portion of original listing fees related to our New York Stock Exchange, or NYSE, businesses. In addition, and to a lesser extent, the adoption decelerated the timing of recognition of a portion of clearing fee revenues. The impact of our adoption of ASC 606 on our performance obligations in our clearing business was minimal. Revenue recognition related to all other trading, clearing and data businesses remained unchanged. Our adoption of ASC 606 was subject to the same internal controls over financial reporting that we apply to our consolidated financial statements.

Our adoption of ASC 606 had the following impact on our reported results for the prior periods presented, driven primarily by the accelerated recognition of listings fee revenue in our NYSE businesses (in millions, except earnings per share):

	As Reported	New Revenue Standard Adjustment	As Adjusted
Year ended December 31, 2017			
Total revenues	\$ 5,834	\$ 9	\$ 5,843
Total revenues, less transaction-based expenses	4,629	9	4,638
Income tax benefit	(25)	(3)	(28)
Net income attributable to Intercontinental Exchange, Inc.	2,514	12	2,526
Diluted earnings per share	\$ 4.23	\$ 0.02	\$ 4.25

	As Reported	New Revenue Standard Adjustment	As Adjusted
Year ended December 31, 2016			
Total revenues	\$ 5,958	\$ 13	\$ 5,971
Total revenues, less transaction-based expenses	4,499	13	4,512
Income tax expense	580	6	586
Net income attributable to Intercontinental Exchange, Inc.	1,422	8	1,430
Diluted earnings per share	\$ 2.37	\$ 0.02	\$ 2.39

	As Reported	New Revenue Standard Adjustment	As Adjusted
As of December 31, 2017			
Deferred revenue, current	\$ 121	\$ 4	\$ 125
Deferred revenue, non-current	143	(52)	91
Net deferred tax liabilities	2,280	15	2,295
Retained earnings	6,825	33	6,858

Additional disclosures related to our adoption of ASC 606 are provided in Note 5.

The FASB has issued ASU No. 2017-07, Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, or ASU 2017-07. The amendments in ASU 2017-07 require that an employer disaggregate the service cost component from the other components of net benefit cost. The amendments also provide explicit guidance on how to present the service cost component in the same line item as other related compensation costs, and the other components of net benefit cost in the income statement outside of operating income. The guidance only allows the service cost component of net benefit cost to be eligible for capitalization. We adopted ASU 2017-07 on January 1, 2018 and applied it retrospectively to each prior period presented. We have a pension plan, a U.S. nonqualified supplemental executive retirement plan, and post-retirement defined benefit plans that are all impacted by the guidance. Each of the foregoing plans are frozen and do not have a service cost component, which means the expense or benefit recognized under each plan represents other components of net benefit cost as defined in the guidance. The combined net periodic (expense) benefit of these plans was (\$8 million) and \$9 million in 2018 and 2017, respectively, and was previously reported as an adjustment to compensation and benefits expenses in the accompanying consolidated statements of income. Following our adoption of ASU 2017-07, these amounts were reclassified to be included in other income, net, in the accompanying consolidated statements of income, and these adjustments had no impact on net income.

The FASB has issued ASU No. 2016-01, which provides updated guidance for the recognition, measurement, presentation, and disclosure of certain financial assets and liabilities, including the requirement that equity investments (except (i) those accounted for under the equity method of accounting or (ii) those that result in consolidation of the investee) are to be measured at fair value with changes in fair value recognized in net income. We adopted ASU 2016-01 on January 1, 2018. Our adoption of ASU 2016-01 did not result in any fair value adjustments on the date of adoption or during 2018. We have made a policy election under ASU 2016-01 to only adjust the fair value of such investments if and when there is an observable price change in an orderly transaction of a similar or identical investment, with any change in fair value recognized in net income.

In December 2017, the SEC staff issued Staff Accounting Bulletin No. 118, or SAB 118, which provided guidance for companies that have not completed their accounting for the income tax effects of the TCJA in the period of enactment, allowing for a measurement period of up to one year after the enactment date to finalize the recording of the related tax impacts. As of December 31, 2018, we have completed our accounting for the tax effects of the enactment of the TCJA. We reaffirmed our position that we were not subject to transition tax under the TCJA. In addition, we concluded that the \$764 million deferred tax benefit recorded as of December 31, 2017 was a reasonable estimate of the TCJA impact on our deferred tax.

In January 2018, the FASB staff issued Question & Answer Topic 740, No. 5, Accounting for Global Intangible Low-Taxed Income, stating that a company may either elect to treat taxes due on future inclusions of its non-U.S. income in its U.S. taxable income under the newly enacted Global Intangible Low-Taxed Income provisions as a current period expense when incurred, or factor them into the company's measurement of its deferred taxes. As of December 31, 2018, we have completed our analysis of the two different accounting policies and have made a policy election to recognize such tax as a current period expense when incurred.

The FASB has issued ASU No. 2018-02, Reclassification of Certain Tax Effects from Accumulative Other Comprehensive Income, or ASU 2018-02. ASU 2018-02 gives entities the option to reclassify to retained earnings certain tax effects related to items in accumulated other comprehensive income, or OCI, that have been stranded in OCI as a result of the enactment of the TCJA. The guidance is effective for fiscal years beginning after December 15, 2018 with early adoption permitted. We have elected early adoption and adopted ASU 2018-02 on December 31, 2018. The impact of our adoption was a balance sheet reclassification from OCI to retained earnings of \$26 million, which is reflected in our consolidated balance sheet as of December 31, 2018. In connection with our adoption of ASU 2018-02, we made a policy election to use a portfolio approach with respect to pension, postretirement benefits plan obligations and currency translation matters when we determine the timing and extent to which stranded income tax effects from items that were previously recorded in accumulated other comprehensive income are released. In the fourth quarter of 2017, we adopted ASU 2016-18, Statement of Cash Flows: Restricted Cash, or ASU 2016-18, which requires us to show the changes in the total of cash, cash equivalents and restricted cash and cash equivalents in the statement of cash flows. As a result, we no longer present transfers between cash, cash equivalents and restricted cash and cash equivalents in the statement of cash flows. We have reclassified changes in restricted cash from cash flows provided by (used in) investing activities, to the total change in beginning and end-of-period balances. Our statements of cash flows for 2018, 2017 and 2016 reflect this change.

In March 2016, we early adopted ASU No. 2016-09, Stock Compensation (Topic 718) - Improvements to Employee Share-Based Payment Accounting, or ASU 2016-09, on a prospective basis. Under the requirements of ASU 2016-09, we recognized \$15 million in excess tax benefits for tax deductions in excess of cumulative compensation expenses for financial reporting purposes in 2016 through our consolidated statement of income.

Accounting Pronouncements Not Yet Adopted

The FASB has issued ASU No. 2016-02, Leases, or ASU 2016-02. ASU 2016-02 requires an entity to recognize both assets and liabilities arising from finance and operating leases, along with additional qualitative and quantitative disclosures. It requires a lessee to recognize a liability in its balance sheet to make lease payments (the lease liability) and a right-of-use asset representing its right to use the underlying asset for the lease term. In transition, lessees and lessors are required to recognize and measure leases at the beginning of the earliest period presented using a modified retrospective approach. ASU 2016-02 is required to be adopted at the beginning of our first quarter of fiscal year 2019. We expect to record a right-of-use asset of approximately \$315 million, eliminate deferred rent of approximately \$50 million and record a lease liability of approximately \$365 million on our adoption date of January 1, 2019, primarily related to our leased office space and data center facilities. We will elect the alternative transition approach allowed under ASU 2016-02, under which we will record a cumulative effect adjustment to retained earnings on January 1, 2019, and will not restate prior periods. We expect to implement new accounting policies as well as to elect certain practical expedients available to us under ASU 2016-02, including those related to capitalization thresholds, leases with terms of less than 12 months and our application of discount rates. Our implementation of the amended lease guidance is subject to the same internal controls over financial reporting that we apply to our consolidated financial statements.

The FASB has issued ASU No. 2016-13, Financial Instruments - Measurement of Credit Losses on Financial Instruments, or ASU 2016-13. ASU 2016-13 applies to all financial instruments carried at amortized cost including held-to-maturity debt securities as well as trade receivables. ASU 2016-13 requires financial assets carried at amortized cost to be presented at the net amount expected to be collected and available-for-sale debt securities to record credit losses through an allowance for credit losses. ASU 2016-13 is required to be adopted at the beginning of our first quarter of fiscal year 2020, with early adoption permitted. We do not expect to adopt ASU 2016-13 early and we are currently evaluating this guidance to determine the potential impact on our consolidated financial statements.

3. Acquisitions and Divestitures

Divestiture of Trayport and the Acquisitions of Natural Gas Exchange Inc. and Shorcan Energy Brokers Inc.

In December 2015, we acquired 100% of Trayport for \$620 million, in a stock transaction comprised of 12.6 million shares of our common stock. Trayport is a software company that licenses its technology to serve exchanges, OTC brokers and traders to facilitate electronic and hybrid trade execution primarily in the energy markets.

The U.K. Competition and Markets Authority, or the CMA, undertook a review of our 2015 acquisition of Trayport under the merger control laws of the U.K. In 2016, the CMA issued its findings calling for a divestment of Trayport to remedy what it determined to be a substantial lessening of competition. In 2016, we appealed the decision with the Competition Appeal

Tribunal. In March 2017, the Competition Appeal Tribunal upheld the CMA decision. Thereafter, we asked for leave to appeal the decision at the U.K. Court of Appeals that denied our request and as such, we were obligated to sell Trayport by January 2018.

We sold Trayport to TMX Group in December 2017 for £550 million (\$733 million). The gross proceeds included a combination of £350 million (\$466 million) in cash and £200 million (\$267 million) in value relating to our acquisitions of Natural Gas Exchange, Inc., or NGX, now named ICE NGX, and Shorcan Energy Brokers Inc., or Shorcan Energy, from TMX Group. Shorcan Energy is now named CalRock Brokers, Inc., or CalRock. We recognized a net gain of \$110 million in other income. The net gain was equal to the \$733 million in gross proceeds received less the adjusted carrying value of Trayport's net assets of \$607 million (\$531 million carrying value plus \$76 million in accumulated other comprehensive loss from foreign currency translation) less \$16 million in disposition costs.

Trayport was included in our Data and Listings segment and ICE NGX and CalRock are primarily included in our Trading and Clearing segment.

The functional currency of Trayport was the pound sterling. The \$620 million in Trayport net assets were recorded when acquired at a pound sterling/U.S. dollar exchange rate of 1.5218 (£407 million). Because our financial statements are presented in U.S. dollars, we included Trayport net assets in our financial statements based on U.S. dollars using the exchange rates in effect at the end of each reporting period. Therefore, exchange rates affected the value of the Trayport balance sheet, with gains or losses included in the cumulative translation adjustment account. As a result of the decrease in the pound sterling/U.S. dollar exchange rate to 1.3331 as of its disposition date, the portion of our equity attributable to its net assets in accumulated other comprehensive loss from foreign currency translation was \$76 million. In connection with the divestiture, the \$76 million loss was included in the net gain on the divestiture as discussed above.

As of June 30, 2017, we classified Trayport as held for sale and accordingly ceased recording depreciation and amortization for its property and equipment and other intangible assets.

ICE NGX, headquartered in Calgary, provides electronic execution, central counterparty clearing and data services to the physical North American natural gas, electricity and oil markets. CalRock offers brokerage services for the North American crude oil markets.

The ICE NGX and CalRock purchase price was allocated to their net tangible and identifiable intangible assets and liabilities based on their estimated fair values on the acquisition date. Our allocation to identifiable intangible assets was \$198 million, including \$140 million for exchange registrations and licenses, which have been assigned an indefinite useful life, and \$53 million for customer relationship intangible assets, which have been assigned useful lives of 20 years. The excess of the purchase price over the allocated net tangible and identifiable intangible asset value was \$123 million and was recorded as goodwill.

Acquisitions

On January 2, 2018, we acquired BondPoint from Virtu Financial, Inc. for \$400 million in cash. BondPoint is a provider of electronic fixed income trading solutions for the buy-side and sell-side, offering access to centralized liquidity and automated trade execution services through its alternative trading system, or ATS. BondPoint is primarily included in our Trading and Clearing segment. The BondPoint purchase price was allocated to its net tangible and identifiable intangible assets and liabilities based on their estimated fair values as of January 2, 2018. Our allocation to identifiable intangible assets was \$130 million and included (i) \$123 million of customer relationships, which have been assigned a useful life of 15 years, and (ii) \$7 million of developed technology, which has been assigned a useful life of three years. The excess of the purchase price over the allocated net tangible and identifiable intangible asset value was \$267 million and was recorded as goodwill.

On July 18, 2018, we acquired CHX Holdings, Inc., the parent company of the Chicago Stock Exchange, or CHX, a full-service stock exchange including trading, data and corporate listings services. CHX operates as a registered national securities exchange, and is primarily included in our Trading and Clearing segment.

On July 23, 2018, we acquired TMC Bonds, LLC, or TMC Bonds, for \$700 million in cash. The cash consideration is gross of \$15 million cash held by TMC Bonds on the date of acquisition. TMC Bonds is an electronic fixed income marketplace, supporting anonymous trading across multiple protocols in various asset classes, including municipals, corporates, treasuries, agencies and certificates of deposit. TMC Bonds is primarily included in our Trading and

Clearing segment. The purchase price of TMC Bonds was allocated to the preliminary net tangible and identifiable intangible assets and liabilities based on their estimated fair values as of July 23, 2018. The identifiable intangible assets acquired were \$261 million and primarily included (i) customer relationships of \$253 million, which have been assigned a useful life of 15 years, and (ii) developed

technology of \$7 million, which has been assigned a useful life of three years. The excess of the purchase price over the preliminary net tangible and identifiable intangible assets was \$423 million and was recorded as goodwill. We now own 100% of MERS. MERS was previously a privately held, member-based organization that owned and managed the MERS® System, made up of lenders, servicers, sub-servicers, investors and government institutions. Originally, on June 30, 2016, we acquired a majority equity position in MERS and entered into a software development agreement to rebuild the MERS® System, a national electronic registry that tracks the changes in servicing rights and beneficial ownership interests in U.S.-based mortgage loans. We treated the investment as an equity method investment since we did not have the ability to control the operations of MERS. On July 20, 2018, we exercised our option to purchase all of the remaining equity interests of MERS as a result of satisfying our deliverables under the software development agreement. On October 3, 2018, we completed the purchase of all remaining interests and accordingly, own 100% of MERS. On that date, we gained control of MERS, began to include MERS's results as part of our consolidated operations, and recorded a \$110 million gain on our initial investment value as other non-operating income. MERS is now part of ICE Mortgage Services and is included in our Trading and Clearing segment.

On October 20, 2017, we acquired Bank of America Merrill Lynch, or BofAML's, Global Research division's index business. The BofAML indices are the second largest group of fixed income indices as measured by assets under management, or AUM, globally, and the indices have been re-branded as the ICE BofAML indices. The ICE BofAML indices are included in our Data and Listings segment.

On May 1, 2017, we acquired 100% of TMX Atrium, a global extranet and wireless services business, from TMX Group. TMX Atrium provides low-latency access to markets and market data across 12 countries, more than 30 major trading venues, and ultra-low latency wireless connectivity to access markets and market data in the Toronto, New Jersey and Chicago metro areas. The wireless assets consist of microwave and millimeter networks that transport market data and provide private bandwidth. TMX Atrium is included in our Data and Listings segment.

On January 31, 2017, we acquired 100% of National Stock Exchange, Inc., now named NYSE National. The acquisition gave the NYSE Group a new U.S. exchange license. NYSE National is distinct from NYSE Group's other listings exchanges because NYSE National is only a trading venue and not a listings market. NYSE Group's other listings exchanges, NYSE, NYSE American, NYSE Arca and newly-acquired CHX, have unique market models designed for corporate and ETF issuers. After closing the transaction, NYSE National ceased operations on February 1, 2017. NYSE Group re-launched operations and commenced trading in May 2018. NYSE National is included in our Trading and Clearing segment.

On October 3, 2016, we acquired from S&P Global 100% of Standard & Poor's Securities Evaluations, Inc., or SPSE, and 100% of Credit Market Analysis for \$431 million in cash. The cash consideration was funded from borrowings under our commercial paper program. SPSE, which has been renamed Securities Evaluations, is a provider of fixed income evaluated pricing and Credit Market Analysis is a provider of independent data for the OTC markets, including credit derivatives and bonds. The purchase price was allocated to the net tangible and identifiable intangible assets and liabilities based on their estimated fair values as of October 3, 2016. The identifiable intangible assets acquired were \$171 million, including customer relationship intangible assets for \$135 million, which have been assigned useful lives of 15 to 20 years, and data/databases intangible assets for \$29 million, which have been assigned useful lives of 5 to 10 years. The excess of the purchase price over the net tangible and identifiable intangible assets was \$312 million and was recorded as goodwill. Securities Evaluations is included in our Data and Listings segment.

Non-Controlling Interest

As of December 31, 2016, non-controlling interests included those related to the operating results of our CDS clearing subsidiaries in which non-ICE limited partners held a 42.5% net profit sharing interest; ICE Endex in which Gasunie held a 21% ownership interest; and ICE Clear Netherlands in which ABN AMRO Clearing Bank N.V. held a 25% ownership interest. For both ICE Endex and ICE Clear Netherlands, in addition to the non-controlling interest reported in the consolidated statements of income, we reported redeemable non-controlling interest in the consolidated balance sheets which represents the minority interest redemption fair value for each company.

During 2017 we purchased both Gasunie's 21% minority ownership interest in ICE Endex and ABN AMRO Clearing Bank N.V.'s 25% minority ownership interest in ICE Clear Netherlands. Subsequent to these acquisitions, we own 100% of ICE Endex and ICE Clear Netherlands and no longer include non-controlling interest for ICE Endex and ICE

Clear Netherlands in our consolidated financial statements.

