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, 2019

Or

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

For the transition period from to

Commission File Number 001-36198

INTERCONTINENTAL EXCHANGE, INC.

(Exact name of registrant as specified in its charter)

Delaware	**46-2286804**
(State or other jurisdiction of incorporation or organization)	*(IRS Employer 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	Trading Symbol(s)	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value per share	ICE	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 Act. Yes ☐ No ☑

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

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

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

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

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

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the 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 $48,031,836,007.

As of February 3, 2020, the number of shares of the registrant’s Common Stock outstanding was 553,450,116 shares.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information contained in the registrant’s Proxy Statement for the 2020 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, 2019

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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 its consolidated subsidiaries. References to “ICE products” mean products listed on one or more of our markets. All references to “options” or “options contracts” in the context of our futures products refer to options on futures contracts. Solely for convenience, references in this Annual Report to any trademarks, service marks and trade names owned by ICE are listed without the ®, ™ and © symbols, but we will assert, to the fullest extent under applicable law, our rights to these trademarks, service marks and trade names.

We also include references to third-party trademarks, trade names and service marks in this Annual Report. 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.

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.

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.

These forward-looking statements relate to future events or our future financial performance and are based on our present beliefs and assumptions, as well as the information currently available to us. They 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.

Forward-looking statements may be introduced by or contain terminology such as “may,” “will,” “should,” “could,” “would,” “targets,” “goal,” “expect,” “intend,” “plan,” “anticipate,” “believe,” “estimate,” “predict,” “potential,” “continue,” or the antonyms of these terms or other comparable terminology. 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, climate change, 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, foreign exchange rates, and mortgage origination and refinancing trends;
- 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’ compliance with their respective regulatory and oversight responsibilities;
- the resilience of our electronic platforms and soundness of our business continuity and disaster recovery plans;
- changes in renewal rates of subscription-based data revenues;
- our ability to execute our growth strategy, identify and effectively pursue, implement and integrate acquisitions and strategic alliances and 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 client preferences;
- our ability to ensure that the technology we utilize is not vulnerable to cyber-attacks, hacking and other cybersecurity risks or other disruptive events;
- our ability to identify trends and adjust our business to benefit from such trends;
- our ability to evolve our benchmarks and indices in a manner that maintains or enhances their reliability and relevance;
- 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 secure additional debt;
- our ability to maintain existing market participants and data customers, and to attract new ones;

- our ability 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;
- our ability to realize the expected benefits of our majority investment in Bakkt which could result in additional unanticipated costs and risks; and
- our ability to detect illegal activity such as fraud, money laundering, tax evasion and ransomware scams through digital currency transactions that are easily exploited.

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

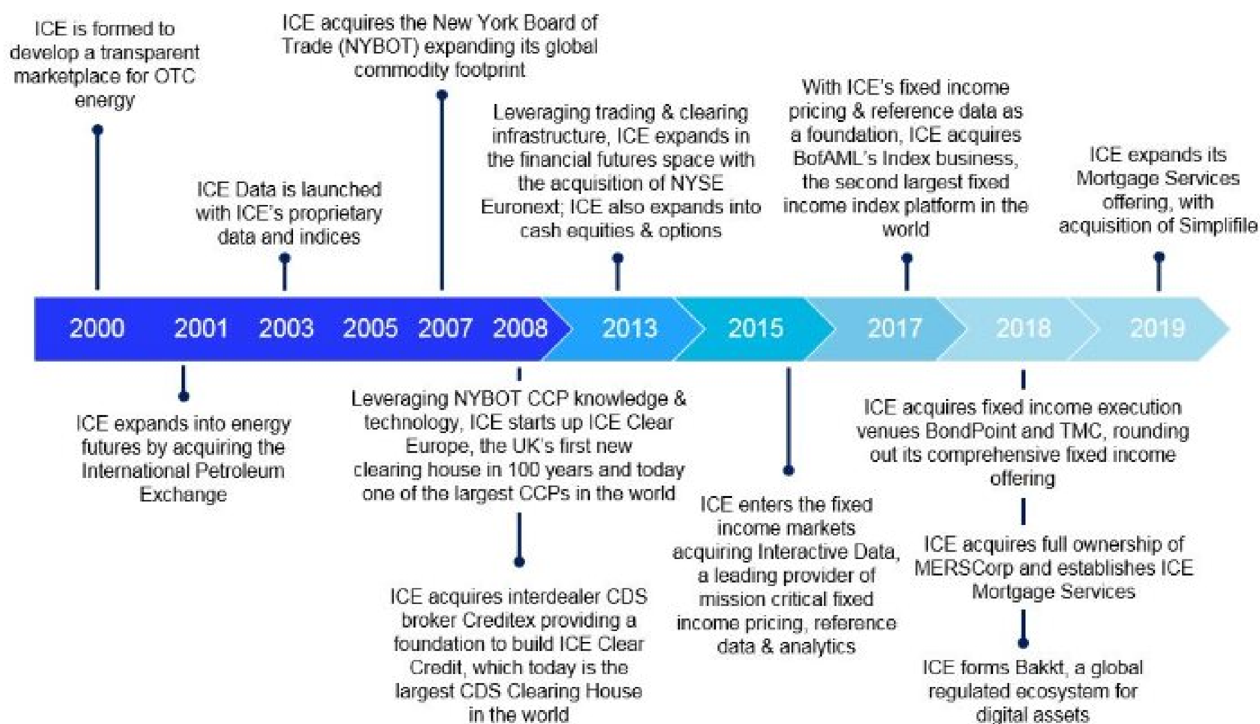
Introduction

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 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, digital assets, bonds and currencies, and also offer mortgage and technology services. In addition, we offer comprehensive data services to support the trading, investment, risk management and connectivity needs of customers around the world and across 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 seek to 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.

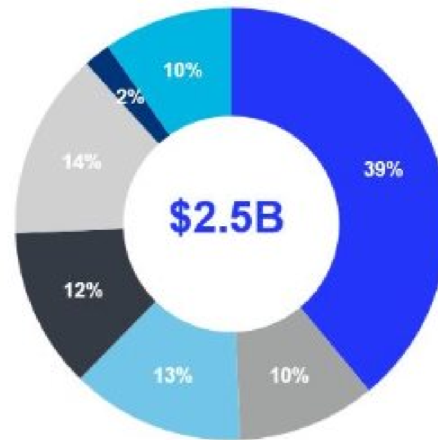
The majority of our identifiable assets are located in the United States, or U.S. and the United Kingdom, or U.K. For a summary of our revenues, net assets and net property and equipment by geographic region, see Note 18 to our consolidated financial statements included in this Annual Report.

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 default swaps, or CDS, bonds, 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 $2.5 billion in 2019. 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 asset classes include:

Trading and Clearing Revenues, Less Transaction –Based Expenses (in millions)	2019	% Change
Energy futures and options	$992	3%
Ags and metals futures and options	251	-
Financials futures and options	332	(6)
Cash equities and equity options, net	298	(9)
Fixed income and credit	364	52
OTC and other transactions	45	(8)
Other revenues	260	11
Segment Revenue	**$2,542**	**5%**



- **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 and related spread contracts. The Brent complex, which includes the ICE Brent crude oil 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. Together, these benchmarks form the foundation for a suite of more than 600 other related oil products such as locational spreads, product spreads and refining spreads. These are precise risk management tools that benefit from the deep liquidity in, and their relationship to, our global oil benchmarks.

  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 800 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. National Balancing Point, or 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 in working to mitigate climate impacts.

- **Agricultural & Metals Futures and Options:** We offer benchmark futures and options contracts on the most globally relevant commodities including: sugar, coffee, cocoa, cotton and frozen concentrated orange juice, 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 offer 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 our five registered securities exchanges, including 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 a transparent, efficient and high quality trading market to our customers, we operate five cash equity exchange venues and two options markets.

- **Fixed Income and Credit:** We offer electronic trade execution for CDS instruments and are the industry leader in global CDS clearing, as measured by gross notional cleared. ICE Bonds, our fixed income execution business, offers deep liquidity pools across multiple trading protocols, such as click-to-trade, auctions and request for quote, or RFQ, providing our customers a 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, and Simplifile, LC, or Simplifile, which serves as an electronic liaison between lenders, settlement agents and county recording offices, streamlining the local recording of residential mortgage transactions in the U.S.

- **OTC and Other Transactions:** Our over-the-counter, or OTC, energy markets comprise of 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, technology development 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 $404 million of our own cash to the guaranty funds included in the table below, and such amounts are at risk and could be used in the event of a clearing member default. In September 2019, we also added a layer of insurance to our clearing member default protection. The default insurance has a three-year term that commenced on September 17, 2019, for the following clearing houses in the following amounts: ICE Clear Credit - $50 million; ICE Clear Europe - $75 million; and, ICE Clear US - $25 million. In addition, ICE NGX maintains a guaranty fund of $100 million funded by a letter of credit issued by a major Canadian bank, and backed by default insurance.

Our contributions to each clearing house as of December 31, 2019 are listed below and our clearing houses are referred to herein collectively as “the ICE Clearing Houses”:

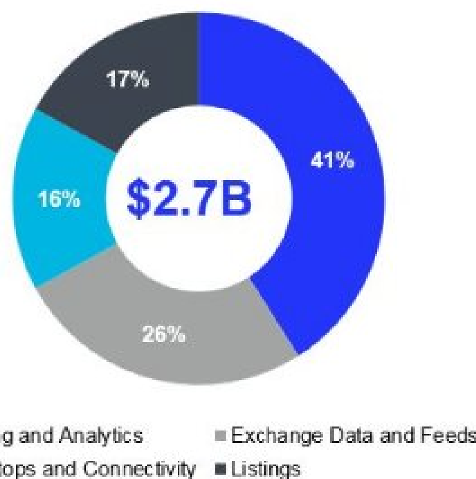
Clearing House	Products Cleared	Location	Exchange where Executed	ICE's Contribution
ICE Clear Europe	Energy, agricultural, interest rates and equity index futures and options contracts and OTC CDS instruments	U.K.	ICE Futures Europe, ICE Futures U.S., ICE Endex, and third-party venues	$308 million
ICE Clear U.S.	Agricultural, metals, FX, equity index futures and options contracts and digital assets futures contracts	U.S.	ICE Futures U.S.	$128 million
ICE Clear Credit	North American, European, Asian-Pacific and Emerging Market CDS instruments	U.S.	Creditex, OTC and third-party venues	$100 million
ICE Clear Netherlands	Derivatives on equities and equity indices traded on regulated markets	The Netherlands	ICE Endex	$2 million
ICE Clear Singapore	Energy, metals and financial futures products	Singapore	ICE Futures Singapore	$1 million
ICE NGX	Physical North American natural gas, electricity and oil futures	Canada	ICE NGX	$115 million

Of our total contribution to ICE Clear U.S. above, $35 million is solely applicable to any losses associated with a default in digital asset contracts.

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. Revenues in our Data and Listings segment are largely subscription-based and recurring in nature and generally not impacted by seasonality. The Data and Listings segment generated revenues of $2.7 billion in 2019 and accounted for 51% of our consolidated revenues.

Data and Listings Revenue (in millions)	2019	% Change
Pricing and Analytics	$1,083	4%
Exchange Data and Feeds	704	5
Desktops and Connectivity	424	5
Data Total	**2,211**	**5**
Listings	449	1
Segment Revenue	**$2,660**	**4%**



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

We provide fixed income valuations, including independent evaluated pricing services, on 2.8 million fixed income securities and other hard-to-value financial instruments each day. These instruments span approximately 154 countries and 65 currencies that 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 by offering our clients a broad range of descriptive information, covering over 33 million financial instruments across over 210 markets. Our reference data coverage increased from 13 million securities in 2018 by adding both active and inactive, or historical, securities. This data is used by clients to inform risk management, support regulatory and compliance needs, create indices and improve operational efficiency. Additionally, we completed a unified and comprehensive reference data service for exchange traded derivatives, or ETD, products traded on ICE exchanges and cleared at ICE Clearing Houses.

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. ICE Data Indices, LLC, or ICE Data Indices, which includes the ICE BofA indices, is the benchmark provider for more than $1 trillion in fund assets, and is second largest in benchmarked assets under management, or AUM, for fixed income funds. 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 proprietary data and content from our electronic futures trading platform, as well as our cash equity and equity options venues. In addition, we receive a share of revenue from the National Market System Plan, or NMS Plan. Under the NMS Plan, the Financial Industry Markets Authority, or FINRA, and all SEC-registered securities exchanges send trades and top-of-book quotes in exchange listed securities to a central consolidator, which then distributes the data pursuant to SEC-approved requirements. Finally, through our consolidated feeds business, we offer a broad array of third-party trading venues and news feeds.

- **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. Through our ICE Global Network, we offer connectivity solutions to access markets and data through highly secure, resilient and low latency network options, as well as global colocation services and Direct Market Access provides connectivity to over 150 trading venues and data from over 750 third-party sources. 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 nearly 100,000 market participants in the industry through a secure 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 2019, the NYSE and NYSE American LLC, or NYSE American, raised the most capital, globally, for the ninth consecutive year, with approximately $112 billion raised in initial public offerings, or IPOs, and follow-on offerings from over 300 transactions. The total capital raised by NYSE-listed and

NYSE American-listed companies was 30% higher than the capital raised by the next largest exchange and more than 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.

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 the trading activities and 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 developed an integrated trading platform and matching engine known as NYSE Pillar and have migrated all of our cash equity securities markets to this platform. We also expect to migrate our equity options markets to this platform, which have historically operated on distinct platforms. This integrated platform is expected to improve performance and reduce the complexity of operating multiple 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.

- **Business Continuity Planning and Disaster Recovery:** We maintain comprehensive business continuity and disaster recovery plans and facilities designed to enable 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.

Cybersecurity

Our business activities rely extensively on technology and software, including the systems used by our business partners, regulators and customers. In addition, our activities involve the use and retention of confidential data and information. These activities make us susceptible to cyber-attacks. We employ the following activities, processes and strategies to evaluate, manage and address these risks.

- **Strategy:** We maintain a Cybersecurity Strategy, or CSS, which emphasizes consideration of the nature of our business, ongoing intelligence collection regarding cybersecurity threats, and initiatives to specifically address prominent areas of cybersecurity risk. The CSS outlines the key priorities for our cybersecurity program and the methods by which our Information Security department seeks to accomplish those goals. The CSS is ratified by the Risk Committee of our Board of Directors and when applicable, also by the corporate governance committees of our regulated subsidiaries.

- **Risk Management:** Thematic threats such as sabotage, fraud, and theft of assets or customer data are used to frame our risk management activities. Asset theft often involves organized crime or financially motivated nations staging sophisticated, well-planned campaigns to steal significant cash, cryptocurrency, or equivalent assets. Our thematic threats, along with others, are evaluated by our Board of Directors as well as our Risk Committee, Chief Risk Officer and Chief Information Security Officer, or CISO. The CSS provides the framework we use for assessing risk, prioritizing testing, identifying remedial actions and validating improvements. The CSS also provides for the deployment of external and internal teams of ethical hackers that operate alongside our traditional vulnerability detection processes.

- **Information Sharing:** We recognize the importance of collaboration and information sharing among private sector firms in the financial services sector, across sectors, and with global public-sector agencies, when appropriate. Our cybersecurity leaders hold positions within the Financial Services Information Sharing and Analysis Center and the Financial Systemic Analysis and Resiliency Center in the U.S., the Financial Sector Cyber Collaboration Centre in the U.K., and similar organizations across the EU and in Singapore.

- **Governance and Leadership:** Our Information Security department is led by our CISO, who provides comprehensive reports to a dedicated internal governance committee at least quarterly outlining threat assessment, control performance, and ongoing enhancements. Additionally, cybersecurity matters are reported to and discussed with a cross-subsidiary leadership committee, the Risk Committee of our Board of Directors, and when applicable, subsidiary boards. Our CISO and other senior security leaders conduct periodic cybersecurity education sessions with our employees and directors. These sessions cover general cybersecurity topics as well as specific details regarding our cybersecurity program.

- **Third-Party Review:** Our information security group utilizes extensive penetration testing, vulnerability scanning, ethical hacking and maturity assessment services from global leaders in these practices. The results of these reviews alongside frequent regulatory and customer examinations are assessed, with any resulting mitigation activity assigned and tracked to remediation.

- **Controls**: Our identification of risks and selection of cyber-related controls is performed in the context of the critical financial infrastructure we maintain and operate. Our ongoing threat assessments are intended to identify changes in external events and in our activities, infrastructure and processes that could necessitate reprioritization of risks and controls. The nature of our business activities mandates an emphasis on sabotage and asset theft as primary threats in addition to the other typical contemporary themes of data theft. Our focus on these threats leads to an emphasis on social engineering controls, behavioral detection of insider threat, and deliberate and rehearsed recovery strategies.

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.

FTSE® and the FTSE indexes are trademarks and service marks of the London Stock Exchange plc and Financial Times Limited and are used under license. MSCI® and the MSCI indexes are trademarks and service marks of MSCI Inc. or its affiliates and are used under license.

Employees

As of December 31, 2019, we had a total of 5,989 employees with 1,691 in New York, 1,035 in Atlanta, 754 in the U.K., 533 in India, and a total of 1,976 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 2019. 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 Bank of America Merrill Lynch, or BofAML's, indices (now named the ICE BofA 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. ICE Data Pricing & Reference Data is an independent provider of evaluated pricing services and reference data solutions. We are a leading source to the institutional investment community for market data and analytic and financial information. We also offer our fixed income continuous evaluated pricing service, best execution service, and ICE Liquidity Indicators in the front, middle and back office, extending the reach of fixed income evaluations into intra-day applications.

- **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 750 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, cybersecurity, 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

- We face competition from multiple exchanges, electronic trading systems, third-party clearing houses, technology firms, voice brokers active in the credit derivatives markets, market data vendors and trading facilities in the U.S. and globally. Some of these exchanges are consortiums formed by banks and exchanges.

- 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 Global Markets 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.

- In our ICE Mortgage Services business, which includes MERS and Simplifile, we compete with other digital mortgage solution providers. We also compete for mortgage activity that does not utilize digital solutions.

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 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 we achieved in 2019 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 several years, including Interactive Data, SPSE, which we renamed Securities Evaluations, Credit Market Analysis and BofAML's Global Research division's index business (now named the ICE BofA indices).

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 nearly 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 2019, demand for our listing services continued to be strong in terms of new listings and secondary offerings. A total of 89 new issuers listed on NYSE and NYSE American in 2019. In 2019, NYSE and NYSE American raised the most capital globally with approximately $112 billion raised in IPOs and follow-on offerings from over 300 transactions. The NYSE listed 58 IPOs in 2019, raising total IPO proceeds of approximately $29 billion, including the largest U.S. IPO of 2019. The NYSE has listed 24 of the 25 largest U.S. IPOs of all time. 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.

NYSE Arca listed ETFs with approximately $3.4 trillion in AUM representing 77% of all U.S. listed ETFs as of December 31, 2019. 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 nearly 3,100 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 will continue rolling out NYSE Pillar, our new integrated trading platform and matching engine, to our equity options markets to improve performance and reduce the complexity of operating multiple trading systems. We operate systems that support trading, clearing and data and analytics across five data centers. We also offer connectivity solutions to global exchanges and content service

providers through dedicated data circuits. Finally, we operate our ICE Global Network, which provides connectivity to over 150 trading venues and data from over 750 third-party sources, including ICE-operated markets and data services.

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 or related industries, expanding our products and services, diversifying our business, addressing underserved markets, advancing our technology and anticipating or responding to regulatory or other potential changes in our industry or other industries. For example, in June 2019, we acquired Simplifile to expand our ICE Mortgage Services portfolio. Simplifile offers an array of mortgage services, primarily serving as an electronic liaison between lenders, settlement agents and county recording offices, streamlining the local recording of residential mortgage transactions.

Our Customer Base

Client types

Accounting firms	Commercial hedgers	Hedge funds	Mutual funds
Asset managers	Corporates	Insurance companies	Quote vendors
Broker/dealers	Custodians	Investment banks	Quantitative funds
Clearing firms	ETF & index sponsors	Market makers	Retail/wealth managers

No single customer accounted for more than 10% of total consolidated revenues during 2019, 2018 or 2017.

Information About Our Executive Officers

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

Regulation

Our activities and the markets in which we operate are subject to regulations that impact us as well as our customers, and, in turn, meaningfully influence our activities, the manner in which we operate and our strategy. We are primarily subject to the jurisdiction of regulatory agencies in the U.S., U.K., EU, Canada, Singapore and Abu Dhabi. 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, Singapore and Abu Dhabi.

- 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. 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.
- In Abu Dhabi, ICE Futures Abu Dhabi is an RIE and regulated by the Financial Services Regulatory Authority, or FSRA. ICE Futures Abu Dhabi is expected to launch following regulatory approval.
- In Canada, ICE NGX is recognized as an exchange and clearing house by the Alberta Securities Commission and is also registered by the CFTC as a Foreign Board of Trade and as a Derivatives Clearing Organization, or DCO.
- ICE Clear Credit and ICE Clear U.S. are regulated by the CFTC as 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 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, 2019.
- ICE Clear Europe, which is primarily regulated in the U.K. by the Bank of England, or BOE, as a Recognized Clearing House, 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 NYSE Chicago 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 NYSE Chicago 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 ATSs, ICE BondPoint and ICE Credit Trade, and TMC Bonds, which operates the TMC Bonds ATS. Both Creditex Securities Corporation and TMC Bonds are subject to oversight by the SEC and are members of FINRA, and are registered with the Municipal Securities Rulemaking Board, or MSRB. FINRA and MSRB are SROs that regulate broker-dealers in the U.S. ICE Securities Execution & Clearing, LLC, a full clearing member of the National Securities Clearing Corporation, the Fixed Income Clearing Corporation and The Depository Trust Corporation, provides correspondent clearing for Creditex Securities and is subject to oversight by the SEC, FINRA and the MSRB.
- 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. Additionally, Creditex Brokerage is authorized to provide automated trading services in Hong Kong and is subject to oversight by the Hong Kong Securities and Futures Commission in connection with its offering of bonds in Hong Kong.

Regulation of our Data Business

We have a U.S. subsidiary that is registered with the SEC under the Investment Advisers Act of 1940, or the Investment Advisers Act, for its 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, or ICE Data Indices, applies the International Organization of Securities Commissions Principles for Financial Benchmarks to its indices, and as a third country (i.e. non-EU) Benchmark Administrator in Europe. ICE Data Indices has been recognized as a third country benchmark administrator under Article 32 of the EU Benchmarks Regulation, or BMR, by the FCA. ICE Benchmark Administration Limited is authorized and regulated by the FCA in connection with the regulated activity of administering a benchmark, and is authorized as a benchmark administrator under the BMR. 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:

- **Brexit timing and implications.** On January 31, 2020, the U.K. officially withdrew from the EU. In connection with the U.K.'s withdrawal from the EU, the U.K. and the EU entered into a withdrawal agreement, which, amongst other things, includes a transitional period until December 31, 2020, during which EU law will continue to apply in and to the U.K.

- **Continued access by EU market participants to U.K. CCPs and exchanges**. Under the terms of the withdrawal agreement, EU law will continue to apply in and to the U.K. for a transitional period until December 31, 2020. During such time, EU market participants will be able to continue clearing through U.K. central counterparties, or CCPs, such as ICE Clear Europe, and accessing U.K. trading venues, such as ICE Futures Europe. Access by EU market participants to U.K. CCPs following the end of the transitional period, will be contingent upon the terms of any trade agreement entered into by the U.K. and EU prior to the end of the transitional period and/or U.K. CCPs being recognized by ESMA. Separately, ICE Futures Europe and ICE Endex will continue to be able to permit access by EU and U.K. persons to transact on their platforms, even in the absence of any trade agreement being entered into by the U.K. and EU prior to the end of the transitional period and/or any trading venue equivalence decisions by the U.K. or ESMA. The lack of equivalence decisions for trading venues, however, may result in increased costs for certain EU and U.K. market participants which could impact trading on ICE Futures Europe and ICE Endex. 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 and U.K. customers to our services in the event that the transition period ends without any trade agreement addressing access to CCPs and trading venues being entered into.

- **The proposed revisions to the regulatory structure of non-EU clearing houses.** On January 1, 2020, the European Market Infrastructure Regulation, or EMIR 2.2, became effective, which revises the EU's current regulatory and supervisory structure for EU and non-EU clearing houses. These revisions of the regulatory structure may have an impact on our non-EU clearing houses if they are determined to be systemically important or likely to become systemically important to the financial stability of the EU or one or more of its Member States. It remains uncertain what the nature and extent of the regulation's impact will be on the regulation and supervision of one or more of our non-EU clearing houses, which will depend on ESMA’s future determination of whether a non-EU clearing house is systemically important to the EU or its Member States and the extent to which ESMA will rely on such clearing house’s domestic regulator.

- **Requirement that European exchanges and CCPs offer non-discriminatory access.** The non-discriminatory access provisions of the Markets in Financial Instruments Directive II, or MiFID II, would require our European exchanges and CCPs 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 could have a negative impact on certain of our clearing members, in particular, the Supplemental Leverage Ratio applicable to certain financial institutions may impose capital requirements on certain of our clearing house members and their customers that may raise the costs and thus discourage financial institutions from client clearing. In June 2019, the Basel Committee on Banking Supervision revised its treatment of the leverage ratio capital requirement for derivatives that a bank centrally clears on behalf of its clients. The revised treatment will permit both cash and non-cash forms of initial margin and variation margin received from a client to offset the replacement cost and potential future exposure for client cleared derivatives only. The revision will apply to the version of the leverage ratio standard that will serve as the Pillar 1 minimum capital requirement as of January 1, 2022. In November 2019, the Federal Reserve Board, the Federal Deposit Insurance Corporation, or FDIC, and the Office of the Comptroller of the Currency finalized rule changes to the derivative exposure calculations and

leverage ratio requirements. The final rule also revised the treatment of the leverage ratio capital requirement for derivatives that a bank centrally clears on behalf of its clients to permit both cash and non-cash forms of initial margin and variation margin received from a client to offset the replacement cost and potential future exposure for client cleared derivatives only. The compliance date for the revised regulation is January 1, 2022, however early adoption is permitted beginning April 1, 2020.

- **Capital requirements for investment firms acting as market makers.** EU policy makers are developing a framework for prudential requirements for European investment firms. The proposed rules risk imposing disproportionate capital requirements on European investment firms acting as market makers. European investment firms may be discouraged from acting as market makers on certain markets operated by ICE Futures Europe and ICE Endex due to the increased capital requirements.

- **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 either lower or higher than the corresponding limits on U.S. equivalent contracts. In November 2019, ESMA issued a consultation paper on position limits seeking market views on proposed changes to the position limits and position management regime. Conversely, in January 2020, the CFTC proposed a rule which replaces the CFTC's prior Dodd-Frank position limit efforts. 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 and the EU either does not make changes to MiFID II or makes changes inconsistent with U.S. regulations.

- **A proposed European financial transaction tax.** A number of EU Member States have considered such a tax, but 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.

- **The EU Benchmarks Regulation, or BMR.** In June 2016, the BMR entered into force and the majority of provisions applied from January 2018. Under the BMR, benchmarks provided by a third-country (i.e. non-EU) benchmark administrator may be used by EU-supervised entities provided that the European Commission, or 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 was extended by the EU authorities to January 1, 2022 for providers of critical benchmarks and third-country benchmark providers. In May 2019, ICE Data Indices received recognition from the FCA, and as such, benchmarks provided by ICE Data Indices and included in the ESMA register may continue to be used by supervised entities in the EU. In October 2019, the EC published a consultation reviewing the BMR and included a proposal to provide competent authorities with broader powers to require a benchmark administrator to change the methodology of a critical benchmark. Increasing the powers of a competent authority to change the underlying market or benchmark could result in increased risks to the administrator of a critical benchmark and the operator of a derivatives market referencing the benchmark. We are monitoring the impacts to our business as a result of the consultation and any resulting legislative changes.

