VIRTU ITG HOLDINGS LLC
Form 10-K
March 14, 2019
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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, D.C. 20549

FORM 10 K

(Mark One)

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

For the fiscal year ended December 31, 2018

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 32722

VIRTU ITG HOLDINGS LLC

(Exact name of registrant as specified in its charter)

DELAWARE	95 2848406
(State of incorporation)	(IRS Employer Identification No.)
165 Broadway, New York, New York	10006
(Address of principal executive offices)	(Zip Code)

(212) 588 4000

(Registrant's telephone number, including area code)

SECURITIES REGISTERED PURSUANT TO SECTION 12(B) OF THE ACT: None

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 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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10 K or any amendment to this Form 10 K

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

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

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

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

Aggregate market value of the voting stock held by non affiliates of the Registrant at June 30, 2018:	Number of shares outstanding of the Registrant's Class of common stock at February 20, 2019:
$673,668,879	33,947,655

The Registrant meets the conditions set forth in General Instruction I(1)(a) and (b) of Form 10-K and is therefore filing this form with the

reduced disclosure format permitted by General Instruction I(2) of Form 10-K.

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2018 FORM 10 K ANNUAL REPORT

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Virtu, Investment Technology Group, ITG, the ITG logo, AlterNet, TriAct, ITG Net, POSIT, POSIT Alert, RFQ hub and Triton are registered trademarks or service marks of the Virtu Financial, Inc. companies. ITG Opt, Trade Ops, Single Ticket Clearing and Algo Wheel are trademarks or service marks of the Virtu Financial, Inc. companies.

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PRELIMINARY NOTES

When we use the terms “ITG,” the “Company,” “we,” “us” and “our,” we mean Investment Technology Group, Inc. and its consolidated subsidiaries for periods prior to the completion of the Merger (as defined below) unless otherwise indicated or the context otherwise requires. As described in more detail below, immediately following the Effective Time (as defined below) of the Merger, the Company was converted from a Delaware corporation into a Delaware limited liability company with the name “Virtu ITG Holdings LLC”.

OMISSION OF INFORMATION BY CERTAIN WHOLLY-OWNED SUBSIDIARIES

Following the Merger (as defined below), we are an indirect wholly owned subsidiary of Virtu Financial, Inc., a Delaware Corporation (“Virtu”). We meet the conditions specified in General Instruction I(1)(a) and (b) of Form 10-K and are thereby permitted to use the reduced disclosure format for wholly-owned subsidiaries of reporting companies specified therein. Accordingly, we have omitted from this Annual Report on Form 10-K the information called for by the following sections:

- Part III Item 10 “Directors, Executive Officers and Corporate Governance”
- Part III Item 11 “Executive Compensation”
- Part III Item 12 “Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters”
- Part III Item 13 “Certain Relationships and Related Transactions, and Director Independence”
- List of subsidiaries exhibit required by Item 601

FORWARD LOOKING STATEMENTS

In addition to the historical information contained throughout this Annual Report on Form 10 K, there are forward looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, Section 21E of the Securities Exchange Act of 1934, as amended (the “Exchange Act”) and the Private Securities Litigation Reform Act of 1995. All statements regarding our expectations related to our future financial position, results of operations, revenues, cash flows, dividends, financing plans, business and product strategies, competitive positions, as well as the plans and objectives of management for future operations, and all expectations concerning securities markets, client trading and economic trends are forward looking statements. In some cases, you can identify these statements by forward looking words such as “may,” “might,” “will,” “could,” “should,” “would,” “expect,” “plan,” “anticipate,” “believe,” “predict,” “trend,” “potential” or “continue” and the negative of these terms and other comparable terminology.

Although we believe our expectations reflected in such forward looking statements are based on reasonable assumptions and beliefs, and on information currently available to our management, there can be no assurance that such expectations will prove to have been correct. Important factors that could cause actual results to differ materially from the expectations reflected in the forward looking statements herein include, among others, general economic, business, credit, political and financial market conditions, both internationally and domestically, financial market volatility, fluctuations in market trading volumes, effects of inflation, adverse changes or volatility in interest rates, fluctuations in foreign exchange rates, evolving industry regulations and increased regulatory scrutiny, the outcome of contingencies such as legal proceedings or governmental or regulatory investigations and customer reaction to, or further proceedings or sanctions based on, such matters, changes in tax policy or accounting rules, the ability of the Company to utilize its loss and tax credit carryforwards, the actions of both current and potential new competitors, changes in commission pricing, rapid changes in technology, errors or malfunctions in our systems or technology, operational risks related to misconduct or errors by our employees or entities with which we do business, cash flows into or redemptions from equity mutual funds, ability to meet the capital and liquidity requirements of our securities businesses and the related clearing of our customers' trades, customer trading patterns, the success of our products and service offerings, our ability to continue to innovate and meet the demands of our customers for new or enhanced products, our ability to protect our intellectual property, our ability to execute on strategic initiatives or transactions and our ability to attract and retain talented employees.

Certain of these factors, and other factors, are more fully discussed in Item 1A, Risk Factors, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and Item 7A, Quantitative and Qualitative Disclosures about Market Risk, in this Annual Report which you are encouraged to read.

We disclaim any duty to update any of these forward looking statements after the filing of this report to conform our prior statements to actual results or revised expectations and we do not intend to do so. These forward looking statements should not be relied upon as representing our views as of any date subsequent to the filing of this report.