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During 2017, we purchased 12.6% of the net profit sharing interest in our CDS clearing subsidiaries and in September 2018, we purchased an additional 3.2% interest. The remaining non-ICE limited partners in our CDS clearing subsidiaries hold a 26.7% ownership interest as of December 31, 2018.

In December 2018, Bakkt, LLC, or Bakkt, a newly formed entity, was capitalized with \$183 million in initial funding by us as majority owner, along with a group of other minority investors. Bakkt is an integrated platform that will enable consumers and institutions to transact in digital assets. Bakkt will include regulated trading, clearing and custodial solutions for digital assets, which will be supported by ICE Futures U.S. and ICE Clear U.S. We hold a call option over these interests subject to certain terms, similarly the non-ICE partners in Bakkt hold a put option to require us to repurchase their interests subject to certain terms. These minority interests are reflected as redeemable non-controlling interests in temporary equity within our consolidated balance sheet.

Divestitures

On June 1, 2017, we sold NYSE Governance Services, a provider of governance, compliance, and education tools for organizations and their boards of directors, to Marlin Heritage, L.P. We recognized a net loss of \$6 million on the divestiture of NYSE Governance Services, which was recorded as an impairment loss within our Data and Listings segment in the accompanying consolidated statements of income in 2017.

On March 31, 2017, we sold Interactive Data Managed Solutions, or IDMS, a unit of Interactive Data, to FactSet. IDMS is a managed solutions and portal provider for the global wealth management industry. There was no gain or loss recognized on the sale of IDMS.

4. Investments

Our equity investments, including our investments in Euroclear plc, or Euroclear, BIDS Trading, L.P. and Coinbase Global, Inc., or Coinbase, among others, are now subject to valuation under ASU 2016-01.

Investment in Euroclear

During 2017, we purchased a 4.7% stake in Euroclear valued at €276 million (\$327 million). Upon purchasing this stake, we agreed to participate on the Euroclear Board of Directors. During the same period, we negotiated an additional purchase which closed on February 21, 2018 following regulatory approval. This provided us with an additional 5.1% stake in Euroclear for a purchase price of €246 million in cash (\$304 million). As of December 31, 2018, we own a 9.8% stake in Euroclear for a total investment of \$631 million. Euroclear is classified as an equity investment and included as an other non-current asset in our consolidated balance sheets.

Euroclear is a provider of post-trade services, including settlement, central securities depositories and related services for cross-border transactions across asset classes. In 2018, we recognized dividend income of \$15 million from Euroclear, included in other income.

Investment in Cetip

Until March 29, 2017, we held a 12% ownership interest in Cetip, S.A., or Cetip, classified as a long-term investment. On that date, in connection with the merger of Cetip with BM&FBOVESPA S.A., which changed its name to B3 S.A. - Brasil, Bolsa, Balcão, or B3, we recognized a \$176 million realized investment gain in other income (expense), net, and \$9 million in foreign exchange losses and transaction expenses in other income (expense), net. We recognized dividend income received relating to our investment in Cetip in other income of \$5 million and \$17 million in 2017 and 2016, respectively.

Other Investments

We had previously accounted for our investment in MERS as an equity method investment before completing our acquisition of 100% of MERS on October 3, 2018 (Note 3). As of December 31, 2018, our Options Clearing Corporation, or OCC, investment is our sole equity method investment and is included in other non-current assets in the accompanying consolidated balance sheets. We recognized \$46 million, \$36 million and \$25 million in income related to these equity method investments during 2018, 2017 and 2016, respectively, as other income. See “Summary of Significant Accounting Policies” for further information on our equity method investments.

As a result of our acquisition of a majority equity position in MERS in June 2016, MERS was required to have cash or investments reserved in order to satisfy terms of the governing agreements of the acquisition. The reserve is satisfied with fixed income securities, including treasuries, corporates and municipals. The balance of the reserve is primarily used to cover

settlement amounts from all litigation and claims arising from the operations of MERS prior to the acquisition of the majority equity position. As of December 31, 2018, and subsequent to our October 2018 acquisition and consolidation of the remaining MERS interests, it amounted to \$81 million and is included in prepaid expenses and other current assets and non-current assets. As of December 31, 2018, the reserve is offset by an equal \$81 million due to former MERS equity holders and is reflected in other current liabilities and other non-current liabilities.

5. Revenue Recognition

Our primary revenue contract classifications are described below. These categories best represent those with similar economic characteristics of the nature, amount, timing and uncertainty of our revenues and cash flows.

Transaction and clearing, net - Transaction and clearing revenues represent fees charged for the performance obligations of derivatives trading and clearing, and from our cash trading, equity options and fixed income exchanges. The derivatives trading and clearing fees contain two performance obligations: (1) trade execution/clearing novation and (2) risk management of open interest. While we allocate the transaction price between these two performance obligations, since they generally are satisfied almost simultaneously, there is no significant deferral of revenue. Cash trading, equity options and fixed income fees contain one performance obligation related to trade execution which occurs instantaneously, and the revenue is recorded at the point in time of the trade execution. Our transaction and clearing revenues are reported net of rebates, except for the NYSE transaction-based expenses. Rebates were \$844 million, \$749 million and \$674 million in 2018, 2017 and 2016, respectively. Transaction and clearing fees can be variable based on trade volume discounts used in the determination of rebates, however virtually all volume discounts are calculated and recorded on a monthly basis. Transaction and clearing fees, as well as any volume discounts rebated to our customers, are calculated and billed monthly in accordance with our published fee schedules. We make liquidity payments to certain customers in our NYSE businesses and recognize those payments as a cost of revenue. In addition, we pay NYSE regulatory oversight fees to the SEC and collect equal amounts from our customers. These are also considered a cost of revenue, and both of these NYSE-related fees are included in transaction-based expenses. Transaction and clearing revenues and the related transaction-based expenses are all recognized in our Trading and Clearing segment.

Data services - Data service revenues represent the following:

Pricing and analytics services provide global securities evaluations, reference data, market indices, risk analytics, derivative pricing and other information designed to meet our customers' portfolio management, trading, risk management, reporting and regulatory compliance needs.

Exchange data and feeds services represent subscription fees for the provision and feeds of our market data that is created from activity in our Trading and Clearing segment.

Desktops and connectivity services provide the connection to our exchanges, clearing houses and data centers and comprise hosting, colocation, infrastructure, technology-based information platforms, workstations and connectivity solutions through the ICE Global Network.

The nature and timing of each contract type for the data services above are similar in nature. Data services revenues are primarily subscription-based, billed monthly, quarterly or annually in advance and recognized ratably over time as our performance obligations of data delivery are met consistently throughout the period. Considering these contracts primarily consist of single performance obligations with fixed prices, there is no variable consideration and no need to allocate the transaction price. In certain of our data contracts, where third parties are involved, we arrange for the third party to transfer the services to our customers; in these arrangements we are acting as an agent and revenue is recorded net. All data services fees are included in our Data and Listings segment.

Listings - Listings revenues include original and annual listings fees, and other corporate action fees. Each distinct listing fee is allocated to multiple performance obligations including original and incremental listing and investor relations services, 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 listing services is based on the original and annual listing fees and the standalone selling price of the investor relations services is based on its market value. All listings fees are billed upfront and the identified performance obligations are satisfied over time. Revenue related to the investor relations performance obligation is recognized ratably over a two-year period, with the remaining revenue recognized ratably over time as customers continue to list on our exchanges, which is generally estimated to be over a period of up to nine years for NYSE and up to five years for NYSE Arca and NYSE American. Listings fees related to other corporate actions are considered contract modifications of our listing contracts and are recognized ratably over time as customers continue to list on our exchanges, which is generally estimated to be a period of six years for NYSE and three years for NYSE Arca and NYSE American. All listings fees are recognized in our Data and Listings segment.

Other revenues - Other revenues primarily include interest income on certain clearing margin deposits, regulatory penalties and fines, fees for use of our facilities, regulatory fees charged to member organizations of our U.S. securities exchanges, designated market maker service fees, exchange membership fees and agricultural grading and certification fees. Generally, fees for other revenues contain one performance obligation. Because these contracts primarily consist of single performance obligations with fixed prices, there is no variable consideration and no need to allocate the transaction price. Services for other revenues are primarily satisfied at a point in time. Therefore, there is no need to allocate the fee and no deferral results as we have no further obligation to the customer at that time. Other revenues are recognized in our Trading and Clearing segment.

The following table depicts the disaggregation of our revenue according to business line and segment (in millions). Segment totals here are consistent with the segment totals in Note 18:

	Trading & Clearing Segment	Data & Listings Segment	Total Consolidated
Year ended December 31, 2018			
Transaction and clearing, net	\$ 3,483	\$ —	\$ 3,483
Data services	—	2,115	2,115
Listings	—	444	444
Other revenues	234	—	234
Total revenues	3,717	2,559	6,276
Transaction-based expenses	1,297	—	1,297
Total revenues, less transaction-based expenses	\$ 2,420	\$ 2,559	\$ 4,979

Timing of Revenue Recognition

Services transferred at a point in time	\$ 2,074	\$ —	\$ 2,074
Services transferred over time	346	2,559	2,905
Total revenues, less transaction-based expenses	\$ 2,420	\$ 2,559	\$ 4,979

	Trading & Clearing Segment	Data & Listings Segment	Total Consolidated
Year ended December 31, 2017			
Transaction and clearing, net	\$ 3,131	\$ —	\$ 3,131
Data services	—	2,084	2,084
Listings	—	426	426
Other revenues	202	—	202
Total revenues	3,333	2,510	5,843
Transaction-based expenses	1,205	—	1,205
Total revenues, less transaction-based expenses	\$ 2,128	\$ 2,510	\$ 4,638

Timing of Revenue Recognition

Services transferred at a point in time	\$ 1,813	\$ —	\$ 1,813
Services transferred over time	315	2,510	2,825
Total revenues, less transaction-based expenses	\$ 2,128	\$ 2,510	\$ 4,638

	Trading & Clearing Segment	Data & Listings Segment	Total Consolidated
Year ended December 31, 2016			
Transaction and clearing, net	\$ 3,384	\$ —	\$ 3,384
Data services	—	1,978	1,978
Listings	—	432	432
Other revenues	177	—	177
Total revenues	3,561	2,410	5,971
Transaction-based expenses	1,459	—	1,459
Total revenues, less transaction-based expenses	\$ 2,102	\$ 2,410	\$ 4,512

Timing of Revenue Recognition

Services transferred at a point in time	\$ 1,791	\$ —	\$ 1,791
Services transferred over time	311	2,410	2,721
Total revenues, less transaction-based expenses	\$ 2,102	\$ 2,410	\$ 4,512

The Trading and Clearing segment revenues above include \$248 million, \$226 million, and \$219 million in 2018, 2017 and 2016, respectively, for services transferred over time related to risk management of open interest performance obligations. A majority of these performance obligations are performed over a short period of time of one month or less.

6. Short-Term and Long-Term Restricted Cash and Cash Equivalents

ICE Futures Europe operates as a U.K. Recognized Investment Exchange, and is required by the U.K. Financial Conduct Authority to maintain financial resources sufficient to properly perform its relevant functions equivalent to a minimum of six months of operating costs, subject to certain deductions, which is held in cash or cash equivalents or investments, at all times. As of December 31, 2018 and 2017, the amounts held for this purpose were \$90 million and \$77 million, respectively, and are included in short-term restricted cash and cash equivalents.

ICE Clear Europe operates as a U.K. Recognized Clearing House. As such, ICE Clear Europe is required by the BOE and the European Market Infrastructure Regulation, or EMIR, to restrict as cash, cash equivalents or investments an amount to reflect an estimate of the capital required to wind down or restructure the activities of the clearing house, cover operational, legal and business risks and to reserve capital to meet credit, counterparty and market risks not covered by the members' margin and guaranty funds. As of December 31, 2018 and 2017, \$435 million and \$423 million, respectively, are included in short-term restricted cash and cash equivalents held for these purposes. The increase in the regulatory capital restricted cash at ICE Clear Europe as of December 31, 2018 was primarily due to additional costs incurred due to the growth of our clearing businesses and the consequential additional regulatory capital buffers required by the BOE. ICE Clear Europe, in addition to being regulated by the BOE, is also regulated by the CFTC as a U.S. Derivatives Clearing Organizations, or DCO. The regulatory capital available to ICE Clear Europe, as described above, exceeds the CFTC requirements.

Our CFTC regulated U.S. Designated Contract Market, or DCM, ICE Futures U.S., our CFTC regulated U.S. DCOs, ICE Clear U.S. and ICE Clear Credit, our CFTC regulated U.S. Swap Data Repository, or SDR, ICE Trade Vault, and our U.S. Swap Execution Facility, or SEF, ICE Swap Trade, are required to maintain financial resources including cash, in an amount that would cover certain operating costs for a one-year period, subject to certain deductions, to satisfy at least six months of such operating costs at all times. As of December 31, 2018 and 2017, the financial resources reserved were \$213 million and \$193 million, respectively, included as short-term restricted cash and cash equivalents. For our U.S. DCOs, ICE Clear U.S. and ICE Clear Credit, these amounts include voluntarily-held additional reserves consistent with the EMIR requirements to cover operational, legal and business risks and to reserve capital to meet credit, counterparty and market risks not covered by the member margin and guaranty funds.

Our clearing houses, other than ICE NGX, require each clearing member to make deposits to a fund known as the guaranty fund. As of December 31, 2018 and 2017, our combined contributions to the guaranty funds of our clearing houses are \$253 million and \$254 million, respectively. In addition, beginning in March 2018, certain of our exchanges are now required to make similar contributions to those made by the clearing houses to be utilized pro rata along with the clearing house contributions in the event of the default of any clearing member. As of December 31, 2018, these cash contributions were \$67 million. All of these contributions are included in long-term restricted cash and cash equivalents. See Note 14 for additional information on the guaranty funds and our contributions of cash to our clearing houses guaranty funds.

As of December 31, 2018 and 2017, there is \$67 million and \$64 million, respectively, of additional combined cash included in short-term restricted cash and cash equivalents related to other regulated entities and exchanges, including ICE Benchmark Administration, ICE Clear Netherlands, ICE Clear Canada (for 2017 only), ICE Trade Vault U.K., ICE Endex, ICE Clear

Singapore and ICE NGX. The increase in the regulatory capital restricted cash as of December 31, 2018 was primarily due to additional costs incurred due to the growth of these businesses and the acquisition of ICE NGX in December 2017.

As of December 31, 2018 and 2017, we have \$23 million and \$22 million, respectively, of additional restricted cash, primarily related to escrow for recent acquisitions included in short-term or long-term restricted cash and cash equivalents.

7. Property and Equipment

Property and equipment consisted of the following (in millions):

	As of December 31,		Depreciation Period
	2018	2017	(Years)
Software and internally developed software	\$919	\$766	3 to 7
Computer and network equipment	682	575	3 to 5
Land	145	137	N/A
Buildings and building improvements	294	289	15 to 40
Leasehold improvements	242	234	4 to 12
Equipment, aircraft and office furniture	225	275	4 to 15
	2,507	2,276	
Less accumulated depreciation and amortization	(1,266)	(1,030)	
Property and equipment, net	\$1,241	\$1,246	

In 2018, 2017 and 2016, amortization of software and internally developed software was \$160 million, \$135 million and \$113 million, respectively, and depreciation of all other property and equipment was \$133 million, \$122 million and \$142 million, respectively. As of December 31, 2018 and 2017, unamortized software and internally developed software was \$298 million and \$269 million, respectively.

8. Goodwill and Other Intangible Assets

The following is a summary of the activity in the goodwill balance (in millions):

Goodwill balance at January 1, 2017	\$12,291
Acquisitions	211
Divestitures	(344)
Foreign currency translation	63
Other activity, net	(5)
Goodwill balance at December 31, 2017	12,216
Acquisitions	889
Foreign currency translation	(38)
Other activity, net	18
Goodwill balance at December 31, 2018	\$13,085

The following is a summary of the activity in the other intangible assets balance (in millions):

Other intangible assets balance at January 1, 2017	\$10,420
Acquisitions	274
Divestitures	(216)
Foreign currency translation	69
Amortization of other intangible assets	(272)
Other activity, net	(6)
Other intangible assets balance at December 31, 2017	10,269
Acquisitions	548
Foreign currency translation	(45)
Amortization of other intangible assets	(289)
Other activity, net	(21)
Other intangible assets balance at December 31, 2018	\$10,462

We completed the acquisitions of BondPoint, CHX Holdings, Inc., TMC Bonds and MERS during 2018, and ICE NGX, CalRock, the ICE BofAML indices, TMX Atrium and NYSE National and sold Trayport, NYSE Governance Services and IDMS during 2017 (Note 3).

The foreign currency translation adjustments result from a portion of our goodwill and other intangible assets being held at our U.K., EU and Canadian subsidiaries, whose functional currencies are not the U.S. dollar. Amortization of other intangible assets in the table above includes an impairment charge of \$4 million recorded during 2018 on the remaining value of exchange registration intangible assets in connection with the July 2018 closure of ICE Futures Canada and ICE Clear Canada (Note 14) and the \$6 million net impairment loss on the sale of NYSE Governance Services in 2017 (Notes 2 and 3). ICE Futures Canada and ICE Clear Canada were part of our Trading and Clearing segment and NYSE Governance Services was part of our Data and Listings segment. We did not recognize any other impairment losses on goodwill or other intangible assets during 2018 and 2017. The changes in other activity, net, in the tables above primarily relate to adjustments to the fair value of the net tangible assets and intangible assets relating to the acquisitions, with a corresponding adjustment to goodwill.