- **Market Data Requirements.** Our U.K. and EU derivatives exchanges could be impacted by changes to requirements related to the dissemination of market data. In its December 2019 report to the EC, ESMA recommended, among other things, against outright regulation of market data prices, however ESMA suggested that users could gain transparency into how market data prices are set with the help of new supervisory guidance and targeted changes to the MiFID II/Markets in Financial Instruments Regulation, or MiFIR, text. The EC is considering ESMA's report and is expected to issue its own report on these issues in mid-2020.

  In addition, in October 2019, the SEC proposed a change to Rule 608 that would eliminate the provision allowing market data fee changes proposed by NMS Plans to become immediately effective. Further, in January 2020, the SEC requested comment on a proposed order directing the exchanges and FINRA to submit a plan to create a new, single NMS Plan to replace the three existing NMS Plans that govern the dissemination of real-time, consolidated equity market data for NMS stocks. If implemented, these changes could impact NYSE's revenues from the consolidated "SIP" feeds.

- **The SEC Transaction Fee Pilot.** In December 2018, the SEC adopted a Transaction Fee Pilot. The final rule established 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 national securities exchanges in certain securities to be designated by the SEC. On March 28, 2019, the SEC partially stayed the Transaction Fee Pilot, pending resolution of our and two other national securities exchanges' petitions for review of the Transaction Fee Pilot by the U.S. Court of Appeals for the District of Columbia Circuit. The only requirement that the SEC did not stay was the requirement that the exchanges collect data during a pre-pilot period, which began on July 1, 2019 and terminated on December 31, 2019.

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. In late 2018, we surveyed our employees to further assess how we, as a company, are living up to our core values, and have taken actions based on the results of the survey to further our embodiment of 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.

Adverse macroeconomic conditions, including recessions, inflation, high unemployment, government shutdowns, currency fluctuations, interest rate changes, geopolitical events, climate change, international trade disputes, including the imposition of tariffs or other protectionist measures, 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, and in turn impact our business. 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 substantial portion of our revenues are derived from market data fees and fees for transactions executed and cleared in our markets. Our market data-based revenues are largely subscription-based, or recurring, and are generated from a range of global financial and commodity markets, including pricing and reference data, exchange data, analytics, feeds, index services, desktops and connectivity solutions. For our transaction-based revenues, we derive a significant percentage from trading in global energy and agricultural-related futures and options contracts, as well as equity transactions and global interest rate contracts. The market data subscriptions and trading volumes in our markets could decline substantially if our market participants reduce their level of spending or trading activity for any reason, including:

- adverse market conditions that curtail the addition of new customers or cause a decrease in purchases by our existing customers for our subscription-based products and services;
- weakness in the macroeconomic environment that causes our customers to delay or cancel existing orders or subscriptions;
- cost-cutting pressures across the industry or decrease in demand for our subscription-based products and services that lead to a reduction in price;
- consolidation in our markets or the markets of our customers that results in a reduction in the number of market participants;
- 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;
- the impact of climate change;
- a prolonged decrease in volatility in the financial markets;
- heightened capital requirements or mandated reductions in leverage resulting from new regulations;
- 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 on the NYSE specifically. A stagnation or a decline in the IPO market, or issuers choosing to list on venues other than the NYSE, could have an adverse effect on our revenues.

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.

In 2016, a majority of voters in the U.K. approved an exit from the EU, commonly referred to as Brexit. 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. In addition, political and economic uncertainty surrounding the terms of Brexit 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 following a transitional period.

Following the formation of a majority Conservative government in December 2019, the U.K. withdrew from the EU on January 31, 2020. The future relationship between the U.K. and the EU remains uncertain as the U.K. and the EU work through the transition period that provides time for them to negotiate the details of their future relationship. The transition period is currently expected to end on December 31, 2020, and, if no agreement is reached, the default scenario would be a “no-deal” Brexit. In the event of a no-deal Brexit, the U.K. will leave the EU with no agreements in place beyond any temporary arrangements that 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. A large portion of our operations are conducted in the U.K. As a result, a no-deal Brexit could restrict access to our services by persons located in the EU or make access more expensive, which could adversely affect our operations and 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 our 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. We face the risk of significant actions by regulatory and taxing authorities in all jurisdictions in which we conduct our businesses and hold investments, which may affect our business, the activity of our market participants, and 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 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 this area, such as the European Union General Data Protection Regulation, and the California Consumer Privacy Act, and other jurisdictions are considering imposing additional restrictions. The laws and regulations related to privacy and data protection 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. Regulation of privacy and data protection often times require monitoring of, and changes to, our data practices in regard to the collection, use, disclosure, storage, transfer and/or security of personal and sensitive information.

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 either lower or higher than the limits in 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, could significantly increase the regulatory compliance costs for our customers and could significantly impact trading activity, 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, EMIR 2.2, 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. Compliance with these requirements has resulted in, and will continue to result in, additional operating costs.

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 SRO participants to begin reporting to the CAT. Due to delays in implementation and failure to implement required functionality, there is an increased risk to SROs (which include 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 SROs and broker-dealers. To date, however, funding has been provided solely by the SROs, partly in exchange for promissory notes, which increases the risk that SROs, including us, will not be reimbursed for costs expended to date. Due to delays and failures in implementation and functionality by the original plan processor, as well as recently published proposals by the SEC for an amended timeline and implementation structure, we recorded promissory note impairment charges of $16 million in 2019. We believe the risk that SROs are not reimbursed has increased, resulting in this impairment. Until the SEC approves a funding model that shares the cost of the CAT between the SROs and broker-dealers, the SROs may continue to incur additional costs, which may become significant and may not be reimbursed. As of December 31, 2019, we have accrued approximately $7 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.

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 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 existing rules, regulations and laws and changing rules, regulations and laws largely depends 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 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 acquisition of Interactive Data, we operate an SEC-registered investment adviser. Investment advisers are subject to significant regulatory obligations under the Investment Advisers Act. Prior to this acquisition, 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 and our acquisition of TMC Bonds in July 2018 exposes us to increased exposure to regulatory scrutiny from the SEC, FINRA and MSRB.

Our regulators have broad enforcement powers to censure, fine, issue cease-and-desist orders, embargo future business activity or prohibit us from engaging in some of our businesses. We have settled certain regulatory actions in the past, including NYSE's settlement with the SEC in March 2018 in which we agreed to pay a $14 million civil monetary penalty. We continue to face the risk of significant intervention by regulatory authorities, including extensive examination and surveillance activity of our business. 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.

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 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, and imposition of protectionist measures;
- 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 have in the past, and could in the future, 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 cybersecurity risks, especially in light of our role in the global financial marketplace, which could result in wrongful manipulation, disclosure, destruction, or use of our information or that of a third party, or which could make our participants unable or reluctant to use our electronic platforms.

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 and other 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, ransomware 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 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 subject to 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 experienced a coordinated set of sophisticated Distributed Denial of Service, or DDoS, attacks in 2019 that activated our detection and response measures, which mitigated the impact. In response to these threats, we also engaged our threat intelligence and risk assessment functions to perform root-cause analysis and continue to refine controls. 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 future attacks, losses or reduced trading volume in our markets. 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.

Further, cybersecurity threats to, and incidents involving, vendors and other third-parties who support our activities - particularly those with less-sophisticated defenses - could impact us. During 2019, we became aware of three separate vendors who were materially impacted by significant ransomware attacks. Although we were able to shift reliance away from each of these vendors quickly, these incidents demonstrate the potential for cybersecurity incidents of third parties to have a material impact despite the efforts we make to minimize concentration risk and ensure the cyber resiliency of our vendors.

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 $32.5 billion as of December 31, 2019 and a total of $65.0 billion for all of our clearing houses as of December 31, 2019. The ICE Clearing Houses may use third-party investment advisors for investment of cash assets, subject to the guidelines provided by each clearing house, 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, in September 2019, we added a layer of insurance to our clearing member default protection. The default insurance layer resides after and in addition to the ICE Clear Credit, ICE Clear Europe, and ICE Clear U.S. Skin In The Game contributions and before the guaranty fund contributions of the non-defaulting clearing members. The default insurance has a three-year term, subject to renewal. Notwithstanding these actions, 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, 2019, our clearing houses held $58.2 billion of non-cash margin or guaranty fund contributions in U.S. and other sovereign treasury securities: $44.5 billion of this amount was comprised of U.S. Treasury securities, $2.4 billion of French Treasury securities, $1.6 billion of German Treasury securities, $1.4 billion of U.K. Treasury securities and $8.3 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 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 in a specific currency relied upon by our clearing houses, 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.

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. 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 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. In addition, 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.

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;
- providers of digital solutions, including providers of mortgage services;
- 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 work together to achieve more favorable terms or 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. Some of our competitors may have greater capital and resources, offer a wide range of products and services or operate under less stringent regulatory regimes than we do.

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.

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 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 issued an order setting aside certain market data fees imposed by NYSE Arca, Inc. and Nasdaq Stock Market LLC that 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 or market access, 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 EC or future European court decisions in a manner that could have an adverse effect on our European market data revenues.

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

Certain of our subsidiaries produce and license multiple global benchmarks and indices across asset classes, and a significant portion of our trading and clearing volume references these benchmarks and indices. To ensure continued trading and clearing in these benchmark-related products, and the continued licensing and use of these benchmarks and indices, our subsidiaries must be able to demonstrate that these benchmarks and indices are administered with integrity and are not readily subject to manipulation and must also continue to evolve these benchmarks and indices as necessary to maintain their reliability and relevance. As an example, our subsidiary, IBA, is the administrator of various global benchmarks, including LIBOR. IBA assumed the administration of LIBOR following various cases of attempted manipulation and misconduct related to the LIBOR benchmark that emerged following the financial crisis. Any failures, negative publicity or lawsuits related to our subsidiaries' administration of benchmarks and indices, including LIBOR, could result in a loss of confidence in the administration of these benchmarks and indices and could harm our business and our reputation. In 2019, ICE and certain affiliates were named as defendants in three virtually identical proposed class action lawsuits regarding the administration of LIBOR that allege that ICE and certain affiliates, along with 18 multinational banks, engaged in a conspiracy to set the U.S. Dollar LIBOR benchmark at artificially low levels. ICE and its affiliates intend to vigorously defend this action.

The replacement of, or transition from, our subsidiaries' benchmarks and indices, including LIBOR, or any other changes or reforms to the determination or administration of such benchmarks and indices, could have an adverse impact on our business, financial condition and operating results. In July 2017, the FCA stated its intention that it would no longer be necessary to sustain LIBOR through its influence or legal powers beyond 2021. As such, there is no guarantee that any LIBOR settings will continue to be published after year-end 2021. Alternative risk free reference rates have been selected for the various LIBOR currencies by working groups in each relevant jurisdiction, and global regulators have advocated for a transition from LIBOR to these alternative rates by year-end 2021. In the U.S., the Federal Reserve Board and the Federal Reserve Bank of New York, or New York Fed, convened the Alternative Reference Rates Committee, which selected the SOFR as the alternative risk free rate for U.S. Dollars. The New York Fed started publishing SOFR in April 2018 and developed a “Paced Transition Plan” of key steps and milestones to encourage its adoption. The transition from LIBOR to alternative rates in the various LIBOR currencies is at different stages and is proceeding at different speeds. We continue to monitor industry and regulatory developments, but it is not yet possible to predict with certainty how the transition from LIBOR will be implemented, whether recommendations and proposals from industry groups will be broadly accepted, and what effect the transition from LIBOR may have on the markets that use the benchmark today.

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.

Our success depends on our ability to maintain and expand our product offerings, our customer base and our technology. 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 have implemented 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.

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 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 use of "open source" software could negatively impact our ability to sell our products and services and subject us to litigation.

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. Further, open-source licensors generally do not provide technology support, maintenance, warranties or assurance of title or controls on the origin of the software, which can also lead to greater risks than use of third-party commercial software.

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, including our ability to recover from the loss of one of our primary data centers, 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 have experienced system failures in the past due to telecommunication failures and hardware and software malfunctions and defects, and could experience in the future, 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. These situations 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, 2019, we had $7.8 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, placing us at a competitive disadvantage compared to our peers 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 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. We may incur additional indebtedness in the future, which could materially affect our financial condition.

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.

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 and the passage of U.S. taxation reform legislation 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 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, 2019, we had goodwill of $13.3 billion and net other intangible assets of $10.3 billion relating to our acquisitions and our purchase of trademarks and Internet domain names from various third parties.

During 2019, we recorded an impairment charge of $31 million on the remaining value of our exchange registration intangible assets on ICE Futures Singapore as a result of a decrease in fair value. 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.

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 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 experience difficulties, discontinue providing services to us for any reason or be unable to or fail to provide the type of service agreed to for any reason, 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, in 2017, the U.S. Court of Appeals for the Second Circuit, or the Second Circuit, issued a decision in City of Providence v. BATS Global Markets et al., a proposed class action case in which two of our subsidiaries, New York Stock Exchange LLC and NYSE Arca, Inc., are defendants. 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 SROs, 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 early 2019, three 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 USD 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. Subsequently, the plaintiffs re-filed these claims as a consolidated amended complaint, which ICE and the other defendants have moved to dismiss. 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 fail to complete or realize the anticipated cost savings, growth opportunities and synergies and other benefits anticipated from our 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.

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, and having adequate succession plans in place. 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.

Effective succession planning is also important to our long-term success. Failure to ensure effective transfer of knowledge and smooth transitions involving key employees could hinder our strategic planning and execution. Further, changes in our management team may be disruptive to our business, and any failure to successfully integrate key new hires or promoted employees could adversely affect our business and results of operations.

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.

We have a majority ownership interest in Bakkt Holdings, LLC and by extension, its subsidiaries (collectively, "Bakkt"). Bakkt intends to create an integrated platform that enables consumers and institutions to transact in digital assets, which include cryptocurrencies and other assets, such as loyalty and rewards points. In 2019, Bakkt launched a custodial solution for Bitcoin futures traded on ICE Futures U.S. and other related trading products based on those futures. In the future, Bakkt plans to launch additional products and services, including a consumer platform that will enable consumers to buy, sell, store, and spend digital assets. Due to our majority ownership interest in Bakkt, we have increased financial and reputational risks if there is a failure to launch one or more products, or if the launch of a new product is unsuccessful. Also, there can be no assurance that we will receive the necessary regulatory approvals or support from customers to launch products as planned, 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 products, systems or personnel into its business operations; and
- maintain trading volume in Bakkt's Bitcoin futures contract, or any subsequent products released by Bakkt.

As digital assets and blockchain technologies evolve, 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. 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.

At present, Bakkt is heavily dependent on trading volume from 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.

While Bakkt maintains insurance policies, they may not be adequate to reimburse us for losses caused by security breaches, and 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.

As Bakkt expands into its consumer business, its business will involve the collection, storage, processing, and transmission of customers' personal data, including financial information. An increasing number of organizations, including large merchants, businesses, technology companies, and financial institutions, as well as government institutions, have disclosed breaches of their information security systems, some of which have involved sophisticated and highly targeted attacks, including on their websites, mobile applications, and infrastructure.

The techniques used to obtain unauthorized, improper, or illegal access to Bakkt's systems, its data or customers' data, disable or degrade service, or sabotage systems are constantly evolving and have become increasingly complex and sophisticated, may be difficult to detect quickly, and may only be recognized or detected after they have been launched against a target. Due to the nature of the Bakkt business and industry, unauthorized parties have attempted, and we expect they will continue to attempt, to gain access to Bakkt's systems or facilities through various means, including hacking into Bakkt's systems or facilities or those of its customers, partners, or vendors, or attempting to fraudulently induce (for example, through spear phishing attacks) its employees, customers, partners, vendors, or other users into disclosing user names, passwords, payment information, or other sensitive information, which may in turn be used to access our systems. Certain efforts may be state-sponsored and supported by significant financial and technological resources, making them even more sophisticated and difficult to defend against and detect. Numerous and evolving cybersecurity threats, including advanced and persistent cyber-attacks, phishing and social engineering schemes, could compromise the confidentiality, availability, and integrity of the data in our systems. We believe that Bakkt is a particularly attractive target for such attacks due to its industry, name, and brand recognition. Although we have developed systems and processes designed to protect our data, customer data, systems, personnel, and facilities from data loss and other security breaches, and expect to continue to expend significant resources to bolster these protections, there can be no assurance that these security measures will be sufficient.

Bakkt's information technology and infrastructure may be vulnerable to cyber-attacks or security breaches, and unauthorized third parties may be able to access its customers' personal or confidential information and other sensitive data that are stored on or accessible through those systems. We may experience breaches of our security measures due to human error, malfeasance, system errors or vulnerabilities in either Bakkt systems or authorized third-party systems that Bakkt relies on. Cybersecurity threats to, and incidents involving, third parties who support our activities - particularly those with less-sophisticated defenses - could impact us despite the efforts we make to ensure their cyber resiliency.

Bakkt expects to expend significant additional resources to protect against security or privacy breaches, and may be required to redress problems caused by breaches. Financial services regulators in various jurisdictions, including the U.S., have implemented authentication requirements for banks and payment processors intended to reduce online fraud, which could impose significant costs, require us to change our business practices, make it more difficult for new customers to join Bakkt, or reduce the ease of use of our products, any of which could harm our business.

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 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 has 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.

In addition, as Bakkt expands its business to new products and services, it will come under the jurisdiction of additional regulators - both with respect to jurisdiction (inside and outside the U.S.) and subject matter (payments, consumer protection, and other areas). Any failure or perceived failure to comply with existing or new laws, regulations, or orders of any governmental authority (including changes to or expansion of the interpretation of those laws, regulations, or orders), including those discussed in this risk factor, may subject Bakkt to significant fines, penalties, criminal and civil lawsuits, forfeiture of significant assets, and enforcement, result in additional compliance and licensure requirements, increase regulatory scrutiny of its business, restrict Bakkt's operations, and force Bakkt to change its business practices, make product or operational changes, or delay planned product launches or improvements. Bakkt has implemented policies and procedures designed to help ensure compliance with applicable laws and regulations, but there can be no assurance that its employees, contractors, or agents will not violate such laws and regulations.

The characteristics of digital currency have been, and may in the future continue to be, exploited to facilitate illegal activity such as fraud, money laundering, tax evasion and ransomware scams; if any of our customers do so or are alleged to have done so, it could adversely affect us.

Digital currencies and the digital currency industry are relatively new and, in many cases, lightly regulated or largely unregulated. Some types of digital currency have characteristics, such as the speed with which digital currency transactions can be conducted, the ability to conduct transactions without the involvement of regulated intermediaries, the ability to engage in transactions across multiple jurisdictions, the irreversible nature of certain digital currency transactions and encryption technology that anonymizes these transactions, that make digital currency particularly susceptible to use in illegal activity such as fraud, money laundering, tax evasion and ransomware scams.

While we believe that Bakkt's risk management and compliance framework is reasonably designed to detect any such illicit activities, we cannot ensure that we will be able to detect any such illegal activity in all instances. Because the speed, irreversibility and anonymity of certain digital currency transactions make them more difficult to track, fraudulent transactions may be more likely to occur. Bakkt may be specifically targeted by individuals seeking to conduct fraudulent transfers, and it may be difficult or impossible for us to detect and avoid such transactions in certain circumstances.

Bakkt is subject to anti-money laundering and counter terrorist financing laws and regulations globally, including the USA PATRIOT Act, as well as economic and trade sanctions programs, including those imposed and administered by the U.S. Department of the Treasury's Office of Foreign Assets Control, or OFAC. Under OFAC's economic sanctions program, Bakkt is prohibited from financial transactions and other dealings with certain countries and geographies (currently, Crimea, Cuba, Iran, North Korea and Syria) and with persons and entities included in OFAC sanctions lists, including its list of Specially Designated Nationals and Blocked Persons. Currently, Iran, Sudan and Syria have been identified by the U.S. State Department as terrorist-sponsoring states. Bakkt is also subject to anti-corruption laws and regulations globally, including the U.S. Foreign Corrupt Practices Act and the U.K. Bribery Act. Bakkt has implemented policies and procedures designed to help ensure compliance with these laws and regulations, but there can be no assurance that its employees or agents will not violate such laws and regulations. A failure by Bakkt or its employees or agents to comply with such laws and regulations and subsequent judgment or settlement against Bakkt under these laws could subject Bakkt to monetary penalties, damages, and/or have a significant reputational impact.

ITEM 1 (B). UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

The net book value of our property was $1.5 billion as of December 31, 2019. 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 2.6 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	Owned/Leased	Lease Expiration	Approximate Size
5660 New Northside Drive Atlanta, Georgia	Owned	N/A	273,000 sq. ft.
11 Wall Street New York, New York	Owned	N/A	370,000 sq. ft.
Basildon, U.K.	Owned	N/A	539,000 sq. ft.
Mahwah, New Jersey	Leased	2029	396,000 sq. ft.
55 East 52nd Street New York, New York	Leased	2028	94,000 sq. ft.
Skyview Tower Hyderabad, India	Leased	2024	84,000 sq. ft.
32 Crosby Drive Bedford, Massachusetts	Leased	2026	82,000 sq. ft.
Milton Gate London, U.K.	Leased	2024	72,000 sq. ft.
Fitzroy House London, U.K.	Leased	2025	68,000 sq. ft.
100 Church Street New York, New York	Leased	2024	65,000 sq. ft.
132 Menachem Begin Rd Tel Aviv, Israel	Leased	2022	57,000 sq. ft.
353 North Clark Street Chicago, Illinois	Leased	2027	57,000 sq. ft.

In addition to the above, we currently lease an aggregate of nearly 460,000 square feet of administrative, sales and disaster preparedness facilities in various cities around the word. 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 3, 2020, there were approximately 494 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, current and future planned strategic growth initiatives, 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, 2019:

- 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

The 2009 Omnibus Incentive Plan 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. 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)) (in thousands) (c)
Equity compensation plans approved by security holders(1)	8,078	(1)	$ 51.87	(1)	34,184
Equity compensation plans not approved by security holders(2)	89	(2)	—	(2)	—
TOTAL	8,167		$ 51.87		34,184

(1) 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 2017 Omnibus Employee Incentive Plan was approved by our stockholders in May 2017. Of the 8.1 million securities to be issued upon exercise, 3.5 million are options with a weighted average exercise price of $51.87 and the remaining 4.6 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.

(2) This category includes the 2003 Restricted Stock Deferral Plan for Outside Directors. All of the 89,000 securities 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, 2019.

Period (2019)	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	1,305	$93.17	15,076	$758
November 1 - November 30	1,149	$92.64	16,225	$652
December 1 - December 31	1,207	$92.73	17,432	$540
Total	3,661	$92.86	17,432	$540

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 2019, 2018 and 2017 and as of December 31, 2019 and 2018 from our audited consolidated financial statements, which are included in this Annual Report. We derived the financial data for 2016 and 2015 and as of December 31, 2017, 2016 and 2015 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,				
	2019	2018	2017	2016	2015
	(In millions, except for per share data)				
Consolidated Statement of Income Data:					
Revenues:					
Transaction and clearing, net[1]	$ 3,627	$ 3,483	$ 3,131	$ 3,384	$ 3,228
Data services	2,211	2,115	2,084	1,978	871
Listings	449	444	426	432	405
Other revenues	260	234	202	177	178
Total revenues	6,547	6,276	5,843	5,971	4,682
Transaction-based expenses[1]	1,345	1,297	1,205	1,459	1,344
Total revenues, less transaction-based expenses	5,202	4,979	4,638	4,512	3,338
Operating expenses:					
Compensation and benefits	1,042	994	946	953	611
Professional services	125	131	121	137	139
Acquisition-related transaction and integration costs[2]	2	34	36	80	88
Technology and communication	469	432	397	374	203
Rent and occupancy	68	68	69	70	57
Selling, general and administrative	161	151	155	116	116
Depreciation and amortization	662	586	535	610	374
Total operating expenses	2,529	2,396	2,259	2,340	1,588
Operating income	2,673	2,583	2,379	2,172	1,750
Other income (expense), net[3]	(192)	(63)	147	(129)	(97)

	2019	2018	2017	2016	2015
	Year Ended December 31,				
	(In millions, except for per share data)				
Income before income tax expense (benefit)	2,481	2,520	2,526	2,043	1,653
Income tax expense (benefit)(4)	521	500	(28)	586	358
Net income	$ 1,960	$ 2,020	$ 2,554	$ 1,457	$ 1,295
Net income attributable to non-controlling interest	(27)	(32)	(28)	(27)	(21)
Net income attributable to ICE	$ 1,933	$ 1,988	$ 2,526	$ 1,430	$ 1,274
Basic earnings per share attributable to ICE common stockholders:					
Basic earnings per share	$ 3.44	$ 3.46	$ 4.29	$ 2.40	$ 2.29
Basic weighted average common shares outstanding(5)	561	575	589	595	556
Diluted earnings per share attributable to ICE common stockholders:					
Diluted earnings per share	$ 3.42	$ 3.43	$ 4.25	$ 2.39	$ 2.28
Diluted weighted average common shares outstanding(5)	565	579	594	599	559
Dividend per share	$ 1.10	$ 0.96	$ 0.80	$ 0.68	$ 0.58

(1) Our transaction and clearing fees are presented net of rebates paid to our customers. We also report 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.

(2) Acquisition-related transaction and integration costs include fees for investment banking advisors, lawyers, accountants, tax advisors and public relations firms, 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 and 2015 relating to our NYSE acquisition, primarily related to employee termination costs, lease terminations costs, transaction-related bonuses and professional services costs incurred relating to the integrations.

(3) Other income (expense), net during 2019 includes a $16 million impairment on promissory notes, interest expense of $285 million and interest income of $35 million. 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.

(4) 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.

(5) The weighted average common shares outstanding decreased in 2019 and 2018 primarily due to our share repurchases. The weighted average common shares outstanding increased in 2016 primarily due to the stock issued for the Interactive Data and Trayport acquisitions. We issued 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,				
	2019	2018	2017	2016	2015
			(In millions)		
Consolidated Balance Sheet Data					
Cash and cash equivalents	$ 841	$ 724	$ 535	$ 407	$ 627
Margin deposits, guaranty funds and delivery contracts receivable[1]	64,987	63,955	51,222	55,150	51,169
Total current assets	67,979	66,692	53,562	57,133	53,313
Goodwill and other intangible assets, net	23,600	23,547	22,485	22,711	22,837
Total assets	94,493	92,791	78,264	82,003	77,987
Margin deposits, guaranty funds and delivery contracts payable[1]	64,987	63,955	51,222	55,150	51,169
Total current liabilities	68,816	66,108	54,175	58,617	54,743
Short-term and long-term debt	7,819	7,441	6,100	6,364	7,308
Equity	17,286	17,231	16,985	15,775	14,840

(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.

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. For discussion related to the results of operations and changes in financial condition for fiscal 2018 compared to fiscal 2017 refer to Part II, Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations in our 2018 Annual Report on Form 10-K, which was filed with the U.S. Securities and Exchange Commission on February 7, 2019.

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 a broad array of derivatives contracts and securities across major asset classes, including energy and agricultural commodities, metals, interest rates, equities, ETFs, credit derivatives, digital assets, bonds and currencies, and also offer mortgage and technology services. In addition, we 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 trading venues 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 clearing houses in the U.S., U.K., EU, Canada and Singapore. We offer a range of data services, globally, for 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 to manage risk and raise capital through liquid markets, benchmark products, access to capital markets and related services. Our business is 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. and U.K.