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Item 1. Business

Investment Technology Group, Inc. was formed as a Delaware corporation on July 22, 1983. Its principal subsidiaries include: (1) ITG Inc. and AlterNet Securities, Inc. (“AlterNet”), institutional broker dealers in the United States (“U.S.”), (2) ITG Canada Corp. (“ITG Canada”), an institutional broker dealer in Canada, (3) Investment Technology Group Limited (“ITG Europe”), an institutional broker dealer in Europe, (4) ITG Australia Limited (“ITG Australia”), an institutional broker dealer in Australia, (5) ITG Hong Kong Limited (“ITG Hong Kong”), an institutional broker dealer in Hong Kong, (6) ITG Software Solutions, Inc., our intangible property, software development and maintenance subsidiary in the U.S. and (7) ITG Solutions Network, Inc., a holding company for ITG Analytics, Inc., a provider of pre and post trade analysis, fair value and trade optimization services, and ITG Platforms Inc., a provider of workflow technology solutions and network connectivity services for the financial community.

ITG is a global financial technology company that helps leading brokers and asset managers improve returns for investors around the world. We empower traders to reduce the end-to-end cost of implementing investments via liquidity, execution, analytics and workflow technology solutions. The firm is headquartered in New York with offices in North America, Europe, and the Asia Pacific region and offers execution services in more than 50 countries.

On March 1, 2019 (the “Closing Date”), the Company completed its merger with and into Impala Merger Sub, Inc. (“Merger Sub”), a Delaware corporation and an indirect wholly owned subsidiary of Virtu, surviving the Merger as an indirect wholly owned subsidiary of Virtu (the “Merger”). The Merger was completed pursuant to that certain Agreement and Plan of Merger, dated as of November 6, 2018 (the “Merger Agreement”), by and among the Company, Virtu and Merger Sub, which has been filed by the Company as Exhibit 2.1 to its Current Report on Form 8-K filed with the Securities and Exchange Commission (“SEC”) on November 8, 2018. At the effective time of the Merger (the “Effective Time”), each share of the Company’s common stock, par value $0.01 per share, issued and outstanding immediately prior to the Effective Time (other than certain shares specified in the Merger Agreement) was cancelled and converted into the right to receive $30.30 in cash without interest (the “Merger Consideration”), less any applicable withholding taxes. Shares of the Company’s common stock ceased trading on the New York Stock Exchange (the “NYSE”) prior to the open of trading on March 1, 2019. Additionally, immediately following the Effective Time, the Company was converted from a Delaware corporation into a Delaware limited liability company with the name “Virtu ITG Holdings LLC”. Certain of the Company’s subsidiaries were converted from a Delaware corporation into a Delaware limited liability company and/or were renamed immediately following the Effective Time, including the following principal subsidiaries:

- ITG Inc. became “Virtu ITG LLC”;
- AlterNet Securities, Inc. became “Virtu AlterNet Securities LLC”;
- ITG Canada Corp. became “Virtu ITG Canada Corp.”;
- ITG Australia Limited became “Virtu ITG Australia Limited”;
- ITG Hong Kong Limited became “Virtu ITG Hong Kong Limited”;
- ITG Software Solutions, Inc. became “Virtu ITG Software Solutions LLC”;
- ITG Solutions Network, Inc. became “Virtu ITG Solutions Network LLC”;
- ITG Analytics, Inc. became “Virtu ITG Analytics LLC”; and
- ITG Platforms Inc. became “Virtu ITG Platforms LLC”.

On March 1, 2019, the NYSE filed Form 25 to delist the Company’s shares of common stock. The Company intends to file Form 15 to terminate registration under Section 12(g) of the Exchange Act, and its duty to file reports under Sections 13 and 15(d) of the Exchange Act.

For additional information related to the Merger and the transactions contemplated by the Merger Agreement, please refer to our Current Report on Form 8-K filed with the SEC on March 1, 2019.

ITG's business is organized into four reportable operating segments: U.S. Operations, Canadian Operations, European Operations and Asia Pacific Operations (see Note 24, Segment Reporting, to the consolidated financial statements). These four operating segments provide the following categories of products and services:

· Execution Services — includes (a) liquidity matching through POSIT, our Alternative Trading System ("ATS"), (b) self-directed trading using algorithms (including single stocks and portfolio lists) and smart

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routing, (c) portfolio trading and single stock sales trading desks providing execution expertise and (d) futures and options trading

· Workflow Technology — includes trade order and execution management software applications in addition to network connectivity

· Analytics — includes (a) tools enabling portfolio managers and traders to improve pre-trade, real-time and post-trade execution performance, (b) portfolio construction and optimization decisions and (c) securities valuation

Regional segment results exclude the impact of corporate activity, which is presented separately and includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within the Company's regional segments. These costs include, among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with our global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non operating expenses.

Execution Services

ITG execution services includes liquidity matching through POSIT, self directed trading by clients using algorithms (including single stocks and portfolio lists) and smart routing and futures and options trading. ITG also provides execution expertise through portfolio trading and single stock trading desks.

POSIT

POSIT was launched in 1987 as a point in time electronic crossing network. Today, POSIT provides anonymous continuous crossing of non displayed (or dark) equity orders and price improvement opportunities within the published best bid and offer price.

POSIT Alert is a block crossing mechanism within POSIT. POSIT Alert scans uncommitted shares from participating clients. When a crossing opportunity is detected, POSIT Alert notifies the relevant buy side users that a matching opportunity exists.

The Dark aggregation algorithm (formerly branded as POSIT Marketplace) provides access to POSIT liquidity, the dark pools of other ATSs, and certain exchange dark order types. Dark is a dark pool aggregator that provides clients with access to a large range of non displayed liquidity destinations. Dark uses advanced quantitative techniques in an effort to interact with quality liquidity while helping to protect clients from gaming.