Other intangible assets and the related accumulated amortization consisted of the following (in millions):

	As of December 31,		Useful Life (Years)
	2018	2017	
Customer relationships	\$ 4,406	\$ 3,923	3 to 25
Technology	524	461	2.5 to 11
Trading products with finite lives	237	237	20
Data/databases	150	150	4 to 10
Market data provider relationships	11	11	20
Non-compete agreements	39	38	1 to 5
Other	36	33	1 to 5
	5,403	4,853	
Less accumulated amortization	(1,532)	(1,200)	
Total finite-lived intangible assets, net	3,871	3,653	
Exchange registrations, licenses and contracts with indefinite lives	6,253	6,243	
Trade names and trademarks with indefinite lives	280	280	
In-process research and development	49	85	
Other	9	8	
Total indefinite-lived intangible assets	6,591	6,616	
Total other intangible assets, net	\$ 10,462	\$ 10,269	

In 2018, 2017 and 2016, amortization of other intangible assets was \$289 million, \$272 million and \$323 million, respectively. Collectively, the remaining weighted average useful lives of the finite-lived intangible assets is 17.7 years as of December 31,

2018. We expect future amortization expense from the finite-lived intangible assets as of December 31, 2018 to be as follows (in millions):

2019	\$303
2020	264
2021	249
2022	241
2023	141
Thereafter	2,673
	\$3,871

9. Deferred Revenue

Our contract liabilities, or deferred revenue, represent consideration received that is yet to be recognized as revenue. Total deferred revenue was \$217 million as of December 31, 2018, including \$135 million in current deferred revenue and \$82 million in non-current deferred revenue. Total deferred revenue was \$216 million as of December 31, 2017, including \$125 million in current deferred revenue and \$91 million in non-current deferred revenue. See Note 5 for a description of our annual listing, original listing, other listings and data services revenues and the revenue recognition policy for each of these revenue streams. The changes in our deferred revenue during 2018 and 2017 are as follows (in millions), adjusted to reflect the adoption of ASC 606 as discussed in Note 2:

	Annual Listing Revenue	Original Listing Revenues	Other Listing Revenues	Data Services and Other Revenues	Total
Deferred revenue balance at January 1, 2017	\$ —	\$ 23	\$ 83	\$ 92	\$198
Additions	368	22	54	374	818
Amortization	(368)	(20)	(39)	(374)	(801)
Acquisitions, net of divestitures (Note 3)	—	—	—	1	1
Deferred revenue balance at December 31, 2017	—	25	98	93	216
Additions	384	24	38	366	812
Amortization	(384)	(24)	(36)	(367)	(811)
Deferred revenue balance at December 31, 2018	\$ —	\$ 25	\$ 100	\$ 92	\$217

Adjustments for divestitures in the table above resulted from our June 2017 divestiture of NYSE Governance Services and our March 2017 divestiture of IDMS, as well as our classification of Trayport deferred revenue as held for sale during 2017. Included in the amortization recognized in 2018, \$114 million related to the deferred revenue balance as of January 1, 2018. Included in the amortization in 2017, \$100 million related to the deferred revenue balance as of January 1, 2017. As of December 31, 2018, we estimate that our deferred revenue will be recognized in the following years (in millions):

	Original Listing Revenues	Other Listing Revenues	Data Services and Other Revenues	Total
2019	\$ 19	\$ 29	\$ 87	\$135
2020	6	29	3	38
2021	—	21	2	23
2022	—	15	—	15
2023	—	6	—	6
Thereafter	—	—	—	—
Total	\$ 25	\$ 100	\$ 92	\$217

10. Debt

Our total debt, including short-term and long-term debt, consisted of the following (in millions):

	As of	
	December 31,	
	2018	2017
Debt:		
Short-term debt:		
Commercial Paper	\$951	\$1,233
2018 Senior Notes (2.50% senior unsecured notes due October 15, 2018)	—	600
Total short-term debt	951	1,833
Long-term debt:		
2020 Senior Notes (2.75% senior unsecured notes due December 1, 2020)	1,246	1,244
2022 Senior Notes (2.35% senior unsecured notes due September 15, 2022)	496	495
2023 Senior Notes (3.45% senior unsecured notes due September 21, 2023)	397	—
2023 Senior Notes (4.00% senior unsecured notes due October 15, 2023)	793	791
2025 Senior Notes (3.75% senior unsecured notes due December 1, 2025)	1,243	1,242
2027 Senior Notes (3.10% senior unsecured notes due September 15, 2027)	496	495
2028 Senior Notes (3.75% senior unsecured notes due September 21, 2028)	591	—
2048 Senior Notes (4.25% senior unsecured notes due September 21, 2048)	1,228	—
Total long-term debt	6,490	4,267
Total debt	\$7,441	\$6,100

Amended Credit Facility

We have a \$3.4 billion senior unsecured revolving credit facility pursuant to a credit agreement with Wells Fargo Bank, N.A., as primary administrative agent, issuing lender and swing-line lender, Bank of America, N.A., as syndication agent, backup administrative agent and swing-line lender, and the lenders party thereto. On August 9, 2018, we extended the final maturity date of the credit facility from August 18, 2022 to August 9, 2023, and made certain other changes, herein referred to as the Amended Credit Facility. We incurred debt issuance costs of \$2 million relating to the Amended Credit Facility and these costs are included in the accompanying consolidated balance sheet as other non-current assets to be amortized over the life of the facility.

The Amended Credit Facility includes an option for us to propose an increase in the aggregate amount available for borrowing by up to \$975 million, subject to the consent of the lenders funding the increase and certain other conditions. No amounts were outstanding under the Amended Credit Facility as of December 31, 2018. As of December 31, 2018, of the \$3.4 billion that is currently available, \$951 million is required to back-stop the amount outstanding under our Commercial Paper Program and \$105 million is required to support certain broker dealer subsidiary commitments. The amount required to backstop the amounts outstanding under the Commercial Paper Program will fluctuate as we increase or decrease our commercial paper borrowings. The remaining \$2.3 billion is available for working capital and general corporate purposes including, but not limited to, acting as a back-stop to future increases in the amounts outstanding under the Commercial Paper Program.

We also pay an annual commitment fee for unutilized amounts payable in arrears at a rate that ranges from 0.08% to 0.20% determined based on our long-term debt rating. As of December 31, 2018, the applicable rate was 0.125%.

Amounts borrowed under the facility may be prepaid at any time without premium or penalty.

The facility also contains customary representations and warranties, covenants and events of default, including a leverage ratio, limitations on liens on our assets, indebtedness of non-obligor subsidiaries, the sale of all or substantially all of our assets, and other matters.

Commercial Paper Program

We have a U.S. dollar commercial paper program, or the Commercial Paper Program. It is currently backed by the borrowing capacity available under the Amended Credit Facility, as described above. The effective interest rate of commercial paper issuances does not materially differ from short-term interest rates (such as USD LIBOR) which fluctuate due to market conditions and as a result may impact our interest expense.

We repaid a net amount of \$283 million of outstanding commercial paper during 2018 using cash flows from operations and cash proceeds received from our 2018 bond issuance. We repaid \$409 million of net notes outstanding under the program during 2017 primarily using net cash proceeds received from the sales of Cetip and Trayport. These reductions were partially offset by notes we issued under the program during 2017, the proceeds of which were used to fund acquisitions and investments and repurchase our common stock. We used net proceeds from notes issued under the program during 2016 for the acquisitions of Securities Evaluations and Credit Market Analysis and for general corporate purposes. We repaid a portion of the amounts outstanding under the program during 2018, 2017 and 2016 with cash flows from operations.

Commercial paper notes of \$951 million with original maturities ranging from two to 77 days were outstanding as of December 31, 2018 with a weighted average interest rate of 2.48% per annum, and a weighted average maturity of 12 days. Commercial paper notes of \$1.2 billion with original maturities ranging from two to 64 days were outstanding as of December 31, 2017, with a weighted average interest rate of 1.49% per annum, and a weighted average maturity of 18 days.

Senior Notes:

Newly-Issued Senior Notes: In August 2018, we issued \$2.25 billion in new aggregate unsecured fixed-rate senior notes, including \$400 million, 3.45% notes due in 2023, or the 2023 Senior Notes, \$600 million, 3.75% notes due in 2028, or the 2028 Senior Notes, and \$1.25 billion, 4.25% notes due in 2048, or the 2048 Senior Notes, and together with the 2023 Senior Notes and the 2028 Senior Notes, the Newly-Issued Senior Notes. We used the proceeds from the offering for general corporate purposes, including to fund the redemption of the \$600 million, 2.50% Senior Notes due October 2018 and to refinance all of our issuances under our Commercial Paper Program that resulted from acquisitions and investments in the last year. We incurred debt issuance costs of \$21 million relating to the Newly-Issued Senior Notes that we recorded as a deduction from the carrying amount of the debt and which is being amortized over the respective note lives.

2022 and 2027 Senior Notes: In August 2017, we issued \$1.0 billion in aggregate senior unsecured fixed-rate notes, including \$500 million, 2.35% notes due September 2022, or the 2022 Senior Notes, and \$500 million, 3.10% notes due September 2027, or the 2027 Senior Notes. We used the majority of the proceeds of the offering to fund the redemption in September 2017 of \$850 million, 2.00% senior unsecured fixed-rate NYSE Notes prior to the October 2017 maturity date. We incurred debt issuance costs of \$8 million relating to the 2022 Senior Notes and the 2027 Senior Notes that we recorded as a deduction from the carrying amount of the debt and which is being amortized over the respective note lives.

2020 and 2025 Senior Notes: In November 2015, we issued \$2.5 billion in aggregate senior unsecured fixed-rate notes, including \$1.25 billion, 2.75% notes due November 2020, or the 2020 Senior Notes, and \$1.25 billion, 3.75% notes due November 2025, or the 2025 Senior Notes. We used the proceeds from the offering, together with \$1.6 billion of borrowings under our Commercial Paper Program, to finance the cash portion of the purchase price of Interactive Data.

October 2023 Senior Notes: In October 2013, we issued \$800 million, 4.00% senior unsecured fixed-rate notes due October 2023, or the October 2023 Senior Notes. We used the net proceeds from the October 2023 Senior Notes to finance a portion of the purchase price of the acquisition of NYSE.

The Newly-Issued Senior Notes, the 2022 Senior Notes, the 2027 Senior Notes, the 2020 Senior Notes, the 2025 Senior Notes, the 2023 Senior Notes and the October 2023 Senior Notes all contain affirmative and negative covenants, including, but not limited to, certain redemption rights, limitations on liens and indebtedness and limitations on certain mergers, sales, dispositions and lease-back transactions.

Debt Repayment Schedule

As of December 31, 2018, the outstanding debt repayment schedule is as follows (in millions):

2019	\$953
2020	1,250
2021	—
2022	500
2023	1,200
Thereafter	3,600
Principal amounts repayable	7,503
Debt issuance costs	(41)
Unamortized balance discounts on bonds, net	(21)
Total debt outstanding	\$7,441

11. Share-Based Compensation

The non-cash compensation expenses for stock options and restricted stock was \$130 million, \$135 million and \$124 million in 2018, 2017 and 2016, respectively, net of \$15 million, \$18 million and \$13 million, respectively, that was capitalized as software development costs. As of December 31, 2018, we had 36.6 million shares in total under various equity plans that are available for future issuance as stock option and restricted stock awards.

Stock Option Plans

Stock options are granted with an exercise price equal to the fair value of our common stock on the grant date. We may grant, under provisions of the plans, both incentive stock options and nonqualified stock options. The options generally vest over three years and may generally be exercised up to ten years after the date of grant, but generally expire either 14 or 60 days after termination of employment. The shares of common stock issued under our stock option plans are made available from authorized and unissued common stock or treasury shares.

The fair value is based on the closing stock price of our stock on the date of grant as well as certain other assumptions. Compensation expense arising from option grants is recognized ratably over the vesting period based on the grant date fair value, net of estimated forfeitures.

The following is a summary of our stock option activity:

	Number of Options (in thousands)	Weighted Average Exercise Price per Option
Outstanding at January 1, 2016	3,873	\$ 31.93
Granted	752	50.01
Exercised	(746)	28.73
Outstanding at December 31, 2016	3,879	36.05
Granted	731	57.34
Exercised	(597)	27.97
Outstanding at December 31, 2017	4,013	41.13
Granted	535	67.23
Exercised	(908)	34.84
Forfeited	(30)	58.01
Outstanding at December 31, 2018	3,610	46.44

Details of stock options outstanding as of December 31, 2018 are as follows:

Number of Options (in thousands)	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (Years)	Aggregate Intrinsic Value (In millions)
Vested or expected to vest 3,610	\$ 46.44	6.2	\$ 104

Number of Options (in thousands)	Weighted Average Exercise Price	Weighted Average Remaining Contractual Life (Years)	Aggregate Intrinsic Value (In millions)
Exercisable 2,596	\$ 40.22	5.4	\$ 91

The total intrinsic value of options exercised during 2018, 2017 and 2016 was \$36 million, \$22 million and \$18 million, respectively. As of December 31, 2018, there were \$8 million in total unrecognized compensation costs related to stock options, which are expected to be recognized over a weighted average period of 1.6 years as the stock options vest.

Of the options outstanding at December 31, 2018, 2.6 million were exercisable at a weighted-average exercise price of \$40.22. Of the options outstanding at December 31, 2017, 3.0 million were exercisable at a weighted-average exercise price of \$36.36. Of the options outstanding at December 31, 2016, 2.8 million were exercisable at a weighted-average exercise price of \$31.61.

We use the Black-Scholes option pricing model to value our stock option awards. During 2018, 2017 and 2016, we used the assumptions in the table below to compute the value:

Assumptions	Year Ended December 31,					
	2018	2017	2016			
Risk-free interest rate	2.67	% 1.84	% 1.51	%		
Expected life in years	6.0	5.0	5.0			
Expected volatility	20	% 21	% 24	%		
Expected dividend yield	1.43	% 1.40	% 1.36	%		
Estimated weighted-average fair value of options granted per share	\$14.08	\$10.50	\$9.88			

The risk-free interest rate is based on the zero-coupon U.S. Treasury yield curve in effect at the date of grant. The expected life is derived from historical and anticipated future exercise patterns. Expected volatility is based on historical volatility data of our stock.

Restricted Stock Plans

Restricted shares are used as an incentive to attract and retain qualified employees and to increase stockholder returns with actual performance linked to both short and long-term stockholder return as well as retention objectives. The grant date fair value of each award is based on the closing stock price of our stock at the date of grant.

Granted but unvested shares are generally forfeited upon termination of employment, whereby compensation costs previously recognized for unvested shares are reversed. Until the shares vest and are issued, participants have no voting or dividend rights and the shares may not be sold, assigned, transferred, pledged or otherwise encumbered.

Unvested restricted stock earns dividend equivalents which are paid in cash on the vesting date.

The grant date fair value of time-based restricted stock units is recognized as expense ratably over the vesting period, which is typically three years, net of forfeitures. Our equity plans include a change in control provision that may accelerate vesting on both the time-based and performance-based restricted shares if the awards are not assumed by an acquirer in the case of a change in control.

For awards with performance conditions, we recognize compensation costs, net of forfeitures, using an accelerated attribution method over the vesting period. Compensation costs are recognized only if it is probable that the performance condition will be satisfied. If we initially determine that it is not probable of being satisfied and later determine that it is, or vice versa, a cumulative catch-up adjustment is retroactively recorded in the period of change based on the new estimate. We recognize the remaining compensation costs over the remaining vesting period. Our Compensation Committee, pursuant to the terms of the equity plans and the authority delegated to it by our Board, can make equitable adjustments to the performance condition in recognition of unusual or non-recurring events.

In February 2018, we reserved a maximum of 1.3 million restricted shares for potential issuance as performance-based restricted shares to certain of our employees. The number of shares ultimately granted under this award was based on our actual financial performance as compared to financial performance targets set by our Board for the year ending December 31, 2018, and was also subject to a market condition reduction based on how our 2018 total stockholder return, or TSR, compared to that of the S&P 500 Index. Our 2018 TSR was higher than the 2018 return of the S&P 500 Index. Therefore, no share reduction was required. Based on our actual 2018 financial performance as compared

to the 2018 financial performance

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level thresholds, 0.7 million restricted shares were awarded, which resulted in \$44 million in compensation expenses that will be expensed over the three-year accelerated vesting period, including \$26 million that was expensed during 2018.

The fair value of awards with a market condition is estimated based on our stock price on the grant date, the valuation of historical awards with market conditions, the relatively low likelihood that the market condition will affect the number of shares granted (as the market condition only affects shares granted in excess of certain financial performance targets), and our expectation of achieving the financial performance targets. The grant date fair value of the awards, when considering the impact of the market condition on fair value, was determined to not be materially different from our stock price on the respective grant dates.

The following is a summary of the nonvested restricted shares under all plans discussed above in 2018, 2017 and 2016:

	Number of Restricted Stock Shares (in thousands)	Weighted Average Grant-Date Fair Value per Share
Nonvested at January 1, 2016	6,271	\$ 39.99
Granted	3,251	50.06
Vested	(2,640)	38.05
Forfeited	(446)	45.51
Nonvested at December 31, 2016	6,436	45.86
Granted	3,274	57.61
Vested	(3,509)	44.64
Forfeited	(453)	52.38
Nonvested at December 31, 2017	5,748	52.78
Granted	1,921	67.92
Vested	(2,819)	50.21
Forfeited	(453)	58.42
Nonvested at December 31, 2018	4,397	60.45

The shares granted include 1.2 million, 2.4 million and 2.3 million time-based restricted stock units during 2018, 2017 and 2016, respectively, and the remainder are performance-based. Performance-based shares have been presented to reflect the actual shares to be issued based on the achievement of past performance targets, also considering the impact of any market conditions. Non-vested performance-based restricted shares granted are presented at the target number of restricted shares that would vest if the target performance targets are met. As of December 31, 2018, there were \$116 million in total unrecognized compensation costs related to time-based and performance-based restricted stock. These costs are expected to be recognized over a weighted-average period of 1.2 years as the restricted stock vests. During 2018, 2017 and 2016, the total fair value of restricted stock vested under all restricted stock plans was \$206 million, \$206 million and \$130 million, respectively.