Recent Developments

Acquisition of Simplifile

On June 12, 2019, we acquired Simplifile for $338 million in cash. The cash consideration was gross of $12 million in cash held by Simplifile on the date of acquisition. Simplifile offers an array of mortgage services, primarily serving as an electronic liaison between lenders, settlement agents and county recording offices, streamlining the local recording of residential mortgage transactions. Simplifile has a presence in over half of U.S. counties, representing over 80% of the U.S. population. The transaction expands the ICE Mortgage Services portfolio, which includes MERS.

Launch of Bakkt Bitcoin Futures Contract

On September 23, 2019, the Bakkt Bitcoin Futures contract launched and on December 9, 2019, options on Bitcoin futures launched. These contracts are traded on ICE Futures U.S. and cleared through ICE Clear U.S. Bakkt was approved by the New York State Department of Financial Services to take custody of digital assets through Bakkt Trust Company, LLC, a qualified custodian. Bakkt Trust takes custody of bitcoin for physically-delivered futures, creating the first fully regulated marketplace to transact physically-delivered digital asset futures. In connection with the launch of the Bakkt Bitcoin Futures contract, Bakkt contributed $35 million to the ICE Clear U.S. guaranty fund in September 2019, solely applicable to any losses associated with a default in Bitcoin contracts and other digital asset contracts that ICE Clear U.S. might clear in the future. Since launch, 2019 volume in physically-delivered Bakkt Bitcoin Daily and Monthly Futures was 85,413 contracts with open interest of 505 contracts at December 31, 2019. Bakkt Bitcoin options volume was 68 contracts in 2019 with open interest of 51 contracts at December 31, 2019.

Launch of ETF Hub

On October 21, 2019, we launched ICE ETF Hub, a new platform designed to bring efficiencies and standardization to the ETF primary trading market, where shares of ETFs are created and redeemed. ICE ETF Hub aims to offer a standardized, automated process for assembling and placing creation and redemption baskets. ICE ETF Hub plans to include ICE Data Services' pricing, reference data and analytics, connectivity and feeds, as well as connections to ICE Bonds, which provides fixed income execution protocols for asset classes including municipals, corporates, treasuries, agencies and certificates of deposit.

Agreement to Acquire Bridge2 Solutions

On February 5, 2020, we agreed to acquire Bridge2 Solutions, a leading provider of loyalty solutions for merchants and consumers, contingent on completion of Hart-Scott-Rodino review. Following the completion of the transaction, Bakkt intends to acquire Bridge2 Solutions from ICE. Bridge2 Solutions enables some of the world's leading brands to engage customers and drive loyalty. It powers incentive and employee perk programs for companies across a wide spectrum of industries.

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):

REVENUES, LESS TRANSACTION-BASED EXPENSES

Trading and Clearing Segment

Data and Listings Segment

OPERATING INCOME

Trading and Clearing Segment

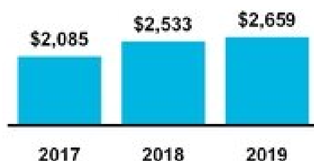
Data and Listings Segment

ADJUSTED OPERATING INCOME (1)

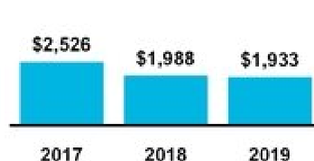
Trading and Clearing Segment

Data and Listings Segment

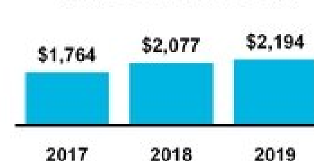
CASH FLOWS FROM OPERATIONS



NET INCOME ATTRIBUTABLE TO ICE



ADJUSTED NET INCOME ATTRIBUTABLE TO ICE (1)



	Year Ended December 31,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Revenues, less transaction-based expenses	$ 5,202	$ 4,979	4 %	$ 4,979	$ 4,638	7 %
Operating expenses	$ 2,529	$ 2,396	6 %	$ 2,396	$ 2,259	6 %
Adjusted operating expenses[1]	$ 2,189	$ 2,071	6 %	$ 2,071	$ 1,947	6 %
Operating income	$ 2,673	$ 2,583	3 %	$ 2,583	$ 2,379	9 %
Adjusted operating income[1]	$ 3,013	$ 2,908	4 %	$ 2,908	$ 2,691	8 %
Operating margin	51%	52%	(1 pt)	52%	51 %	1 pt
Adjusted operating margin[1]	58%	58%	—	58%	58 %	—
Other income (expense), net	$ (192)	$ (63)	203 %	$ (63)	$ 147	n/a
Income tax expense (benefit)	$ 521	$ 500	4 %	$ 500	$ (28)	n/a
Effective tax rate	21%	20%	1 pt	20%	(1)%	21 pts
Net income attributable to ICE	$ 1,933	$ 1,988	(3)%	$ 1,988	$ 2,526	(21)%
Adjusted net income attributable to ICE[1]	$ 2,194	$ 2,077	6 %	$ 2,077	$ 1,764	18 %
Diluted earnings per share attributable to ICE common stockholders	$ 3.42	$ 3.43	— %	$ 3.43	$ 4.25	(19)%
Adjusted diluted earnings per share attributable to ICE common stockholders[1]	$ 3.88	$ 3.59	8 %	$ 3.59	$ 2.97	21 %
Cash flows from operating activities	$ 2,659	$ 2,533	5 %	$ 2,533	$ 2,085	21 %

[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 $223 million in 2019 from 2018. The increase in revenues includes $34 million in unfavorable foreign exchange effects arising from the stronger U.S. dollar in 2019 from 2018.
- 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.
- Operating expenses increased $133 million in 2019 from 2018. The increase in operating expenses includes $14 million in favorable foreign exchange effects arising from the stronger U.S. dollar in 2019 from 2018.
- 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.
- 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/(expense), 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.
- The 2019 effective tax rate is higher than the 2018 effective tax rate primarily due to the 2018 discrete tax benefits from the acquisition of MERS and the divestiture of Trayport exceeding the net increased tax benefits recorded in 2019 from certain international tax provisions under the U.S. Federal Tax Cuts and Jobs Act, or TCJA.
- 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, our divestiture of Trayport and deferred tax benefits from the U.S. tax rate reduction resulting from changes in estimates.

Business Environment and Market Trends

Our business environment has been characterized by:

- globalization of marketplaces, customers and competitors;
- commodity, interest rate and financial markets uncertainty;
- growing demand for data to inform customers' risk management and investment decisions;
- evolving, increasing and disparate regulation across multiple jurisdictions;
- price volatility increasing customers' demand for risk management services;
- increasing focus on capital and cost efficiencies;
- customers' preference to manage risk in markets demonstrating the greatest depth of liquidity and product diversity;
- the evolution of existing products and new product innovation to serve emerging customer needs and changing industry agreements;
- rising demand for speed, data, data capacity and connectivity by market participants, necessitating increased investment in technology; and
- consolidation and increasing competition among global markets for trading, clearing and listings.

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 non-U.S. 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.

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 34% in 2014 to 51% in 2019. This non-transaction revenue includes data services and listings.

We have invested, and continue to invest significant resources, in our proprietary ICE Global Network and cybersecurity protections to minimize the potential impact of a wide-scale cyber interruption, system outages or global regulatory drive to

move critical infrastructure and/or sensitive financial transactions away from the public Internet. We believe that our current and historic investments in this space position us well competitively to accommodate increased costs of compliance, assurance, or incident response, however, trends in nationalism and data privacy could result in requirements that necessitate increases in staffing or the introduction of local data collection, and such requirements could undermine our synergistic centralized service model. Further, a prolonged and impactful cyber-attack on any of our market participants could drive the industry away from electronification and reduce the market advantages we have realized through automation.

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, and prudently manage expenses, in order to mitigate these uncertainties and to build on our growth opportunities by leveraging our proprietary data, clearing and markets.

Segment Results

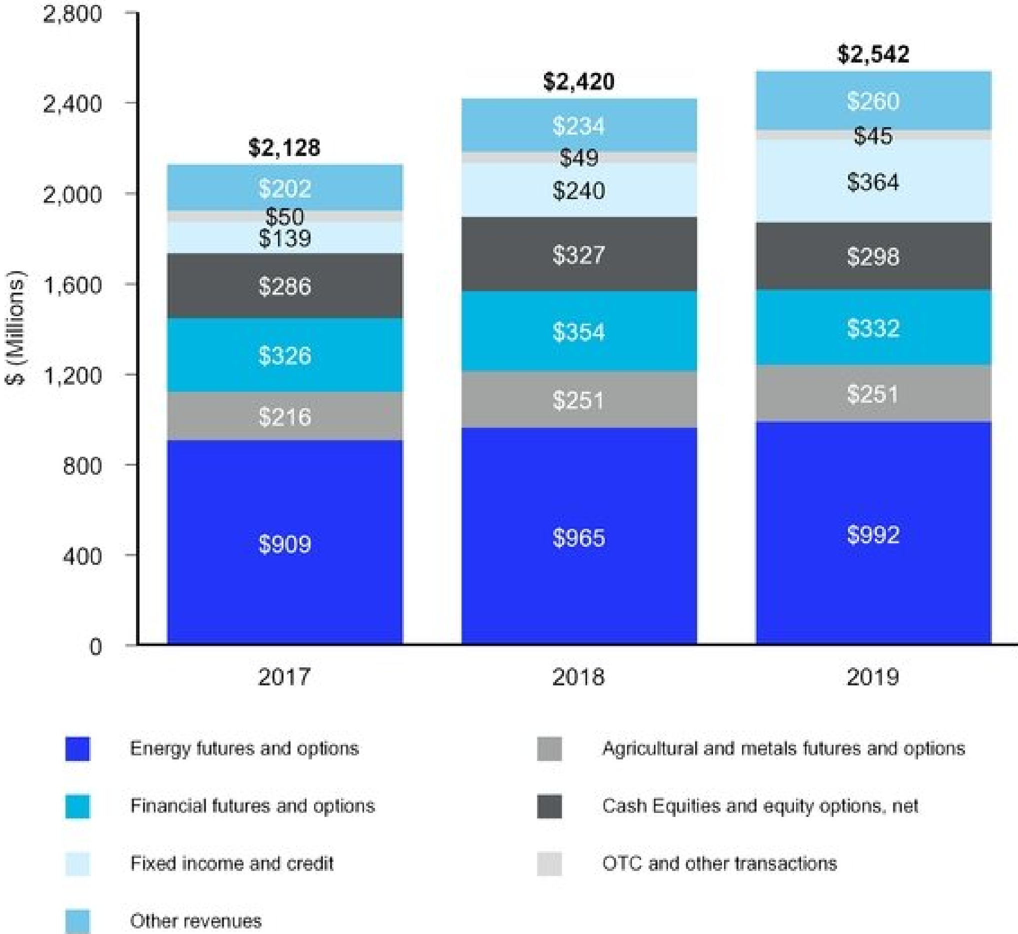
Our business is conducted through two reportable business segments:

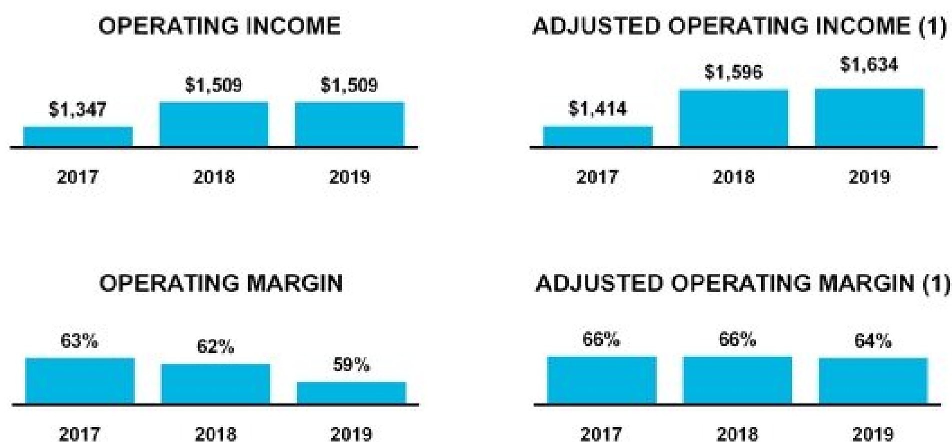
- Trading and Clearing, which comprises our transaction-based execution and clearing businesses; and
- Data and Listings, which comprises our subscription-based data services and securities listings businesses.

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. For details on trends in recent prior year periods, refer to our 2018 and 2017 Annual Reports on Form 10-K.

Trading and Clearing Segment

The following presents selected statements of income data for our Trading and Clearing 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,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Revenues:						
Energy futures and options contracts	$ 992	$ 965	3 %	$ 965	$ 909	6 %
Agricultural and metals futures and options contracts	251	251	—	251	216	16
Financial futures and options contracts	332	354	(6)	354	326	9
Cash equities and equity options	1,643	1,624	1	1,624	1,491	9
Fixed income and credit	364	240	52	240	139	72
OTC and other transactions	45	49	(8)	49	50	(2)
Transaction and clearing, net	3,627	3,483	4	3,483	3,131	11
Other revenues	260	234	11	234	202	16
Revenues	3,887	3,717	5	3,717	3,333	12
Transaction-based expenses	1,345	1,297	4	1,297	1,205	8
Revenues, less transaction-based expenses	2,542	2,420	5	2,420	2,128	14
Other operating expenses	763	686	11	686	592	16
Depreciation and amortization	268	215	24	215	187	16
Acquisition-related transaction and integration costs	2	10	(81)	10	2	n/a
Operating expenses	1,033	911	13	911	781	17
Operating income	$ 1,509	$ 1,509	— %	$ 1,509	$ 1,347	12 %

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. 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 2019 and 2018, 19% and 20%, 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 compared to the

U.S. dollar, our Trading and Clearing segment revenues, less transaction-based expenses, were lower by $25 million in 2019 from 2018.

Our transaction and clearing revenues are presented net of rebates. We recorded rebates of $860 million and $844 million in 2019 and 2018, 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 increased volumes in products with higher rates per contract, an increase in the number of rebate programs offered and an increase in the number of participants within our energy futures and options programs.

- **Energy Futures and Options Contracts:** Total energy volume decreased 3% and revenues increased 3% in 2019 from 2018.
  - Total oil volume decreased 2% in 2019 from 2018 primarily driven by lower volumes within Brent, partially offset by strength in our Other Crude and Refined Products complex.
  - Our global natural gas futures and options volume decreased 6% in 2019 from 2018. The volume decrease was primarily due to lower Henry Hub volumes and was partially offset by increased volumes in our European TTF gas contract. The strength in our European TTF gas volumes was driven by the continued emergence of TTF as the European benchmark for natural gas as natural gas continues to globalize.
  - Emission futures and options volumes increased 2% in 2019 from 2018 driven by higher carbon prices and supply-demand dynamics impacted by regulatory uncertainty.
- **Agricultural and Metals Futures and Options Contracts:** Total volume in our agricultural and metals futures and options markets increased 4% and revenues were flat in 2019 from 2018. The overall increase in agricultural volumes was primarily driven by price volatility resulting from supply and demand dynamics, including weather concerns and geopolitical events.
  - Sugar futures and options volumes increased 2% in 2019 from 2018.
  - Other agricultural and metal futures and options volume increased 5% in 2019 from 2018.
- **Financial Futures and Options Contracts:** Total volume and revenues in our financial futures and options markets decreased 11% and 6%, respectively, in 2019 from 2018.
  - Interest rate futures and options volume and revenue decreased 13% and 15%, respectively, in 2019 from 2018 driven, in part, by a muted European economic backdrop. Interest rate futures and options revenues were $196 million and $230 million in 2019 and 2018, respectively.
  - Other financial futures and options volume, which includes our MSCI®, FTSE® and NYSE FANG+ equity index products, decreased 1% and revenue increased 10% in 2019 from 2018. Other financial futures and options volume decreased due to lower equity market volatility than in the prior year while revenues increased due to strong volumes in our MSCI® complex. Other financial futures and options revenues were $136 million and $124 million in 2019 and 2018, respectively.
- **Cash Equities and Equity Options:** Cash equities handled volume was flat in 2019 from 2018. Cash equities revenues, net of transaction-based expenses, were $203 million and $220 million in 2019 and 2018, respectively. Equity options volume decreased 6% in 2019 from 2018 due to lower equity market volatility than in the prior year. Equity options revenues, net of transaction-based expenses, were $95 million and $107 million in 2019 and 2018, respectively.
- **Fixed Income and Credit:** Fixed income and credit includes revenues from ICE Mortgage Services, ICE Bonds and CDS execution and clearing. Fixed income transaction revenues in 2019 include an increase of $133 million due to acquisitions made in these businesses in late 2018 and 2019.

  CDS clearing revenues were $132 million and $139 million in 2019 and 2018, respectively. The notional value of CDS cleared was $14.7 trillion and $16.4 trillion in 2019 and 2018, respectively. CDS clearing revenues decreased in 2019 from 2018 due to lower market volatility, partially offset by record buy-side participation at our U.S. CDS clearing house, ICE Clear Credit, in terms of number of participants and single name notional cleared.

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

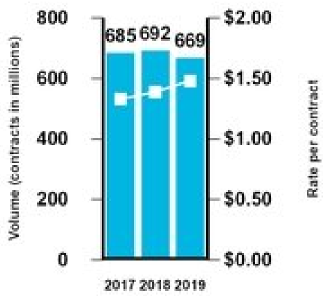
Other Revenues

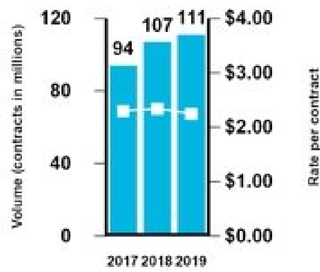
Other revenues primarily include interest income on certain clearing margin deposits, regulatory penalties and fines, fees for use of our facilities, regulatory fees charged to member organizations of our U.S. securities exchanges, designated market maker service fees, technology development fees, exchange membership fees and agricultural grading and certification fees. The increase in other revenues in 2019 from 2018 is primarily due to increased interest income earned on certain clearing margin deposits reflecting higher balances and increased interest rates, as well as due to the acquisition of Simplifile.

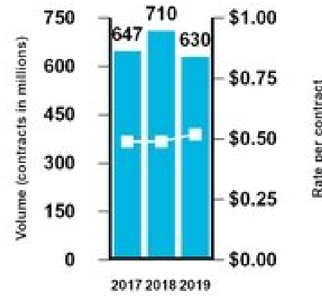
Selected Operating Data

The following charts and tables 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







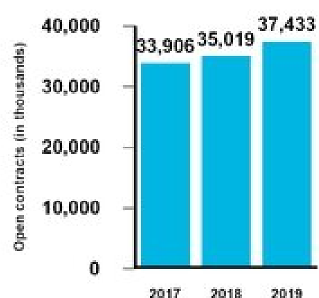
	Year Ended December 31,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Number of contracts traded (in millions):						
Energy futures and options	669	692	(3)%	692	685	1%
Agricultural and metals futures and options	111	107	4 %	107	94	15%
Financial futures and options	630	710	(11)%	710	647	10%
Total	1,410	1,509	(7)%	1,509	1,426	6%

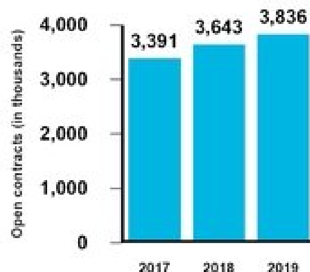
	Year Ended December 31,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Average Daily Volume of contracts traded (in thousands):						
Energy futures and options	2,655	2,747	(3)%	2,747	2,731	1%
Agricultural and metals futures and options	442	427	4 %	427	374	14%
Financial futures and options	2,460	2,770	(11)%	2,770	2,536	9%
Total	5,557	5,944	(7)%	5,944	5,641	5%

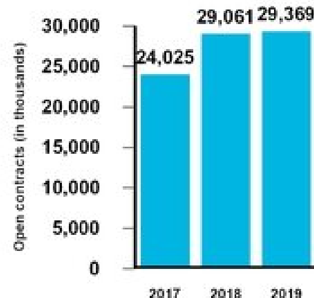
	Year Ended December 31,			Year Ended December 31,		
Rate per contract:	2019	2018	Change	2018	2017	Change
Energy futures and options	$ 1.48	$ 1.39	6 %	$ 1.39	$ 1.33	5%
Agricultural and metals futures and options	$ 2.25	$ 2.34	(4)%	$ 2.34	$ 2.30	2%
Financial futures and options	$ 0.52	$ 0.49	6 %	$ 0.49	$ 0.49	—%

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,			As of December 31,		
	2019	2018	Change	2018	2017	Change
Open interest — in thousands of contracts:						
Energy futures and options	37,433	35,019	7%	35,019	33,906	3%
Agricultural and metals futures and options	3,836	3,643	5%	3,643	3,391	7%
Financial futures and options	29,369	29,061	1%	29,061	24,025	21%
Total	70,638	67,723	4%	67,723	61,322	10%

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, or ADV, and is single counted:

	Year Ended December 31,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
NYSE cash equities (shares in millions):						
Total cash handled volume	1,740	1,735	— %	1,735	1,521	14 %
Total cash market share matched	24.2%	23.2%	1.0 pts	23.2%	22.8%	0.4 pts
NYSE equity options (contracts in thousands):						
NYSE equity options volume	3,172	3,386	(6)%	3,386	2,375	43 %
Total equity options volume	17,542	18,217	(4)%	18,217	14,697	24 %
NYSE share of total equity options	18.1%	18.6%	(0.5) pts	18.6%	16.2%	2.4 pts
Revenue capture or rate per contract:						
Cash equities rate per contract (per 100 shares)	$0.046	$0.050	(8)%	$0.050	$0.051	(2)%
Equity options rate per contract	$0.12	$0.12	(5)%	$0.12	$0.15	(17)%

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.

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 and are subject to change. 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. Section 31 fees were $379 million and $357 million in 2019 and 2018, respectively. 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 $138 million as of December 31, 2019.

We make liquidity payments to cash and options trading customers, as well as routing charges made to other exchanges which are 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. Cash liquidity payments, routing and clearing fees were $966 million and $940 million in 2019 and 2018, respectively.

Operating Expenses, Operating Income and Operating Margin

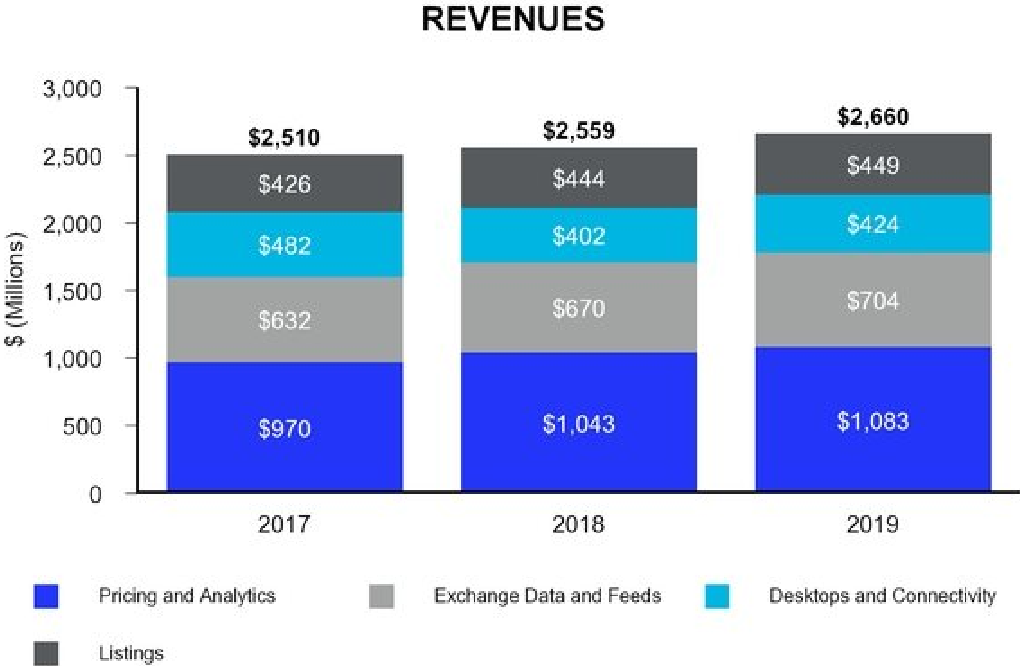
The following chart summarizes our Trading and Clearing segment's operating expenses, operating income and operating margin (dollars in millions). See "- Consolidated Operating Expenses" below for a discussion of the significant changes in our operating expenses.

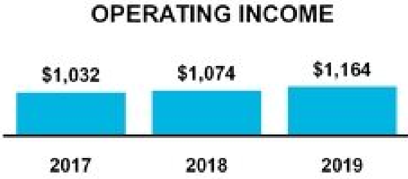
Trading and Clearing Segment:	**Year Ended December 31,**			**Year Ended December 31,**		
	2019	**2018**	**Change**	**2018**	**2017**	**Change**
Operating expenses	$ 1,033	$ 911	13%	$ 911	$ 781	17%
Adjusted operating expenses[1]	$ 908	$ 824	10%	$ 824	$ 714	16%
Operating income	$ 1,509	$ 1,509	—%	$ 1,509	$ 1,347	12%
Adjusted operating income[1]	$ 1,634	$ 1,596	2%	$ 1,596	$ 1,414	13%
Operating margin	59%	62%	(3 pts)	62%	63%	(1 pt)
Adjusted operating margin[1]	64%	66%	(2 pts)	66%	66%	—

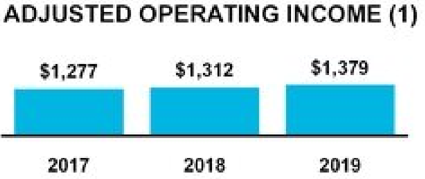
[1] The adjusted figures exclude items that are not reflective of our ongoing core operations and business performance. These adjusted numbers are not calculated in accordance with GAAP. See "- Non-GAAP Financial Measures" below.

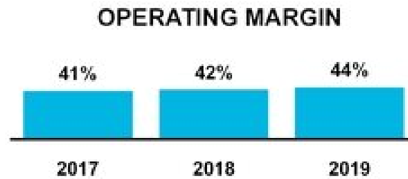
Data and Listings Segment

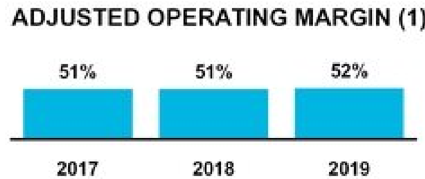
The following charts and table present our selected statements of income data for our Data and Listings segment (dollars in millions):











(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,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Revenues:						
Pricing and analytics	$ 1,083	$ 1,043	4%	$ 1,043	$ 970	7 %
Exchange data and feeds	704	670	5	670	632	6
Desktops and connectivity	424	402	5	402	482	(17)
Data services	2,211	2,115	5	2,115	2,084	1
Listings	449	444	1	444	426	4
Revenues	2,660	2,559	4	2,559	2,510	2
Other operating expenses	1,102	1,090	1	1,090	1,096	(1)
Acquisition-related transaction and integration costs	—	24	n/a	24	34	(29)
Depreciation and amortization	394	371	6	371	348	6
Operating expenses	1,496	1,485	1	1,485	1,478	—
Operating income	$ 1,164	$ 1,074	8%	$ 1,074	$ 1,032	4 %

Our Data and Listings segment represents largely 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 2019 and 2018, 7% and 8%, 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 strengthening of the U.S. dollar compared to the pound sterling and euro during 2019, our data services revenues were lower by $9 million in 2019 than in 2018.

Data Services Revenues

Our data services revenues are primarily subscription-based and increased 5% in 2019 from 2018 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.