ITG's Algorithms and Smart Order Router

ITG's algorithms and smart order router enable portfolio managers and traders to trade orders quickly, comprehensively and cost efficiently from our Execution Management Systems ("EMS") or our Order Management System ("OMS") and most third party trading platforms. The algorithms execute orders anonymously and discreetly, thereby potentially lowering market impact costs and improving overall performance. ITG's algorithms help users pursue best execution through two suites: ITG Single Stock Algorithms and ITG List Based Algorithms.

Our smart order router offers a solution for routing trades that can help capture liquidity with a combination of speed and confidentiality. These routers continuously scan markets for liquidity with an emphasis on trading without displaying the order. Our smart order router uses proprietary techniques to quickly execute at the best available prices.

Single Stock and Portfolio Trading

ITG provides single-stock sales trading as well as portfolio trading for institutional clients. ITG's trading desks are staffed with experienced trading professionals who provide ITG clients with execution through advanced electronic tools.

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Matrix Holding Group

In September 2017, we signed a definitive agreement to form Matrix Holdings Group (“Matrix”), a derivatives execution and technology business focused on sell-side clients, professional traders and select hedge funds. The transaction closed on February 16, 2018. We currently hold an approximate 10% indirect stake in the underlying operating subsidiaries of Matrix and we leverage the technology of this venture to provide U.S. derivatives execution to our institutional client base. (see Note 5, Equity Investment, to the consolidated financial statements).

Workflow Technology

Execution Management and Order Management

Our EMS is designed to meet the needs of a broad range of trading styles. Triton is ITG’s award winning, multi asset and broker neutral EMS, which brings a complete set of integrated execution and analytical tools to the user’s desktop, including the Algo Wheel. The Algo Wheel is a broker-neutral tool for allocating trades to broker algorithms in an unbiased systematic fashion using a quantifiable method for evaluating and rewarding brokers for performance. Triton supports global list based and single stock trading, as well as futures and options capabilities and includes a fully integrated and supported financial services communications network (ITG Net). Triton also provides traders with access to scalable, low latency, multi asset trading opportunities.

Our OMS combines portfolio management, compliance functionality (ITG’s Compliance Monitoring System), and a fully integrated and supported financial services communications network (ITG Net) with a consolidated, outsourced service for global trade matching and settlement (Trade Ops) that provides connectivity to the industry’s post trade utilities, as well as support for multiple, flexible settlement communication methods and a real time process monitor.

ITG Net

ITG Net is a global financial communications network that provides secure, reliable and fully supported connectivity between buy side and sell side firms for multi asset order routing and indication of interest messages with ITG and third party trading platforms. ITG Net supports approximately 9,000 global billable connections to more than 600 unique execution destinations worldwide. ITG Net also integrates the trading products of third party brokers and ATSs into our OMS and EMS platforms.

RFQ hub

RFQ hub, a multi asset platform for global listed and over the counter (“OTC”) financial instruments, connects buy side trading desks and portfolio managers with a large network of sell side market makers in Europe, North America and the Asia Pacific region, allowing these trading desks to place requests for quotes (“RFQ”) in negotiated equities, futures, options, swaps, convertible bonds, structured products and commodities. RFQ hub is available as a stand alone platform and is also integrated with Triton.

Single Ticket Clearing

ITG’s commitment to best execution also extends to broker neutral operational services to help ensure that trades clear and settle efficiently, and to significantly lower the transaction costs associated with trade tickets. Single Ticket Clearing is a broker neutral service that aggregates executions across multiple destinations for settlement purposes. Single Ticket Clearing helps reduce the number of trade tickets and resulting charges imposed by custodians, reducing the costs of trade processing due to market fragmentation.

Commission Management Services

ITG offers administration and consolidation of client commission arrangements across a wide range of our clients' preferred brokerage and research providers through Commission Manager, a robust, multi asset, web based commission management portal, and Budget Tracker, which enables asset managers to set research valuations and create and track budgets for their end clients. ITG also offers a comprehensive research payment account solution, enabling

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clients to unbundle research and execution payments to comply with the European Markets in Financial Instruments Directive ("MiFID") II regulations.

Analytics

Trading Analytics

Our trading analytics suite enables portfolio managers and traders to improve execution performance before the trade happens (pre trade) and during trading (real time) by providing reliable trading analytics and risk models that help them perform predictive analyses, manage risk, change strategy and reduce trading costs. Trading costs are affected by multiple factors, such as execution strategies, time horizon, volatility, spread, volume and order size. Our trading analytics suite gauges the effects of these factors and aids in the understanding of the trade off between market impact and opportunity cost.

Our transaction cost analysis ("TCA") offers robust measurement and reporting capabilities to analyze costs and performance across the trading continuum. TCA assesses trading performance and implicit costs under various market conditions so users can adjust strategies and potentially reduce costs and boost investment performance. TCA is also available for foreign exchange transactions (TCA for FX) and for corporate and sovereign bond trading (Fixed Income TCA).

Alpha Capture Reporting measures cost at every point of the investment process and provides portfolio managers with quarterly analytical reviews, written interpretations and on site consultative recommendations to enhance performance.

Portfolio Analytics

ITG provides market leading tools to assist asset managers with portfolio decision making tasks, from portfolio construction and optimization to the enterprise challenge of global, real time portfolio performance monitoring.