Employee Stock Purchase Plan

In May 2018, our stockholders approved our ESPP, under which we have reserved and may sell up to 25 million shares of our common stock to employees. The ESPP grants participating employees the right to acquire our stock in increments of 1% of eligible pay, with a maximum contribution of 25% of eligible pay, subject to applicable annual Internal Revenue Service, or IRS, limitations. Under our ESPP, participating employees are limited to \$25,000 of common stock annually, and a maximum of 1,250 shares of common stock each offering period. There will be two offering periods each year, which will run from January 1st (or the first trading day thereafter) through June 30th (or the last trading day prior to such date) and from July 1st (or the first trading day thereafter) through December 31st (or the last trading day prior to such date). The first offering period began on July 2, 2018 and ended on December 31, 2018. The purchase price per share of common stock is 85% of the lesser of the fair market value of the stock on the first or the last trading day of each offering period. The prices on the first day and last day of our first trading period were \$73.73 and \$75.33 per share, respectively. We recorded compensation expenses of \$4 million during 2018 related to the 15% discount given to our participating employees.

12. Equity

Treasury Stock

During 2018, 2017 and 2016, we received 1.5 million shares, 1.5 million shares and 1.1 million shares, respectively, of common stock from employees to satisfy tax withholdings we made on their behalf for restricted stock and stock option exercises. We recorded the receipt of the shares as treasury stock.

In connection with the record date for a 5-for-1 stock split, on October 27, 2016, all 35.3 million then outstanding treasury stock shares were retired. In connection with the retirement, of the \$1.5 billion value assigned to the treasury stock shares, \$1.1 billion was allocated to additional paid-in capital and \$370 million to retained earnings. The allocation was based on the paid-in capital per share generated from the historical issuances of these shares.

Stock Repurchase Program

During 2018, 2017 and 2016, we repurchased 16.3 million shares, 15.0 million shares and 0.9 million shares, respectively, of our outstanding common stock at a cost of \$1.2 billion, \$949 million and \$50 million, respectively, excluding shares withheld upon vesting of equity awards. The shares repurchased are held in treasury stock. The timing and extent of future repurchases, if any, will depend upon many conditions. We periodically review whether to repurchase our stock. In making a determination regarding any stock repurchases, we consider multiple factors that may include: overall stock market conditions, our common stock price movements, the remaining amount authorized for repurchases by our Board, the potential impact of a stock repurchase program on our debt ratings, our expected free cash flow and working capital needs, our current and future planned strategic growth initiatives, and other potential uses of our cash and capital resources.

In August 2016, our Board approved an aggregate of \$1.0 billion for repurchases with no fixed expiration date. In September 2017, our Board approved an aggregate of \$1.2 billion with no fixed expiration date. In September 2018, our Board approved an aggregate of \$2.0 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2019. We expect to fund repurchases, if any, from our operating cash flow or borrowings under our debt facilities or our Commercial Paper Program. Repurchases may be made from time to time on the open market, through established trading plans, in privately-negotiated transactions or otherwise, in accordance with all applicable securities laws, rules and regulations. We have entered into a Rule 10b5-1 trading plan, as authorized by our Board, to govern some or all of the repurchases of our shares of common stock. We may discontinue the stock repurchases at any time and may amend or terminate the Rule 10b5-1 trading plan at any time. The approval of our Board for the share repurchases does not obligate us to acquire any particular amount of our common stock. In addition, our Board may increase or decrease the amount available for repurchases from time to time.

We repurchased shares of our common stock in the open market during the periods presented as follows:

	Shares Repurchased (in thousands)	Average Repurchase Price Per Share	Amount of Repurchases (in millions)
2018			
Fourth quarter	1,863	\$ 74.99	\$ 139
Third quarter	3,991	75.17	300
Second quarter	6,298	72.81	459
First quarter	4,105	73.08	300
Total open market common stock repurchases	16,257		\$ 1,198
2017			
Fourth quarter	3,498	\$ 68.62	\$ 240
Third quarter	3,642	65.90	240
Second quarter	3,916	61.28	240
First quarter	3,911	58.49	229
Total open market common stock repurchases	14,967		\$ 949

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2016

Fourth quarter	903	55.42	50
Third quarter	—	—	—
Second quarter	—	—	—
First quarter	—	—	—

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Total open
market
common stock 903 \$ 50
repurchases

Dividends

The declaration of dividends is subject to the discretion of our Board, and may be affected by various factors, including our future earnings, financial condition, capital requirements, levels of indebtedness, credit ratings and other considerations which our Board of Directors deem relevant. Our Board has adopted a quarterly dividend declaration policy providing that the declaration of any dividends will be determined quarterly by the Board or its Audit Committee taking into account such factors as our evolving business model, prevailing business conditions and our financial results and capital requirements, without a predetermined annual net income payout ratio. We declared and paid cash dividends per share during the periods presented as follows:

	Dividends Per Share	Amount (in millions)
2018		
Fourth quarter	\$ 0.24	\$ 138
Third quarter	0.24	138
Second quarter	0.24	139
First quarter	0.24	140
Total cash dividends declared and paid	0.96	\$ 555
2017		
Fourth quarter	\$ 0.20	\$ 118
Third quarter	0.20	119
Second quarter	0.20	119
First quarter	0.20	120
Total cash dividends declared and paid	\$ 0.80	\$ 476
2016		
Fourth quarter	\$ 0.17	\$ 102
Third quarter	0.17	102
Second quarter	0.17	103
First quarter	0.17	102
Total cash dividends declared and paid	\$ 0.68	\$ 409

13. Income Taxes

Income before income taxes and the income tax provision consisted of the following (in millions):

	Year Ended December 31,		
	2018	2017	2016
Income before income taxes			
Domestic	\$1,371	\$1,308	\$1,057
Foreign	1,149	1,218	986
	\$2,520	\$2,526	\$2,043
Income tax provision			
Current tax expense:			
Federal	\$140	\$266	\$258
State	107	92	5

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Foreign	226	268	203
	\$473	\$626	\$466
Deferred tax expense (benefit):			
Federal	\$29	\$(677)	\$71
State	9	33	76

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	Year Ended December 31,		
	2018	2017	2016
Foreign	(11)	(10)	(27)
	\$27	\$(654)	\$120
Total income tax expense (benefit)	\$500	\$(28)	\$586

A reconciliation of the statutory U.S. federal income tax rate to our effective income tax rate is as follows:

	Year Ended December 31,		
	2018	2017	2016
Statutory federal income tax rate	21 %	35 %	35 %
State and local income taxes, net of federal benefit	3	3	3
Foreign tax rate differential	(1)	(7)	(7)
Deferred tax benefit due to tax law changes	—	(30)	(2)
Other	(3)	(2)	—
Total provision for income taxes	20 %	(1)%	29 %

On December 22, 2017, the TCJA was signed into law (Note 2). The TCJA reduced the U.S. corporate income tax rate from 35% to 21% effective January 1, 2018. As a result, the foreign tax rate differential for the year ended December 31, 2018 is significantly lower than it had been in the previous two years. Favorable foreign income tax rate differentials result primarily from lower income tax rates in the U.K. and various other lower tax jurisdictions as compared to the historical income tax rates in the U.S.

We were required to revalue our U.S. deferred tax assets and liabilities at the new federal corporate income tax rate as of the date of enactment of the TCJA and to include the rate change effect in the tax provision for the period ended December 31, 2017. As a result, we recognized a \$764 million deferred tax benefit based on a reasonable estimate of the deferred tax assets and liabilities as of December 22, 2017. This significantly reduced the effective tax rate for the period ended December 31, 2017 in comparison to the effective tax rates in the other years presented. The 2017 effective tax rate would have been 29% without this deferred tax benefit.

The 2018 effective tax rate is lower than the 2017 effective tax rate excluding the deferred tax benefit from the U.S. tax law changes. This is primarily due to the lower U.S. corporate income tax rate that became effective January 1, 2018. In addition, the 2018 effective tax rate was further reduced due to non-taxable gains from the acquisition of MERS, deferred tax benefits from changes in estimates, and additional tax benefits associated with our sale of Trayport in 2017. The tax benefit from the acquisition of MERS is included in "Other" in the above effective tax rate reconciliation.

The decrease in the effective tax rate in 2017 from 2016, is primarily due to the deferred tax benefit associated with the TCJA and tax benefits associated with a divestiture in the second quarter of 2017, partially offset by the deferred tax benefit from the U.K. corporate income tax reduction in the third quarter of 2016, additional tax expense from an Illinois corporate income tax rate increase enacted in the third quarter of 2017, and an income tax expense increase due to a relatively higher U.S. mix of income in 2017.

During the third quarter of 2016, the U.K. further reduced their corporate income tax rate effective April 1, 2020 from 18% to 17%. The reduction in the future U.S. and U.K. corporate income tax rates resulted in deferred tax benefits. The impact of the deferred tax benefits for the U.S. and U.K. corporate income tax rate reductions collectively lowered the effective tax rates by 30% and 2%, in 2017 and 2016, respectively, and resulted in deferred tax benefits of \$764 million and \$34 million, in 2017 and 2016, respectively.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. As a result of the enactment of TCJA on December 22, 2017, we revalued the U.S. deferred tax assets and liabilities at the new federal corporate income tax rate of 21%, for the period ended December 31, 2017. The following table summarizes the significant components of our deferred tax liabilities and assets as of December 31, 2018 and 2017 (in millions):

	As of December	
	31,	2017
	2018	
Deferred tax assets:		
Deferred and stock-based compensation	\$89	\$105
Pension	12	16
Liability reserve	35	37
Tax credits	3	12
Loss carryforward	138	147
Deferred revenue	24	24
Other	55	42
Total	356	383
Valuation allowance	(119)	(126)
Total deferred tax assets, net of valuation allowance	\$237	\$257
Deferred tax liabilities:		
Property and equipment	\$(133)	\$(99)
Acquired intangibles	(2,439)	(2,453)
Total deferred tax liabilities	\$(2,572)	\$(2,552)
Net deferred tax liabilities	\$(2,335)	\$(2,295)
Reported as:		
Net non-current deferred tax assets	\$2	\$3
Net non-current deferred tax liabilities	(2,337)	(2,298)
Net deferred tax liabilities	\$(2,335)	\$(2,295)

A reconciliation of the beginning and ending amount of deferred income tax valuation allowance is as follows (in millions):

	Year Ended		
	December 31,		
	2018	2017	2016
Beginning balance of deferred income tax valuation allowance	\$126	\$122	\$72
Increases charged to income tax expense	—	—	28
Charges against goodwill	—	15	22
Decreases	(7)	(11)	—
Ending balance of deferred income tax valuation allowance	\$119	\$126	\$122

We recognize valuation allowances on deferred tax assets if, based on the weight of the evidence, we believe that it is more likely than not that some or all of the deferred tax assets will not be realized. We recorded a valuation allowance for deferred tax assets of \$119 million and \$126 million as of December 31, 2018 and 2017, respectively. Decreases in 2018 primarily relate to utilization of certain deferred tax assets on capital losses that we did not expect to be realizable. Decreases in 2017 relate to the U.S. corporate income tax rate reduction from 35% to 21% and the net impact from the divestitures of Trayport and IDMS. Increases in 2016 primarily relate to deferred tax assets on foreign net operating and capital losses that we do not expect to be realizable in the future. Increases charged against goodwill primarily relate to deferred tax assets arising on the 2017 acquisition of National Stock Exchange and the 2016 acquisition of a foreign branch that we do not expect to be realizable in future periods.

As part of U.S. tax reform, the TCJA imposes a transition tax on certain accumulated foreign earnings aggregated across all non-U.S. subsidiaries, net of foreign deficits, as computed under U.S. tax principles. As we were in an aggregate net foreign deficit position for U.S. tax purposes as of December 31, 2017, we were not liable for the transition tax.

Effective January 1, 2018, the majority of our 2018 current undistributed earnings of our non-U.S. subsidiaries became subject to the Global Intangible Low-Taxed Income provisions under the TCJA and, as such, are subject to immediate U.S. income taxation and can be distributed to the U.S. in the future with no material additional income tax consequences. Consequently, these earnings are not considered to be indefinitely reinvested and the related tax impact

is included in our income tax provision for the period ended December 31, 2018.

However, our non-U.S. subsidiaries' cumulative undistributed earnings as of December 31, 2017 and the 2018 current undistributed earnings that are not subject to the Global Intangible Low-Taxed Income provisions are considered to be

indefinitely reinvested. Accordingly, no provision for U.S. federal and state income taxes has been made in the accompanying consolidated financial statements. Further, a determination of the unrecognized deferred tax liability is not practicable. An estimate of these indefinitely reinvested undistributed earnings as of December 31, 2018, based on post-income tax earnings under U.S. GAAP principles, is \$4.9 billion.

SAB 118 provided guidance for companies that had not completed their accounting for the income tax effects of the TCJA in the period of enactment, allowing for a measurement period of up to one year after the enactment date to finalize the recording of the related tax impacts. During 2018, we completed our accounting for the tax effects of the enactment of the TCJA. We reaffirmed our position that we were not subject to transition tax under the TCJA as of December 31, 2017, and therefore, we did not record any transition tax during the measurement period. We also concluded that the \$764 million deferred tax benefit recorded in the 2017 tax provision was a reasonable estimate of the impact of the TCJA on our deferred tax balances, and that no further adjustments were necessary during the measurement period.

As of December 31, 2018, we have adopted an accounting policy regarding the treatment of taxes due on future inclusion of non-U.S. income in U.S. taxable income under the Global Intangible Low-Taxed Income provisions as a current period expense when incurred. Therefore, no deferred tax related to these provisions has been recorded as of December 31, 2018.

As of December 31, 2018 and 2017, we have gross U.S. federal net operating loss carryforwards of \$133 million and \$89 million, respectively, and gross state and local net operating loss carryforwards of \$201 million and \$353 million, respectively. The increases of U.S. federal net operating loss carryforwards are primarily due to acquisitions during 2018. The decrease of state and local net operating loss is primarily due to utilization of certain net operating losses in the current year, partially offset by additions related to acquisitions. The net operating loss carryforwards are available to offset future taxable income until they begin to expire in 2019. In addition, as of December 31, 2018 and 2017, we have gross foreign net operating loss carryforwards of \$285 million and \$253 million, respectively. The majority of gross foreign net operating losses are not expected to be realizable in future periods and have related valuation allowances.

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in millions):

	Year Ended December 31,		
	2018	2017	2016
Beginning balance of unrecognized tax benefits	115	\$112	107
Additions related to acquisitions	—	—	22
Additions based on tax positions taken in current year	13	10	9
Additions based on tax positions taken in prior years	7	9	—
Reductions based on tax positions taken in prior years	—	—	(1)
Reductions resulting from statute of limitation lapses	(19)	(8)	(3)
Reductions related to settlements with taxing authorities	(18)	(8)	(22)
Ending balance of unrecognized tax benefits	\$98	\$115	\$112

As of December 31, 2018 and 2017, the balance of unrecognized tax benefits which would, if recognized, affect our effective tax rate was \$81 million and \$77 million, respectively. It is reasonably possible, as a result of settlements of ongoing audits or statute of limitations expirations, unrecognized tax benefits could increase as much as \$13 million and decrease as much as \$20 million within the next 12 months. Of the \$98 million in unrecognized tax benefits as of December 31, 2018, \$74 million is recorded as other non-current liabilities and \$24 million is recorded as other current liabilities.

We recognize interest accrued on income tax uncertainties and accrued penalties as a component of income tax expense. In 2018, 2017 and 2016, we recognized \$6 million, \$1 million and \$1 million, respectively, of income tax benefit for interest and penalties. As of December 31, 2018 and 2017, accrued interest and penalties were \$28 million and \$35 million, respectively. Of the \$28 million in accrued interest and penalties as of December 31, 2018, \$13 million is recorded as other non-current liabilities and \$15 million is recorded as other current liabilities in the accompanying consolidated balance sheet.

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We or one of our subsidiaries files income tax returns in the U.S. federal jurisdiction and various state and foreign jurisdictions. The following table summarizes open tax years by major jurisdiction:

Jurisdiction Open Tax Years

U.S. Federal 2015 - 2018

U.S. States 2008 - 2018

U.K. 2017 - 2018

Netherlands 2012 - 2018

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Although the outcome of tax audits is always uncertain, we believe that adequate amounts of tax, including interest and penalties, have been provided for any adjustments expected to result from open tax years.