- **Pricing and Analytics:** Our pricing and analytics revenues increased 4% in 2019 from 2018. The increase in revenue was due to strength in our pricing and reference data and index businesses driven by the strong retention rate of existing customers, the addition of new customers, increased purchases by existing customers and increases in pricing of our products. This growth was partially offset by $5 million of unfavorable fluctuations in the U.S. dollar as compared to the pound sterling and euro.

- **Exchange Data and Feeds:** Our exchange data and feeds revenues increased 5% in 2019 from 2018. The increase in revenue was largely due to strength in our futures exchange data and to a lesser extent cash equities exchange data. The growth was driven by the strong retention rate of existing customers, the addition of new customers, increased purchases by existing customers, a larger share of the NMS Plan revenue and increases in pricing of our products.

- **Desktops and Connectivity:** Our desktop and connectivity revenues increased 5% in 2019 from 2018. The increase in revenue was driven primarily by growth in our connectivity services including the ICE Global Network, coupled with stronger desktop revenues.

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, 2019, ASV was $2.014 billion, which increased 5.5% compared to the ASV as of December 31, 2018. This does not adjust for year-over-year foreign exchange fluctuations or impacts of acquisitions.

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 the period these services are provided, with the remaining revenue recognized ratably over time as customers continue to list on our exchanges.

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.

In 2019, NYSE and NYSE American raised the most capital globally with approximately $112 billion raised in IPOs and follow-on offerings from over 300 transactions.

Operating Expenses, Operating Income and Operating Margin

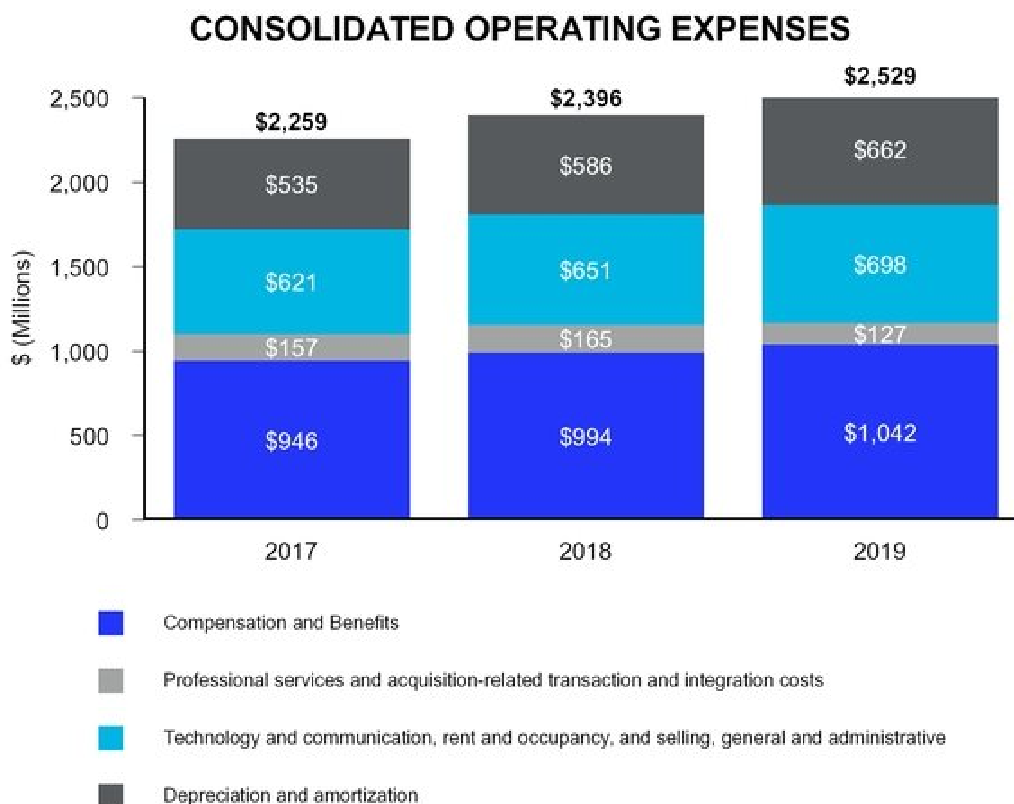
The following chart summarizes our Data and Listings segment's operating expenses, operating income and operating margin (dollars in millions). See “- Consolidated Operating Expenses” below for a discussion of the significant changes in our operating expenses.

Data and Listings Segment:	**Year Ended December 31,**			**Year Ended December 31,**		
	2019	**2018**	**Change**	**2018**	**2017**	**Change**
Operating expenses	$ 1,496	$ 1,485	1%	$ 1,485	$ 1,478	—%
Adjusted operating expenses[1]	$ 1,281	$ 1,247	3%	$ 1,247	$ 1,233	1%
Operating income	$ 1,164	$ 1,074	8%	$ 1,074	$ 1,032	4%
Adjusted operating income[1]	$ 1,379	$ 1,312	5%	$ 1,312	$ 1,277	3%
Operating margin	44%	42%	2 pts	42%	41%	1 pt
Adjusted operating margin[1]	52%	51%	1 pt	51%	51%	—

[1] The adjusted figures exclude items that are not reflective of our ongoing core operations and business performance. These adjusted numbers are not calculated in accordance with GAAP. See “- Non-GAAP Financial Measures” below.

Consolidated Operating Expenses

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



	Year Ended December 31,		Change	Year Ended December 31,		Change
	2019	2018		2018	2017	
Compensation and benefits	$ 1,042	$ 994	5 %	$ 994	$ 946	5 %
Professional services	125	131	(5)	131	121	8
Acquisition-related transaction and integration costs	2	34	(94)	34	36	(5)
Technology and communication	469	432	8	432	397	9
Rent and occupancy	68	68	1	68	69	(2)
Selling, general and administrative	161	151	7	151	155	(3)
Depreciation and amortization	662	586	13	586	535	10
Total operating expenses	$ 2,529	$ 2,396	6 %	$ 2,396	$ 2,259	6 %

The majority of our operating expenses do not vary directly with changes in our volume and revenues, except for certain technology and communication expenses, including data acquisition costs, licensing and other fee-related arrangements 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 the 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 2019 and 2018, 12% and 13%, respectively, of our operating expenses were incurred in pounds sterling or euros. Due to fluctuations in the U.S. dollar compared to the pound sterling and euro, our consolidated operating expenses were $14 million lower in 2019 than in 2018. 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 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 our number of employees. The below chart summarizes the significant drivers of our compensation and benefits expense results for the periods presented (dollars in millions, except employee headcount).

	Year Ended December 31,		
	2019	2018	Change
Employee headcount	5,989	5,161	16 %
Employee severance and retention costs excluding acquisitions	$ 18	$ 30	(41)%
Stock-based compensation expenses	$ 139	$ 130	7 %

Employee headcount and compensation and benefits expenses increased in 2019 from 2018 primarily due the acquisitions of Simplifile in 2019 and CHX Holdings, Inc., the parent company of the Chicago Stock Exchange, or CHX, TMC Bonds and MERS in 2018 and the 2018 launch of Bakkt. Employee headcount also increased due to new employees in our ICE India office, who had previously been our contractors, during the three months ended December 31, 2019. These new businesses resulted in additional compensation and benefits expense of $57 million in 2019 from 2018. Stock-based compensation expenses in the table above relate to employee stock option and restricted stock awards.

Professional Services Expenses

Professional services 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 decreased in 2019 from 2018 primarily due to lower consulting service fees on regulatory, accounting, technology and reference data services. This was partially offset by higher legal fees associated with regulatory matters, litigation matters and consulting work related to strategic initiatives.

Acquisition-Related Transaction and Integration Costs

In 2019, we incurred $2 million in acquisition-related transaction and integration costs, primarily related to professional services costs from our 2019 acquisition of Simplifile and other strategic opportunities.

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 integrations of Interactive Data, Securities Evaluations and 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.

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.

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 connections for our electronic platforms and telecommunications costs.

Technology and communications expense also includes fees paid for access to external market data, 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. Beginning in the second quarter of 2019, we have reflected amounts owed under certain third-party revenue share arrangements as technology and communication operating expenses rather than as had been previously recorded net within transaction and clearing revenues, which resulted in an increase in technology and communications expense of $37 million in 2019 from 2018.

Total technology and communications expenses also increased in 2019 from 2018, due to $16 million in costs related to our acquisitions of CHX, TMC Bonds and MERS in 2018 and Simplifile in 2019, and our launch of Bakkt. The increase in 2019 was offset by additional costs related to data migrations, hardware support upgrades and cybersecurity investments of $17 million in 2018.

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.

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 increased in 2019 from 2018, primarily due to $5 million in costs related to our 2018 acquisitions of CHX, TMC Bonds, and MERS, our 2019 acquisition of Simplifile and our launch of Bakkt, and increased travel and entertainment and other general and administrative costs, partially offset by the release of non-income tax reserves.

Depreciation and Amortization Expenses

Depreciation and amortization expense results from depreciation of long-lived assets such as buildings, leasehold improvements, aircraft, hardware and networking equipment, software, 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 $311 million and $289 million in 2019 and 2018, respectively. Amortization expense increased in 2019 from 2018, as a result of CHX, TMC Bonds and MERS intangible assets, and the $31 million impairment loss on exchange registration intangible assets on ICE Futures Singapore, partially offset by the 2018 $4 million impairment loss on exchange registration intangible assets related to our closure of ICE Futures Canada and ICE Clear Canada.

We recorded depreciation expenses on our fixed assets of $320 million and $293 million in 2019 and 2018, respectively. The increase in 2019 over 2018 was primarily due to depreciation resulting from increased software development and networking equipment.

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 December 31,			Year Ended December 31,		
	2019	2018	Change	2018	2017	Change
Other income (expense):						
Interest income	$ 35	$ 22	55 %	$ 22	$ 8	174 %
Interest expense	(285)	(244)	17	(244)	(187)	31
Other income, net	58	159	(63)	159	326	(51)
Total other income (expense), net	$ (192)	$ (63)	203 %	$ (63)	$ 147	n/a
Net income attributable to non-controlling interest	$ (27)	$ (32)	(17)%	$ (32)	$ (28)	12 %

Interest Income

Interest income increased in 2019 from 2018 primarily due to a rise in short-term interest rates on various investments, as well as higher cash and restricted cash balances at ICE Clear Europe related to our guaranty fund contributions and increased regulatory capital.

Interest Expense

Interest expense increased in 2019 from 2018 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. See “- Debt” below.

Other income, net

In connection with our equity investment in Euroclear, we recognized dividend income of $19 million and $15 million in 2019 and 2018, respectively, which is included in other income.

In September 2019, we recorded promissory note impairment charges of $16 million on work performed by the original plan processor on the CAT. Due to delays and failures in implementation and functionality by the original plan processor, as well as recently-published proposals by the SEC for an amended timeline and implementation structure, we believe the risk that execution venues are not reimbursed has increased, resulting in this impairment.

Our equity method investments include the Options Clearing Corporation, or OCC, and prior to purchasing the remaining minority stake in MERS in October 2018, our majority investment in MERS. We recognized $62 million and $46 million in equity income as other income related to these investments during 2019 and 2018, respectively.

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 recognized a $110 million gain on our initial investment value as other income.

We own a 40% interest in the OCC, which is regulated by the SEC and the CFTC. On February 13, 2019, the SEC disapproved the OCC capital plan that was established in 2015. Following the SEC disapproval, the OCC also announced that it will not be providing a refund to clearing members or declaring a dividend to shareholders for the year ended December 31, 2018, which resulted in higher reported OCC 2018 net income than we had estimated. During 2019, we recognized $62 million of equity earnings as our share of estimated OCC profits, including $19 million related to 2018 earnings which was recognized during 2019. Refer to Note 4 to our consolidated financial statements, included in this Annual Report for additional details on our OCC investment.

In connection with our adoption of Accounting Standards Update, or ASU, 2017-07, *Compensation Retirement Benefits: Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost*, or 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 of these plans was $4 million and $8 million in 2019 and 2018, respectively.

We incurred foreign currency transaction losses of $5 million and $2 million in 2019 and 2018, respectively. This was primarily attributable to the fluctuations of the pound sterling and euro relative to the U.S. dollar. Foreign currency transaction gains

and losses are recorded in other income, net, when the settlement of foreign currency assets, liabilities and payables that occur 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 interests. As of December 31, 2019, our non-controlling interests include those related to the non-ICE limited partners in our CDS clearing subsidiaries and the redeemable non-controlling interests of the non-ICE partners in Bakkt.

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, 2019. Refer to Note 3 to our consolidated financial statements contained elsewhere in this Annual Report.

In December 2018, Bakkt Holdings, LLC, or Bakkt, was capitalized with $183 million in initial funding with ICE as the 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 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 was $521 million and $500 million in 2019 and 2018, respectively. The change in consolidated income tax expense between years is primarily due to the tax impact of changes in our pre-tax income and the changes in our effective tax rate. Our effective tax rate was 21% and 20% in 2019 and 2018, respectively.

The 2019 effective tax rate is higher than the 2018 effective tax rate primarily due to the 2018 discrete tax benefits from the acquisition of MERS and the divestiture of Trayport exceeding the net increased tax benefits recorded in 2019 from certain international tax provisions under the TCJA.

On December 22, 2017, the TCJA was signed into law. The TCJA enacted broad changes to the U.S. federal income tax code, including reducing the federal corporation income tax rate from 35% to 21%. The reductions in U.S. corporate income tax rates resulted in deferred tax benefits in the period of enactment. The impact of the deferred tax benefits lowered the 2017 effective tax rate by 30% and resulted in a deferred tax benefit of $764 million.

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

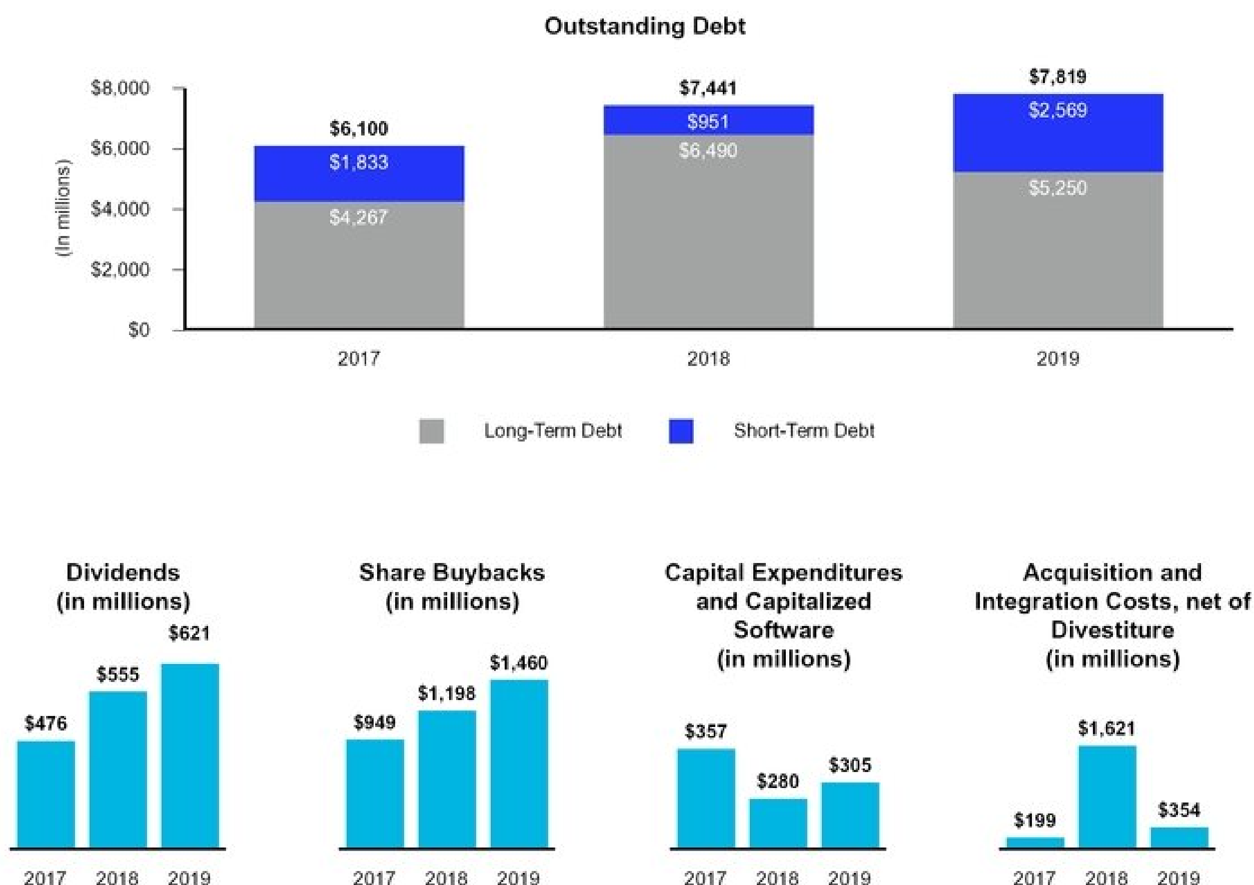
The following quarterly unaudited condensed consolidated statements of income data has been prepared on substantially the same basis as our audited consolidated financial statements and includes all adjustments, consisting only of normal recurring adjustments, necessary for the fair presentation of our 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, 2019	September 30, 2019	June 30, 2019	March 31, 2019	December 31, 2018	September 30, 2018	June 30, 2018	March 31, 2018
Revenues:								
Energy futures and options contracts	$ 243	$ 265	$ 255	$ 229	$ 257	$ 223	$ 250	$ 235
Agricultural and metals futures and options contracts	57	60	72	62	54	58	74	65
Financial futures and options contracts	80	91	78	83	92	77	94	91
Cash equities and equity options	442	401	410	390	462	335	389	438
Fixed income and credit	96	101	80	87	83	56	45	56
OTC and other transactions	11	11	12	11	13	11	12	13
Total transaction and clearing, net	929	929	907	862	961	760	864	898
Pricing and analytics	274	273	270	266	264	263	262	254
Exchange data and feeds	176	172	180	176	174	168	164	164
Desktops and connectivity	109	108	103	104	101	99	100	102
Total data services	559	553	553	546	539	530	526	520
Listings	113	114	111	111	112	112	111	109
Other revenues	66	67	63	64	65	61	55	53
Total revenues	1,667	1,663	1,634	1,583	1,677	1,463	1,556	1,580
Transaction-based expenses	369	327	336	313	369	263	310	355
Total revenues, less transaction-based expenses	1,298	1,336	1,298	1,270	1,308	1,200	1,246	1,225
Compensation and benefits	274	261	259	248	262	251	241	240
Professional services	28	35	29	33	40	32	29	30
Acquisition-related transaction and integration costs	1	—	1	—	1	6	15	12
Technology and communication	123	126	113	107	112	107	108	105
Rent and occupancy	16	17	18	17	18	17	16	17
Selling, general and administrative	45	33	41	42	42	37	39	33
Depreciation and amortization	189	158	157	158	157	148	143	138
Total operating expenses	676	630	618	605	632	598	591	575
Operating income	622	706	680	665	676	602	655	650
Other income (expense), net [1]	(35)	(66)	(52)	(39)	62	(48)	(44)	(33)
Income tax expense	134	103	150	134	119	89	149	143
Net income	$ 453	$ 537	$ 478	$ 492	$ 619	$ 465	$ 462	$ 474
Net income attributable to non-controlling interest	(5)	(8)	(6)	(8)	(8)	(7)	(7)	(10)
Net income attributable to Intercontinental Exchange, Inc.	$ 448	$ 529	$ 472	$ 484	$ 611	$ 458	$ 455	$ 464

[1] Other income (expense), net for the three months ended December 31, 2018 includes a $110 million gain in connection with our acquisition of MERS.

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 equity investments, cash paid for non-controlling interest and redeemable non-controlling interest, and acquisition-related transaction and integration costs, 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 that we made during 2019. These acquisitions were funded from borrowing under our Commercial Paper Program along with cash flows from operations.

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 had net issuances of $360 million under our Commercial Paper Program during 2019.

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 which meets or exceeds the amount issued under our Commercial Paper Program at any time. 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 $841 million and $724 million as of December 31, 2019 and 2018, respectively. We had $1.3 billion and $1.1 billion in short-term and long-term restricted cash and cash equivalents as of December 31, 2019 and 2018, respectively.

As of December 31, 2019, the amount of unrestricted cash held by our non-U.S. subsidiaries was $459 million. Due to U.S. tax reform, the majority of our foreign earnings since January 1, 2018 have been subject to immediate U.S. income taxation, and consequently, the existing non-U.S. unrestricted cash balance 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 2019 and 2018, we repurchased 17.4 million shares and 16.3 million shares, respectively, of our outstanding common stock at a cost of $1.5 billion and $1.2 billion, respectively. In 2019, we repurchased 16.1 million shares of our outstanding common stock at a cost of $1.4 billion under our Rule 10b5-1 trading plan and 1.3 million shares at a cost of $100 million on the open market. Shares repurchased are held in treasury stock.

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 performance, 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 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. In December 2019, our Board of Directors approved an aggregate of $2.4 billion for future repurchases of our common stock with no fixed expiration date that became effective January 1, 2020. The $2.4 billion replaced the previous amount approved by the Board of Directors. 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):

	Year Ended December 31,		
	2019	2018	2017
Net cash provided by (used in):			
Operating activities	$ 2,659	$ 2,533	$ 2,085
Investing activities	(594)	(1,755)	92
Financing activities	(1,753)	(463)	(1,971)
Effect of exchange rate changes	4	(11)	12
Net increase in cash, cash equivalents, and restricted cash and cash equivalents	$ 316	$ 304	$ 218

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 $126 million increase in net cash provided by operating activities in 2019 from 2018, is primarily a result of an increase in net income, excluding certain non-cash adjustments such as the 2018 non-cash gain on MERS and the $31 million impairment loss on the ICE Futures Singapore exchange registration intangible asset in 2019. The remaining increase is due to fluctuations in our working capital and the timing of various payments such as transaction-related expenses and taxes.

Investing Activities

Consolidated net cash provided by (used in) investing activities in 2019 and 2018 relates to cash paid for acquisitions, purchases of investments, proceeds from term deposits, a return of capital related to our investment in OCC, proceeds from investments related to MERS and changes in capital expenditures and capitalized software development costs.

We paid cash for acquisitions, net of the cash of the companies acquired, of $352 million and $1.2 billion in 2019 and 2018, respectively, primarily relating to the Simplifile acquisition during 2019 and the BondPoint, TMC Bonds and MERS acquisitions during 2018. We made cash investments of $306 million during 2018 related to Euroclear and MERS.

In 2019, we had a $60 million return of capital related to our equity method investment in the OCC. Refer to Note 4 to our consolidated financial statements, included in this Annual Report for additional details on our OCC investment.

We had capital expenditures of $153 million and $134 million in 2019 and 2018, respectively, and we had capitalized software development expenditures of $152 million and $146 million in 2019 and 2018, 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, London and India. 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 2019 primarily relates to $1.5 billion in repurchases of common stock, $360 million in net borrowings under our Commercial Paper Program, $621 million in dividend payments to stockholders and $65 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 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 September 2023, 2028 and 2048 Senior Notes). See Note 10 to our consolidated financial statements, included in this Annual Report.

Debt

As of December 31, 2019, we had $7.8 billion in outstanding debt, consisting of $6.5 billion of senior notes and $1.3 billion under the U.S. dollar commercial paper program, or the Commercial Paper Program. The commercial paper notes had

original maturities ranging from two to 87 days as of December 31, 2019, with a weighted average interest rate of 1.84% per annum, and a weighted average remaining maturity of 22 days. 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 remaining maturity of 12 days.

We currently have a $3.4 billion senior unsecured revolving credit facility, or the 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. As of December 31, 2019, of the $3.4 billion that is currently available for borrowing under the Credit Facility, $1.3 billion is required to back-stop the amount outstanding under our Commercial Paper Program and $160 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 $1.9 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.

For additional details of our debt instruments, refer to Note 10 to our consolidated financial statements, included in this Annual Report.

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 2020, which we believe will support the enhancement of our technology, business integration and the continued growth of our businesses.

In December 2019, our Board of Directors approved an aggregate of $2.4 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2020. 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, our current and future planned strategic growth initiatives and our financial results and capital requirements, without a predetermined net income payout ratio. During 2019, we paid cash dividends of $1.10 per share of our common stock in the aggregate, including quarterly dividends of $0.275 per share, for an aggregate payout of $621 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 2020, we announced a $0.30 per share dividend payable on March 31, 2020 to stockholders of record as of March 17, 2020.

Other than the facilities for the ICE Clearing Houses, our 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. See Notes 10 and 14 to our consolidated financial statements where discussed further. 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 Note 10 to our consolidated financial statements, included in this Annual Report.

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 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,			Year Ended December 31,			Year Ended December 31,		
	2019	2018	2017	2019	2018	2017	2019	2018	2017
Total revenues, less transaction-based expenses	$ 2,542	$ 2,420	$ 2,128	$ 2,660	$ 2,559	$ 2,510	$ 5,202	$ 4,979	$ 4,638
Operating expenses	1,033	911	781	1,496	1,485	1,478	2,529	2,396	2,259
Less: Interactive Data transaction and integration costs and acquisition-related success fees	—	6	—	—	24	31	—	30	31
Less: Amortization of acquisition-related intangibles	94	73	53	215	214	208	309	287	261
Less: Impairment of exchange registration intangible assets on ICE Futures Singapore	31	—	—	—	—	—	31	—	—
Less: Accruals relating to investigations and inquiries	—	—	14	—	—	—	—	—	14
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	$ 908	$ 824	$ 714	$ 1,281	$ 1,247	$ 1,233	$ 2,189	$ 2,071	$ 1,947
Operating income	$ 1,509	$ 1,509	$ 1,347	$ 1,164	$ 1,074	$ 1,032	$ 2,673	$ 2,583	$ 2,379
Adjusted operating income	$ 1,634	$ 1,596	$ 1,414	$ 1,379	$ 1,312	$ 1,277	$ 3,013	$ 2,908	$ 2,691
Operating margin	59%	62%	63%	44%	42%	41%	51%	52%	51%
Adjusted operating margin	64%	66%	66%	52%	51%	51%	58%	58%	58%
Net income attributable to ICE common stockholders							$ 1,933	$ 1,988	$ 2,526
Add: Interactive Data transaction and integration costs and acquisition-related success fees							—	30	31
Add: Amortization of acquisition-related intangibles							309	287	261
Add: Impairment of CAT promissory notes							16	—	—
Add: Impairment of exchange registration intangible assets on ICE Futures Singapore							31	—	—
Less: Gain on acquisition of MERS							—	(110)	—
Add: Accruals relating to investigations and inquiries							—	—	14
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	—
Add/(Less): Gain on divestiture of Trayport, net							—	1	(110)
Less: Cetip investment gain, net							—	—	(167)
Less: Income tax effect for the above items							(90)	(98)	(43)
Less: Deferred tax adjustments from U.S. tax rate reduction							—	(11)	(764)
Add/(Less): Deferred tax adjustments on acquisition-related intangibles							(8)	(5)	10
Add/(Less): Other tax adjustments							3	(13)	—
Adjusted net income attributable to ICE common stockholders							$ 2,194	$ 2,077	$ 1,764
Basic earnings per share attributable to ICE common stockholders							$ 3.44	$ 3.46	$ 4.29
Diluted earnings per share attributable to ICE common stockholders							$ 3.42	$ 3.43	$ 4.25
Adjusted basic earnings per share attributable to ICE common stockholders							$ 3.91	$ 3.61	$ 2.99
Adjusted diluted earnings per share attributable to ICE common stockholders							$ 3.88	$ 3.59	$ 2.97
Basic weighted average common shares outstanding							561	575	589
Diluted weighted average common shares outstanding							565	579	594

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 given the magnitude of the $5.6 billion purchase price of this acquisition. 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.