Fair Value helps mutual fund managers meet their obligations to investors and regulators to fairly price the securities within their funds, and helps minimize the impact of market timing.

ITG Opt allows portfolio managers to develop new portfolio construction strategies and solve complex optimization problems. ITG Opt allows users to accurately model tax liability, transaction costs and long/short objectives, while adhering to diverse portfolio specific constraints.

Non U.S. Operations

ITG has established a strong and growing presence in key financial centers around the world to serve the needs of global institutional investors. In addition to its New York headquarters, ITG has North American offices in Boston, Chicago, Los Angeles, San Francisco and Toronto. In Europe, ITG has offices in London, Dublin and Paris. In the Asia Pacific region, ITG has offices in Hong Kong, Singapore, Sydney and Melbourne. Local representation in regional markets provides an important competitive advantage for ITG. ITG also provides electronic and single stock sales trading for Latin American equities from its New York headquarters, including algorithms for Brazil, Mexico and Chile, and POSIT Alert on-exchange block crossing in Brazil and Mexico, as well as single stock sales trading access into Colombia and Peru.

Canadian Operations

ITG Canada was founded in 2000. ITG Canada provides electronic brokerage services, including ITG's algorithms and smart order router, as well as single stock execution, portfolio trading services and commission management services. In addition, ITG Canada provides Triton, connectivity services, Single Ticket Clearing, ITG Opt, trading analytics, TCA, and Fair Value. ITG Canada also engages in foreign exchange trading to facilitate equity trades by clients in different currencies as well as other client foreign exchange trades unrelated to equity trades.

In July 2007, ITG Canada launched MATCHNow, an ATS for Canadian listed equities, operated by ITG's wholly owned subsidiary, TriAct Canada Marketplace LP ("TriAct"). MATCHNow is a leading dark pool ATS in

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Canada, offering a call auction marketplace with a confidential non displayed book with trades executed at or within the Canadian National Best Bid and Offer.

European Operations

ITG Europe was established as a broker dealer in 1998. Today, ITG Europe focuses on trading European, Middle Eastern and African equities as well as providing ITG's technologies to its clients. ITG Europe provides electronic brokerage services including ITG's algorithms and smart order router, and the POSIT suite, as well as single stock execution services, portfolio trading services and commission management services. In January 2018, ITG (a) expanded its dark cash equity orders segment to include an any price point system and reference price system, in each case, for large sized orders that are not subject to the MiFID II double volume caps set at 4% of all the dark regulated venue trading volume in a given security for any individual dark venue and 8% of such volume for all dark trading venues in the aggregate and (b) launched POSIT Auction, a lit segment on the POSIT Multilateral Trading Facility ("MTF") which provides additional access to liquidity under MiFID II trading rules. In Europe, ITG provides Triton, OMS, connectivity services, Single Ticket Clearing, RFQ hub, TCA, Alpha Capture Reporting, trading analytics and Fair Value.

Asia Pacific Operations

Australia

In 1997, ITG launched ITG Australia, an institutional brokerage firm specializing in execution and analytics for Australian listed equities. ITG provides clients with a range of products and services including trade execution, trade execution management through Triton, connectivity services and pre and post trade analysis through TCA and trading analytics. Trade execution services include electronic brokerage products such as ITG's algorithms and the POSIT suite, as well as single stock trading.

Hong Kong

In 2001, ITG formed ITG Hong Kong, an institutional broker dealer focused on developing and applying ITG's technologies across the Asian markets. Execution services are provided through electronic brokerage products such as ITG's algorithms and the POSIT suite and through an experienced single stock and portfolio trading services team. Other trading and analytical tools provided by ITG Hong Kong include Triton, connectivity services, TCA and trading analytics.

Singapore

In 2010, ITG Singapore Pte. Limited ("ITG Singapore") obtained a Capital Markets Services License from the Monetary Authority of Singapore ("MAS"). ITG Singapore provides clients in Singapore with a range of ITG's products and services including trade execution management through Triton and trading analysis through TCA and trading analytics.

Competition

The financial services industry generally, and the institutional securities brokerage business in which we operate, are extremely competitive, and we expect them to remain so for the foreseeable future. Our full suite of products does not directly compete with any particular firm; however, individual products compete with various firms and consortia:

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Our trading and portfolio analytics compete with offerings from several sell side affiliated and independent companies.

- POSIT and MATCHNow compete with various national and regional securities exchanges, ATSs, Electronic Communication Networks, MTFs and systematic internalizers for trade execution services.

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- Our EMSs, OMS, connectivity and RFQ services compete with offerings from independent vendors, agency only firms and other sell side firms.
- Our algorithmic and smart routing products, as well as our high touch agency execution and portfolio trading services, compete with agency only and other sell side firms.

In many cases we face competitors that are larger and have greater financial resources than ITG. These competitors may have more flexibility to offer a broader set of products and services than we can. Competition is also intense for the recruitment and retention of qualified professionals. The performance of our business is in large part dependent on the skills, expertise and performance of our employees. Our ability to continue to compete effectively in our businesses will depend upon our continued ability to attract new professionals and retain and motivate our existing professionals.

Regulation

Certain of our subsidiaries are subject to various securities regulations and capital adequacy requirements promulgated by the regulatory and exchange authorities of the countries in which they operate. In the U.S., the SEC is the federal agency responsible for the administration of the federal securities laws, with the regulation of broker dealers primarily delegated to self regulatory organizations ("SROs"), principally the Financial Industry Regulatory Authority ("FINRA") as well as other national securities exchanges. In addition to federal and SRO oversight, securities firms are also subject to regulation by state securities administrators in those states in which they conduct business. Furthermore, our non U.S. subsidiaries are subject to regulation by central banks and regulatory bodies in those jurisdictions where each subsidiary is authorized to do business, as further discussed below. The SROs, central banks and regulatory bodies conduct periodic examinations of our broker dealer subsidiaries in accordance with the rules they have adopted and amended from time to time.