14. Clearing Operations

We operate six clearing houses, each of which acts as a central counterparty that becomes the buyer to every seller and the seller to every buyer for its clearing members. Through this central counterparty function, the clearing houses provide financial security for each transaction for the duration of the position by limiting counterparty credit risk. Our clearing houses are responsible for providing clearing services to each of our futures exchanges, and in some cases outside of our execution venues, and are as follows, referred to herein collectively as "the ICE Clearing Houses":

Clearing House	Products Cleared	Exchange where Executed	Location	ICE Clearing House Portion of Guaranty Fund Contribution		
				As of December 31, 2018 (in millions)	As of December 31, 2017 (in millions)	As of December 31, 2018 (in millions)
ICE Clear Europe	Energy, agricultural, interest rates and equity index futures and options contracts and OTC European CDS instruments	ICE Futures Europe, ICE Futures U.S. and ICE Index	U.K.	\$150	\$150	\$56
ICE Clear U.S.	Agricultural, metals, FX and equity index futures and options contracts	ICE Futures U.S	U.S.	50	50	11
ICE Clear Credit	North American, European, Asian-Pacific and Emerging Market CDS instruments	Creditex and third-party venues	U.S.	50	50	—
ICE Clear Netherlands	Approved to offer clearing of Dutch equity options	ICE Endex	EU	2	2	—
ICE Clear Singapore	Energy, metals and financial futures products	ICE Futures Singapore	Singapore	1	1	—
ICE NGX	Physical North American natural gas, electricity and oil futures	ICE NGX	Canada	N/A	N/A	—
ICE Clear Canada	Canola contracts transitioned to ICE Clear U.S. on July 30, 2018 and ICE Clear Canada ceased operations.	N/A	Canada	N/A	1	—
Total				\$253	\$254	\$67

As of December 31, 2018, ICE NGX maintains a guaranty fund utilizing a \$100 million letter of credit discussed below.

We previously operated ICE Clear Canada for the clearing and settlement of our canola contracts traded through ICE Futures Canada. On July 30, 2018, and in connection with the transition of the trading in those contracts to ICE Futures U.S., we transitioned the clearing of those contracts to ICE Clear U.S., after which ICE Clear Canada ceased operations.

Original & Variation Margin

To reduce their exposure, the ICE Clearing Houses have a risk management program with both initial and ongoing membership standards. Each of the ICE Clearing Houses generally require all clearing members or participants to establish guaranty fund (discussed below) and collateral accounts, and require them to maintain cash on deposit or pledge certain assets. Such amounts in total are known as “original margin.” In addition, they may make intraday original margin calls in circumstances where market conditions require additional protection. The daily profits and losses to and from the ICE Clearing Houses due to the marking-to-market of open contracts is known as “variation margin.” With the exception of ICE NGX’s physical natural gas and physical power products discussed separately below, the ICE Clearing Houses mark all outstanding contracts to market, and therefore pay and collect variation margin, at least once daily.

The amounts that the clearing members and participants are required to maintain are determined by standardized parameters established by each ICE Clearing House and reviewed by the risk committees and the boards of directors of the respective ICE Clearing House and may fluctuate over time. Each of the ICE Clearing Houses is a separate legal entity and is not subject to the liabilities of the others, or the obligations of the members of the other ICE Clearing Houses.

Should a particular clearing member or participant fail to deposit its original margin, provide its collateral, or fail to make a variation margin payment, when and as required, the relevant ICE Clearing House may liquidate or hedge its open positions and use their original margin and guaranty fund deposits to make up any amount owed. In the event that those deposits are

not sufficient to pay the amount owed in full, the ICE Clearing Houses may utilize the respective guaranty fund deposits or collect additional funds from their respective clearing members on a pro-rata basis for that purpose. As of December 31, 2018 and 2017, the ICE Clearing Houses have received or have been pledged \$121.4 billion and \$92.6 billion, respectively, in cash and non-cash collateral in original margin and guaranty fund deposits to cover price movements of underlying contracts for both periods.

Guaranty Funds & ICE Contribution

Mechanisms have been created, called guaranty funds, to provide partial protection in the event of a clearing member default. Each of the ICE Clearing Houses generally require that each clearing member make deposits into a guaranty fund.

We have contributed our own capital, or “skin-in-the-game” on a voluntary basis which could be used if a defaulting clearing member’s original margin and guaranty fund deposits are insufficient, recorded as long-term restricted cash and cash equivalents in our balance sheets, and included in the table above.

The contributions to ICE Clear Europe include \$100 million for futures and options and \$50 million for CDS. These contributions, as well as those for ICE Clear U.S. and ICE Clear Credit, would be used after the funds of the defaulting clearing member but before other amounts within those guaranty funds.

Our risk management framework for our CDS markets through ICE Clear Credit and ICE Clear Europe is separate from our non-CDS clearing operations. Our CDS clearing houses are open-access, consistent with regulatory requirements, and we accept qualifying trades for clearing that are executed on other venues. As of December 31, 2018, our CDS clearing houses collectively clear 515 single name instruments and 154 CDS indexes.

Beginning in March 2018, certain of our exchanges are required to make similar contributions to be utilized pro rata along with the clearing contributions in the event of a clearing member default, subject to a minimum \$10 million and based on average guaranty fund contributions for futures and options contracts per exchange. These are recorded as long-term restricted cash and cash equivalents in our balance sheet (Note 6), and were \$67 million combined for ICE Futures Europe, ICE Futures U.S. and ICE Endex as of December 31, 2018 and included in the table above.

On January 31, 2019, we increased our contribution to ICE Clear Europe’s guaranty fund by \$27 million due to changes in the size of its futures and options guaranty fund which included an increase to our exchange contribution to reflect an increase in the size of the average guaranty fund contributions.

Cash and Cash Equivalent Deposits

We have recorded cash and cash equivalent margin deposits and amounts due in our balance sheets as current assets with corresponding current liabilities to the clearing members. As of December 31, 2018, our cash and cash equivalent margin deposits are as follows (in millions):

	ICE Clear Europe (1)	ICE Clear Credit	ICE Clear U.S.	ICE NGX	Other ICE Clearing Houses	Total
Original margin	\$27,597	\$22,770	\$ 6,260	\$—	\$ 3	\$56,630
Unsettled variation margin, net	—	—	—	417	—	417
Guaranty fund	3,267	2,456	460	—	5	6,188
Delivery contracts receivable/payable, net	—	—	—	720	—	720
Total	\$30,864	\$25,226	\$ 6,720	\$1,137	\$ 8	\$63,955

As of December 31, 2017, our cash and cash equivalent deposits, are as follows (in millions):

	ICE Clear Europe (2)	ICE Clear Credit	ICE Clear U.S.	ICE NGX	Other ICE Clearing Houses	Total
Original margin	\$19,792	\$20,703	\$ 3,898	\$—	\$ 126	\$44,519
Unsettled variation margin, net	—	—	—	227	1	228
Guaranty fund	3,037	2,607	299	—	23	5,966
Delivery contracts receivable/payable, net	—	—	—	509	—	509
Total	\$22,829	\$23,310	\$ 4,197	\$ 736	\$ 150	\$51,222

- (1) \$25.8 billion and \$5.1 billion is related to futures and options and CDS, respectively.
- (2) \$18.5 billion and \$4.3 billion is related to futures and options and CDS, respectively.

Our cash and cash equivalent margin and guaranty fund deposits are maintained in accounts with national banks and reputable financial institutions or secured through direct investments, primarily in U.S. Treasury securities with original maturities of less than three months, or reverse repurchase agreements with primarily overnight maturities. Details of our cash and cash equivalent deposits are as follows (in millions):

Clearing House	Investment Type	As of December 31,	
		2018	2017
ICE Clear Europe	National Bank Account ⁽¹⁾	\$8,647	\$4,002
ICE Clear Europe	Reverse repo	18,097	13,927
ICE Clear Europe	Sovereign Debt	4,035	4,868
ICE Clear Europe	Demand deposits	85	32
ICE Clear Credit	National Bank Account ⁽²⁾	19,484	18,445
ICE Clear Credit	Reverse repo	1,935	1,680
ICE Clear Credit	Demand deposits	3,807	3,185
ICE Clear U.S.	Reverse repo	4,380	3,033
ICE Clear U.S.	U.S. Treasuries	2,340	1,164
ICE Clear Canada	Demand deposits	—	140
Other ICE Clearing Houses	Demand deposits	8	10
ICE NGX	Unsettled Variation Margin and Delivery Contracts	1,137	736
	Receivable/Payable		
Total		\$63,955	\$51,222

⁽¹⁾ As of December 31, 2018, ICE Clear Europe held €7.0 billion (\$8.0 billion based on the euro/U.S. dollar exchange rate of 1.1466 as of December 31, 2018) at De Nederlandsche Bank, or DNB, and £500 million (\$638 million based on the pound sterling/U.S. dollar exchange rate of 1.2756 as of December 31, 2018) at the Bank of England, or BOE. As of December 31, 2017, ICE Clear Europe held €3.3 billion (\$4.0 billion based on the euro/U.S. dollar exchange rate of 1.2003 as of December 31, 2017) at DNB.

⁽²⁾ ICE Clear Credit is a systemically important financial market utility, or SIFMU, as designated by the Financial Stability Oversight Council, and holds its U.S. dollar cash margin in cash accounts at the Federal Reserve Bank of Chicago.

Other Deposits

In addition to the cash deposits above, the ICE Clearing Houses have also received other assets from clearing members, which include government obligations, and may include other non-cash collateral such as certain agency and corporate debt, letters of credit or gold to mitigate credit risk. For certain deposits, we may impose discount or “haircut” rates to ensure adequate collateral if market values fluctuate. The risks and rewards of these assets remain with the clearing members. Any gain or loss accrues to the clearing member. The ICE Clearing Houses have not sold or re-pledged these assets or experienced an event of a default. These pledged assets are not reflected in our balance sheets, and are as follows:

	As of December 31, 2018					
	ICE Clear Europe	ICE Clear Credit	ICE Clear U.S.	ICE NGX	Other ICE Clearing Houses	Total
Original margin:						
Government securities at face value	\$29,887	\$12,990	\$ 10,208	\$—	\$	—\$53,085
Letters of credit	—	—	—	2,556	—	2,556
ICE NGX cash deposits	—	—	—	605	—	605

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Total	\$29,887	\$12,990	\$ 10,208	\$3,161	\$	—\$56,246
Guaranty fund:						
Government securities at face value	\$654	\$256	\$ 264	\$—	\$	—\$1,174

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As of December 31, 2017

	ICE Clear Europe	ICE Clear Credit	ICE Clear U.S.	ICE NGX	Other ICE Clearing Houses	Total
Original margin:						
Government securities at face value	\$23,496	\$5,699	\$ 9,581	\$—	\$ 18	\$38,794
Letters of credit	—	—	—	1,663	—	1,663
ICE NGX cash deposits	—	—	—	233	—	233
Total	\$23,496	\$5,699	\$ 9,581	\$1,896	\$ 18	\$40,690
Guaranty fund:						
Government securities at face value	\$323	\$176	\$ 169	\$—	\$ 2	\$670

ICE NGX

ICE NGX is the central counterparty to participants on opposite sides of its physically-settled contracts, and the balance related to delivered but unpaid contracts is recorded as a delivery contract net receivable, with an offsetting delivery contract net payable in our balance sheets. Unsettled variation margin equal to the fair value of open contracts is recorded as of each balance sheet date. Fair value is determined based on the difference between the original trade price and the settlement price. There is no impact on income for either delivery contracts receivable/payable or unsettled variation margin, and an equivalent amount is recognized as both an asset and a liability. ICE NGX marks all outstanding contracts to market daily, but only collects variation margin when a clearing member's or participant's open position falls outside a specified percentage of its pledged collateral.

ICE NGX requires participants to maintain cash or letters of credit to serve as collateral in the event of default. The cash is maintained in a segregated bank account that is subject to a collateral agreement between the bank and ICE NGX, the trustee, and the cash remains the property of the participant, only accessed by ICE NGX if a default occurs. Since the cash is held in trust and remains the property of the participant, it is not included in our balance sheets. ICE NGX maintains the following accounts with a third-party Canadian chartered bank which are available in the event of physical settlement shortfalls:

Account Type	As of December 31, 2018 (In C\$ millions)	As of December 31, 2018 (In \$USD millions)
Daylight liquidity facility	C\$300	\$220
Overdraft facility	20	15
Total	C\$320	\$235

Because it is not our policy to guaranty credit facilities of our clearing houses which maintain contingent liquidity facilities secured by highly liquid assets, in February 2018 we eliminated a \$100 million guaranty that we had previously provided ICE NGX. As of December 31, 2018, ICE NGX maintains a guaranty fund utilizing a \$100 million letter of credit that has been entered into with a major Canadian chartered bank and backed by a default insurance policy underwritten by Export Development Corporation, or EDC, a Canadian government agency. In event of a participant default, where a participant's collateral becomes depleted, the remaining shortfall would be covered by a draw down on the letter of credit following which ICE NGX would pay the first \$15 million in losses per its deductible and recover additional losses under the insurance policy up to \$100 million.

Clearing House Exposure

The net notional value of unsettled contracts was \$2.8 trillion as of December 31, 2018. Each ICE Clearing House bears financial counterparty credit risk and provides a central counterparty guarantee, or performance guarantee, to its

clearing members or participants. Excluding the effects of original and variation margin, guaranty fund and collateral requirements, the ICE Clearing Houses' maximum estimated exposure for this guarantee is \$101.0 billion as of December 31, 2018, which represents the maximum estimated value by the ICE Clearing Houses of a hypothetical one-day movement in pricing of the underlying unsettled contracts. This value was determined using proprietary risk management software that simulates gains and losses based on historical market prices, volatility and other factors present at that point in time for those particular unsettled contracts. Future actual market price volatility could result in the exposure being significantly different than this amount.

We also performed calculations to determine the fair value of our counterparty performance guarantee taking into consideration factors such as daily settlement of contracts, margining and collateral requirements, other elements of our risk management program, historical evidence of default payments, and estimated probability of potential default payouts by the ICE Clearing

Houses. Based on these analyses, the estimated counterparty performance guaranty liability was determined to be nominal and no liability was recorded as of December 31, 2018 or 2017. The ICE Clearing Houses have never experienced an incident of a clearing member default which has required the use of the guaranty funds of non-defaulting clearing members or the assets of the ICE Clearing Houses.

15. Commitments and Contingencies

Leases

We have lease agreements for office space, equipment facilities and certain computer equipment for varying periods that expire at various dates through 2028. Our leases contain terms which may include renewal options, rent escalations, rent holidays and leasehold improvement incentives. All of our leases are classified as operating leases. Rental expense under these leases, included in rent and occupancy and technology and communication expenses, totaled \$59 million, \$58 million and \$58 million in 2018, 2017, and 2016, respectively. As of December 31, 2018, future minimum lease payments under non-cancellable operating lease agreements are as follows (in millions):

2019	\$64
2020	61
2021	60
2022	58
2023	41
Thereafter	133
Total	\$417

Legal Proceedings

We are subject to legal proceedings, claims and investigations that arise in the ordinary course of our business. We establish accruals for those matters in circumstances when a loss contingency is considered probable and the related amount is reasonably estimable. Any such accruals may be adjusted as circumstances change. Assessments of losses are inherently subjective and involve unpredictable factors. We do not believe that the resolution of these legal matters, including the matters described below, will have a material adverse effect on our consolidated financial condition, results of operations, or liquidity. It is possible, however, that future results of operations for any particular quarterly or annual period could be materially and adversely affected by any developments relating to the legal proceedings, claims and investigations. A range of possible losses related to the cases below cannot be reasonably estimated at this time, except as otherwise disclosed below.

City of Providence Litigation

In 2014, New York Stock Exchange LLC and NYSE Arca, Inc., two of our subsidiaries, were among more than 40 financial institutions and exchanges named as defendants in four purported class action lawsuits filed in the U.S. District Court for the Southern District of New York, or the Southern District, by the City of Providence, Rhode Island, and other plaintiffs. In subsequent consolidated amended complaints, the plaintiffs asserted claims against the exchange defendants and Barclays PLC which operates an ATS known as Barclays LX, on behalf of a class of “all public investors” who bought or sold stock from April 18, 2009 to the present on the U.S.-based equity exchanges operated by the exchange defendants or on Barclays LX.

In 2015, the district court granted the defendants’ motions to dismiss and dismissed the second amended complaint with prejudice. The court held that the plaintiffs had failed to sufficiently state a claim against the defendants under Sections 10(b) and 6(b) of the Exchange Act, and additionally that some of the claims against the exchanges were barred by the doctrine of self-regulatory organization immunity. In 2015, the plaintiffs filed an appeal of the dismissal of the lawsuit to the U.S. Court of Appeals for the Second Circuit, or the Second Circuit.

On December 19, 2017, the Second Circuit issued a decision vacating the dismissal and remanding the case to the district court for further proceedings. The Second Circuit held that the claims against the exchanges were not barred by the doctrine of self-regulatory organization immunity because (according to the Second Circuit) the exchanges were not carrying out regulatory functions while operating their markets and engaging in the challenged conduct at issue, and that the plaintiffs had adequately pleaded claims against the defendants under Section 10(b) of the Exchange Act. The Second Circuit directed that, on remand, the district court should address and rule upon various other defenses raised by the exchanges in their motion to dismiss (which the district court did not address in its prior

opinion and order). The parties are awaiting a decision on a motion to dismiss filed by the defendant exchanges in the district court seeking dismissal on grounds other than those considered by the Second Circuit in its December 2017 decision.

LIBOR Litigation

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On January 15, 2019 and January 31, 2019, two virtually identical purported class action complaints were filed, respectively, by Putnam Bank, a savings bank based in Putnam, Connecticut, and two municipal pension funds affiliated with the City of Livonia, Michigan, in the Southern District against ICE and several of its subsidiaries, including ICE Benchmark Administration Limited (“IBA”) (the “ICE Defendants”), as well as 18 multinational banks and various of their respective subsidiaries and affiliates (the “Panel Bank Defendants”). IBA is the administrator for various regulated benchmarks, including the ICE LIBOR benchmark that is calculated daily based upon the submissions from a reference panel (which includes the Panel Bank Defendants).

The plaintiffs seek to litigate on behalf of a purported class of all U.S.-based persons or entities who transacted with a Panel Bank Defendant by receiving a payment on an interest rate indexed to a LIBOR-benchmarked rate during the period February 1, 2014 to the present. The plaintiffs allege that the ICE Defendants and Panel Bank Defendants engaged in a conspiracy to set the LIBOR benchmark at artificially low levels, with an alleged purpose and effect of depressing payments by the Panel Bank Defendants to members of the purported class.