We include the 2019 impairment of exchange registration intangible assets on ICE Futures Singapore as a non-GAAP adjustment. This impairment is not based on our core business operations, but rather was a result of the estimated fair value of an acquired intangible asset falling below its carrying value. See Note 8 to our consolidated financial statements, included in this Annual Report.

We include the 2019 promissory note impairment charges on work performed by the original plan processor on the CAT as a non-GAAP adjustment. This is included as a non-GAAP adjustment as this is not considered a part of our core business operations. See additional discussion on the CAT, above, in Item 1(A) "-Risk Factors" in this Annual Report.

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

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 ($8 million), ($5 million) and $10 million in 2019, 2018 and 2017, respectively;
- 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%; and
- Other tax adjustments of $3 million in 2019 for additional audit settlement payments primarily related to pre-acquisition tax matters in conjunction with our acquisition of NYSE in 2013; and other tax adjustments in 2018 including a $17 million tax benefit on the sale of Trayport, partially offset by an audit settlement for a pre-acquisition period in connection with our acquisition of NYSE in 2013.

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

As described in Notes 3 and 14 to our consolidated financial statements, which are included elsewhere in this Annual Report, certain clearing house collateral and Bakkt custodial assets are reported off-balance sheet. 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, 2019 (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	$ 10,265	$ 2,794	$ 891	$ 1,522	$ 5,058
Operating lease obligations	376	62	128	86	100
Purchase obligations	263	187	71	5	—
Total contractual cash obligations	$ 10,904	$ 3,043	$ 1,090	$ 1,613	$ 5,158

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 $65.0 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, 2019, our cumulative UTBs were $103 million, and interest and penalties related to UTBs were $33 million. 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, 2019, we, through NYSE, have net obligations of $150 million related to our pension and other benefit programs. The date of payment under these net 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.

In addition, the future funding of the implementation and operation of the CAT is ultimately expected to be provided by both the SROs and broker-dealers. To date, however, funding has been provided solely by the SROs, and future funding is expected to be repaid if industry member fees are approved by the SEC and subsequently collected by industry members. See "- Non-GAAP Measures" above.

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 “- 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. Estimation uncertainty may exist due to the sensitivity of the respective fair value to underlying assumptions about the future performance of an acquired business in our discounted cash flow models. Significant assumptions typically include revenue growth rates and expense synergies that form the basis of the forecasted results and the discount rate.

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, and 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 Credit reporting unit. 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, no further testing is required. For annual indefinite-lived intangible asset impairment testing, we also have the option to first perform a qualitative assessment to determine whether it is more likely than not that the fair value of the indefinite-lived intangible assets is less than its carrying amount. For our goodwill impairment testing, we have elected to bypass the qualitative assessment and apply the quantitative approach. For our testing of indefinite-lived intangible assets, we apply qualitative and quantitative approaches.

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. During 2019, we recorded an impairment charge of $31 million on the remaining value of exchange registration intangible assets on ICE Futures Singapore as a result of a decrease in fair value determined during our annual impairment testing.

We are also required to evaluate other finite-lived intangible assets 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 had 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 and cash equivalents, short-term and long-term investments and indebtedness. As of December 31, 2019 and 2018, our cash and cash equivalents, short-term and long-term restricted cash and cash equivalents and short-term and long-term investments were $2.2 billion and $2.0 billion, respectively, of which $282 million and $275 million, respectively, were denominated in pounds sterling, euros or Canadian dollars, and the remaining amounts are denominated in U.S. dollars. We do not use our investment portfolio for trading or other speculative purposes. A hypothetical 100 basis point decrease in short-term interest rates would decrease annual pre-tax earnings by $15 million as of December 31, 2019, 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, 2019, we had $7.8 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 $1.3 billion relates to our Commercial Paper Program, which bears interest at fluctuating rates and, therefore, subjects us to interest rate risk, and a subsidiary line of credit. A hypothetical 100 basis point increase in short-term interest rates relating to the amounts outstanding under our Commercial Paper Program as of December 31, 2019 would decrease annual pre-tax earnings by $13 million, assuming no change in the volume or composition of our outstanding indebtedness and no hedging activity. See Note 10 to our consolidated financial statements 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 decreased from 2.48% as of December 31, 2018 to 1.84% as of December 31, 2019. The decrease in the Commercial Paper Program weighted average interest rate was primarily due to the decisions by the U.S. Federal Reserve to decrease the federal funds short-term interest rate by 25 basis points in each of July, September and October of 2019. The effective interest rate of commercial paper issuances 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 2019 and 2018 is presented by primary foreign currency in the following table (dollars in millions, except exchange rates):

	Year Ended December 31, 2019		Year Ended December 31, 2018	
	Pound Sterling	Euro	Pound Sterling	Euro
Average exchange rate to the U.S. dollar in the current year period	$ 1.2769	$ 1.1195	$ 1.3356	$ 1.1813
Average exchange rate to the U.S. dollar in the same period in the prior year	$ 1.3356	$ 1.1813	$ 1.2890	$ 1.1297
Average exchange rate increase (decrease)	(4)%	(5)%	4%	5%
Foreign denominated percentage of:				
Revenues, less transaction-based expenses	8 %	5 %	9%	5%
Operating expenses	10 %	2 %	11%	2%
Operating income	7 %	8 %	7%	7%
Impact of the currency fluctuations [(1)] on:				
Revenues, less transaction-based expenses	$ (19)	$ (15)	$ 16	$ 10
Operating expenses	$ (11)	$ (3)	$ 9	$ 2
Operating income	$ (8)	$ (12)	$ 7	$ 8

(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 2019 and 2018, 13% and 14%, respectively, of our consolidated revenues, less transaction-based expenses, were denominated in pounds sterling or euros, and 12% and 13%, 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 occurs 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 $5 million and $2 million in 2019 and 2018, respectively. The foreign currency transaction 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, 2019, assuming no change in the composition of the foreign currency denominated assets, liabilities and payables and assuming no hedging activity, would result in a foreign currency loss of $2 million.

We entered into foreign currency hedging transactions during 2019 and 2018 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, 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, 2019		
	Position in pounds sterling	Position in Canadian dollars	Position in euros
Assets	£ 805	C$ 1,583	€ 151
of which goodwill represents	613	408	92
Liabilities	91	1,178	45
Net currency position	£ 714	C$ 405	€ 106
Net currency position, in $USD	$ 947	$ 312	$ 118
Negative impact on consolidated equity of a 10% decrease in foreign currency exchange rates	$ 95	$ 31	$ 12

Foreign currency translation adjustments are included as a component of accumulated other comprehensive loss within our balance sheet. See the table below for the portion of equity attributable to foreign currency translation adjustments

as well as the activity by year included within our statement of other comprehensive income. The impact of the foreign currency exchange rate differences in the table below were primarily driven by fluctuations of the pound sterling as compared to the U.S. dollar which were 1.3260, 1.2756 and 1.3510 as of December 31, 2019, 2018, and 2017, respectively.

	Changes in Accumulated Other Comprehensive Income (Loss) from Foreign Currency Translation Adjustments (in millions)
Balance, as of January 1, 2017	$ (345)
Net current period other comprehensive income	209
Balance, as of December 31, 2017	(136)
Net current period other comprehensive loss	(91)
Balance, as of December 31, 2018	(227)
Net current period other comprehensive income	50
Balance, as of December 31, 2019	$ (177)

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 $65.0 billion as of December 31, 2019. 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 managed by using exposure limits depending on the credit profile of the counterparty 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 the 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 at 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 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, 2019. 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, 2019.

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 6, 2020	February 6, 2020

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, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Intercontinental Exchange, Inc. and Subsidiaries (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of the Company as of December 31, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in equity and redeemable non-controlling interest, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes, and our report dated February 6, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying "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 6, 2020

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, 2019 and 2018, and the related consolidated statements of income, comprehensive income, changes in equity and redeemable non-controlling interest, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the consolidated financial position of the Company at December 31, 2019 and 2018, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 Framework), and our report dated February 6, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

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

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

Critical Audit Matters

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

	Accounting for Acquisition
Description of the Matter	As discussed in Note 3 to the consolidated financial statements, during 2019, the Company completed its acquisition of Simplifile, LC ("Simplifile") for net consideration of $338 million. This transaction was accounted for as a business combination.

Auditing the Company's accounting for its acquisition of Simplifile was complex due to the significant estimation in the Company's determination of fair value of the customer relationship identified intangible asset of $104 million. The significant estimation was primarily due to sensitivity of the fair value to underlying assumptions about future performance of the acquired business in the Company's discounted cash flow model used to measure the customer relationship intangible asset. These significant assumptions included the revenue and expense growth rates that form the basis of the forecasted results and the discount rate.

How We Addressed the Matter in Our Audit

We tested the Company's controls over its accounting for acquisitions. For example, we tested controls over the estimation process supporting the recognition and measurement of the customer relationship intangible asset, which included testing controls over management's review of assumptions used in its customer relationship valuation model.

To test the estimated fair value of the customer relationship intangible asset, we performed audit procedures that included, among others, evaluating the valuation methodology and the significant assumptions used by the Company's valuation specialist, and evaluating the completeness and accuracy of the underlying data supporting the estimated fair value. We involved our valuation specialists to assist with our evaluation of the methodology used by the Company and significant assumptions included in the fair value estimate, including testing the revenue and expense growth rates that form the basis of the forecasted results and the discount rate. For example, we compared the significant assumptions to current industry, market and economic trends, to assumptions used to value similar assets in other acquisitions, to the historical results of the acquired business, and to the Company's budgets and forecasts, in addition to performing sensitivity analysis over these assumptions. We also evaluated the adequacy of the Company's disclosures included in Note 3 in relation to these acquisition matters.

Accounting for Income Taxes

Description of the Matter

As discussed in Note 13 to the consolidated financial statements, the Company operates in the United States and multiple international tax jurisdictions and is subject to tax treaty arrangements and transfer pricing guidelines for intercompany transactions. Consolidated income tax expense, including the liability for unrecognized tax benefits, is an estimate based on management's understanding and interpretation of current enacted tax laws and tax rates of each tax jurisdiction. For the year-ended December 31, 2019, the Company recognized consolidated income tax expense of $521 million, and as of December 31, 2019, the Company accrued liabilities of $103 million for unrecognized tax benefits.

Auditing the Company's accounting for consolidated income tax expense was complex because management's calculation of consolidated income tax expense involves application and interpretation of complex tax laws, many of which were significantly modified as part of the Tax Cuts and Jobs Act. Further, the identification and measurement of unrecognized tax benefits requires significant management judgment and estimation. Each tax position may involve unique facts and circumstances to be evaluated, and there may be uncertainties around initial recognition and de-recognition of tax positions, including regulatory changes, litigation and examination activity.

How We Addressed the Matter in Our Audit

We tested the Company's controls that address the risks of material misstatement relating to the Company's consolidated income tax expense. For example, we tested controls over management's calculation of the federal, state and foreign components of income tax expense including management's controls over the identification and ongoing review of its unrecognized tax benefits.

To test consolidated income tax expense, we performed audit procedures that included, among others, recalculation of consolidated income tax expense and agreeing the data used in the calculations to the Company's underlying books and records. We involved our tax professionals to evaluate the application of tax law to management's calculation methodologies and tax positions. This included assessing the Company's correspondence with the relevant tax authorities and evaluating third-party advice obtained by the Company. We also evaluated the assumptions the Company used to develop its tax positions and related unrecognized tax benefit amounts by jurisdiction. For example, we compared the estimated liabilities for unrecognized tax benefits to similar positions in prior periods and assessed management's consideration of current tax controversy and litigation and trends in similar positions challenged by tax authorities. We also assessed the historical accuracy of management's estimates of its unrecognized tax benefits by comparing the estimates with the resolution of those positions. We also evaluated the adequacy of the Company's disclosures included in Note 13 in relation to these tax matters.

/s/ Ernst & Young LLP

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

Atlanta, Georgia
February 6, 2020

Intercontinental Exchange, Inc. and Subsidiaries
Consolidated Balance Sheets
(In millions, except per share amounts)

	As of December 31,	
	2019	**2018**
Assets:		
Current assets:		
Cash and cash equivalents	$ 841	$ 724
Short-term restricted cash and cash equivalents	943	818
Customer accounts receivable, net of allowance for doubtful accounts of $8 and $7, respectively	988	953
Margin deposits, guaranty funds and delivery contracts receivable	64,987	63,955
Prepaid expenses and other current assets	220	242
Total current assets	67,979	66,692
Property and equipment, net	1,536	1,241
Other non-current assets:		
Goodwill	13,342	13,085
Other intangible assets, net	10,258	10,462
Long-term restricted cash and cash equivalents	404	330
Other non-current assets	974	981
Total other non-current assets	24,978	24,858
Total assets	$ 94,493	$ 92,791
Liabilities and Equity:		
Current liabilities:		
Accounts payable and accrued liabilities	$ 505	$ 521
Section 31 fees payable	138	105
Accrued salaries and benefits	291	280
Deferred revenue	129	135
Short-term debt	2,569	951
Margin deposits, guaranty funds and delivery contracts payable	64,987	63,955
Other current liabilities	197	161
Total current liabilities	68,816	66,108
Non-current liabilities:		
Non-current deferred tax liability, net	2,314	2,337
Long-term debt	5,250	6,490
Accrued employee benefits	198	204
Non-current operating lease liability	281	—
Other non-current liabilities	270	350
Total non-current liabilities	8,313	9,381
Total liabilities	77,129	75,489
Commitments and contingencies:		
Redeemable non-controlling interest in consolidated subsidiaries	78	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; 607 and 554 shares issued and outstanding at December 31, 2019, respectively, and 604 and 569 shares issued and outstanding at December 31, 2018, respectively	6	6
Treasury stock, at cost; 53 and 35 shares, respectively	(3,879)	(2,354)
Additional paid-in capital	11,742	11,547
Retained earnings	9,629	8,317
Accumulated other comprehensive loss	(243)	(315)
Total Intercontinental Exchange, Inc. stockholders' equity	17,255	17,201
Non-controlling interest in consolidated subsidiaries	31	30
Total equity	17,286	17,231
Total liabilities and equity	$ 94,493	$ 92,791

See accompanying notes.

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

	Year Ended December 31,		
	2019	**2018**	**2017**
Revenues:			
Transaction and clearing, net	$ 3,627	$ 3,483	$ 3,131
Data services	2,211	2,115	2,084
Listings	449	444	426
Other revenues	260	234	202
Total revenues	6,547	6,276	5,843
Transaction-based expenses:			
Section 31 fees	379	357	372
Cash liquidity payments, routing and clearing	966	940	833
Total revenues, less transaction-based expenses	5,202	4,979	4,638
Operating expenses:			
Compensation and benefits	1,042	994	946
Professional services	125	131	121
Acquisition-related transaction and integration costs	2	34	36
Technology and communication	469	432	397
Rent and occupancy	68	68	69
Selling, general and administrative	161	151	155
Depreciation and amortization	662	586	535
Total operating expenses	2,529	2,396	2,259
Operating income	2,673	2,583	2,379
Other income (expense):			
Interest income	35	22	8
Interest expense	(285)	(244)	(187)
Other income, net	58	159	326
Other income (expense), net	(192)	(63)	147
Income before income tax expense (benefit)	2,481	2,520	2,526
Income tax expense (benefit)	521	500	(28)
Net income	$ 1,960	$ 2,020	$ 2,554
Net income attributable to non-controlling interest	(27)	(32)	(28)
Net income attributable to Intercontinental Exchange, Inc.	$ 1,933	$ 1,988	$ 2,526
Earnings per share attributable to Intercontinental Exchange, Inc. common stockholders:			
Basic	$ 3.44	$ 3.46	$ 4.29
Diluted	$ 3.42	$ 3.43	$ 4.25
Weighted average common shares outstanding:			
Basic	561	575	589
Diluted	565	579	594

See accompanying notes.

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

	Year Ended December 31,		
	2019	**2018**	**2017**
Net income	$ 1,960	$ 2,020	$ 2,554
Other comprehensive income (loss):			
Foreign currency translation adjustments, net of tax expense (benefit) of $1, ($1) and ($6) for 2019, 2018 and 2017, respectively, and net impact of $1 from adoption of ASU 2018-02 in 2018	50	(91)	133
Change in fair value of available-for-sale securities	—	—	68
Reclassification of realized gain on available-for-sale investment to other income	—	—	(176)
Change in equity method investment	(1)	—	—
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, $9 and $8 in 2019, 2018 and 2017, respectively, and net impact of $25 from adoption of ASU 2018-02 in 2018	23	(1)	20
Other comprehensive income (loss)	72	(92)	121
Comprehensive income	$ 2,032	$ 1,928	$ 2,675
Comprehensive income attributable to non-controlling interest	(27)	(32)	(28)
Comprehensive income attributable to Intercontinental Exchange, Inc.	$ 2,005	$ 1,896	$ 2,647

See accompanying notes.

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

	Intercontinental Exchange, Inc. Stockholders' Equity							Non-Controlling Interest in Consolidated Subsidiaries	Total Equity	Redeemable Non-controlling Interest
	Common Stock		Treasury Stock		Additional Paid-in Capital	Retained Earnings	Accumulated Other Comprehensive Income (Loss)			
	Shares	Value	Shares	Value						
Balance, as of January 1, 2017	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)
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
Other comprehensive income	—	—	—	—	—	—	72	—	72	—
Exercise of common stock options	1	—	—	—	23	—	—	—	23	—
Repurchases of common stock	—	—	(17)	(1,460)	—	—	—	—	(1,460)	—
Payments relating to treasury shares	—	—	(1)	(65)	—	—	—	—	(65)	—
Stock-based compensation	—	—	—	—	143	—	—	—	143	11
Issuance under the employee stock purchase plan	—	—	—	—	29	—	—	—	29	—
Issuance of restricted stock	2	—	—	—	—	—	—	—	—	—
Distributions of profits	—	—	—	—	—	—	—	(29)	(29)	—
Dividends paid to stockholders	—	—	—	—	—	(621)	—	—	(621)	—
Net income attributable to non-controlling interest	—	—	—	—	—	(27)	—	30	3	(4)
Net income	—	—	—	—	—	1,960	—	—	1,960	—
Balance, as of December 31, 2019	607	$ 6	(53)	$ (3,879)	$ 11,742	$ 9,629	$ (243)	$ 31	$ 17,286	$ 78

See accompanying notes.

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

	Year Ended December 31,		
	2019	2018	2017
Operating activities:			
Net income	$ 1,960	$ 2,020	$ 2,554
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	662	586	535
Stock-based compensation	139	130	135
Deferred taxes	(33)	27	(654)
Cetip realized investment gain, net	—	—	(114)
Trayport gain, net	—	—	(110)
Gain on acquisition of remaining MERS interest	—	(110)	—
Other	(40)	(24)	(22)
Changes in assets and liabilities:			
Customer accounts receivable	(30)	(44)	(135)
Other current and non-current assets	(17)	(45)	(24)
Section 31 fees payable	34	(33)	(2)
Deferred revenue	(18)	1	8
Other current and non-current liabilities	2	25	(86)
Total adjustments	699	513	(469)
Net cash provided by operating activities	2,659	2,533	2,085
Investing activities:			
Capital expenditures	(153)	(134)	(220)
Capitalized software development costs	(152)	(146)	(137)
Proceeds from sale of Cetip, net	—	—	438
Cash paid for acquisitions, net of cash acquired	(352)	(1,246)	(423)
Return of capital from equity method investment	60	—	—
Cash received from divestitures	—	—	761
Purchases of equity investments	—	(306)	(327)
Proceeds from investments, net	9	77	—
Other	(6)	—	—
Net cash provided by (used in) investing activities	(594)	(1,755)	92
Financing activities:			
Proceeds from debt facilities, net	10	2,213	984
Repayments of debt facilities	—	(600)	(850)
Proceeds from/(repayments of) commercial paper, net	360	(283)	(409)
Repurchases of common stock	(1,460)	(1,198)	(949)
Dividends to stockholders	(621)	(555)	(476)
Payments relating to treasury shares received for restricted stock tax payments and stock option exercises	(65)	(80)	(88)
Acquisition of non-controlling interest and redeemable non-controlling interest	—	(35)	(174)
Proceeds from issuance of redeemable non-controlling interest	—	71	—
Other	23	4	(9)
Net cash used in financing activities	(1,753)	(463)	(1,971)
Effect of exchange rate changes on cash, cash equivalents, and restricted cash and cash equivalents	4	(11)	12
Net increase in cash, cash equivalents, and restricted cash and cash equivalents	316	304	218
Cash, cash equivalents, and restricted cash and cash equivalents at beginning of year	1,872	1,568	1,350
Cash, cash equivalents, and restricted cash and cash equivalents at end of year	$ 2,188	$ 1,872	$ 1,568
Supplemental cash flow disclosures:			
Cash paid for income taxes	$ 557	$ 533	$ 594

Cash paid for interest	$ 280	$ 202	$ 171

See accompanying notes.

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, digital assets, bonds and currencies, and also offer mortgage and technology services. In addition, we 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 trading venues 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 to manage risk and raise capital through liquid markets, benchmark products, access to capital markets and related services.

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. Where outside owners hold an option to require us to repurchase their interests, these amounts are shown as redeemable non-controlling interests and are subject to remeasurement when repurchase is probable (Note 3).

All intercompany balances and transactions between us and our wholly-owned and controlled subsidiaries have been eliminated in consolidation. 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 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, our 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. (Note 18).

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. We classify all other investments that are not cash equivalents with original maturity dates of 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.

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. 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. 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). We hold the cash deposits at highly-rated financial institutions or through reverse repurchase agreements or direct investments. See "Credit Risk and Significant Customers", below. 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 2019, 2018 and 2017 (in millions):

	Year Ended December 31,		
	2019	2018	2017
Beginning balance of allowance for doubtful accounts	$ 7	$ 6	$ 7
Bad debt expense	10	8	4
Charge-offs	(9)	(7)	(5)
Ending balance of allowance for doubtful accounts	$ 8	$ 7	$ 6

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 specialist 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, Fixed Income and Credit 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. For our goodwill impairment testing, we have elected to bypass the qualitative assessment and apply the quantitative approach. For our testing of indefinite-lived intangible assets, we apply qualitative and quantitative approaches.

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.

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.

We entered into foreign currency hedging transactions during 2019, 2018 and 2017 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, provided 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 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 Options Clearing Corporation, or 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 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). In the event it occurs in the future, 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, 2019. ICE Clear Europe maintains a euro-denominated account at the De Nederlandsche Bank, or DNB, the central bank of the Netherlands, as well as pounds sterling- and euro-denominated accounts 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, 2019 or December 31, 2018. No single customer accounted for more than 10% of total consolidated revenues during 2019, 2018 or 2017.

Leases

Operating lease right-of-use assets and liabilities are recorded at the lease commencement date based on the present value of the lease payments to be made over the lease term using an estimated incremental borrowing rate. We expense rent monthly on a straight-line basis, as a reduction to the right-of-use asset. Rent expense is included in rent and occupancy expenses and technology and communication expenses in the accompanying consolidated statements of income (Notes 2 and 15). See "Recently Adopted Accounting Pronouncements," below, for the new lease accounting standard and its impact on our financial statements.

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, as well as costs associated with credit facilities and other external costs directly related to the proposed or closed transactions.

Acquisition-related transaction and integration costs were nominal in 2019. 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 review of Trayport by the U.K. Competition and Markets Authority, or the CMA, and various other costs incurred for our other acquisitions that closed during 2017. 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, 2019 and 2018, the portion

of our equity attributable to accumulated other comprehensive loss from foreign currency translation adjustments was $177 million and $227 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 $5 million, $2 million and $4 million in 2019, 2018 and 2017, 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

Standard/Description	Effective Date and Adoption Considerations	Effect on Financial Statements
ASU No. 2016-02, *Leases,* requires entities to recognize both assets and liabilities arising from finance and operating leases, along with additional qualitative and quantitative disclosures.	Adopted on January 1, 2019.	Further disclosures and details on our adoption are discussed below.
ASU 2018-07, *Compensation–Stock Compensation (Topic 718) - Improvements to Nonemployee Share-Based Payment Accounting*, or ASU 2018-07 aligns the accounting for share-based payment awards issued to employees and nonemployees. Under this new guidance, the existing employee guidance will now apply to nonemployee share-based transactions.	Effective for fiscal years beginning after December 15, 2018. Adopted on January 1, 2019.	This guidance will be applied to all new awards granted after the date of adoption, and adoption did not have a material impact on our consolidated financial statements or related disclosures.
ASU 2018-14, *Compensation-Retirement Benefits-Defined Benefit Plans — General (Subtopic 715-20): Disclosure Framework-Changes to the Disclosure Requirements for Defined Benefit Plans*, or ASU 2018-14 was issued in August 2018 and removes certain disclosures that are not considered cost beneficial, clarifies certain required disclosures and adds additional disclosures.	Effective for fiscal years beginning after December 15, 2020 with early adoption permitted. We elected early adoption and adopted on December 31, 2019. The amendments in ASU 2018-14 are required to be applied retrospectively.	Upon adoption we eliminated certain disclosure requirements related to our defined benefit plans that were previously disclosed in Note 16. Certain other disclosure requirements described in Subtopic 715-20 were not applicable to us.
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.	Adopted retrospectively on January 1, 2018 and restated each prior period presented.	Further disclosures and details on our adoption are discussed below.

Standard/Description	Effective Date and Adoption Considerations	Effect on Financial Statements
ASU No. 2017-07, *Compensation-Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost* requires 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.	Adopted on January 1, 2018 and applied 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 these 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, these amounts were reclassified to be included in other income, net, and these adjustments had no impact on net income.
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. See "Investments" section above for additional detail.	Adopted on January 1, 2018.	Our adoption did not result in any fair value adjustments on the date of adoption.
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 of the TCJA, 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 completed our accounting for the tax effects of the enactment of the TCJA.	As of December 31, 2018, 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.	In 2018, we completed our analysis of the two different accounting policies.	As of December 31, 2018, we made a policy election to recognize such tax as a current period expense when incurred.

Standard/Description	Effective Date and Adoption Considerations	Effect on Financial Statements
ASU No. 2018-02, *Reclassification of Certain Tax Effects from Accumulative Other Comprehensive Income*, or ASU 2018-02, gave 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.	Effective for fiscal years beginning after December 15, 2018 with early adoption permitted. We elected early adoption and adopted in the fourth quarter of 2018.	The impact of our adoption was a balance sheet reclassification from OCI to retained earnings of $26 million, which was reflected in our consolidated balance sheet as of December 31, 2018. In connection with our adoption, we made a policy election to use a portfolio approach with respect to pension, postretirement benefit 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.
ASU 2016-18, *Statement of Cash Flows: Restricted Cash*, or ASU 2016-18, required us to show the changes in the total of cash, cash equivalents and restricted cash and cash equivalents in the statement of cash flows.	Adopted in the fourth quarter of 2017.	We no longer present transfers between cash, cash equivalents and restricted cash and cash equivalents in the statement of cash flows. We 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 2019, 2018 and 2017 reflect this change.

Accounting Pronouncements Not Yet Adopted in These Financial Statements

Standard/Description	Effective Date and Adoption Considerations	Effect on Financial Statements
ASU No. 2016-13, *Financial Instruments - Measurement of Credit Losses on Financial Instruments* applies to all financial instruments carried at amortized cost including held-to-maturity debt securities and trade receivables. Requires financial assets carried at amortized cost to be presented at the net amount expected to be collected and requires entities to record credit losses through an allowance for credit losses on available-for-sale debt securities.	We adopted on January 1, 2020. Our adoption was subject to the same internal controls over financial reporting that we apply to our consolidated financial statements.	We have evaluated this guidance to determine the impact on our consolidated financial statements. Based on our assessment, we concluded the impact of adoption of this guidance not to be material.