ITG's principal regulated subsidiaries are listed below. The principal self regulator of our U.S. broker dealers is FINRA.

- ITG Inc. is a U.S. broker dealer registered with the SEC, FINRA, The NASDAQ Stock Market ("NASDAQ"), NYSE, NYSE Arca, Inc., NYSE American, Cboe BYX Exchange, Inc., Cboe BZX Exchange, Inc., Chicago Stock Exchange Inc., Cboe EDGA Exchange, Inc. ("EDGA"), Cboe EDGX Exchange, Inc. ("EDGX"), NASDAQ BX, Inc., NASDAQ PHLX LLC, The Investors Exchange LLC, National Futures Association, all 50 states, Puerto Rico and the District of Columbia.
- AlterNet is a U.S. broker dealer registered with the SEC, FINRA, NASDAQ, EDGA, EDGX and 14 states.
- ITG Canada is a Canadian broker dealer registered as an investment dealer with the Investment Industry Regulatory Organization of Canada ("IIROC"), Ontario Securities Commission ("OSC"), the Autorité Des Marchés Financiers in Quebec, Alberta Securities Commission ("ASC"), British Columbia Securities Commission, Manitoba Securities Commission, New Brunswick Securities Commission, Nova Scotia Securities Commission and Saskatchewan Financial Services Commission. ITG Canada is also registered as a Futures Commission Merchant in Ontario and Manitoba and Derivatives Dealer in Quebec. ITG Canada is a member of the Toronto Stock Exchange ("TSX"), TSX Venture Exchange, TriAct (which is registered with the OSC and ASC), NASDAQ Canada, CX2, CXD, Omega, Lynx, Canadian Securities Exchange, TSX Alpha Exchange, Instinet Canada Cross Limited and Aequitas NEO Exchange (of which ITG Canada is a minority owner and has a board seat).
- ITG Europe is authorized and regulated by the Central Bank of Ireland. ITG Europe is a member of the main national European exchanges, including the London Stock Exchange, Deutsche Börse and Euronext, as well as most of the European domiciled MTFs. It also operates the POSIT crossing system in Europe as a MTF under MiFID II. ITG Europe's London Branch is registered with the UK Financial Conduct Authority ("FCA") and ITG Europe's Paris branch is registered with the Banque de France. AlterNet (UK) Limited, a U.K. broker, is registered with the FCA.

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- ITG Australia is a market participant of the Australian Securities Exchange ("ASX") and Chi X Australia Limited. It is also a holder of an Australian Financial Services License issued by the Australian Securities and Investments Commission ("ASIC"). ITG Australia's principal regulators are the ASX and ASIC.
- ITG Hong Kong is a participating organization of the Hong Kong Stock Exchange and a holder of a securities dealer's license issued by the Securities and Futures Commission of Hong Kong ("SFC"), with the SFC acting as its principal regulator.
- ITG Singapore is a holder of a Capital Markets Services License from the MAS, with the MAS acting as its principal regulator.

Broker dealers are subject to regulations covering all aspects of the securities trading business, including sales methods, trade practices, anti-money laundering/anti-bribery compliance, use and safekeeping of clients' funds and securities, capital structure, record keeping, technology implementation, risk management and conduct of directors, officers and employees. Additional legislation or changes in the interpretation or enforcement of existing laws and rules may directly affect the mode of operation and profitability of broker dealers. The SEC, SROs, state securities commissions and foreign regulatory authorities may conduct administrative proceedings or commence judicial actions, which can result in censure, judgments, settlements, fines, disgorgements, penalties, injunctions, the issuance of cease and desist orders or the suspension or expulsion of a broker dealer, its directors, officers or employees.

ITG Inc. and AlterNet are required by law to belong to the Securities Investor Protection Corporation ("SIPC"). In the event of a U.S. broker dealer's insolvency, the SIPC fund provides protection for client accounts up to $500,000 per customer, with a limitation of $250,000 on claims for cash balances. ITG Canada and TriAct are required by Canadian law to belong to the Canadian Investor Protection Fund ("CIPF"). In the event of a Canadian broker dealer's insolvency, CIPF provides protection for client accounts up to CAD $1 million per customer. ITG Europe is required to be a member of the Investor Compensation Scheme, which provides compensation to retail investors in the event of certain stated defaults by an investment firm. ITG Hong Kong is regulated by the SFC. The SFC operates the Investor Compensation Fund which provides compensation to retail investors in the event of a default by a regulated financial institution. ITG Australia is obligated to contribute to the ACH Clearing Fund and/or the National Guarantee Fund if and when requested by ASIC. In the past twelve months, no such requests have been made of ITG Australia.