The complaints assert claims for violations of the Sherman and Clayton Antitrust Acts and for unjust enrichment under common law, and seek unspecified treble damages and other relief. ICE intends to vigorously defend these matters.

SEC Investigation of 2015 NYSE Outage

In December 2015, our subsidiaries New York Stock Exchange, LLC and NYSE American received an inquiry from the Enforcement staff of the New York regional office, or the Staff, of the SEC regarding a July 8, 2015 outage on the NYSE markets, during which trading was suspended for approximately 3.5 hours in all symbols. The Staff’s investigation proceeded throughout 2016, and NYSE received a Wells Notice stating that the Staff had made a preliminary determination to recommend that the SEC file an enforcement action in connection with NYSE’s response to the circumstances leading into the suspension of trading that day. NYSE disputed the appropriateness of the proposed charges and made a written submission to the Staff in response to the Wells Notice. On March 6, 2018, NYSE and affiliated exchanges reached a settlement with the SEC on this matter and various matters under investigation and agreed to pay a \$14 million civil monetary penalty, together with certain non-monetary relief. For further details about the settlement and underlying matters that were under investigation, please refer to Order Instituting Administrative and Cease-and-Desist Proceedings Pursuant to Section 8A of the Securities Act of 1933, Sections 19(h)(1) and 21C of the Securities Exchange Act of 1934, Making Findings, and Imposing Remedial Sanctions and a Cease-and-Desist Order, Administrative Proceeding File No. 3-18388 (In the Matter of New York Stock Exchange LLC, NYSE American LLC, and NYSE Arca, Inc.) entered into on March 6, 2018. For this matter and other SEC investigative matters, during 2017, we recorded an aggregate of \$14 million in expense accruals.

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 involving us or one of our subsidiaries, 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 continuously review our positions as these matters progress.

16. Pension and Other Benefit Programs

Defined Benefit Pension Plan

We have a pension plan covering employees in certain of our U.S. operations whose benefit accrual has been frozen. Retirement benefits are derived from a formula, which is based on length of service and compensation.

During 2018, we did not make any contributions to our pension plan. During 2017, in connection with our de-risking strategy, we contributed \$136 million to our plan. At the same time, we changed the plan’s target allocation from 65% equity securities and 35% fixed income securities, to 5% equity securities and 95% fixed income securities. The fixed income allocation includes corporate bonds of companies from diversified industries and U.S. government bonds. As a result of this contribution and change in investment policy, we anticipate that there will be less need for contributions in future years, and the pension plan will not be required to pay the Pension Benefit Guaranty Corporation variable rate premiums. Income is expected to be lower than it was in prior periods because the expected return on plan assets is lower. During 2016, we contributed \$10 million to our pension plan.

We do not expect to make contributions to the pension plan in 2019. We will continue to monitor the plan's funded status, and we will consider modifying the plan's investment policy based on the actuarial and funding characteristics of the retirement plan, the demographic profile of plan participants, and our business objectives. Our long-term objective is to keep the plan at or near full funding, while minimizing the risk inherent in pension plans.

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The fair values of our plan assets as of December 31, 2018, by asset category, are as follows (in millions):

Asset Category	Fair Value Measurements			Total
	Quoted Prices in Active Markets for Identical (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
Cash	\$8	\$ —	\$ —	\$8
Equity securities:				
U.S. large-cap	—	21	—	21
U.S. small-cap	—	5	—	5
International	—	11	—	11
Fixed income securities	127	640	7	774
Total	\$135	\$ 677	\$ 7	\$819

The above table excludes trades pending settlement with a net obligation of \$25 million as of December 31, 2018. These trades settled in January 2019.

The fair values of our plan assets as of December 31, 2017, by asset category, are as follows (in millions):

Asset Category	Fair Value Measurements			Total
	Quoted Prices in Active Markets for Identical (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	
Cash	\$164	\$ —	\$ —	\$164
Equity securities:				
U.S. large-cap	—	30	—	30
U.S. small-cap	—	8	—	8
International	—	15	—	15
Fixed income securities	335	314	3	652
Total	\$499	\$ 367	\$ 3	\$869

The measurement dates for the pension plan are December 31, 2018 and 2017. The following table provides a summary of the changes in the pension plan's benefit obligations and the fair value of assets measured using the valuation techniques described in Note 17, as of December 31, 2018 and 2017 and a statement of funded status of the pension plan as of December 31, 2018 and 2017 (in millions):

	As of December 31,	
	2018	2017
Change in benefit obligation:		
Benefit obligation at beginning of year	\$875	\$853
Interest cost	26	27
Actuarial (gain) loss	(61)	44
Benefits paid	(49)	(49)

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Benefit obligation at year end	\$791	\$875
Change in plan assets:		
Fair value of plan assets at beginning of year	\$869	\$681
Actual return on plan assets	(26)	101
Contributions	—	136
Benefits paid	(49)	(49)
Fair value of plan assets at end of year	\$794	\$869
Funded status	\$3	\$(6)
Accumulated benefit obligation	\$791	\$875
Amounts recognized in the accompanying consolidated balance sheets:		
Accrued employee benefits	\$3	\$(6)

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The following shows the components of the pension plan expense (benefit) for 2018, 2017 and 2016 (in millions):

	Year Ended		
	December 31,		
	2018	2017	2016
Interest cost	\$26	\$27	\$27
Estimated return on plan assets	(29)	(44)	(44)
Amortization of loss	4	2	1
Aggregate pension expense (benefit)	\$1	\$(15)	\$(16)

We use a market-related value of plan assets when determining the estimated return on plan assets. Gains/losses on plan assets are amortized over a four-year period and accumulate in other comprehensive income. We recognize deferred gains and losses in future net income based on a “corridor” approach, where the corridor is equal to 10% of the greater of the benefit obligation or the market-related value of plan assets at the beginning of the year.

The following shows the projected payments for the pension plan based on actuarial assumptions (in millions):

2019	\$50
2020	49
2021	49
2022	49
2023	50

Next 5 years 244

Supplemental Executive Retirement Plan

We have a U.S. nonqualified supplemental executive retirement plan, or SERP, which provides supplemental retirement benefits for certain employees. The future benefit accrual of the SERP plan is frozen. To provide for the future payments of these benefits, we have purchased insurance on the lives of certain of the participants through company-owned policies. As of December 31, 2018 and 2017, the cash surrender value of such policies was \$57 million and \$55 million, respectively, and is included in other non-current assets in the accompanying consolidated balance sheets. We also acquired a SERP through both the ICE NGX and CHX acquisitions. The following table provides a summary of the changes in the SERP benefit obligations (in millions):

	As of	
	December	
	31,	
	2018	2017
Change in benefit obligation:		
Benefit obligation at beginning of year	\$49	\$54
Interest cost	1	1
Actuarial (gain) loss	(2)	2
Benefits paid	(7)	(8)
Benefit obligation at year end	\$41	\$49
Funded status	\$(41)	\$(49)
Amounts recognized in the accompanying consolidated balance sheets:		
Other current liabilities	\$(5)	\$(7)
Accrued employee benefits	(36)	(42)

SERP plan expense in the accompanying consolidated statements of income was \$1 million, \$1 million and \$1 million in 2018, 2017 and 2016, respectively, and primarily consisted of interest cost. The following table shows the projected payments for the SERP plan based on the actuarial assumptions (in millions):

Projected SERP Plan Payments	
2019	\$5
2020	5
2021	5
2022	4
2023	4

Next 5 years

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Pension and SERP Plans Assumptions

The weighted-average assumptions used to develop the actuarial present value of the projected benefit obligation and net periodic pension/SERP costs in 2018, 2017 and 2016 are set forth below:

	Year Ended December 31,		
	2018	2017	2016
Weighted-average discount rate for determining benefit obligations (pension/SERP plans)	4.0% / 3.8%	3.4% / 3.1%	3.9% / 3.4%
Weighted-average discount rate for determining interest costs (pension/SERP plans)	3.0% / 2.7%	3.2% / 2.6%	3.3% / 2.5%
Expected long-term rate of return on plan assets (pension/SERP plans)	3.5% / N/A	6.5% / N/A	6.5% / N/A
Rate of compensation increase	N/A	N/A	N/A

The assumed discount rate reflects the market rates for high-quality corporate bonds currently available. The discount rate was determined by considering the average of pension yield curves constructed on a large population of high quality corporate bonds. The resulting discount rates reflect the matching of plan liability cash flows to yield curves. To develop the expected long-term rate of return on assets assumption, we considered the historical returns and the future expectations for returns for each asset class as well as the target asset allocation of the pension portfolio.

The determination of the interest cost component utilizes a full yield curve approach by applying the specific spot rates along the yield curve used in the determination of the benefit obligation to each year's discounted cash flow.

Post-retirement Benefit Plans

Our defined benefit plans provide certain health care and life insurance benefits for certain eligible retired NYSE U.S. employees. These post-retirement benefit plans, which may be modified in accordance with their terms, are fully frozen. The net periodic post-retirement benefit costs were \$5 million, \$5 million and \$7 million in 2018, 2017 and 2016, respectively. The defined benefit plans are unfunded and we currently do not expect to fund the post-retirement benefit plans. The weighted-average discount rate for determining the benefit obligation as of December 31, 2018 and 2017 is 4.0% and 3.4%, respectively. The weighted-average discount rate for determining the interest cost as of December 31, 2018 and 2017 is 3.0% and 3.2%, respectively. The following table shows the actuarial determined benefit obligation, interest costs, employee contributions, actuarial (gain) loss, benefits paid during the periods and the accrued employee benefits (in millions):

	As of	
	December 31, 2018	2017
Benefit obligation at the end of year	\$154	\$179
Interest cost	5	5
Actuarial gain	(19)	(16)
Employee contributions	3	3
Benefits paid	(13)	(14)
Amounts recognized in the accompanying consolidated balance sheets:		
Other current liabilities	\$(10)	\$(11)
Accrued employee benefits	(144)	(168)

The following table shows the payments projected for our post-retirement benefit plans (net of expected Medicare subsidy receipts of \$13 million in aggregate over the next ten fiscal years) based on actuarial assumptions (in millions):

Projected Post-Retirement Benefit by Year	Projected Payment
2019	\$ 11
2020	11
2021	11
2022	11
2023	11

Next 5 years

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For measurement purposes, we assumed a 7.2% annual rate of increase in the per capita cost of covered health care benefits in 2018 which will decrease on a graduated basis to 4.5% in the year 2038 and thereafter. The following table shows the effect of a one percentage point increase and decrease in assumed health care cost trend rates (in millions):

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Assumed Health Care Cost Trend Rate	1%	1%
	Increase	Decrease
Effect of post-retirement benefit obligation	\$ 16	\$ (14)
Effect on total of service and interest cost components	1	(1)

Accumulated Other Comprehensive Loss

The accumulated other comprehensive loss, after tax, as of December 31, 2018, consisted of the following amounts that have not yet been recognized in net periodic benefit cost (in millions):

	Pension Plans	SERP Plans	Post-retirement Benefit Plans	Total
Unrecognized net actuarial losses (gains), after tax	\$ 108	\$ 4	\$ (22)	\$ 90

The amount of prior actuarial loss (gain) included in accumulated other comprehensive income related to the pension, SERP and postretirement plans as of December 31, 2018, which are expected to be recognized in net periodic benefit cost in the coming year, is estimated to be (in millions):

	Pension Plans	SERP Plans	Post-retirement Benefit Plans	Total
Loss (gain) recognition	\$ 2	\$ —	\$ (1)	\$ 1

Other Benefit Plans and Defined Contribution Plans

Our U.S. employees are eligible to participate in 401(k) and profit sharing plans and our non-U.S. employees are eligible to participate in defined contribution pension plans. Total contributions under the 401(k), profit sharing and defined contribution pension plans were \$39 million, \$38 million and \$31 million in 2018, 2017 and 2016, respectively. No discretionary or profit sharing contributions were made during 2018, 2017 or 2016.

17. Fair Value Measurements

Financial assets and liabilities recorded or disclosed at fair value in the accompanying consolidated balance sheets as of December 31, 2018 and 2017 are classified in their entirety based on the lowest level of input that is significant to the asset or liability's fair value measurement.

Our mutual funds are equity and fixed income mutual funds held for the purpose of providing future payments for the supplemental executive savings plan and SERP and are classified as equity investments and measured at fair value using Level 1 inputs with adjustments recorded in net income (Note 16).

MERS holds fixed income investments in order to satisfy the original terms of the governing documents of our June 2016 acquisition of a majority equity position in MERS (Note 4). These investments are measured at fair value using Level 2 inputs with adjustments recorded in net income.

We did not use Level 3 inputs to determine the fair value of assets or liabilities measured at fair value on a recurring basis as of December 31, 2018 or 2017.

We measure certain assets, such as intangible assets, at fair value on a non-recurring basis. These assets are recognized at fair value if they are deemed to be impaired. As of December 31, 2018 and 2017, except for the fair value adjustment related to our \$4 million impairment of exchange registration intangible assets associated with the closure of ICE Futures Canada and ICE Clear Canada (Note 8), none of our intangible assets were required to be recorded at fair value since no other impairments were recorded.

We measure certain equity investments at fair value on a non-recurring basis using our policy election under ASU No. 2016-01 (Note 2). During 2018, we evaluated transactions involving these investments and concluded that no fair value adjustments were required under this election.

See Note 14 for the fair value considerations related to our margin deposits, guaranty funds and delivery contracts receivable.

As of December 31, 2018, (i) the fair value of our \$1.23 billion 2048 Senior Notes was \$1.24 billion, (ii) the fair value of our \$591 million 2028 Senior Notes was \$599 million, (iii) the fair value of our \$496 million 2027 Senior Notes was \$477 million, (iv) the fair value of our \$1.24 billion 2025 Senior Notes was \$1.26 billion, (v) the fair value of our \$793 million October 2023 Senior Notes was \$821 million, (vi) the fair value of our \$397 million September 2023 Senior Notes was \$402 million, (vii) the fair value of our \$496 million 2022 Senior Notes was \$484 million, and (viii) the fair value of our \$1.25 billion 2020 Senior Notes was \$1.24 billion. The fair values of these fixed rate notes were

estimated using quoted market prices for these

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instruments. 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, 2018.

Excluding our equity investments without a readily determinable fair value, all other financial instruments are determined to approximate carrying value due to the short period of time to their maturities.

18. Segment Reporting

We operate two business segments: our Trading and Clearing segment and our Data and Listings segment. This presentation is reflective of how our chief operating decision maker reviews and operates our business. Our Trading and Clearing segment comprises our transaction-based execution and clearing businesses. Our Data and Listings segment comprises our data services and our securities listings businesses, which are both largely subscription-based. Our chief operating decision maker does not review total assets or statements of income below operating income by segments; therefore, such information is not presented below. Our two segments do not engage in intersegment transactions.

Certain prior year segment expenses have been reclassified to conform to our current year's segment financial statement presentation, as follows:

In 2018, we began tracking fixed income and credit revenues separately as a result of acquisitions.

Exchange data revenues increased by \$76 million and \$66 million in 2017 and 2016, respectively, and desktops and connectivity revenues decreased by the same amount as a result of reclassifying feeds revenues to be included with exchange data revenues.

Operating expenses for the Data and Listings segment increased by \$55 million in 2016 while decreasing the operating expenses for the Trading and Clearing segment by the same amount.

Financial data for our business segments is as follows in 2018, 2017 and 2016 (in millions):

	Year Ended December 31, 2018			Year Ended December 31, 2017			Year Ended December 31, 2016		
	Trading and Clearing Segment	Data and Listings Segment	Consolidated	Trading and Clearing Segment	Data and Listings Segment	Consolidated	Trading and Clearing Segment	Data and Listings Segment	Consolidated
Revenues:									
Energy futures and options contracts	\$965	\$—	\$ 965	\$909	\$—	\$ 909	\$865	\$—	\$ 865
Agricultural and metals futures and options contracts	251	—	251	216	—	216	228	—	228
Financial futures and options contracts	354	—	354	326	—	326	318	—	318
Cash equities and equity options	1,624	—	1,624	1,491	—	1,491	1,780	—	1,780
Fixed income and credit	240	—	240	139	—	139	143	—	143
OTC and other transactions	49	—	49	50	—	50	50	—	50
Pricing and analytics	—	1,043	1,043	—	970	970	—	858	858
Exchange data and feeds	—	670	670	—	632	632	—	602	602
Desktops and connectivity	—	402	402	—	482	482	—	518	518
Listings	—	444	444	—	426	426	—	432	432
Other revenues	234	—	234	202	—	202	177	—	177
Revenues	3,717	2,559	6,276	3,333	2,510	5,843	3,561	2,410	5,971
Transaction-based expenses	1,297	—	1,297	1,205	—	1,205	1,459	—	1,459
Revenues, less transaction-based expenses	2,420	2,559	4,979	2,128	2,510	4,638	2,102	2,410	4,512
Operating expenses	911	1,485	2,396	781	1,478	2,259	826	1,514	2,340

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Operating income	\$1,509	\$ 1,074	\$ 2,583	\$1,347	\$ 1,032	\$ 2,379	\$1,276	\$ 896	\$ 2,172
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Revenue from one clearing member of the Trading and Clearing segment comprised \$406 million, or 17% of our Trading and Clearing revenues in 2018. Revenue from two clearing members of the Trading and Clearing segment comprised \$477 million, or 22% of our Trading and Clearing revenues in 2017. Revenue from one clearing member of the Trading and Clearing segment comprised \$221 million, or 11% of our Trading and Clearing revenues in 2016. Clearing members are primarily intermediaries and represent a broad range of principal trading firms. If a clearing member ceased its operations, we believe that the trading firms would continue to conduct transactions and would clear those transactions through another clearing member firm. No additional customers or clearing members accounted for more than 10% of our segment revenues or consolidated revenues in 2018, 2017 and 2016.