Adoption of ASC 606, *Revenues from Contracts with Customers*

The FASB has issued 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 revenues in our NYSE businesses (in millions, except earnings per share):

Year ended December 31, 2017	As Reported	New Revenue Standard Adjustment	As Adjusted
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 of December 31, 2017	As Reported	New Revenue Standard Adjustment	As Adjusted
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.

Adoption of ASU 2016-02, *Leases*

On January 1, 2019, we adopted ASU 2016-02, *Leases*, or ASU 2016-02. This standard requires recognition of both assets and liabilities arising from finance and operating leases, along with additional qualitative and quantitative disclosures. ASU 2016-02 requires lessees to recognize a right-of-use asset representing a right to use the underlying asset over the lease term, and a corresponding lease liability on the balance sheet. Our operating leases primarily relate to our leased office space and data center facilities, and we do not have any leases classified as finance leases.

We adopted ASU 2016-02 using the modified retrospective transition method and did not restate prior periods. Using the modified retrospective approach, we applied the provisions of ASU 2016-02 beginning in the period of adoption, and elected the package of practical expedients available to us. There was no impact to the opening balance of retained earnings as a result of a cumulative-effect adjustment on the adoption date. We elected the practical expedient to not reassess lease classifications, but alternatively to carry forward our historical classifications. In addition, we elected the practical expedient of not separating lease and non-lease components as our lease arrangements are not highly dependent on other underlying assets. Our implementation of the amended lease guidance was subject to the same internal controls over financial reporting that we apply to our consolidated financial statements.

At lease inception, we review the service arrangement and components of a contract to identify if a lease or embedded lease arrangement exists. An indicator of a contract containing a lease is when we have the right to control and use an identified asset over a period of time in exchange for consideration. Operating lease right-of-use assets and liabilities are recognized at the commencement date based on the present value of lease payments over the lease term, using our estimated incremental borrowing rate. Upon adoption of ASU 2016-02, we made the policy election to not record existing or future leases with a term of 12 months or less on the balance sheet, and to recognize lease expense on a straight-line basis over the lease term. For these leases, the impact on adoption was nominal. We have also made policy elections related to capitalization thresholds and discount rates. We have elected to use a portfolio approach in consideration of our incremental borrowing rate to our population of lease agreements. Upon adoption, our incremental borrowing rate was determined based on our recent debt issuances that we believe are reflective of current borrowing rates. Subsequent to adoption, current incremental borrowing rates were used. Certain lease agreements include options to extend, renew or terminate the lease agreement. As of December 31, 2019, the weighted-average remaining lease term was 6.7 years and the weighted average discount rate was 3.5%. Our lease agreements do not contain any residual value guarantees.

Upon adoption of ASU 2016-02, we recorded $368 million in operating lease liabilities, of which $53 million is included in other current liabilities and $315 million is included in non-current operating lease liabilities within our accompanying consolidated balance sheet. We also recorded $317 million in operating lease right-of-use assets that are included as a component of property and equipment, net, in our balance sheet and are recorded in an amount equal to our lease liability, adjusted for any remaining unamortized lease incentives such as our deferred rent balances. As part of our adoption, we eliminated $51 million in deferred rent liabilities, of which $2 million had previously been included in other current liabilities and $49 million had been included in other non-current liabilities on our balance sheet. On the date of adoption, deferred

rent liabilities were reclassified and presented as a reduction to the right-of-use asset, included in property and equipment, net, on our consolidated balance sheet. Our adoption did not have an impact on our consolidated income statement.

We recognize rent expense monthly on a straight-line basis for each respective operating lease, as a reduction to the right-of-use asset. We recognized $41 million, $38 million and $39 million of rent expense for office space as rent and occupancy expense in 2019, 2018, and 2017, respectively, and $21 million, $21 million and $19 million of rent expense for data center facilities as technology and communication expense in 2019, 2018, and 2017, respectively, within our consolidated income statement. We do not have any significant variable lease costs related to building and maintenance costs, real estate taxes, or other charges.

Details of our lease asset and liability balances are as follows (in millions):

	As of December 31, 2019	As of January 1, 2019
Right-of-use lease assets	$287	$317
Current operating lease liability	53	53
Non-current operating lease liability	281	315
Total operating lease liability	$334	$368

As of December 31, 2019, we estimate that our operating lease liability will be recognized in the following years (in millions):

2020	62
2021	65
2022	63
2023	45
2024	41
Thereafter	100
Lease liability amounts repayable	376
Interest costs	42
Total operating lease liability	$ 334

Supplemental cash flow information and non-cash activity related to our operating leases are as follows:

	Year Ended December 31, 2019
Cash paid for amounts included in the measurement of operating lease liability	$ 65
Right-of-use assets obtained in exchange for operating lease obligations	$ 389

3. Acquisitions and Divestitures

Acquisitions

Company	Acquisition Date	Primary Segment	Description
Simplifile, LC, or Simplifile	June 12, 2019	Trading and Clearing	Simplifile offers an array of mortgage services, primarily serving as an electronic liaison between lenders, settlement agents and county recording offices, streamlining the local recording of residential mortgage transactions. The transaction expands the ICE Mortgage Services portfolio, which includes MERS. See below for the Simplifile purchase price allocation.

Company	Acquisition Date	Primary Segment	Description
MERSCORP Holdings, Inc., or MERS	October 3, 2018	Trading and Clearing	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. MERS is now part of ICE Mortgage Services. Further disclosures and details on our acquisition of MERS is discussed below.
TMC Bonds, LLC, or TMC Bonds	July 23, 2018	Trading and Clearing	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. See below for the TMC Bonds purchase price allocation.
CHX Holdings, Inc., the parent company of the Chicago Stock Exchange, Inc., or CHX	July 18, 2018	Trading and Clearing	CHX, now named NYSE Chicago, is a full-service stock exchange including trading, data and corporate listings services. NYSE Chicago operates as a registered national securities exchange.
BondPoint	January 2, 2018	Trading and Clearing	BondPoint was acquired from Virtu Financial, Inc. and 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. See below for the BondPoint purchase price allocation.
Bank of America Merrill Lynch, or BofAML's, Global Research division's index business, now named ICE BofA indices	October 20, 2017	Data and Listings	The ICE BofA indices are the second largest group of fixed income indices as measured by assets under management, or AUM, globally.
TMX Atrium	May 1, 2017	Data and Listings	TMX Atrium was acquired from TMX Group and is 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.
National Stock Exchange, Inc., now named NYSE National	January 31, 2017	Trading and Clearing	National Stock Exchange, Inc. gave the NYSE group of exchanges, or the NYSE Group, a new U.S. exchange license and 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 NYSE Chicago, have unique market models designed for corporate and ETF issuers. After closing the transaction, NYSE National ceased operations on February 1, 2017. NYSE National re-launched operations and commenced trading in May 2018.

During 2019, our consolidated subsidiary, Bakkt Holdings, LLC, or Bakkt, acquired two other companies which are not material to our operations.

Additional MERS Acquisition Considerations

In June 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.

Acquisition Purchase Prices and Allocation

The following summarizes our purchase price allocation for material acquisitions to the respective net tangible and identifiable intangible assets and liabilities based on their respective estimated fair values on the date of acquisition. For each acquisition, the excess of the purchase price over the net tangible and identifiable intangible assets has been recorded as goodwill. Cash consideration was gross of $12 million cash held by Simplifile and $15 million cash held by TMC Bonds on the date of each respective acquisition.

	Acquisition Purchase Price Allocation (dollars in millions)					
	Simplifile (Preliminary)	Useful Life (Years)	TMC Bonds	Useful Life (Years)	BondPoint	Useful Life (Years)
Customer relationship intangibles	$ 104	20	$ 253	15	$ 123	15
Developed technology intangibles	7	7	7	3	7	3
Trade name intangibles	2	5	—		—	
Total identifiable intangible assets	113		260		130	
Goodwill	218		423		267	
Other working capital adjustments	7		17		3	
Total purchase price cash consideration	$ 338		$ 700		$ 400	

Non-Controlling Interest

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 either company in our consolidated financial statements.

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, 2019.

In December 2018, Bakkt Holdings, LLC, or Bakkt, 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 terms. These minority interests are reflected as redeemable non-controlling interests in temporary equity within our consolidated balance sheet.

Bakkt is an integrated platform that enables consumers and institutions to transact in digital assets. Bakkt was approved by the New York State Department of Financial Services to take custody of digital assets through Bakkt Trust Company, LLC, a qualified custodian. Bakkt Trust Company, LLC takes custody of bitcoin for physically-delivered futures, creating the first fully regulated marketplace for trading, clearing and custodial solutions of physically-delivered digital asset futures, and is supported by ICE Futures U.S. and ICE Clear U.S.

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. The CMA subsequently undertook a review of our acquisition of Trayport under the merger control laws of the U.K. and we were ultimately 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 cash and 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 on the transaction. 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. 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 were assigned an indefinite useful life, and $53 million for customer relationship intangible assets, which were 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.

Other 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, and Coinbase Global, Inc., or Coinbase, among others, are subject to valuation under ASU 2016-01. See Note 17 for a discussion of our determination of fair value of our financial instruments.

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, 2019, we own a 9.8% stake in Euroclear for a total investment of $631 million. Euroclear is classified as an equity investment and included in other non-current assets 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 2019 and 2018, we recognized dividend income of $19 million and $15 million, respectively, 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 in 2017.

Equity Method Investments

We recognized $62 million, $46 million and $36 million as other income during 2019, 2018 and 2017, respectively, related to our equity method investments in OCC and MERS, discussed below. 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).

Investment in OCC

We own a 40% interest in the Options Clearing Corporation, or OCC, through a direct investment by the New York Stock Exchange, or NYSE, that we treat as an equity method investment. As of December 31, 2019, OCC is our only equity method investment and is included in other non-current assets in the accompanying consolidated balance sheets. OCC serves as a clearing house for securities options, security futures, commodity futures and options on futures traded on various independent exchanges. OCC clears securities options traded on NYSE Arca and NYSE Amex Options, along with other non-affiliated exchanges, and is regulated by the SEC as a registered clearing agency and by the Commodity Futures Trading Commission, or CFTC, as a derivatives clearing organization. Under the equity method of accounting, each reporting period we adjust the carrying value of our OCC investment on our balance sheet by recognizing our pro-rata 40% share of the earnings or losses of OCC, with a corresponding adjustment in our statement of income to other income, after eliminating

any intra-entity income or expenses. In addition, if and when OCC issues cash dividends to us, we deduct the amount of these dividends from the carrying amount of our investment.

OCC adopted a new capital plan during the first quarter of 2015, which raised $150 million in equity capital from OCC's shareholders, including $60 million contributed by us. Pursuant to the terms of the capital plan, in exchange for the contributions of equity capital from its shareholders, OCC was required, subject to determination by its board of directors and compliance with legal requirements, to pay an annual dividend to its shareholders on a pro rata basis. The dividend was intended to be equal to the amount (i) of after-tax income of OCC, in excess of the amount required to maintain its target capital requirement and satisfy other capital requirements, and (ii) remaining after refunds to its clearing members equal to 50% of distributable earnings before tax. Related to that capital plan, from 2015-2017 we received a total of $31 million in dividends from OCC.

Subsequent to our $60 million investment, certain industry participants appealed the SEC's approval of the OCC capital plan in the U.S. Court of Appeals, and in August 2017, the Court of Appeals remanded the capital plan to the SEC. On February 13, 2019, the SEC disapproved the OCC capital plan established in 2015. Consistent with the SEC's disapproval of the OCC capital plan, the OCC returned our original $60 million contribution during 2019 as a result of the disapproval, including $16 million returned during the three months ended December 31, 2019.

Following the SEC disapproval, the OCC also announced that it would not be providing a refund to clearing members or declaring a dividend to shareholders for the year ended December 31, 2018, which resulted in higher reported OCC 2018 net income than we had estimated. Therefore, during 2019, we adjusted equity earnings in OCC by recording an additional $19 million earnings in other income to reflect our share of OCC's 2018 net income. In addition, we recognized $43 million in 2019 of equity earnings as our share of OCC's estimated 2019 profits, which is also included in other income.

Investments Related to MERS Prior to Acquisition

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 was satisfied with fixed income securities, including treasuries, corporates and municipals. The balance of the reserve was 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, 2019 and 2018, it amounted to $42 million and $81 million, respectively, including interest, and was included in prepaid expenses and other current assets and non-current assets, offset by an equal amount due to former MERS equity holders and was reflected in other current liabilities and other non-current liabilities. During 2019, we sold $41 million of these investments and distributed the proceeds to the original MERS shareholders (Note 17).

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, cash, equity options and fixed income trading, as well as mortgage and technology services. 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. In our fixed income trading markets, we earn transaction fees on the trade execution of agency trades, commissions and net markups and markdowns on riskless principal trades. In our mortgage services market we earn fees for the registration and electronic recording of residential mortgage transactions.

  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, mortgage services and fixed income fees contain one performance obligation related to each transaction which occurs instantaneously, and the revenue is recorded at the point in time of the transaction. Our transaction and clearing revenues are reported net of rebates, except for the NYSE transaction-based expenses. Rebates were $860 million, $844 million and $749 million in 2019, 2018 and 2017, 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. In our NYSE businesses, we make liquidity payments to certain customers, as well as charge routing fees related to orders in our markets which are routed to other markets for execution 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. In certain of our revenue share arrangements with third parties we control the delivered contract; in these arrangements we are acting as a principal and the revenue is recorded gross.

- **Data services** - Data service revenues represent the following:

    - Pricing and analytics services provide global securities evaluations, reference data, market indices, risk analytics, derivatives pricing and other information designed to meet our customers' portfolio management, trading, risk management, reporting and regulatory compliance needs.
    - Exchange data and feeds services provide real-time, historical and derived pricing data, order book and transaction information related to our trading venues, as well as data from a broad array of third-party trading venues and news feeds.
    - 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 the period these services are provided, with the remaining revenue recognized ratably over time as customers continue to list on our exchanges. 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. 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, technology development 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). Amounts here have been aggregated as they follow consistent revenue recognition patterns, and are consistent with the segment information in Note 18:

	Trading & Clearing Segment	Data & Listings Segment	Total Consolidated
Year ended December 31, 2019			
Transaction and clearing, net	$ 3,627	$ —	$ 3,627
Data services	—	2,211	2,211
Listings	—	449	449
Other revenues	260	—	260
Total revenues	3,887	2,660	6,547
Transaction-based expenses	1,345	—	1,345
Total revenues, less transaction-based expenses	$ 2,542	$ 2,660	$ 5,202
Timing of Revenue Recognition			
Services transferred at a point in time	$ 2,194	$ —	$ 2,194
Services transferred over time	348	2,660	3,008
Total revenues, less transaction-based expenses	$ 2,542	$ 2,660	$ 5,202

	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

The Trading and Clearing segment revenues above include $247 million, $248 million, and $226 million in 2019, 2018 and 2017, 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.

Beginning in the three months ended June 30, 2019, we have reflected amounts owed under certain third-party revenue share arrangements as technology and communication operating expenses rather than as had been previously recorded net within transaction and clearing revenues. These are included within our Trading and Clearing segment.

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 both December 31, 2019 and 2018, the amount held for this purpose was $90 million and is 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, 2019 and 2018, $465 million and $435 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, 2019 was due to the growth of our clearing businesses, a related increase in costs 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 Organization, 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, 2019 and 2018, the financial resources reserved were $239 million and $213 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, 2019 and 2018, our combined contributions from the clearing houses to the guaranty funds of our clearing houses are $404 million and $320 million, respectively. In January 2019, we increased our contribution to ICE Clear Europe’s guaranty fund by $27 million and in March 2019, we increased our ICE Clear U.S. guaranty fund contribution by $7 million. In September 2019, we increased our ICE Clear U.S. guaranty fund contribution by $35 million in connection with the launch of Bakkt, solely applicable to any losses associated with a default in Bitcoin contracts and other digital asset contracts that ICE Clear U.S. might clear in the future associated with Bakkt operations. In addition, we have a $15 million first-loss amount related to ICE NGX insurance and included in our contribution to its guaranty fund. 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, 2019 and 2018, there is $104 million and $67 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 Trade Vault U.K., ICE Endex, ICE Clear Singapore, ICE NGX. As of December 31, 2019, short-term restricted cash includes the clearing member requirements of ICE Securities Executions & Clearing, LLC and restricted cash related to the launch of Bakkt Trust Company, LLC. The increase in the regulatory capital restricted cash as of December 31, 2019 was primarily due to additional costs incurred due to the growth of these businesses.

As of December 31, 2019 and 2018, we have $45 million and $23 million, respectively, of additional restricted cash, primarily related to escrow for recent acquisitions included in short-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 (Years)
	2019	2018	
Software and internally developed software	$ 1,056	$ 919	3 to 7
Computer and network equipment	742	682	3 to 5
Land	146	145	N/A
Buildings and building improvements	309	294	15 to 40
Right-of-use lease assets	287	—	1 to 16
Leasehold improvements	269	242	4 to 12
Equipment, aircraft and office furniture	233	225	4 to 15
	3,042	2,507	
Less accumulated depreciation and amortization	(1,506)	(1,266)	
Property and equipment, net	$ 1,536	$ 1,241	

Beginning January 1, 2019, in connection with our adoption of ASU 2016-02 (Note 2), we recognize right-of-use assets representing our rights to use assets over an underlying lease term as rent expense.

In 2019, 2018 and 2017, amortization of software and internally developed software was $175 million, $160 million and $135 million, respectively, and depreciation of all other property and equipment was $145 million, $133 million and $122 million, respectively. As of December 31, 2019 and 2018, unamortized software and internally developed software was $301 million and $298 million, respectively.

8. Goodwill and Other Intangible Assets

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

Goodwill balance at January 1, 2018	$ 12,216
Acquisitions	889
Foreign currency translation	(38)
Other activity, net	18
Goodwill balance at December 31, 2018	13,085
Acquisitions	235
Foreign currency translation	20
Other activity, net	2
Goodwill balance at December 31, 2019	$ 13,342

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

Other intangible assets balance at January 1, 2018	$ 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
Acquisitions	116
Foreign currency translation	24
ICE Futures Singapore exchange registration intangible assets impairment	(31)
Amortization of other intangible assets	(311)
Other activity, net	(2)
Other intangible assets balance at December 31, 2019	$ 10,258

We completed several acquisitions, including Simplifile, during 2019, and BondPoint, CHX Holdings, Inc., TMC Bonds and MERS during 2018 (Note 3).

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. The table above includes an impairment charge of $31 million recorded during 2019 on the remaining value of exchange registration intangible assets on ICE Futures Singapore as a result of a decrease in fair value determined during our annual impairment testing. ICE Futures Singapore is part of our Trading and Clearing segment. In addition, the table 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. ICE Futures Canada and ICE Clear Canada were part of our Trading and Clearing segment. Other than these impairments and the impairment related to the 2017 NYSE Governance Services divestiture (Note 3), we did not recognize any other impairment losses on goodwill or other intangible assets during 2019, 2018 or 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 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)
	2019	2018	
Customer relationships	$ 4,510	$ 4,406	3 to 25
Technology	544	524	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	42	39	1 to 5
Other	36	36	1 to 5
	5,530	5,403	
Less accumulated amortization	(1,811)	(1,532)	
Total finite-lived intangible assets, net	3,719	3,871	
Exchange registrations, licenses and contracts with indefinite lives	6,228	6,253	
Trade names and trademarks with indefinite lives	280	280	
In-process research and development	23	49	
Other	8	9	
Total indefinite-lived intangible assets	6,539	6,591	
Total other intangible assets, net	$ 10,258	$ 10,462	

In 2019, 2018 and 2017, amortization of other intangible assets was $311 million, $289 million and $272 million, respectively. Collectively, the remaining weighted average useful lives of the finite-lived intangible assets is 17.1 years as of December 31, 2019. We expect future amortization expense from the finite-lived intangible assets as of December 31, 2019 to be as follows (in millions):

2020	$ 278
2021	261
2022	254
2023	247
2024	290
Thereafter	2,389
	$ 3,719

9. Deferred Revenue

Our contract liabilities, or deferred revenue, represent consideration received that is yet to be recognized as revenue. Total deferred revenue was $201 million as of December 31, 2019, including $129 million in current deferred revenue and $72 million in other non-current liabilities. Total deferred revenue was $217 million as of December 31, 2018, including $135 million in current deferred revenue and $82 million in other non-current liabilities. 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 2019 and 2018 are as follows (in millions):

	Annual Listing Revenue	Original Listing Revenues	Other Listing Revenues	Data Services and Other Revenues	Total
Deferred revenue balance at January 1, 2018	$ —	$ 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
Additions	384	17	36	394	831
Amortization	(384)	(23)	(42)	(398)	(847)
Deferred revenue balance at December 31, 2019	$ —	$ 19	$ 94	$ 88	$ 201

Included in the amortization recognized in 2019, $122 million related to the deferred revenue balance as of January 1, 2019. Included in the amortization in 2018, $114 million related to the deferred revenue balance as of January 1, 2018. As of December 31, 2019, 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
2020	$ 15	$ 31	$ 83	$ 129
2021	4	24	4	32
2022	—	21	1	22
2023	—	11	—	11
2024	—	6	—	6
Thereafter	—	1	—	1
Total	$ 19	$ 94	$ 88	$ 201

10. Debt

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

	As of December 31,	
	2019	2018
Debt:		
Short-term debt:		
Commercial Paper	$ 1,311	$ 951
2020 Senior Notes (2.75% senior unsecured notes due December 1, 2020)	1,248	—
Other short-term debt	10	—
Total short-term debt	2,569	951
Long-term debt:		
2020 Senior Notes (2.75% senior unsecured notes due December 1, 2020)	—	1,246
2022 Senior Notes (2.35% senior unsecured notes due September 15, 2022)	497	496
2023 Senior Notes (3.45% senior unsecured notes due September 21, 2023)	398	397
2023 Senior Notes (4.00% senior unsecured notes due October 15, 2023)	794	793
2025 Senior Notes (3.75% senior unsecured notes due December 1, 2025)	1,244	1,243
2027 Senior Notes (3.10% senior unsecured notes due September 15, 2027)	496	496
2028 Senior Notes (3.75% senior unsecured notes due September 21, 2028)	592	591
2048 Senior Notes (4.25% senior unsecured notes due September 21, 2048)	1,229	1,228
Total long-term debt	5,250	6,490
Total debt	$ 7,819	$ 7,441

Credit Facilities

We have a $3.4 billion senior unsecured revolving credit facility, or the 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. We incurred debt issuance costs of $2 million relating to the 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 Credit Facility.

The 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 Credit Facility as of December 31, 2019. As of December 31, 2019, of the $3.4 billion that is currently available for borrowing under the Credit Facility, $1.3 billion is required to back-stop the amount outstanding under our U.S. dollar commercial paper program, or the Commercial Paper Program, and $160 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 $1.9 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, 2019, the applicable rate was 0.125%. Amounts borrowed under the facility may be prepaid at any time without premium or penalty.

The Credit 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.

During 2019, a subsidiary of ours entered into a new $20 million line of credit for their general corporate purposes. As of December 31, 2019, the subsidiary had borrowed $10 million, which is reflected as “other short-term debt” in the table above.

Commercial Paper Program

Our Commercial Paper Program is currently backed by the borrowing capacity available under the 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 had net issuances of $360 million under the Commercial Paper Program during 2019, the proceeds of which were used to fund the acquisition of Simplifile and for general corporate purposes. We repaid $283 million of net notes outstanding under the Commercial Paper Program during 2018 primarily using cash flows from operations and cash proceeds received from our 2018 bond issuance. This was partially offset by notes we issued under the program during 2018, the proceeds of which were used to fund acquisitions and investments and repurchase our common stock. We repaid $409 million of net notes outstanding under the Commercial Paper Program during 2017 primarily using net cash proceeds received from the sales of Cetip and Trayport. We repaid a portion of the amounts outstanding under the program during 2019, 2018 and 2017 with cash flows from operations.

Commercial paper notes of $1.3 billion with original maturities ranging from two to 87 days were outstanding as of December 31, 2019 with a weighted average interest rate of 1.84% per annum, and a weighted average remaining maturity of 22 days. 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 remaining maturity of 12 days.

Senior Notes:

- **2023, 2028 and 2048 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. 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 2018. We incurred debt issuance costs of $21 million relating to these 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 these 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 December 2020, or the 2020 Senior Notes, and $1.25 billion, 3.75% notes due December 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.

All of our Senior Notes 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, 2019, the outstanding debt repayment schedule is as follows (in millions):

2020	$	2,574
2021		—
2022		500
2023		1,200
2024		—
Thereafter		3,600
Principal amounts repayable		7,874
Debt issuance costs		(35)
Unamortized balance discounts on bonds, net		(20)
Total debt outstanding	$	7,819

11. Share-Based Compensation

The non-cash compensation expenses for stock options and restricted stock were $139 million, $130 million and $135 million in 2019, 2018 and 2017, respectively, net of $14 million, $15 million and $18 million, respectively, that was capitalized as software development costs. As of December 31, 2019, we had 34.2 million shares in total under various equity plans 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 our closing stock price 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, 2017	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
Granted	493	76.16
Exercised	(598)	38.96
Forfeited	(4)	77.58
Outstanding at December 31, 2019	3,501	51.87

Details of stock options outstanding as of December 31, 2019 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	3,501	$ 51.87	5.9	$ 142
Exercisable	2,445	$ 44.35	4.9	$ 118

Details of stock options exercised during 2019, 2018 and 2017 are as follows:

	Year Ended December 31,		
Options exercised:	2019	2018	2017
Total intrinsic value of options exercised (in millions)	$ 26	$ 36	$ 22

	As of December 31,		
Options outstanding:	2019	2018	2017
Number of options exercisable (in millions)	2.4	2.6	3.0
Weighted-average exercise price	$ 44.35	$ 40.22	$ 36.36

As of December 31, 2019, 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 1.4 years as the stock options vest.

We use the Black-Scholes option pricing model to value our stock option awards. During 2019, 2018 and 2017, we used the assumptions in the table below to compute the value:

Assumptions:	Year Ended December 31, 2019	2018	2017
Risk-free interest rate	2.49 %	2.67 %	1.84 %
Expected life in years	5.9	6.0	5.0
Expected volatility	20 %	20 %	21 %
Expected dividend yield	1.44 %	1.43 %	1.40 %
Estimated weighted-average fair value of options granted per share	$ 15.45	$ 14.08	$ 10.50

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.

In February 2019, we reserved a maximum of 1.1 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 is based on our actual financial performance as compared to financial performance targets set by our Board of Directors and its Compensation Committee for the year ending December 31, 2019, and is also subject to a market condition reduction based on how our 2019 total stockholder return, or TSR, compared to that of the S&P 500 Index. In 2019, no TSR share reduction was required. Based on our actual 2019 financial performance as compared to the 2019 financial performance level thresholds, 0.5 million restricted shares were awarded, which resulted in $39 million in compensation expenses that will be expensed over the three-year accelerated vesting period, including $20 million expensed during 2019.

The fair value of awards with a market condition is estimated based on a simulation of various outcomes and includes inputs such as 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 following is a summary of nonvested restricted shares under all plans discussed above:

	Number of Restricted Stock Shares (in thousands)	Weighted Average Grant-Date Fair Value per Share
Nonvested at January 1, 2017	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	1,994	67.88

	Number of Restricted Stock Shares (in thousands)	Weighted Average Grant-Date Fair Value per Share
Vested	(2,819)	50.21
Forfeited	(453)	58.42
Nonvested at December 31, 2018	4,470	60.56
Granted	1,697	76.85
Vested	(2,269)	57.92
Forfeited	(231)	67.66
Nonvested at December 31, 2019	3,667	69.29

	Year Ended December 31,		
	2019	2018	2017
Time-based restricted stock units granted (in thousands) [(1)]	997	1,153	2,364
Total fair value of restricted stock vested under all restricted stock plans (in millions)	$ 173	$ 206	$ 206

[(1)] The remaining shares granted are performance-based.