Regulation ATS

Regulation ATS permits U.S. "alternative trading systems" such as POSIT to match orders submitted by buyers and sellers without having to register as a national securities exchange. Accordingly, POSIT is not registered with the SEC as an exchange. We continue to review and monitor POSIT's systems and procedures to ensure compliance with Regulation ATS. The Form ATS describing the operations of POSIT in the U.S. is publicly available at http://www.itg.com/about/transparency/. On July 18, 2018, the SEC unanimously adopted amendments (the "Final ATS Amendments") to Regulation ATS and related rules under the Securities Exchange Act of 1934, as amended (the "Exchange Act") to enhance transparency requirements on, and increase the SEC's oversight of, ATSs that facilitate transactions in National Market System stocks (generally, exchange-listed equities) ("NMS Stock ATSs"). The regulation became effective on October 9, 2018. The amendments require, among other things, a publicly-available Form ATS-N containing disclosures about the operation of the ATS and the interactions between the ATS, its affiliates, and other firm products (e.g. smart routers and algorithms). We filed our first Form ATS-N on February 8, 2019.

Net Capital Requirement

ITG Inc. and AlterNet are subject to the Uniform Net Capital Rule (Rule 15c3 1) under the Exchange Act, which requires the maintenance of minimum net capital.

ITG Inc. has elected to use the alternative method permitted by Rule 15c3 1, which requires that ITG Inc. maintain minimum net capital equal to the greater of $1.0 million or 2% of aggregate debit balances arising from customer transactions, as defined. AlterNet has elected to use the basic method permitted by Rule 15c3 1, which requires that they maintain minimum net capital equal to the greater of $6^2/_3$% of aggregate indebtedness or $100,000. Dividends or withdrawals of capital cannot be made if capital is needed to comply with regulatory requirements. In addition, our Canadian, European and Asia Pacific Operations have subsidiaries with regulatory capital requirements.

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For further information on our net capital position, see Note 18, Net Capital Requirement, to the consolidated financial statements.

Intellectual Property

Patents and other proprietary rights are important to our business. We also rely upon trade secrets, know how, continuing technological innovations, and licensing opportunities to maintain and improve our competitive position.

We own a portfolio of patents and patent applications, in the U.S. and abroad, that principally relate to financial services, information technology and software. Patents for individual products extend for varying periods according to the date of patent filing or grant and the legal term of patents in the various countries where patent protection is obtained. We also own and maintain a portfolio of trademarks. The extent and duration of trademark rights are dependent upon national laws and use of the trademarks.

While we consider our patents and trademarks to be valued assets, we do not believe that our competitive position is heavily dependent on patent or trademark protection or that our operations are dependent upon any single patent or group of related patents.

It is our practice to enter into confidentiality and intellectual property ownership agreements with our clients, employees, independent contractors and business partners, and to control access to, and distribution of, our intellectual property.

Clients

For the years ended December 31, 2018, 2017 and 2016, no single client accounted for more than 5% of our consolidated revenue.

Employees

On December 31, 2018, the Company employed 883 staff globally, of whom 521, 91, 164 and 107 staff were employed by the U.S., Canadian, European and Asia Pacific Operations, respectively.

Website and Availability of Public Reports

We are required to file reports and other information with the SEC. Our Annual Reports on Form 10 K, Quarterly Reports on Form 10 Q and Current Reports on Form 8 K, together with any amendments to those reports, are available without charge on the SEC’s website at http://www.sec.gov. Prior to the Merger, these filings were also available on ITG’s website (http://investor.itg.com).

Item 1A. Risk Factors

Certain Factors That May Affect Our Financial Condition and Results of Operations

We face risks and uncertainties that may affect our financial condition and results of operations. The following risk factors should be considered in evaluating our business and outlook and may be important to understanding any statement in this Annual Report on Form 10 K. These risk factors should be read in conjunction with Part II, Item 7, Management’s Discussion and Analysis of Financial Condition and Results of Operations, and the consolidated financial statements and related notes in Part II, Item 8, Financial Statements and Supplementary Data, of this Form 10 K. These risk factors should also be read in conjunction with the risk factors of Virtu, appearing in Item 1A of

Virtu's 2018 Annual Report on Form 10-K as filed with the SEC on March 1, 2019.

Decreases in equity trading activity by active fund managers and declining securities prices could harm our business and profitability.

Declines in the trading activity of active fund managers generally result in lower revenues from our trading solutions, which generate the majority of our revenues globally. In addition, securities' price declines adversely affect

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our trading commissions outside North America, which are based on the value of transactions. The demand for our trading solutions is directly affected by factors such as economic, regulatory and political conditions that may lead to decreased trading activity and prices in the securities markets in the U.S. and in the foreign markets we serve. Significant flows of investments out of actively managed equity funds has curtailed their trading activity, which impacts our buy side trading volumes and the use of some of our higher value services. Volatility levels also impact the amount of trading activity. Sustained periods of low volatility can result in lower levels of trading activity. In addition, trading activity tends to decline in periods following extreme levels of volatility.

Decreases in our commission rates and other transactional revenues could adversely affect our operating results.

Commission rates on institutional trading activity have declined historically and we anticipate a continuation of the competitive pricing environment for the foreseeable future. In addition, we have seen a shift in the mix of our business to include an increased portion from higher turnover, lower rate clients, particularly sell side firms. A decline in commission rates or revenue capture from future mix shifts or from rate reductions within client segments could materially reduce our margins and harm our operating results.

Our fixed costs may result in reduced profitability or losses.

We incur significant operating and capital expenditures to support our business that do not vary directly, at least in the short term, with fluctuations in executed transaction volumes or revenues. In addition, changes in market practices have required us, and may require us in the future, to invest in additional infrastructure to increase capacity levels without a corresponding increase in revenues. To ensure that we have the capacity to process projected increases in trade orders and executed transaction volumes, we have historically made substantial infrastructure investments in advance of such projected increases, including during periods of low revenues. In the event of reductions in trade executions and/or revenues, we may not be able to reduce such expenses quickly and, as a result, we could experience reduced profitability or losses. If the growth in our executed volumes does not occur or we are not able to successfully implement and monetize our investments, including by failing to accurately forecast the demand for new products, effectively deploy new products or decommission legacy products, the expenses related to such investments could cause reduced profitability or losses.