Geographical Information

The following represents our revenues, less transaction-based expenses, net assets and net property and equipment based on the geographic location (in millions):

	United States	Foreign Countries	Total
Revenues, less transaction-based expenses:			
Year ended December 31, 2018	\$ 3,087	\$ 1,892	\$4,979
Year ended December 31, 2017	\$ 2,807	\$ 1,831	\$4,638
Year ended December 31, 2016	\$ 2,757	\$ 1,755	\$4,512
Net assets:			
As of December 31, 2018	\$ 9,226	\$ 8,005	\$17,231
As of December 31, 2017	\$ 9,152	\$ 7,833	\$16,985
Property and equipment, net:			
As of December 31, 2018	\$ 1,125	\$ 116	\$1,241
As of December 31, 2017	\$ 1,134	\$ 112	\$1,246

The foreign countries category above primarily relates to the U.K. and to a lesser extent, EU, Israel, Canada and Singapore.

19. Earnings Per Common Share

The following is a reconciliation of the numerators and denominators of the basic and diluted earnings per common share computations in 2018, 2017 and 2016 (in millions, except per share amounts):

	Year Ended December 31,		
	2018	2017	2016
Basic:			
Net income attributable to Intercontinental Exchange, Inc.	\$1,988	\$2,526	\$1,430
Weighted average common shares outstanding	575	589	595
Basic earnings per common share	\$3.46	\$4.29	\$2.40
Diluted:			
Weighted average common shares outstanding	575	589	595
Effect of dilutive securities - stock options and restricted stock	4	5	4
Diluted weighted average common shares outstanding	579	594	599
Diluted earnings per common share	\$3.43	\$4.25	\$2.39

Basic earnings per common share is calculated using the weighted average common shares outstanding during the periods. The weighted average common shares outstanding decreased in 2018 from 2017, primarily due to stock repurchases (Note 12).

Common equivalent shares from stock options and restricted stock awards, using the treasury stock method, are included in the diluted per share calculations unless the effect of their inclusion would be antidilutive. During 2018, 2017 and 2016 471,000, 694,000 and 725,000 outstanding stock options, respectively, were not included in the computation of diluted earnings per common share, because to do so would have had an antidilutive effect. As of both

December 31, 2018 and 2017, there were 89,000 restricted stock units that were vested but have not been issued that are included in the computation of diluted earnings per share. Certain figures in the table above may not recalculate due to rounding.

20. Quarterly Financial Data (Unaudited)

The following table has been prepared from our financial records and reflects all adjustments that are necessary for a fair presentation of the results of operations for the interim periods presented (in millions, except per share amounts):

	1 st Qtr	2 nd Qtr	3 rd Qtr	4 th Qtr
Year Ended December 31, 2018				
Revenues, less transaction-based expenses	\$1,225	\$1,246	\$1,200	\$1,308
Operating income	650	655	602	676
Net income attributable to Intercontinental Exchange, Inc. ^(a)	464	455	458	611
Earnings per common share: ^(c)				
Basic	\$0.80	\$0.79	\$0.80	\$1.07
Diluted	\$0.79	\$0.78	\$0.79	\$1.07
Year Ended December 31, 2017				
Revenues, less transaction-based expenses	\$1,166	\$1,180	\$1,146	\$1,146
Operating income	582	609	596	592
Net income attributable to Intercontinental Exchange, Inc. ^(b)	503	419	371	1,233
Earnings per common share: ^(c)				
Basic	\$0.85	\$0.71	\$0.63	\$2.11
Diluted	\$0.84	\$0.71	\$0.63	\$2.09

(a) We recognized a \$110 million gain on our acquisition of MERS in other income for the three months ended December 31, 2018 (Note 3).

We recognized a \$176 million realized investment gain on our sale of Cetip in other income for the three months ended March 31, 2017 (Note 4), we recognized a \$764 million gain relating to the deferred tax benefit associated (b) with future U.S. income tax rate reductions for the three months ended December 31, 2017 (Note 13), and we recognized a \$110 million gain on our sale of Trayport in other income for the three months ended December 31, 2017 (Note 3).

(c) The annual earnings per common share may not equal the sum of the individual quarter's earnings per common share due to rounding.

21. Subsequent Events

We have evaluated subsequent events and determined that no events or transactions met the definition of a subsequent event for purposes of recognition or disclosure.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9 (A). CONTROLS AND PROCEDURES

(a) Evaluation of Disclosure Controls and Procedures. As of the end of the period covered by this report, an evaluation was carried out by our management, with the participation of our Chief Executive Officer and Chief Financial Officer, of the effectiveness of our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934). Based upon that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that these disclosure controls and procedures were effective as of the end of the period covered by this report.

(b) Management’s Annual Report on Internal Control over Financial Reporting and the Attestation Report of the Independent Registered Public Accounting Firm. Management’s report on its assessment of the effectiveness of our internal control over financial reporting as of December 31, 2018 and the attestation report of Ernst & Young LLP on our internal control over financial reporting are set forth in Part II, Item 8 of this Annual Report.

(c) Changes in Internal Controls over Financial Reporting. Except as described below, there were no changes in our internal controls over financial reporting that occurred during our most recent fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal controls over financial reporting. As a result, no corrective actions were taken.

ITEM 9 (B). OTHER INFORMATION

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Information relating to our Board of Directors set forth under the caption “Item 1 — Election of Directors — Nominees for Election as Directors at the 2019 Annual Meeting” in our Proxy Statement for our 2019 Annual Meeting of Stockholders (“2019 Proxy Statement”) is incorporated herein by reference. Information relating to our executive officers is, pursuant to Instruction 3 of Item 401(b) of Regulation S-K and General Instruction G(3) of Form 10-K, set forth below under the caption “Executive Officers.” Information regarding compliance by our directors and executive officers and owners of more than ten percent of our Common Stock with the reporting requirements of Section 16(a) of the Exchange Act (Item 405 of Regulation S-K), set forth under the caption “Section 16(a) of the Securities Exchange Act Beneficial Ownership Reporting Compliance” in the 2019 Proxy Statement is incorporated herein by reference. Information relating to our financial expert serving on our Audit Committee (Item 407(d)(5) of Regulation S-K), our Nominating and Corporate Governance Committee (Item 407(c)(3) of Regulation S-K), and our Audit Committee (Item 407(d)(4) of Regulation S-K) is set forth under the caption “Meetings and Committees of the Board of Directors” in our 2019 Proxy Statement and is incorporated herein by reference.

Executive Officers

Set forth below, in accordance with General Instruction G(3) of Form 10-K and Instruction 3 to Item 401(b) of Regulation S-K, is information regarding our executive officers:

Name	Age	Title
Jeffrey C. Sprecher	63	Chairman of the Board and Chief Executive Officer
Charles A. Vice	55	Vice Chairman
Scott A. Hill	51	Chief Financial Officer
Benjamin R. Jackson	46	President
David S. Goone	58	Chief Strategy Officer
Lynn C. Martin	42	President and Chief Operating Officer, ICE Data Services
Andrew J. Surdykowski	48	General Counsel

Name	Age	Title
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Mark P. Wassersug	49	Chief Operating Officer
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Jeffrey C. Sprecher. Mr. Sprecher has been a director and our Chief Executive Officer since our inception and has served as Chairman of our Board of Directors since November 2002. As our Chief Executive Officer, he is responsible for our strategic direction, operational and financial performance. Mr. Sprecher acquired Continental Power Exchange, or CPEX, our predecessor company, in 1997. Prior to acquiring CPEX, Mr. Sprecher held a number of positions, including President, over a fourteen-year period with Western Power Group, Inc., a developer, owner and operator of large central-station power plants. While with Western Power, he was responsible for a number of significant financings. Mr. Sprecher holds a B.S. degree in Chemical Engineering from the University of Wisconsin and an MBA from Pepperdine University.

Charles A. Vice. Mr. Vice has served as Vice Chairman since November 2017. Previously, he served as Chief Operating Officer from July 2001 to November 2017 and President from October 2005 to November 2017. As Vice Chairman, Mr. Vice oversees global technology, information security and operations. For over 25 years, he has been a leader in the application of information technology in the energy and financial services industries. Prior to the founding of ICE in 2000, Mr. Vice was a Director at CPEX, an electronic market for trading electric power. Before joining the CPEX startup in 1994, he was a Principal at Energy Management Associates, where he provided consulting services to the electric power and natural gas industries. Mr. Vice earned a BS degree in Mechanical Engineering from the University of Alabama and an MBA from the Owen Graduate School of Management at Vanderbilt University. He serves on the Board of Visitors at the Owen School and the Leadership Board of the University of Alabama College of Engineering where he is a Distinguished Engineering Fellow.

Scott A. Hill. Mr. Hill has served as Chief Financial Officer since May 2007. As our Chief Financial Officer, he is responsible for overseeing all aspects of our finance and accounting functions, treasury, tax, audit and controls, business development, human resources and investor relations. In addition, Mr. Hill oversees our global clearing operations. Prior to joining us, Mr. Hill spent 16 years as an international finance executive for IBM. He oversaw IBM's worldwide financial forecasts and measurements from 2006 through 2007, working alongside the Chief Financial Officer of IBM and with all of the company's global business units. Prior to that, Mr. Hill was Vice President and Controller of IBM Japan's multi-billion dollar business operation from 2003 through 2005. He currently serves on the Board of Directors of VVC Exploration Corporation and serves on the Audit Committee. Mr. Hill earned his BBA in Finance from the University of Texas at Austin and his MBA from New York University.

Benjamin R. Jackson. Mr. Jackson has served as President since November 2017. Mr. Jackson is responsible for coordinating our global futures and OTC trading businesses. Additionally, he leads the integration planning and execution of our acquisitions and joint ventures as well as overseeing our marketing and public relations efforts. He also serves on the CFTC Energy and Environmental Markets Advisory Committee. Mr. Jackson previously served as Chief Commercial Officer, and prior to that President and Chief Operating Officer of ICE Futures U.S. Mr. Jackson joined us in July 2011 from SunGard, a leading software and technology provider to commodity market participants. At SunGard, he led the company's energy and commodities business segment as Senior Executive Vice President. Prior to that, Mr. Jackson served as President of SunGard's Kiindex commodity risk management platform. Mr. Jackson earned a Bachelor of Science degree in economics from John Carroll University with supporting studies at the London School of Economics and Political Science.

David S. Goone. Mr. Goone has served as Chief Strategy Officer since March 2001. He is responsible for all aspects of our product line, including futures products and capabilities for ICE's electronic platform. Mr. Goone is a Director of ICE Mortgage Services, the governing Board of MERSCORP Holdings, Inc. Mr. Goone also represents us on industry boards including the Options Clearing Corporation, National Futures Association and the Depository Trust & Clearing Corporation. Prior to joining us, Mr. Goone served as the Managing Director and Head of Product Development and Sales at the Chicago Mercantile Exchange where he worked for nine years. From 1989 through 1992, Mr. Goone was Vice President at Indosuez Carr Futures, where he developed institutional and corporate business. Prior to joining Indosuez, Mr. Goone worked at Chase Manhattan Bank, where he developed and managed their exchange-traded foreign currency options operation at the Chicago Mercantile Exchange. Mr. Goone holds a B.S. degree in Accountancy from the University of Illinois at Urbana-Champaign.

Lynn C. Martin. Ms. Martin has served as President and Chief Operating Officer of ICE Data Services since July 2015. She is responsible for managing our global data businesses, including exchange data, pricing and analytics, reference data, indices, desktop, feeds and connectivity services that cover all major asset classes. Prior to her current role, Ms. Martin served as Chief Operating Officer of ICE Clear US, Inc. Ms. Martin joined NYSE Euronext in 2001 and served in a number of leadership roles, including as CEO of NYSE Liffe U.S. and Chief Executive Officer of New York Portfolio Clearing. Prior to joining NYSE Euronext, Ms. Martin worked at IBM in their Global Services organization where she served a variety of functions, predominately as a project manager within the financial services practice. Ms. Martin holds a B.S. in Computer Science from Manhattan College and a M.A. in Statistics from Columbia University. Ms. Martin serves on the Manhattan College Board of Trustees as well as the Advisory Board of the School of Science.

Andrew J. Surdykowski. Mr. Surdykowski has served as General Counsel since October 2018. He is responsible for overseeing our legal affairs globally, including public company compliance, corporate governance matters and serving as our key legal advisor. Previously Mr. Surdykowski was SVP, Associate General Counsel and Assistant Corporate Secretary. Prior to joining us in 2005, Mr. Surdykowski was a corporate attorney at McKenna, Long & Aldridge LLP, a national law firm now known as Dentons. At McKenna, Long & Aldridge, he practiced in the corporate law group and represented a broad array of clients in matters dealing with securities, mergers and acquisitions, corporate governance, finance and private equity. Mr. Surdykowski holds a J.D. degree from the Georgia State University College of Law, and a B.S. in Management from the Georgia Institute of Technology.

Mark P. Wassersug. Mr. Wassersug has served as Chief Operating Officer since November 2017. Mr. Wassersug leads operations, including IT infrastructure, data networks, data centers and engineering. Previously Mr. Wassersug was our SVP, Operations. Prior to joining us in 2001, Mr. Wassersug worked as a strategic planning and technology consultant in Internet infrastructure and ecommerce for Exodus Communication. Mr. Wassersug earned a Bachelor of Science degree in Civil Engineering from Lehigh University and completed an MBA at the Goizueta Business School at Emory University.

Code of Ethics

We have adopted a Global Code of Business Conduct that applies to all of our employees, officers and directors. Our Global Code of Business Conduct meets the requirements of a “code of ethics” as defined by Item 406 of Regulation S-K, and applies to our Chief Executive Officer and Chief Financial Officer (who is the principal financial officer), as well as all other employees, as indicated above. Our Global Code of Business Conduct also meets the requirements of a code of ethics and business conduct under the New York Stock Exchange listing standards. Our Global Code of Business Conduct is available on our website at www.theice.com under the heading “About,” “Investors & Media” then “Governance.” We intend to disclose promptly on our website any substantive amendments to our Global Code of Business Conduct. We will also provide a copy of the Global Code of Business Conduct to stockholders at no charge upon written request.

ITEM 11. EXECUTIVE COMPENSATION

Information relating to executive compensation set forth under the captions “Item 1 — Election of Directors — Non-Employee Directors Compensation,” “Compensation Discussion & Analysis,” “Compensation Committee Report,” and “Compensation Committee Interlocks and Insider Participation” in our 2019 Proxy Statement is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Information regarding ownership of our common stock by certain persons as set forth under the caption “Security Ownership of Certain Beneficial Owners and Management” in our 2019 Proxy Statement is incorporated herein by reference. In addition, information in tabular form relating to securities authorized for issuance under our equity compensation plans is set forth under the caption “Equity Compensation Plan Information” in this Annual Report and “Share-Based Compensation” and “Pension and Other Benefit Programs” as described in Notes 11 and 16 to our consolidated financial statements in this Annual Report.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information regarding certain relationships and transactions between our company and certain of our affiliates as set forth under the caption “Certain Relationships and Related Transactions” in our 2019 Proxy Statement is incorporated herein by reference. In addition, information regarding our directors’ independence (Item 407(a) of Regulation S-K) as set forth under the caption “Item 1 — Election of Directors — Nominees for Election as Directors at the 2019 Annual Meeting” in our 2019 Proxy Statement is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

Information regarding principal accountant fees and services of our independent registered public accounting firm, Ernst & Young LLP, is set forth under the caption “Information About the Company’s Independent Registered Public Accounting Firm Fees and Services” in our 2019 Proxy Statement and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) Documents Filed as Part of this Report.

(1) Financial Statements

Our consolidated financial statements and the related reports of management and our independent registered public accounting firm which are required to be filed as part of this Report are included in this Annual Report on Form 10-K. These consolidated financial statements are as follows:

Consolidated Balance Sheets as of December 31, 2018 and 2017.

Consolidated Statements of Income for the years ended December 31, 2018, 2017 and 2016.

Consolidated Statements of Comprehensive Income for the years ended December 31, 2018, 2017 and 2016.

Consolidated Statements of Changes in Equity, Accumulated Other Comprehensive Income (Loss) and Redeemable Non-Controlling Interest for the years ended December 31, 2018, 2017 and 2016.

Consolidated Statements of Cash Flows for the years ended December 31, 2018, 2017 and 2016.

Notes to Consolidated Financial Statements.

(2) Financial Statement Schedules

Schedules have been omitted because they are not applicable or the required information is included in the consolidated financial statements or notes, thereto.

(3) Exhibits

See (b) below.

(b) Exhibits

The exhibits listed below under “Index to Exhibits” are filed with or incorporated by reference in this Report. Where such filing is made by incorporation by reference to a previously filed registration statement or report, such registration statement or report is identified in parentheses. We will furnish any exhibit upon request to Investor Relations, 5660 New Northside Drive, Atlanta, Georgia 30328.

ITEM 16. FORM 10-K SUMMARY

Not applicable.

INDEX TO EXHIBITS

The following exhibits are filed with this Report. We will furnish any exhibit upon request to Intercontinental Exchange, Inc., Investor Relations, 5660 New Northside Drive, Third Floor, Atlanta, Georgia 30328.