Performance-based restricted 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 in the table above at the target number of restricted shares that would vest if the performance targets are met. As of December 31, 2019, there were $106 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 1.1 years as the restricted stock vests.

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 are two offering periods each year, 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 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. We recorded compensation expenses of $7 million and $4 million during 2019 and 2018, respectively, related to the 15% discount given to our participating employees.

Bakkt Incentive Units

In February 2019, our Board approved the adoption of the Bakkt Equity Incentive Plan to issue various Bakkt equity unit awards. Under this plan, as of December 31, 2019, Bakkt has 82 million, 4 million and 9 million of its preferred, common and phantom incentive units, respectively, outstanding. These awards were made to certain employees and Board members. The units are unvested at the issuance date, are subject to the vesting terms in the award agreements and upon vesting are converted into Bakkt equity or cash.

12. Equity

Treasury Stock

During 2019, 2018 and 2017, we received 1.0 million shares, 1.5 million shares and 1.5 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.

Stock Repurchase Program

We periodically review whether to repurchase our stock. In making a determination regarding the timing and extent of any stock repurchases, we consider multiple factors that may include: overall stock market conditions, our common stock price

performance, 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 September 2017, our Board approved an aggregate of $1.2 billion for future repurchases with no fixed expiration date. In September 2018, our Board approved an aggregate of $2.0 billion for future repurchases with no fixed expiration date. In December 2019, our Board approved an aggregate of $2.4 billion for future repurchases of our common stock with no fixed expiration date that became effective on January 1, 2020. The $2.4 billion replaced the previous amount approved by the Board of Directors.

During 2019, 2018 and 2017, we repurchased 17.4 million shares, 16.3 million shares and 15.0 million shares, respectively, of our outstanding common stock at a cost of $1.5 billion, $1.2 billion and $949 million, respectively, excluding shares withheld upon vesting of equity awards. The shares repurchased are held in treasury stock.

We expect to fund repurchases from our operating cash flow, 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 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.

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 periods presented as follows:

	Shares Repurchased (in thousands)	Average Repurchase Price Per Share	Amount of Repurchases (in millions)	Total cumulative year-to-date 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 as of the end of the quarter (in millions)
2019					
Fourth quarter	3,661	$ 92.86	$ 340	17,432	$ 540
Third quarter	3,730	$ 91.16	340	13,771	$ 880
Second quarter	4,170	$ 81.53	340	10,041	$ 1,220
First quarter	5,871	$ 74.95	440	5,871	$ 1,560
Total common stock repurchases[1]	17,432	$ 83.75	$ 1,460		
2018					
Fourth quarter	1,863	$ 74.99	$ 139	16,257	$ 2
Third quarter	3,991	$ 75.17	300	14,394	$ 141
Second quarter	6,298	$ 72.81	459	10,403	$ 441
First quarter	4,105	$ 73.08	300	4,105	$ 900
Total common stock repurchases[2]	16,257	$ 73.71	$ 1,198		
2017					
Fourth quarter	3,498	$ 68.62	$ 240	14,967	$ 51
Third quarter	3,642	$ 65.90	240	11,469	$ 291
Second quarter	3,916	$ 61.28	240	7,828	$ 531
First quarter	3,911	$ 58.49	229	3,911	$ 771
Total open market common stock repurchases	14,967	$ 63.39	$ 949		

[1] Includes 1.3 million shares purchased on the open market at a cost of $100 million and 16.1 million shares purchased under our Rule 10b5-1 trading plan at a cost of $1.4 billion.
[2] Includes 2.2 million shares purchased on the open market at a cost of $159 million and 14.1 million shares purchased under our Rule 10b5-1 trading plan at a cost of $1.0 billion.

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, our current and future planned

strategic growth initiatives 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)
2019		
Fourth quarter	$ 0.275	$ 154
Third quarter	0.275	155
Second quarter	0.275	155
First quarter	0.275	157
Total cash dividends declared and paid	$ 1.10	$ 621
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

Accumulated Other Comprehensive Income (Loss)

The following tables present changes in the accumulated balances for each component of other comprehensive income (loss) (in millions):

	Changes in Accumulated Other Comprehensive Income (Loss) by Component				
	Foreign currency translation adjustments	Comprehensive income from equity method investment	Employee benefit plans adjustments	Fair value of available-for-sale securities	Total
Balance, as of January 1, 2017	$ (345)	$ 2	$ (109)	$ 108	$ (344)
Other comprehensive income (loss)	203	—	28	(108)	123
Income tax benefit (expense)	6	—	(8)	—	(2)
Net current period other comprehensive income (loss)	209	—	20	(108)	121
Balance, as of December 31, 2017	(136)	2	(89)	—	(223)
Other comprehensive income (loss)	(91)	—	33	—	(58)
Net impact of adoption of ASU 2018-02	(1)	—	(25)	—	(26)
Income tax benefit (expense)	1	—	(9)	—	(8)
Net current period other comprehensive income (loss)	(91)	—	(1)	—	(92)
Balance, as of December 31, 2018	(227)	2	(90)	—	(315)
Other comprehensive income (loss)	51	(1)	32	—	82
Income tax benefit (expense)	(1)	—	(9)	—	(10)
Net current period other comprehensive income (loss)	50	(1)	23	—	72
Balance, as of December 31, 2019	(177)	1	(67)	—	(243)

13. Income Taxes

Income before income taxes and the income tax provision consisted of the following (in millions):

	Year Ended December 31,		
	2019	2018	2017
Income before income taxes			
Domestic	$ 1,333	$ 1,371	$ 1,308
Foreign	1,148	1,149	1,218
Total	$ 2,481	$ 2,520	$ 2,526
Income tax provision			
Current tax expense:			
Federal	$ 189	$ 140	$ 266
State	124	107	92
Foreign	241	226	268
Total	$ 554	$ 473	$ 626
Deferred tax expense (benefit):			
Federal	$ (21)	$ 29	$ (677)
State	(4)	9	33
Foreign	(8)	(11)	(10)
	$ (33)	$ 27	$ (654)
Total income tax expense (benefit)	$ 521	$ 500	$ (28)

A reconciliation of the statutory U.S. federal income tax rate to our effective income tax rate is as follows:

	Year Ended December 31,		
	2019	2018	2017
Statutory federal income tax rate	21 %	21 %	35 %
State and local income taxes, net of federal benefit	4	3	3
Foreign tax rate differential	(1)	(1)	(7)
Current year tax benefit from foreign derived intangible income	(1)	—	—
Deferred tax benefit due to tax law changes	—	—	(30)
Other	(2)	(3)	(2)
Total provision for income taxes	21 %	20 %	(1)%

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 differentials in 2019 and 2018 are significantly lower than they had been in previous 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.

Our effective tax rates were 21% and 20% in 2019 and 2018, respectively. The difference is primarily driven by the 2018 discrete tax benefits from the acquisition of MERS and the divestiture of Trayport exceeding the net increased tax benefits recorded in 2019 from certain international tax provisions under the TCJA, including the tax benefit from Foreign-Derived Intangible Income, or FDII. The impact of the 2019 FDII benefit is outlined in the above effective tax rate reconciliation.

The 2018 effective tax rate was 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 tax benefits from the acquisition of MERS and the divestiture

of Trayport, and deferred tax benefits from changes in estimates. The tax benefit from the acquisition of MERS is included in "Other" in the above effective tax rate reconciliation.

Deferred Tax Assets and Liabilities

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. The following table summarizes the significant components of our deferred tax liabilities and assets as of December 31, 2019 and 2018 (in millions):

	As of December 31,	
	2019	2018
Deferred tax assets:		
Deferred and stock-based compensation	$ 82	$ 89
Pension	4	12
Liability reserve	38	35
Tax credits	2	3
Loss carryforward	129	138
Deferred revenue	22	24
Other	42	55
Total	319	356
Valuation allowance	(119)	(119)
Total deferred tax assets, net of valuation allowance	$ 200	$ 237
Deferred tax liabilities:		
Property and equipment	$ (132)	$ (133)
Acquired intangibles	(2,382)	(2,439)
Total deferred tax liabilities	$ (2,514)	$ (2,572)
Net deferred tax liabilities	$ (2,314)	$ (2,335)
Reported as:		
Net non-current deferred tax assets	$ —	$ 2
Net non-current deferred tax liabilities	(2,314)	(2,337)
Net deferred tax liabilities	$ (2,314)	$ (2,335)

A reconciliation of the beginning and ending amount of deferred income tax valuation allowance is as follows (in millions):

	Year Ended December 31,		
	2019	2018	2017
Beginning balance of deferred income tax valuation allowance	$ 119	$ 126	$ 122
Charges against goodwill	1	—	15
Decreases	(1)	(7)	(11)
Ending balance of deferred income tax valuation allowance	$ 119	$ 119	$ 126

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 as of both December 31, 2019 and 2018. 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 charged against goodwill primarily relate to deferred tax assets arising on the 2017 acquisition of National Stock Exchange.

As part of U.S. tax reform, the TCJA imposed 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 2019 and 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. with no material additional income tax consequences in the

future. Consequently, these earnings are not considered to be indefinitely reinvested and the related tax impact is included in our income tax provision for the periods ended December 31, 2019 and 2018, respectively.

However, our non-U.S. subsidiaries' cumulative undistributed earnings as of December 31, 2017 and the 2019 and 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, 2019, based on post-income tax earnings under U.S. GAAP, is $5.2 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.

In 2018 we 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, 2019 or 2018.

As of December 31, 2019 and 2018, we have gross U.S. federal net operating loss carryforwards of $119 million and $133 million, respectively, and gross state and local net operating loss carryforwards of $110 million and $201 million, respectively. The decreases of federal and state and local net operating loss carryforwards are 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 expire, with material amounts beginning in 2026. In addition, as of December 31, 2019 and 2018, we have gross foreign net operating loss carryforwards of $282 million and $285 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,		
	2019	**2018**	**2017**
Beginning balance of unrecognized tax benefits	98	$ 115	112
Additions based on tax positions taken in current year	17	13	10
Additions based on tax positions taken in prior years	9	7	9
Reductions based on tax positions taken in prior years	(1)	—	—
Reductions resulting from statute of limitation lapses	(13)	(19)	(8)
Reductions related to settlements with taxing authorities	(7)	(18)	(8)
Ending balance of unrecognized tax benefits	$ 103	$ 98	$ 115

As of December 31, 2019 and 2018, the balance of unrecognized tax benefits which would, if recognized, affect our effective tax rate was $85 million and $81 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 $17 million and decrease as much as $13 million within the next 12 months. Of the $103 million in unrecognized tax benefits as of December 31, 2019, $90 million is recorded as other non-current liabilities and $13 million is recorded as other current liabilities.

We recognize interest and penalties accrued on income tax uncertainties as a component of income tax expense. In 2019, 2018 and 2017, we recognized $5 million, ($6 million) and ($1 million), respectively, of income tax expense/(benefit) for interest and penalties. As of December 31, 2019 and 2018, accrued interest and penalties were $33 million and $28 million, respectively. Of the $33 million in accrued interest and penalties as of December 31, 2019, $23 million is recorded as other non-current liabilities and $10 million is recorded as other current liabilities in the accompanying consolidated balance sheet.

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	2016 - 2019
U.S. States	2008 - 2019

U.K.	2018 - 2019
Netherlands	2013 - 2019

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 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., ICE Endex and third-party venues	U.K.
ICE Clear U.S.	Agricultural, metals, FX and equity index futures and options contracts and digital assets futures contracts	ICE Futures U.S.	U.S.
ICE Clear Credit	North American, European, Asian-Pacific and Emerging Market CDS instruments	Creditex, OTC and third-party venues	U.S.
ICE Clear Netherlands	Derivatives on equities and equity indices traded on regulated markets	ICE Endex	The Netherlands
ICE Clear Singapore	Energy, metals and financial futures products	ICE Futures Singapore	Singapore
ICE NGX	Physical North American natural gas, electricity and oil futures	ICE NGX	Canada

Original & Variation Margin

Each of the ICE Clearing Houses generally requires all clearing members or participants to deposit collateral in cash or certain pledged assets. The collateral deposits are known as “original margin.” In addition, the ICE Clearing Houses 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 proprietary risk models established by each ICE Clearing House and reviewed by the relevant regulators, independent model validators, risk committees and the boards of directors of the respective ICE Clearing House. The amounts required 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 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 pay any amount owed. In the event that the defaulting clearing member's deposits are not sufficient to pay the amount owed in full, the ICE Clearing Houses will first use their respective contributions to the guaranty fund, often referred to as Skin In The Game, or SITG, to pay any remaining amount owed. In the event that the SITG is not sufficient, the ICE Clearing Houses may utilize the respective guaranty fund deposits, or collect additional funds from their respective non-defaulting clearing members on a pro-rata basis, to pay any remaining amount owed.

As of December 31, 2019 and 2018, the ICE Clearing Houses have received or have been pledged $126.0 billion and $121.4 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

As described above, 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, each of the ICE Clearing Houses requires that each clearing member make deposits into a guaranty fund.

In addition, we have contributed our own capital which could be used if a defaulting clearing member's original margin and guaranty fund deposits are insufficient. Such amounts are recorded as long-term restricted cash and cash equivalents in our balance sheets and are as follows (in millions):

	ICE Portion of Guaranty Fund Contribution		Default insurance	
	As of December 31,		As of December 31,	
Clearing House	2019	2018	2019	2018
ICE Clear Europe	$233	$206	$75	N/A
ICE Clear U.S.	103	61	25	N/A
ICE Clear Credit	50	50	50	N/A
ICE Clear Netherlands	2	2	N/A	N/A
ICE Clear Singapore	1	1	N/A	N/A
ICE NGX	15	N/A	100	$100
Total	$404	$320	$250	$100

In September 2019, we added a layer of insurance to our clearing member default protection. The default insurance has a three-year term that commenced September 17, 2019, for the following clearing houses in the following amounts: ICE Clear Credit - $50 million; ICE Clear Europe - $75 million; and, ICE Clear US - $25 million. The default insurance layer resides after and in addition to the ICE Clear Credit, ICE Clear Europe, and ICE Clear U.S. SITG contributions and before the guaranty fund contributions of the non-defaulting clearing members.

Similar to SITG, the default insurance layer is not intended to replace or reduce the position risk-based amount of the guaranty fund. As a result, the default insurance layer is not a factor that is included in the calculation of the clearing members' guaranty fund contribution requirement. Instead, it serves as a new, additional, distinct, and separate default resource that should serve to further protect the non-defaulting clearing members' guaranty fund contributions from being mutualized in the event of a default.

As of December 31, 2019, ICE NGX maintains a guaranty fund utilizing a $100 million letter of credit and a default insurance policy, discussed below.

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, 2019, 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	$ 28,318	$ 22,145	$ 6,802	$ —	$ 2	$ 57,267
Unsettled variation margin, net	—	—	—	255	—	255
Guaranty fund	4,144	2,268 —	463	—	5	6,880
Delivery contracts receivable/payable, net	—	—	—	585	—	585
Total	$ 32,462	$ 24,413	$ 7,265	$ 840	$ 7	$ 64,987

As of December 31, 2018, 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	$ 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

[1] $27.4 billion and $5.1 billion is related to futures/options and CDS, respectively.
[2] $25.8 billion and $5.1 billion is related to futures/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.

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 and ICE Clear Netherlands have entered into Committed FX Facilities to support these liquidity needs. As of December 31, 2019 the following facilities were in place:

- **ICE Clear Europe:** $1.0 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 U.S.:** $400 million in Committed Repo to finance U.S. dollar deposits.
- **ICE Clear Netherlands**: €10 million in Committed FX Facilities to finance euro payment obligations.

Details of our cash and cash equivalent deposits are as follows (in millions):

Clearing House	Investment Type	As of December 31, 2019	As of December 31, 2018
ICE Clear Europe	National Bank Account [1]	$ 9,667	$ 8,647
ICE Clear Europe	Reverse repo	19,187	18,097
ICE Clear Europe	Sovereign Debt	3,591	4,035
ICE Clear Europe	Demand deposits	17	85
ICE Clear Credit	National Bank Account [2]	19,480	19,484
ICE Clear Credit	Reverse repo	2,411	1,935
ICE Clear Credit	Demand deposits	2,522	3,807
ICE Clear U.S.	Reverse repo	4,320	4,380
ICE Clear U.S.	Sovereign Debt	2,945	2,340
Other ICE Clearing Houses	Demand deposits	7	8
ICE NGX	Unsettled Variation Margin and Delivery Contracts Receivable/Payable	840	1,137
Total		64,987	63,955

[1] As of December 31, 2019, ICE Clear Europe held €8.0 billion ($9.0 billion based on the euro/U.S. dollar exchange rate of 1.1212 as of December 31, 2019) at De Nederlandsche Bank, or DNB, £500 million ($663 million based on the pound sterling/U.S. dollar exchange rate of 1.3260 as of December 31, 2019) at the Bank of England, or BOE and €10 million ($11 million based on the above exchange rate) at the BOE. 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 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 BOE.

[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 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 value-related risks and rewards of these assets remain with the clearing members. Any gain or loss accrues to the clearing member. The ICE Clearing Houses do not, in the ordinary course, rehypothecate or re-pledge these assets. These pledged assets are not reflected in our balance sheets, and are as follows (in millions):

	As of December 31, 2019				
	ICE Clear Europe	ICE Clear Credit	ICE Clear U.S.	ICE NGX	Total
Original margin:					
Government securities at face value	$ 30,635	$ 13,710	$ 12,633	$ —	$ 56,978
Letters of credit	—	—	—	2,469	2,469
ICE NGX cash deposits	—	—	—	362	362
Total	$ 30,635	$ 13,710	$ 12,633	$ 2,831	$ 59,809
Guaranty fund:					
Government securities at face value	$ 475	$ 523	$ 243	$ —	$ 1,241

	As of December 31, 2018				
	ICE Clear Europe	ICE Clear Credit	ICE Clear U.S.	ICE NGX	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
Total	$ 29,887	$ 12,990	$ 10,208	$ 3,161	$ 56,246
Guaranty fund:					
Government securities at face value	$ 654	$ 256	$ 264	$ —	$ 1,174

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. 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, held in trust and remains the property of the participant, therefore, 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, subject to certain conditions:

Account Type:	As of December 31, 2019 (In C$ millions)	As of December 31, 2019 (In $USD millions)
Daylight liquidity facility	C$300	$231
Overdraft facility	20	15
Total	C$320	$246

As of December 31, 2019, ICE NGX maintains a guaranty fund of $100 million funded by a letter of credit issued by a major Canadian bank, and backed by default insurance underwritten by Export Development Canada, or EDC, a Crown corporation operated at arm's length from the Canadian government. In the event of a participant default where the participant's collateral is depleted, the shortfall would be covered by a draw down on the letter of credit following which ICE NGX would file a claim under the default insurance to recover additional losses up to $100 million beyond the $15 million first-loss amount that ICE NGX is responsible for under the default insurance policy.

Clearing House Exposure

The net notional value of unsettled contracts was $2.8 trillion as of December 31, 2019. Each ICE Clearing House bears financial counterparty credit risk and provides a central counterparty guarantee, or performance guarantee, to its clearing members or participants. To reduce their exposure, the ICE Clearing Houses have a risk management program with both initial and ongoing membership standards. Excluding the effects of original and variation margin, guaranty fund and collateral requirements, the ICE Clearing Houses' maximum estimated exposure for this guarantee is $108.8 billion as of December 31, 2019, 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 guarantee liability was determined to be nominal and no liability was recorded as of December 31, 2019 and 2018. 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 2029. All of our leases are classified as operating leases. For details of our lease assets, lease liabilities and rent expense see Note 2.

Legal Proceedings

We are subject to legal proceedings, claims and investigations that arise in the ordinary course of our business. We record estimated expenses and reserves 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.

In 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 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).

In 2018, the defendant exchanges then filed a new motion to dismiss seeking dismissal on grounds other than those considered by the Second Circuit in its remand decision. On May 28, 2019, the district court denied the motion. The exchanges filed a motion in the district court on June 17, 2019 asking the court to certify the matter for an immediate appeal to the U.S. Court of Appeals for the Second Circuit and on July 16, 2019, the court denied the exchanges' motion. On July 25, 2019, the exchanges filed answers to the second amended complaint, denying the principal allegations of the plaintiffs, denying liability in the matter, and asserting various affirmative defenses. The discovery period in the matter commenced and is scheduled to continue through 2020.

LIBOR Litigation

On January 15, 2019 and January 31, 2019, two virtually identical purported class action complaints were filed by, respectively, Putnam Bank, a savings bank based in Putnam, Connecticut, and two municipal pension funds affiliated with the City of Livonia, Michigan in the U.S. District Court for the Southern District of New York 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”). On March 4, 2019, a virtually identical complaint was filed on behalf of four retirement and benefit funds affiliated with the Hawaii Sheet Metal Workers Union. 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). On July 1, 2019, the various plaintiffs referenced above filed a consolidated amended complaint against the ICE and 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 one-month or three-month USD LIBOR-benchmarked rate during the period from February 1, 2014 to the present. The plaintiffs allege that the ICE 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.

As with the individual complaints, the consolidated amended complaint asserts a claim for violations of the Sherman and Clayton Antitrust Acts and seeks unspecified treble damages and other relief. The ICE and Panel Bank Defendants filed motions to dismiss the consolidated amended complaint on August 30, 2019. The district court heard oral arguments on the motions on January 30, 2020, and the parties are awaiting the court's decision. ICE intends to vigorously defend the matter.

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.

We did not make any contributions to our pension plan during 2019 or 2018. 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.

We do not expect to make contributions to the pension plan in 2020. 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.

The fair values of our plan assets as of December 31, 2019, by asset category, are as follows (in millions):

Asset Category	Fair Value Measurements Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
Cash	$ 7	$ —	$ —	$ 7
Equity securities:				
U.S. large-cap	—	25	—	25
U.S. small-cap	—	7	—	7
International	—	13	—	13
Fixed income securities	137	751	6	894
Total	$ 144	$ 796	$ 6	$ 946

The above table excludes trades pending settlement with a net obligation of $52 million as of December 31, 2019. These trades settled in January 2020.

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 Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Total
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 measurement dates for the pension plan are December 31, 2019 and 2018. 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, 2019 and 2018 and a statement of funded status of the pension plan as of December 31, 2019 and 2018 (in millions):

	As of December 31,	
	2019	2018
Change in benefit obligation:		
Benefit obligation at beginning of year	$ 791	$ 875
Interest cost	28	26
Actuarial (gain) loss	90	(61)
Benefits paid	(48)	(49)
Benefit obligation at year end	$ 861	$ 791
Change in plan assets:		
Fair value of plan assets at beginning of year	$ 794	$ 869
Actual return on plan assets	148	(26)
Contributions	—	—
Benefits paid	(48)	(49)
Fair value of plan assets at end of year	$ 894	$ 794
Funded status	$ 33	$ 3
Accumulated benefit obligation	$ 861	$ 791
Amounts recognized in the accompanying consolidated balance sheets:		
Accrued pension plan asset	$ 33	$ 3

The following shows the components of the pension plan expense (benefit) for 2019, 2018 and 2017 (in millions):

	Year Ended December 31,		
	2019	2018	2017
Interest cost	$ 28	$ 26	$ 27
Estimated return on plan assets	(31)	(29)	(44)
Amortization of loss	3	4	2
Aggregate pension expense (benefit)	$ —	$ 1	$ (15)

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):

2020	$ 49
2021	50
2022	49
2023	49
2024	49
Next 5 years	243

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, 2019 and 2018, the cash surrender value of such policies was $58 million and $57 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,	
	2019	2018
Change in benefit obligation:		
Benefit obligation at beginning of year	$ 41	$ 49
Interest cost	1	1
Actuarial (gain) loss	4	(2)
Benefits paid	(5)	(7)
Benefit obligation at year end	$ 41	$ 41
Funded status	$ (41)	$ (41)
Amounts recognized in the accompanying consolidated balance sheets:		
Other current liabilities	$ (5)	$ (5)
Accrued employee benefits	(36)	(36)

SERP plan expense in the accompanying consolidated statements of income was $1 million each year in 2019, 2018 and 2017 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	
2020	$ 5
2021	5
2022	4
2023	4
2024	3
Next 5 years	13

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 2019, 2018 and 2017 are set forth below:

	Year Ended December 31,		
	2019	2018	2017
Weighted-average discount rate for determining benefit obligations (pension/SERP plans)	3.0% / 2.7%	4.0% / 3.8%	3.4% / 3.1%
Weighted-average discount rate for determining interest costs (pension/SERP plans)	3.7% / 3.5%	3.0% / 2.7%	3.2% / 2.6%
Expected long-term rate of return on plan assets (pension/SERP plans)	3.9% / N/A	3.5% / 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 $2 million, $5 million and $5 million in 2019, 2018 and 2017, 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, 2019 and 2018 is 3.0% and 4.0%, respectively. The weighted-average discount rate for determining the interest cost as of December 31, 2019 and 2018 is 3.7% and 3.0%, 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,	
	2019	2018
Benefit obligation at the end of year	$ 142	$ 154
Interest cost	5	5
Actuarial gain	(8)	(19)
Employee contributions	3	3
Benefits paid	(12)	(13)
Amounts recognized in the accompanying consolidated balance sheets:		
Other current liabilities	$ (8)	$ (10)
Accrued employee benefits	(134)	(144)

The following table shows the payments projected for our post-retirement benefit plans (net of expected Medicare subsidy receipts of $11 million in aggregate over the next ten fiscal years) based on actuarial assumptions (in millions):

Projected Post-Retirement Benefit by Year:	Projected Payment
2020	$ 8
2021	8
2022	8
2023	8
2024	8
Next 5 years	39

For measurement purposes, we assumed a 6.7% annual rate of increase in the per capita cost of covered health care benefits in 2019 which will decrease on a graduated basis to 4.5% in the year 2038 and thereafter.

Accumulated Other Comprehensive Loss

The accumulated other comprehensive loss, after tax, as of December 31, 2019, 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	$ 87	$ 6	$ (26)	$ 67

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 $42 million, $39 million and $38 million in 2019, 2018 and 2017, respectively. No discretionary or profit sharing contributions were made during 2019, 2018 or 2017.

17. Fair Value Measurements

Financial assets and liabilities recorded or disclosed at fair value in the accompanying consolidated balance sheets as of December 31, 2019 and 2018 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. These mutual funds are classified as equity investments and measured at fair value using Level 1 inputs with adjustments recorded in net income (Note 16).

MERS is part of our ICE Mortgage Services business and held fixed income investments in 2019 as part of a reserve fund 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). The majority of these investments are held in U.S. Treasuries and measured at fair value using Level 1 inputs with adjustments recorded to other current liabilities. The remaining amount of the reserve fund is held in other fixed income investments and measured using Level 2 inputs.

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.

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, 2019 or 2018.

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, 2019 and 2018, except for the fair value adjustments related to our ICE Futures Canada, ICE Clear Canada and ICE Futures Singapore exchange registration intangible assets (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 2019, 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.

The table below displays the fair value of our debt as of December 31, 2019 and December 31, 2018. The fair values of our fixed rate notes were estimated using quoted market prices for these instruments. The fair value of our commercial paper includes a discount and other short-term debt approximates par value since the interest rates on this short-term debt approximate market rates as of December 31, 2019 and December 31, 2018.