We may not have sufficient cash flows from operating activities, cash on hand and the ability to obtain borrowing capacity to finance required capital expenditures, fund strategic initiatives and meet our other cash needs. These obligations require a significant amount of cash, and we may need additional funds, which may not be readily available.

We depend on the availability of adequate capital to maintain and develop our business and meet our regulatory capital requirements. Although we believe that we can meet our ongoing operating cash and regulatory capital needs from our cash flow from operations, our existing cash balances and our available credit facilities, if cash on hand and cash flow from operations are not sufficient to meet our needs, our ability to borrow additional funds may be impacted by financial lending institutions' ability or willingness to lend to us on commercially acceptable terms and we may become subject to covenants even more restrictive than those contained in our current credit facilities. If, for any reason, we are unable to comply with the covenants under our existing or future credit facilities, we may not be able to borrow additional funds under commercially acceptable terms or may not be granted waivers or amendments to such restrictions, such waivers or amendments may be provided at significant additional cost to us or we may not be able to refinance our debt on terms acceptable to us, or at all. The lenders under our current credit facilities also have the right to terminate any commitments they have to provide further borrowings in certain circumstances and, in an event of default, if not cured or waived, could result in the acceleration of all or substantially all of our debt or the loss of the assets securing our debt. On January 25, 2019, we amended our $150 million revolving credit agreement, dated as of January 26, 2018 (the "Credit Agreement"), between ITG Inc., as borrower, the Company, as guarantor, and a syndicate of banks and JPMorgan Chase Bank, N.A., as Administrative Agent. The purpose of the amendment was to extend the maturity date of the existing Credit Agreement from January 25, 2019 to March 31, 2019 to maintain financing availability under the Credit Agreement until the expected closing of the Merger. The Credit Agreement was terminated at the Effective Time of the Merger.

A prolonged period of low levels of operating cash flow together with limited access to capital or credit in the future could have an impact on our ability to, among others, meet our regulatory capital requirements, invest in our software and infrastructure, engage in strategic initiatives, make acquisitions or strategic investments in other companies, react to changing economic and business conditions, repay our outstanding debt, make dividend payments or repurchase shares of our common stock. If we are unable to generate sufficient cash flow from operations or borrow additional funds to fund our capital or credit requirements, it could have an adverse effect on our business, financial condition and operating results.

We will need to continue to invest in our operations for the foreseeable future to fund our strategic initiatives. If we do not achieve the expected operating results, we may need to seek additional financing in the debt or equity markets or sell selected assets or reduce or delay planned capital, research or development expenditures. These measures may not be successful and may harm our business and prospects. In addition, any financing, or sale of assets might not be available, or may not be available on economically favorable terms.

A failure in the design, operation or configuration of our technology could adversely affect our profitability and reputation.

A technological failure or error of one or more of our products or systems, including but not limited to POSIT, our algorithms, smart routers, and order and execution management systems, could result in lost revenues and/or significant market losses. We operate complex trading systems, algorithms and analytical products that may fail to correctly model interacting or conflicting trading objectives, unusual market conditions, available trading venues and other factors, which may cause unintended results. Similarly, the operation and configuration of our systems can be quite complex and departure from standard procedures can result in adverse trading outcomes. Such problems could cause us to incur trading losses, lose clients or experience other reputational harm resulting in lost revenues and profits. Our quality assurance testing cannot test for all potential scenarios or ensure that the technology will function as designed and intended in all cases.

Failure to keep up with rapid changes in technology while continuing to seek to provide leading products and services to our customers could negatively impact our results of operations.

The institutional brokerage industry is subject to rapid technological change and evolving industry standards. Our customers' demands become greater and more sophisticated as the dissemination of products and information to customers increases. If we are unable to anticipate and respond to the demand for new services, products and technologies, innovate in a timely and cost effective manner and adapt to technological advancements and changing standards, we may be unable to compete effectively, which could have a material adverse effect on our business. Many of our competitors have significantly greater resources than we do to fund such technological advances. Moreover, the development of technology based services is a complex and time consuming process. New products and enhancements to existing products can require long development and testing periods. Significant delays in new product releases, failure to meet key deadlines, or significant problems in creating new products could negatively impact our revenues and profits.

Insufficient system capacity, system operating failures, or disasters could materially harm our reputation, financial position and profitability.

The success of our business is dependent on the computer and communications systems supporting our operations, which must monitor, process and support a large volume of transactions across numerous execution venues in many countries and multiple currencies. As our business continues to expand, we will need to continue to expand our systems to accommodate an increasing volume of transactions across a larger client base and more geographical locations. In addition, certain changes in market practices may require us to invest in infrastructure to increase capacity levels. Unexpectedly high volumes or times of unusual market volatility could cause our systems to operate slowly, decrease output or even fail for periods of time, as could general power or telecommunications failures, hardware failures, software errors, data center outages, human error, computer viruses, acts of vandalism, natural disasters, terrorist activities, cybersecurity breaches or other business disruptions. System failure or degradation could adversely affect our ability to effectuate transactions and lead our customers to file formal complaints with industry regulatory organizations, initiate regulatory inquiries or proceedings, file lawsuits against us, trade less frequently through us or cease doing business with us. In turn, we could incur financial loss, liability to clients, regulatory intervention or reputational damage.