Exhibit Number	Description of Document
3.1	<u>Fourth Amended and Restated Certificate of Incorporation of Intercontinental Exchange, Inc. effective May 25, 2017 (incorporated by reference to Exhibit 3.1 to Intercontinental Exchange, Inc.’s Current Report on Form 8-K filed with the SEC on May 26, 2017, File No. 001-36198).</u>
3.2	<u>Eighth Amended and Restated Bylaws of Intercontinental Exchange, Inc. effective May 25, 2017 (incorporated by reference to Exhibit 3.2 to Intercontinental Exchange, Inc.’s Current Report on Form 8-K filed with the SEC on May 26, 2017, File No. 001-36198).</u>
4.1	<u>Indenture dated as of October 8, 2013 among Intercontinental Exchange, Inc., as issuer, Intercontinental Exchange Inc. and Baseball Merger Sub, LLC, as guarantors, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange, Inc.’s Current Report on Form 8-K filed with the SEC on October 8, 2013, File No. 333-187402).</u>

- 4.2 First Supplemental Indenture dated as of October 8, 2013 among Intercontinental Exchange, Inc., as issuer, Intercontinental Exchange Holdings, Inc. and Baseball Merger Sub, LLC, as guarantors, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on October 8, 2013, File No. 333-187402).
- 4.3 Form of 4.00% Senior Notes due 2023 (included as an exhibit to the First Supplemental Indenture dated as of October 8, 2013) (incorporated by reference to Exhibit 4.4 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on October 8, 2013, File No. 333-187402).
- 4.4 Indenture dated as of November 24, 2015 among Intercontinental Exchange, Inc., as issuer, NYSE Holdings LLC, as guarantor, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 24, 2015, File No. 001-36198).
- 4.5 First Supplemental Indenture dated as of November 24, 2015 among Intercontinental Exchange, Inc., as issuer, NYSE Holdings LLC, as guarantor, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 24, 2015, File No. 001-36198).
- 4.6 Form of 2.75% Senior Notes due 2020 (included as an exhibit to the First Supplemental Indenture dated as of November 24, 2015) (incorporated by reference to Exhibit 4.3 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 24, 2015, File No. 001-36198).
- 4.7 Form of 3.75% Senior Notes due 2025 (included as an exhibit to the First Supplemental Indenture dated as of November 24, 2015) (incorporated by reference to Exhibit 4.4 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 24, 2015, File No. 001-36198).
- 4.8 Second Supplemental Indenture dated as of August 17, 2017 among Intercontinental Exchange, Inc., as issuer, NYSE Holdings LLC, as guarantor, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 17, 2017, File No. 001-36198).
- 4.9 Form of 2.350% Senior Notes due 2022 (included as an exhibit to the Second Supplemental Indenture dated as of August 17, 2017) (incorporated by reference to Exhibit 4.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 17, 2017, File No. 001-36198).
- 4.10 Form of 3.100% Senior Notes due 2027 (included as an exhibit to the Second Supplemental Indenture dated as of August 17, 2017) (incorporated by reference to Exhibit 4.3 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 17, 2017, File No. 001-36198).
- 4.11 Indenture dated as of August 13, 2018 between Intercontinental Exchange, Inc., as issuer, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 13, 2018, File No. 001-36198).
- 4.12 First Supplemental Indenture dated as of August 13, 2018 between Intercontinental Exchange, Inc., as issuer, and Wells Fargo Bank, National Association, as trustee (incorporated by reference to Exhibit 4.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 13, 2018, File No. 001-36198).
- 4.13 Form of 3.450% Senior Notes due 2023 (included as an exhibit to the First Supplemental Indenture dated as of August 13, 2018) (incorporated by reference to Exhibit 4.3 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 13, 2018, File No. 001-36198).
- 4.14 Form of 3.750% Senior Notes due 2028 (included as an exhibit to the First Supplemental Indenture dated as of August 13, 2018) (incorporated by reference to Exhibit 4.4 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 13, 2018, File No. 001-36198).
- 4.15 Form of 4.250% Senior Notes due 2048 (included as an exhibit to the First Supplemental Indenture dated as of August 13, 2018) (incorporated by reference to Exhibit 4.5 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 13, 2018, File No. 001-36198).
- 10.1 Employment Agreement dated February 24, 2012 between Intercontinental Exchange Holdings, Inc. and Jeffrey C. Sprecher (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on February 24, 2012, File No. 001-32671).

- Employment Agreement dated February 24, 2012 between Intercontinental Exchange Holdings, Inc. and Charles A. Vice (incorporated by reference to Exhibit 10.2 to Intercontinental Exchange Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on February 24, 2012, File No. 001-32671).
- 10.2 Employment Agreement dated February 24, 2012 between Intercontinental Exchange Holdings, Inc. and David S. Goone (incorporated by reference to Exhibit 10.3 to Intercontinental Exchange Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on February 24, 2012, File No. 001-32671).
- 10.3 Employment Agreement dated February 24, 2012 between Intercontinental Exchange Holdings, Inc. and Scott A. Hill (incorporated by reference to Exhibit 10.5 to Intercontinental Exchange Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on February 24, 2012, File No. 001-32671).
- 10.4

- 10.5 ~~Employment Agreement dated June 18, 2012 between Intercontinental Exchange Holdings, Inc. and Thomas W. Farley (incorporated by reference to Exhibit 10.6 to Intercontinental Exchange Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 6, 2013, File No. 001-32671).~~
- 10.6 ~~Employment Agreement dated August 1, 2016 between Intercontinental Exchange Holdings, Inc. and Benjamin Jackson (incorporated by reference to Exhibit 10.6 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2018, File No. 001-36198).~~
- 10.7 ~~Form of Employment Agreement between Intercontinental Exchange Holdings, Inc. and the other U.S. officers (incorporated by reference to Exhibit 10.6 to Intercontinental Exchange Holdings, Inc.'s Current Report on Form 8-K filed with the SEC on February 24, 2012, File No. 001-32671).~~
- 10.8 ~~Intercontinental Exchange Holdings, Inc. 2000 Stock Option Plan, as amended effective December 31, 2008 (incorporated by reference to Exhibit 10.6 to Intercontinental Exchange Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 11, 2009, File No. 001-32671).~~
- 10.9 ~~Intercontinental Exchange Holdings, Inc. 2003 Restricted Stock Deferral Plan for Outside Directors, as amended effective December 31, 2008 (incorporated by reference to Exhibit 10.7 to Intercontinental Exchange Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 11, 2009, File No. 001-32671).~~
- 10.10 ~~Intercontinental Exchange Holdings, Inc. Executive Bonus Plan (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 5, 2009, File No. 001-32671).~~
- 10.11 ~~Intercontinental Exchange Holdings, Inc. 2009 Omnibus Incentive Plan (incorporated by reference to Exhibit 10.2 to Intercontinental Exchange Holdings, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 5, 2009, File No. 001-32671).~~
- 10.12 ~~Intercontinental Exchange Holdings, Inc. 2013 Omnibus Employee Incentive Plan (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange Holdings, Inc.'s Registration Statement on Form S-8, filed with the SEC on May 24, 2013, File No. 333-188815).~~
- 10.13 ~~Intercontinental Exchange Holdings, Inc. 2013 Omnibus Non-Employee Director Incentive Plan (incorporated by reference to Exhibit 4.2 to Intercontinental Exchange Holdings, Inc.'s Registration Statement on Form S-8, filed with the SEC on May 24, 2013, File No. 333-188815).~~
- 10.14 ~~Amendment No. 1 to the Intercontinental Exchange Holdings, Inc. 2013 Omnibus Non-Employee Director Incentive Plan (incorporated by reference to Exhibit 10.2 to Intercontinental Exchange, Inc.'s Quarterly Report on Form 10-Q filed with the SEC on August 3, 2017, File No. 001-36198).~~
- 10.15 ~~Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan (incorporated by reference to Exhibit 4.1 to Intercontinental Exchange, Inc.'s Form S-8 filed with the SEC on May 22, 2017, File No. 333-218619).~~
- 10.16 ~~Intercontinental Exchange, Inc. 2018 Employee Stock Purchase Plan (incorporated by reference to Exhibit 4.3 to Intercontinental Exchange, Inc.'s Registration Statement on Form S-8, filed with the SEC on May 21, 2018, File No. 333-225065).~~
- 10.17 ~~NYSE Amended and Restated Omnibus Incentive Plan (as amended and restated effective October 27, 2010) (incorporated by reference to Exhibit 10.33 to NYSE Euronext's Annual Report on Form 10-K filed with the SEC on February 28, 2011, File No. 001-33392).~~
- 10.18 ~~Form of Performance-Based Restricted Stock Unit Award Agreement (EBITDA and TSR) used with respect to grants of performance-based restricted stock units by the Company under the Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan (incorporated by reference to Exhibit 10.17 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2018, File No. 001-36198).~~
- 10.19 ~~Form of Performance-Based Restricted Stock Unit Award Agreement (Relative 3-Year TSR) used with respect to grants of performance-based restricted stock units by the Company under the Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan (incorporated by reference to Exhibit 10.18 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2018, File No. 001-36198).~~
- 10.20 ~~Contribution and Asset Transfer Agreement, dated as of May 11, 2000, by and between IntercontinentalExchange, LLC, Continental Power Exchange, Inc., and Jeffrey C. Sprecher (incorporated by reference to Exhibit 10.31 to Intercontinental Exchange Holdings, Inc.'s Registration Statement on Form S-1~~

- filed with the SEC on October 25, 2005, File No. 333-123500).
- 10.21 First Amendment to Contribution and Asset Transfer Agreement, dated as of May 17, 2000, by and among IntercontinentalExchange, LLC, Continental Power Exchange, Inc., and Jeffrey C. Sprecher (incorporated by reference to Exhibit 10.32 to Intercontinental Exchange Holdings, Inc.'s Registration Statement on Form S-1 filed with the SEC on October 25, 2005, File No. 333-123500).
- 10.22 Second Amendment to Contribution and Asset Transfer Agreement, dated as of October 24, 2005, by and among Intercontinental Exchange Holdings, Inc., Continental Power Exchange, Inc., and Jeffrey C. Sprecher (incorporated by reference to Exhibit 10.33 to Intercontinental Exchange Holdings, Inc.'s Registration Statement on Form S-1 filed with the SEC on October 25, 2005, File No. 333-123500).

- 10.23 Aircraft Time Sharing Agreement dated as of February 6, 2012 between Intercontinental Exchange Holdings, Inc. and Jeffrey C. Sprecher (incorporated by reference to Exhibit 10.37 to Intercontinental Exchange Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 8, 2012, File No. 001-32671).
- 10.24 Aircraft Time Sharing Agreement dated as of February 6, 2012 between Intercontinental Exchange Holdings, Inc. and Charles A. Vice (incorporated by reference to Exhibit 10.38 to Intercontinental Exchange Holdings, Inc.'s Annual Report on Form 10-K filed with the SEC on February 8, 2012, File No. 001-32671).
- 10.25 Credit Agreement dated as of April 3, 2014 among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swingline lender, Bank of America, N.A., as syndication agent, and each of the lenders party thereto for an aggregate \$3.0 billion five-year senior unsecured revolving credit facility (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on April 7, 2014).
- 10.26 First Amendment to Credit Agreement dated as of May 15, 2015 amending Credit Agreement originally dated April 3, 2014 among Intercontinental Exchange, Inc. (formerly known as IntercontinentalExchange Group, Inc.) and ICE Europe Parent Limited, as borrowers, Wells Fargo Bank, National Association, as administrative agent, issuing lender and swingline lender, Bank of America N.A., as syndication agent, and each of the lenders party thereto for an aggregate \$3.0 billion five-year senior unsecured revolving credit facility (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on May 19, 2015, File No. 001-36198).
- 10.27 Second Amendment to Credit Agreement dated as of November 9, 2015 among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, amending that certain Credit Agreement, dated April 3, 2014 (as amended by the First Amendment to Credit Agreement, dated as of May 15, 2015) among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 13, 2015, File No. 001-36198).
- 10.28 Third Amendment to Credit Agreement dated as of November 13, 2015 among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, amending that certain Credit Agreement, dated as of April 3, 2014 (as amended by the First Amendment to Credit Agreement, dated as of May 15, 2015 and the Second Amendment to Credit Agreement, dated as of November 9, 2015) among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, (incorporated by reference to Exhibit 10.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on November 13, 2015, File No. 001-36198).
- 10.29 The Fourth Amendment to Credit Agreement, dated as of August 18, 2017 among Intercontinental Exchange, Inc. as borrower, NYSE Holdings LLC as guarantor, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, amending that certain Credit Agreement, dated as of April 3, 2014 among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent (as amended by the First Amendment to Credit Agreement, dated as of May 15, 2015, the Second Amendment to Credit Agreement, dated as of November 9, 2015, and the Third Amendment to Credit Agreement, dated as of November 13, 2015) (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 21, 2017, File No. 001-36198).
- 10.30 The Fifth Amendment to Credit Agreement, dated as of August 18, 2017 among Intercontinental Exchange, Inc. as borrower, NYSE Holdings LLC as guarantor, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, amending that certain Credit Agreement, dated as of April 3, 2014 among Intercontinental Exchange, Inc. and ICE Europe Parent Limited, as borrowers, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent (as amended by the First Amendment to Credit Agreement, dated as of May 15, 2015, the Second Amendment to Credit Agreement, dated as of November 9, 2015, the Third Amendment to Credit Agreement, dated as of November 13, 2015 and the Fourth Amendment to Credit Agreement, dated as of August 18, 2017) (incorporated by reference to Exhibit 10.2 to Intercontinental

10.31 Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 21, 2017, File No. 001-36198). The Sixth Amendment to Credit Agreement, dated as of August 9, 2018 among Intercontinental Exchange, Inc. as borrower, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent, amending that certain Credit Agreement, dated as of April 3, 2014 among Intercontinental Exchange, Inc., as borrower, the lenders party thereto and Wells Fargo Bank, National Association, as administrative agent (as amended by the First Amendment to Credit Agreement, dated as of May 15, 2015, the Second Amendment to Credit Agreement, dated as of November 9, 2015, the Third Amendment to Credit Agreement, dated as of November 13, 2015, the Fourth Amendment to Credit Agreement, dated as of August 18, 2017, and the Fifth Amendment to Credit Agreement, dated as of August 18, 2017) (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 9, 2018, File No. 001-36198).

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- Form of Agreement Relating to Noncompetition and Other Covenants signed by each of the non-employee
10.32 directors and by Intercontinental Exchange, Inc. (incorporated by reference to Exhibit 10.1 to Intercontinental
Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on May 17, 2016, File No. 001-36198).
Separation Agreement between Intercontinental Exchange Holdings, Inc. and Thomas W. Farley dated May 21,
10.33 2018 (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K
filed with the SEC on May 22, 2018, File No. 001-36198).
10.34 Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings,
Inc. and Scott A. Hill.
10.35 Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings,
Inc. and Benjamin R. Jackson.
10.36 Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings,
Inc. and David S. Goone.
21.1 Subsidiaries of Intercontinental Exchange, Inc.
23.1 Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm.
24.1 Power of Attorney (included with signature page hereto).
31.1 Rule 13a -14(a)/15d -14(a) Certification of Chief Executive Officer.
31.2 Rule 13a -14(a)/15d -14(a) Certification of Chief Financial Officer.
32.1 Section 1350 Certification of Chief Executive Officer.
32.2 Section 1350 Certification of Chief Financial Officer.
101 The following materials from Intercontinental Exchange, Inc.'s Annual Report on Form 10-K for the year ended
December 31, 2018 formatted in XBRL (Extensible Business Reporting Language): (i) the Consolidated
Balance Sheets, (ii) the Consolidated Statements of Income, (iii) the Consolidated Statements of Changes in
Equity, Accumulated Other Comprehensive Income (Loss) and Redeemable Non-Controlling Interest, (iv) the
Consolidated Statements of Comprehensive Income, (v) Consolidated Statements of Cash Flows and (vi) Notes
to Consolidated Financial Statements, tagged as blocks of text.*

As provided in Rule 406T of Regulation S-T, this information is "furnished" and not "filed" for purposes of Sections 11
* and 12 of the Securities Act of 1933 and Section 18 of the Securities Exchange Act of 1934. Such exhibit will not be
deemed to be incorporated by reference into any filing under the Securities Act of 1933 or the Securities Exchange
Act of 1934 unless Intercontinental Exchange, Inc. specifically incorporates it by reference.

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.

Intercontinental Exchange,
Inc.
(Registrant)

Date: February 7, 2019 By: /s/ Jeffrey C. Sprecher
Jeffrey C. Sprecher
Chief Executive Officer

KNOW ALL MEN BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Jeffrey C. Sprecher and Scott A. Hill, and each of them his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report in 2018 and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

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 the date indicated.

Signatures	Title	Date
/s/ Jeffrey C. Sprecher Jeffrey C. Sprecher	Chairman of the Board and Chief Executive Officer (principal executive officer)	February 7, 2019
/s/ Scott A. Hill Scott A. Hill	Chief Financial Officer (principal financial officer)	February 7, 2019
/s/ James W. Namkung James W. Namkung	Chief Accounting Officer and Corporate Controller (principal accounting officer)	February 7, 2019
/s/ Sharon Y. Bowen Sharon Y. Bowen	Director	February 7, 2019
/s/ Ann M. Cairns Ann M. Cairns	Director	February 7, 2019
/s/ Charles R. Crisp Charles R. Crisp	Director	February 7, 2019
/s/ Duriya M. Farooqui Duriya M. Farooqui	Director	February 7, 2019
/s/ Jean-Marc Forneri Jean-Marc Forneri	Director	February 7, 2019

/s/ Frederick W.
Hatfield
Frederick W. Hatfield

Director

February 7, 2019

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/s/ Lord Hague of Richmond Director February 7, 2019
The Rt. Hon. the Lord Hague of Richmond

/s/ Thomas E. Noonan Director February 7, 2019
Thomas E. Noonan

/s/ Frederic V. Salerno Director February 7, 2019
Frederic V. Salerno

/s/ Judith A. Sprieser Director February 7, 2019
Judith A. Sprieser

/s/ Vincent Tese Director February 7, 2019
Vincent Tese