	As of December 31, 2019 (in millions)		As of December 31, 2018 (in millions)	
Debt:	Carrying Amount	Fair value	Carrying Amount	Fair value
Commercial Paper	$ 1,311	$ 1,314	$ 951	$ 953
Other short-term debt	10	10	—	—
2020 Senior Notes	1,248	1,259	1,246	1,244
2022 Senior Notes	497	505	496	484
2023 Senior Notes	398	420	397	402
October 2023 Senior Notes	794	855	793	821
2025 Senior Notes	1,244	1,355	1,243	1,258
2027 Senior Notes	496	526	496	477
2028 Senior Notes	592	657	591	599
2048 Senior Notes	1,229	1,490	1,228	1,236
Total debt	$ 7,819	$ 8,391	$ 7,441	$ 7,474

18. Segment Reporting

Our reportable 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.

Financial data for our business segments is as follows in 2019, 2018 and 2017 (in millions):

	Year Ended December 31, 2019			Year Ended December 31, 2018			Year Ended December 31, 2017		
	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	$ 992	$ —	$ 992	$ 965	$ —	$ 965	$ 909	$ —	$ 909
Agricultural and metals futures and options contracts	251	—	251	251	—	251	216	—	216
Financial futures and options contracts	332	—	332	354	—	354	326	—	326
Cash equities and equity options	1,643	—	1,643	1,624	—	1,624	1,491	—	1,491

	Year Ended December 31, 2019			Year Ended December 31, 2018			Year Ended December 31, 2017		
	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
Fixed income and credit	364	—	364	240	—	240	139	—	139
OTC and other transactions	45	—	45	49	—	49	50	—	50
Pricing and analytics	—	1,083	1,083	—	1,043	1,043	—	970	970
Exchange data and feeds	—	704	704	—	670	670	—	632	632
Desktops and connectivity	—	424	424	—	402	402	—	482	482
Listings	—	449	449	—	444	444	—	426	426
Other revenues	260	—	260	234	—	234	202	—	202
Revenues	3,887	2,660	6,547	3,717	2,559	6,276	3,333	2,510	5,843
Transaction-based expenses	1,345	—	1,345	1,297	—	1,297	1,205	—	1,205
Revenues, less transaction-based expenses	2,542	2,660	5,202	2,420	2,559	4,979	2,128	2,510	4,638
Operating expenses	1,033	1,496	2,529	911	1,485	2,396	781	1,478	2,259
Operating income	$ 1,509	$ 1,164	$ 2,673	$ 1,509	$ 1,074	$ 2,583	$ 1,347	$ 1,032	$ 2,379

Revenue from one clearing member of the Trading and Clearing segment comprised $368 million, or 14% of our Trading and Clearing revenues, less transaction-based expenses in 2019. Revenue from one clearing member of the Trading and Clearing segment comprised $406 million, or 17% of our Trading and Clearing revenues less transaction-based expenses 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. 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 2019, 2018 and 2017.

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, 2019	$ 3,290	$ 1,912	$ 5,202
Year ended December 31, 2018	$ 3,087	$ 1,892	$ 4,979
Year ended December 31, 2017	$ 2,807	$ 1,831	$ 4,638
Net assets:			
As of December 31, 2019	$ 9,038	$ 8,248	$ 17,286
As of December 31, 2018	$ 9,226	$ 8,005	$ 17,231
Property and equipment, net:			
As of December 31, 2019	$ 1,353	$ 183	$ 1,536
As of December 31, 2018	$ 1,125	$ 116	$ 1,241

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 2019, 2018 and 2017 (in millions, except per share amounts):

	Year Ended December 31,		
	2019	2018	2017
Basic:			

	Year Ended December 31,		
	2019	2018	2017
Net income attributable to Intercontinental Exchange, Inc.	$ 1,933	$ 1,988	$ 2,526
Weighted average common shares outstanding	561	575	589
Basic earnings per common share	$ 3.44	$ 3.46	$ 4.29
Diluted:			
Weighted average common shares outstanding	561	575	589
Effect of dilutive securities - stock options and restricted stock	4	4	5
Diluted weighted average common shares outstanding	565	579	594
Diluted earnings per common share	$ 3.42	$ 3.43	$ 4.25

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 2019 from 2018, and 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 2019, 2018 and 2017 454,000, 471,000 and 694,000 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, 2019 and 2018, 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):

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Year Ended December 31, 2019				
Revenues, less transaction-based expenses	$ 1,270	$ 1,298	$ 1,336	$ 1,298
Operating income	665	680	706	622
Net income attributable to Intercontinental Exchange, Inc.	484	472	529	448
Earnings per common share: (a)				
Basic	$ 0.85	$ 0.84	$ 0.95	$ 0.81
Diluted	$ 0.85	$ 0.84	$ 0.94	$ 0.80
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.(b)	464	455	458	611
Earnings per common share: (a)				
Basic	$ 0.80	$ 0.79	$ 0.80	$ 1.07
Diluted	$ 0.79	$ 0.78	$ 0.79	$ 1.07

(a) The annual earnings per common share may not equal the sum of the individual quarter's earnings per common share due to rounding.
(b) We recognized a $110 million gain on our acquisition of MERS in other income for the three months ended December 31, 2018 (Note 3).

21. Subsequent Events

On February 5, 2020, we agreed to acquire Bridge2 Solutions, a leading provider of loyalty solutions for merchants and consumers, contingent on completion of Hart-Scott-Rodino review. Following the completion of the transaction, Bakkt intends to acquire Bridge2 Solutions from us. Bridge2 Solutions enables some of the world's leading brands to engage customers and drive loyalty. It powers incentive and employee perk programs for companies across a wide spectrum of industries.

We have evaluated subsequent events and determined that no other 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, 2019 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.* 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 2020 Annual Meeting" in our Proxy Statement for our 2020 Annual Meeting of Stockholders ("2020 Proxy Statement") is incorporated herein by reference. Information relating to our executive officers is, pursuant to General Instruction G(3) of Form 10-K, set forth below under the caption "Information about our 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 "Delinquent 16(a) Reports" in the 2020 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 2020 Proxy Statement and is incorporated herein by reference.

Executive Officers

Set forth below, in accordance with General Instruction G(3) of Form 10-K, is information regarding our executive officers:

Name	Age	Title
Jeffrey C. Sprecher	64	Chairman of the Board and Chief Executive Officer
Charles A. Vice	56	Vice Chairman
Scott A. Hill	52	Chief Financial Officer
Benjamin R. Jackson	47	President
David S. Goone	59	Chief Strategy Officer
Lynn C. Martin	43	President, ICE Data Services
Andrew J. Surdykowski	49	General Counsel
Mark P. Wassersug	50	Chief Operating Officer

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. On January 21, 2020, we announced that Mr. Vice will retire on March 31, 2020. 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. 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 oversees ICE's global technology, information security, operations and 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 coordinating sales, marketing and public relation endeavors. 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 Kiodex 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 of ICE Data Services since July 2015 and as President and Chief Operating Officer of ICE Data Services from July 2015 to September 2019. 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. She has served on the SEC's Fixed Income Market Structure Advisory Committee since its formation in 2017. Prior to her current role, Ms. Martin served in a number of leadership roles, including Chief Operating Officer of ICE Clear U.S., Chief Executive Officer 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 is responsible for the day-to-day operations and support of global infrastructure, data centers, networks and corporate IT systems that support ICE and its subsidiaries including the New York Stock Exchange, ICE's global derivatives trading and clearing businesses, and multiple data analytics, reporting and delivery platforms. Mr. Wassersug is also responsible for the customer service teams and oversees all disaster recovers and business continuity planning and operations. Previously, Mr. Wassersug served as SVP of 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 2020 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 2020 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 2020 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 2020 Annual Meeting” in our 2020 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 2020 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, 2019 and 2018.
- Consolidated Statements of Income for the years ended December 31, 2019, 2018 and 2017.
- Consolidated Statements of Comprehensive Income for the years ended December 31, 2019, 2018 and 2017.
- Consolidated Statements of Changes in Equity and Redeemable Non-Controlling Interest for the years ended December 31, 2019, 2018 and 2017.
- Consolidated Statements of Cash Flows for the years ended December 31, 2019, 2018 and 2017.
- 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	—	Fifth Amended and Restated Certificate of Incorporation of Intercontinental Exchange, Inc. effective October 30, 2019 (incorporated by reference to Exhibit 3.2 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on October 31, 2019, File No. 001-36198).

3.2	—	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).
4.1	—	Indenture dated as of October 8, 2013 among Intercontinental Exchange, Inc., as issuer, IntercontinentalExchange 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).
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).
4.16		Description of ICE's Securities Registered under Section 12 of the Exchange Act.
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).
10.2	—	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).

10.3	—	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).
10.4	—	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).
10.5	—	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).
10.6	—	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).
10.7	—	Transition and Separation Agreement between Intercontinental Exchange Holdings, Inc. and Charles A. Vice dated January 21, 2020 (incorporated by reference to Exhibit 10.1 to Intercontinental Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on January 21, 2020, File No. 001-36198).
10.8	—	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).
10.9	—	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).
10.10	—	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).
10.11	—	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).
10.12	—	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).
10.13		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).
10.14	—	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).
10.15	—	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).
10.16	—	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).
10.17	—	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).
10.18	—	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).
10.19	—	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).
10.20	—	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).

10.21	—	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).
10.22	—	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).
10.23	—	Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings, Inc. and David S. Goone (incorporated by reference to Exhibit 10.36 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2019, File No. 001-36198).
10.24	—	Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings, Inc. and Scott A. Hill (incorporated by reference to Exhibit 10.34 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2019, File No. 001-36198).
10.25	—	Aircraft Time Sharing Agreement dated as of February 6, 2019 between Intercontinental Exchange Holdings, Inc. and Benjamin R. Jackson (incorporated by reference to Exhibit 10.35 to Intercontinental Exchange, Inc.'s Annual Report on Form 10-K filed with the SEC on February 7, 2019, File No. 001-36198).
10.26		Form of Agreement Relating to Noncompetition and Other Covenants signed by each of the non-employee 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).
10.27	—	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).
10.28	—	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).
10.29	—	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).
10.30	—	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).
10.31	—	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).

10.32	—	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 Exchange, Inc.'s Current Report on Form 8-K filed with the SEC on August 21, 2017, File No. 001-36198).
10.33	—	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).
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, 2019 formatted in Inline XBRL (Extensible Business Reporting Language): (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Income, (iii) the Consolidated Statements of Changes in Equity 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.
104	—	The cover page from Intercontinental Exchange, Inc.'s Annual Report on Form 10-K for the fiscal year ended December 31, 2019, formatted in Inline XBRL.

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 6, 2020

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 2019 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 6, 2020
/s/ Scott A. Hill Scott A. Hill	Chief Financial Officer (principal financial officer)	February 6, 2020
/s/ James W. Namkung James W. Namkung	Chief Accounting Officer and Corporate Controller (principal accounting officer)	February 6, 2020
/s/ Sharon Y. Bowen Sharon Y. Bowen	Director	February 6, 2020
/s/ Charles R. Crisp Charles R. Crisp	Director	February 6, 2020
/s/ Duriya M. Farooqui Duriya M. Farooqui	Director	February 6, 2020
/s/ Jean-Marc Forneri Jean-Marc Forneri	Director	February 6, 2020
/s/ Frederick W. Hatfield Frederick W. Hatfield	Director	February 6, 2020
/s/ Lord Hague of Richmond The Rt. Hon. the Lord Hague of Richmond	Director	February 6, 2020

Signature	Title	Date
/s/ Thomas E. Noonan Thomas E. Noonan	Director	February 6, 2020
/s/ Frederic V. Salerno Frederic V. Salerno	Director	February 6, 2020
/s/ Judith A. Sprieser Judith A. Sprieser	Director	February 6, 2020
/s/ Vincent Tese Vincent Tese	Director	February 6, 2020

Exhibit 4.16

Description of Intercontinental Exchange, Inc.'s Securities Registered Under Section 12 of the Exchange Act

The following summary of the capital stock of Intercontinental Exchange, Inc. ("ICE") is based on and qualified by ICE's fifth amended and restated certificate of incorporation (the "certificate of incorporation") and ICE's eighth amended and restated bylaws (the "bylaws"). For a complete description of the terms and provisions of ICE's capital stock, refer to the certificate of incorporation and the bylaws, both of which are filed as exhibits to this Annual Report on Form 10-K. Throughout this exhibit, references to "we," "our," "us" and "the Company" refer to ICE.

General

Pursuant to the certificate of incorporation, ICE's authorized capital stock consists of one billion six hundred million (1,600,000,000) shares, each with a par value of $0.01 per share, of which:

- one hundred million (100,000,000) shares are designated as preferred stock; and
- one billion five hundred million (1,500,000,000) shares are designated as common stock.

As of December 31, 2019, 554,381,289 shares of common stock were outstanding and no shares of preferred stock were outstanding.

Common Stock

Holders of ICE's common stock have the following rights, privileges and limitations:

- *Voting*: Each share of common stock is entitled to one vote per share, *provided* that for so long as ICE directly or indirectly controls a national securities exchange registered under Section 6 of the Exchange Act (each such national securities exchange so controlled, an "Exchange"), no person, either alone or together with its related persons (as that term is defined in Article V of the certificate of incorporation), is entitled to vote or cause the voting of shares of ICE stock representing in the aggregate more than 10% of the then outstanding votes entitled to be cast on such matter. ICE will disregard any votes cast in excess of the 10% voting limitation unless the ICE board of directors expressly permits a person, either alone or together with its related persons, to exercise a vote in excess of the voting limitation and the Securities and Exchange Commission (the "SEC") approves such vote.

- *Ownership*: For so long as ICE directly or indirectly controls an Exchange, no person, either alone or together with its related persons, may beneficially own shares of stock representing in the aggregate more than 20% of the then outstanding votes entitled to be cast on any matter. The 20% ownership limitation will apply unless the ICE board of directors expressly permits a person, either alone or together with its related persons, to own shares in excess of limitation and the SEC approves such exception. If no such permission is granted and approved, any person who owns shares of ICE stock in excess of the 20% ownership threshold will be obligated to sell, and ICE will be obligated to purchase, at par value the number of shares held by such person above the ownership limitation.

- *Dividends and distributions*: The holders of shares of ICE common stock have the right to receive dividends and distributions, whether payable in cash or otherwise, as may be declared from time to time by the ICE board of directors from legally available assets or funds.

- *Liquidation, dissolution or winding-up*: In the event of the liquidation, dissolution or winding-up of ICE, holders of the shares of common stock are entitled to share equally, share-for-share, in the assets available for distribution after payment of all creditors and the liquidation preferences of any ICE preferred stock.

- *Restrictions on transfer*: Neither the certificate of incorporation nor the bylaws contain any restrictions on the transfer of shares of ICE common stock, although restrictions on transfer may be imposed under applicable securities laws.

- *Redemption, conversion or preemptive rights*: Holders of shares of common stock have no redemption or conversion rights or preemptive rights to purchase or subscribe for ICE securities.

- *Other provisions*: There are no sinking fund provisions applicable to the common stock, nor is the common stock subject to calls or assessments by ICE.

The rights, preferences, and privileges of the holders of shares of ICE common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that ICE may designate and issue in the future.

Limitation of Liability and Indemnification Matters

The certificate of incorporation provides that no ICE director will be liable to ICE or its stockholders for monetary damages for breach of fiduciary duty as a director, except in those cases in which liability is mandated by the Delaware General Corporation Law, and except for liability for breach of the director's duty of loyalty, acts or omissions not in good faith or involving intentional misconduct or a knowing violation of law, or any transaction from which the director derived any improper personal benefit. The bylaws provide for indemnification, to the fullest extent permitted by law, of any person made or threatened to be made a party to any action, suit or proceeding by reason of the fact that such person is or was a director or senior officer of ICE or, at the request of ICE, serves or served as a director, officer, partner, member, employee or agent of any other enterprise, against all expenses, liabilities, losses and claims actually incurred or suffered by such person in connection with the action, suit or proceeding. The bylaws also provide that, to the extent authorized from time to time by the ICE board of directors, ICE may provide to any one or more other persons rights of indemnification and rights to receive payment or reimbursement of expenses, including attorneys' fees.

Section 203 of the Delaware General Corporation Law

ICE is subject to the provisions of Section 203 of the Delaware General Corporation Law. In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner or a certain level of stock is acquired upon consummation of the transaction in which the person became an interested stockholder. A business combination includes, among other things, a merger, asset sale or a transaction resulting in a financial benefit to the interested stockholder. Subject to certain exceptions, an interested stockholder is a person who, together with affiliates and associates, owns (or, in certain cases, within three years prior, did own) 15% or more of the corporation's outstanding voting stock. Under Section 203 of the Delaware General Corporation Law, a business combination between ICE and an interested stockholder is prohibited during the relevant three-year period unless it satisfies one of the following conditions:

- prior to the time the stockholder became an interested stockholder, the ICE board of directors approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- on consummation of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of ICE voting stock outstanding at the time the transaction commenced (excluding, for purposes of determining the number of shares outstanding, shares owned by persons who are directors and officers); or
- the business combination is approved by the ICE board of directors and authorized at an annual or special meeting of the stockholders by the affirmative vote of at least 66 2/3% of ICE outstanding voting stock that is not owned by the interested stockholder.

Certain Anti-Takeover Matters

The certificate of incorporation and bylaws include a number of provisions that may have the effect of encouraging persons considering unsolicited tender offers or other unilateral takeover proposals to negotiate with the ICE board of directors rather than pursue non-negotiated takeover attempts. These provisions include:

Board of Directors

Vacancies and newly created seats on the ICE board may be filled only by the ICE board of directors. Generally, only the ICE board of directors may determine the number of directors on the ICE board of directors. However, if the holders of any class or classes of stock or series thereof are entitled to elect one or more directors, then the number of directors elected by the holders of such stock will be determined according to the terms of the stock and pursuant to the resolutions relating to the stock. The inability of stockholders to determine the number of directors or to fill vacancies or newly created seats on the board makes it more difficult to change the composition of the ICE board of directors. These provisions are designed to promote a continuity of existing management.

Advance Notice Requirements

The bylaws establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings of ICE stockholders. These procedures provide that notice of such stockholder proposals must be timely given in writing to the ICE secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at the principal executive offices of ICE not less than 90 days nor more than 120 days prior to the first anniversary date of the annual meeting for the preceding year. The notice must contain certain information specified in the bylaws.

Proxy Access

The bylaws provide that qualified stockholders can nominate candidates for election to the board of directors if such stockholders comply with the requirements contained in our bylaws within the designated time periods. Under the proxy access provisions of our bylaws, any stockholder (or group of up to 20 stockholders) owning 3% or more of our common stock continuously for at least three years may nominate up to two individuals or 20% of our board of directors, whichever is greater, as director candidates for election to the board of directors, and require us to include such nominees in our annual meeting proxy statement if the stockholders and nominees satisfy the requirements contained in our bylaws. These procedures provide that notice of such stockholder proposals must be timely given in writing to the ICE secretary prior to the meeting at which the action is to be taken. Generally, to be timely, notice must be received at the principal executive offices of ICE no earlier than the close of business 150 calendar days and no later than the close of business 120 calendar days before the anniversary date that we mailed our proxy materials for the annual meeting for the preceding year. The notice must contain certain information specified in the bylaws.

Adjournment of Meetings of Stockholders Without a Stockholder Vote

The bylaws permit the chairman of the meeting of stockholders, who is appointed by the board of directors, to adjourn any meeting of stockholders for a reasonable period of time without a stockholder vote.

Special Meetings of Stockholders

The bylaws provide that special meetings of the stockholders may be called by the board of directors, the chairman of the board, the chief executive officer, or at the request of holders of at least 50% of the shares of common stock outstanding at the time that would be entitled to vote at the meeting.

No Written Consent of Stockholders

The certificate of incorporation requires all stockholder actions to be taken by a vote of the stockholders at an annual or special meeting. The certificate of incorporation does not permit holders of shares of ICE common stock to act by written consent without a meeting.

Amendment of Certificate of Incorporation and Bylaws

Under the Delaware General Corporation Law, unless a corporation's certificate of incorporation imposes a higher vote requirement, a corporation may amend its certificate of incorporation upon the submission of a proposed amendment to stockholders by the board of directors and the subsequent receipt of the affirmative vote of a majority of its outstanding voting shares and the affirmative vote of a majority of the outstanding shares of each class entitled to vote thereon as a class. Under the certificate of incorporation, the affirmative vote of the holders of not less than 66 2/3% of the voting power of all outstanding shares of common stock and all other outstanding shares of stock of ICE entitled to vote on such matter is required to amend, modify in any respect or repeal any provision of the certificate of incorporation related to: (i) considerations of the board of directors in taking any action; (ii) limitations on stockholder action by written consent; (iii) the required quorum at meetings of the stockholders; (iv) the amendment of the bylaws by the stockholders; (v) the location of stockholder meetings and records; (vi) limitations on voting and ownership of ICE common stock and (vii) the provisions in Article X requiring such a supermajority vote.

Subject to certain exceptions, the ICE board of directors is expressly authorized to adopt, amend or repeal any or all of the bylaws of ICE at any time. ICE stockholders may adopt, amend or repeal any of the ICE bylaws by an affirmative vote of the holders of not less than 66 2/3% of the voting power of all outstanding ICE common stock entitled to vote on the matter.

For so long as ICE shall control, directly or indirectly, any Exchange, before any amendment or repeal of any provision of the bylaws or the certificate of incorporation may become effective, it must be submitted to the boards of directors of each Exchange. If any of these boards of directors determines that the amendment or repeal must be filed with, or filed with and approved by, the SEC under Section 19 of the Exchange Act, then the amendment or repeal shall not be effectuated until filed with, or filed with and approved by, as applicable, the SEC.

Listing

ICE's common stock is listed on the New York Stock Exchange under the symbol "ICE".

Transfer Agent

The transfer agent for ICE common stock is Computershare Investor Services.

Blank Check Preferred Stock

The certificate of incorporation provides for one hundred million (100,000,000) authorized shares of preferred stock. The existence of authorized but unissued shares of preferred stock may enable the board of directors to render more difficult or to discourage an attempt to obtain control of ICE by means of a merger, tender offer, proxy contest or otherwise. For example, if in the due exercise of its fiduciary obligations, the ICE board of directors were to determine that a takeover proposal is not in the best interests of ICE, the board of directors could cause shares of preferred stock to be issued without stockholder approval in one or more private offerings or other transactions that might dilute the voting or other rights of the proposed acquirer or insurgent stockholder or stockholder group. In this regard, the certificate of incorporation grants the ICE board of directors broad power to establish the rights and preferences of authorized and unissued shares of preferred stock. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the rights and powers, including voting rights, of such holders and may have the effect of delaying, deterring or preventing a change in control. The ownership limitations described above under "Common Stock" are applicable to holders of preferred stock, and, to the extent holders of shares of preferred stock are entitled to vote on a matter, the voting limitations described above under "Common Stock" would also be applicable to holders of preferred stock. The board of directors currently does not intend to seek stockholder approval prior to any issuance of shares of preferred stock, unless otherwise required by law.

Exhibit 21.1

The following is a list of Intercontinental Exchange, Inc.'s significant legal entity subsidiaries as of December 31, 2019, as defined by SEC rules, and the states or jurisdictions in which they are organized. The list includes the parent company of significant subsidiaries even if the parent company did not meet the definition of a significant subsidiary. Excluded from the list are subsidiaries that, if considered in the aggregate, would not constitute a "significant subsidiary" as that term is defined in Rule 1-02(w) of Regulation S-X under the Securities Exchange Act of 1934.

Name of Subsidiary	Jurisdiction of Incorporation or Organization
Intercontinental Exchange Holdings, Inc.	Delaware, U.S.A.
ICE Data Management Group, LLC	Delaware, U.S.A.
ICE Data Investment Group, LLC	Delaware, U.S.A.
ICE Data, LP	Delaware, U.S.A.
ICE Futures U.S., Inc.	Delaware, U.S.A.
ICE Clear U.S., Inc.	New York, U.S.A.
ICE US Holding Company GP LLC	Delaware, U.S.A.
ICE US Holding Company LP LLC	Delaware, U.S.A.
ICE US Holding Company L.P.	Cayman Islands
ICE Clear Credit LLC	Delaware, U.S.A.
NYSE Holdings LLC	Delaware, U.S.A.
NYSE Group, Inc.	Delaware, U.S.A.
NYSE Arca, Inc.	Delaware, U.S.A.
NYSE American LLC	Delaware, U.S.A.
New York Stock Exchange LLC	New York, U.S.A.
NYSE Market (DE), Inc.	Delaware, U.S.A.
IntercontinentalExchange International, Inc.	Delaware, U.S.A.
ICE UK GP, LLC	Delaware, U.S.A.
ICE UK LP, LLC	Delaware, U.S.A.
ICE Europe Partners LP	United Kingdom
ICE Europe Parent Limited	United Kingdom
Aether IOS Limited	United Kingdom
IntercontinentalExchange Holdings	United Kingdom
ICE Clear Europe Limited	United Kingdom
ICE Futures Holdings Limited	United Kingdom
ICE Futures Holdco No. 1 Limited	United Kingdom
ICE Futures Holdco No. 2 Limited	United Kingdom
ICE Futures Europe	United Kingdom
Interactive Data Holdings Corporation	Delaware, U.S.A.
Igloo Intermediate Corporation	Delaware, U.S.A.
ICE Data Services, Inc.	Delaware, U.S.A.
ICE Data Pricing & Reference Data, LLC	Delaware, U.S.A.

EXHIBIT 23.1

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

(1) Registration Statement (Form S-3 No. 333-223502) of Intercontinental Exchange, Inc.,

(2) Registration Statement (Form S-8 No. 333-225065) pertaining to the Intercontinental Exchange, Inc. 2018 Employee Stock Purchase Plan,

(3) Registration Statement (Form S-8 No. 333-218169) pertaining to the Intercontinental Exchange, Inc. 2017 Omnibus Employee Incentive Plan, and

(4) Registration Statement (Form S-8 No. 333-192301) pertaining to the IntercontinentalExchange, Inc. 2013 Omnibus Employee Incentive Plan, the IntercontinentalExchange Group, Inc. 2013 Omnibus Non-Employee Director Incentive Plan, the IntercontinentalExchange, Inc. 2009 Omnibus Incentive Plan, the IntercontinentalExchange, Inc. 2003 Restricted Stock Deferral Plan for Outside Directors, the IntercontinentalExchange, Inc. 2000 Stock Option Plan, and the NYSE Euronext Omnibus Incentive Plan;

of our reports dated February 6, 2020, with respect to the consolidated financial statements of Intercontinental Exchange, Inc. and Subsidiaries and the effectiveness of internal control over financial reporting of Intercontinental Exchange, Inc. and Subsidiaries included in this Annual Report (Form 10-K) of Intercontinental Exchange, Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Atlanta, Georgia
February 6, 2020

EXHIBIT 31.1

CERTIFICATIONS

I, Jeffrey C. Sprecher, certify that:

1. I have reviewed this Annual Report on Form 10-K of Intercontinental Exchange, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 6, 2020

/s/ Jeffrey C. Sprecher

Jeffrey C. Sprecher
Chairman of the Board and
Chief Executive Officer

EXHIBIT 31.2

CERTIFICATIONS

I, Scott A. Hill, certify that:

1. I have reviewed this Annual Report on Form 10-K of Intercontinental Exchange, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 6, 2020

/s/ Scott A. Hill

Scott A. Hill
Chief Financial Officer

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Intercontinental Exchange, Inc. (the “Company”) on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Jeffrey C. Sprecher, Chairman and Chief Executive Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 6, 2020

/s/ Jeffrey C. Sprecher

Jeffrey C. Sprecher
Chairman of the Board and
Chief Executive Officer

EXHIBIT 32.2

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Intercontinental Exchange, Inc. (the “Company”) on Form 10-K for the period ended December 31, 2019 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Scott A. Hill, Chief Financial Officer of the Company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that, to the best of my knowledge:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 6, 2020

/s/ Scott A. Hill

Scott A. Hill
Chief Financial Officer