Our corporate headquarters and largest concentration of employees and technology is in the New York metropolitan area. Our other offices are also located in major cities around the globe. If a business system disruption

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were to occur, especially in New York, for any reason, including widespread health emergencies, natural disasters or terrorist activities, and we were unable to execute our business continuity plan, or our business continuity plan proves insufficient, it could have a material effect on our business. Moreover, we have varying levels of business continuity plan coverage among our non U.S. subsidiaries.

Any system capacity or operational failure or business system disruption could result in regulatory or legal claims. We could incur significant costs in defending such regulatory or legal claims, even those without merit. Moreover, such failures could result in the need to remediate issues and repair or expand our networks and systems. Any obligation to expend significant resources to defend claims or repair and expand infrastructure could have an adverse effect on our financial condition and results of operations.

Our systems and those of our third party service providers may be vulnerable to cybersecurity risks.

Our business relies on the secure collection, storage, processing and transmission of proprietary information, including our clients' confidential data, in our internal systems and through our vendor networks and communications infrastructure. Increased cybersecurity threats pose a risk to this information, in addition to our and our third-party service providers' systems and networks. While we have not been the victim of cyber attacks that have had a material impact on our operations or financial condition, we have experienced cyber security incidents such as denial of service attempts, malware infections, phishing attempts, business e-mail account compromise attempts and other attempts at compromising our information technology that are typical for a company of our size that operates in the global financial marketplace. Our systems also may be vulnerable to unauthorized access, computer viruses, acts of vandalism, or other malicious code, cyber-attack and other adverse events that could have a negative impact, including loss or destruction of data (including confidential client information) and unavailability or disruption of service. Despite our efforts to implement industry standard security measures, we face the risk that our security measures may prove insufficient as attacks have resulted in material breaches against other financial services companies with significant security controls and the nature of cyber threats continues to evolve. These threats may come from external factors such as governments, organized crime, hackers, and other third parties such as outsource or infrastructure-support providers and application developers, or may originate internally from within us. System errors that result from these acts may be repeated or compounded before they are discovered and rectified. Successful security breaches of our systems or the systems of certain of our vendors could expose us to a risk of misappropriation of our or our clients' confidential information, the corruption or deletion of data, and the disruption of our services to our clients. These outcomes could result in reputational damage, loss of clients, lower trading volumes, a negative impact on our competitive position, significant expense in implementing future security measures, litigation, and regulatory inquiries or proceedings, all of which could adversely impact our financial results.

Financial services regulators in recent years have increased their examination and enforcement focus on matters relating to cybersecurity threats, including the assessment of firms' vulnerability to cyber-attacks. In particular, regulatory concerns have been raised about firms establishing effective cybersecurity governance and risk management policies, practices and procedures; protecting firm networks and information; identifying and addressing risk associated with remote access to client information; identifying and addressing risks associated with client business partners, counterparties, vendors, and other third parties, including exchanges and clearing organizations; preventing and detecting unauthorized activities; adopting effective mitigation and business continuity plans to address the impact of cybersecurity breaches; and establishing protocols for reporting cybersecurity incidents. Although we maintain insurance coverage that, subject to policy terms and conditions, covers certain aspects of cyber risks, such insurance coverage may be insufficient to cover all losses and would not protect us from the effects of adverse regulatory actions that may result from the incident or a finding that we had inadequate cybersecurity controls, or any follow-on litigation, including the reputational harm that could result from such regulatory actions, findings or litigation.

We are dependent on certain third party vendors for key services.

We depend on a number of third parties to supply elements of our trading systems, computers, market data, data centers, access to trading in certain markets, FIX connectivity, communication network infrastructure, other equipment and related support and maintenance. We cannot be certain that any of these providers will be willing or able to continue to provide these services in an efficient and cost effective manner or to meet our evolving needs. Moreover, we are dependent on our communications network providers for interconnectivity with our clients, markets and clearing agents to service our customers and operate effectively. We have also made substantial investments in our infrastructure to provide improved business recovery capabilities in the event of potential outages at our third-party service providers. If

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our vendors fail to meet their obligations, provide poor, inaccurate or untimely service, we are unable to make alternative arrangements for the supply of these services, we are unable to execute our business recovery plan, or our business recovery plan proves insufficient, we may fail, in turn, to provide our services or to meet our obligations to our customers, and our business, financial condition and our operating results could be materially harmed.

Our securities business and related clearing operations expose us to material liquidity risk.

We self clear most equity transactions in the U.S. and Australia. In those markets, we may be required to provide considerable additional funds with clearing and settlement organizations, such as the National Securities Clearing Corporation or Depository Trust and Clearing Corporation in the U.S., especially during periods of high market volatility. In addition, regulatory agencies have required these clearing and settlement organizations to increase the level of margin deposit requirements over time and they may continue to do so in the future. We rely on our excess cash, certain established credit facilities and the use of outsourced clearing arrangements to meet or reduce those demands. While we have historically met requests for additional margin deposits, there is no guarantee that our excess cash and our established credit facilities and clearing arrangements will be sufficient for future needs, particularly if there is an increase in requirements. There is also no guarantee that these established credit facilities and outsourced clearing arrangements will continue to be available to us.

In addition, each of our broker dealer subsidiaries worldwide is subject to regulatory capital requirements promulgated by the applicable regulatory and exchange authorities of the countries in which they operate. Growth in trading activity in certain jurisdictions outside the U.S. has led, and could continue to lead to, higher regulatory capital requirements. While we have implemented measures to reduce our regulatory capital requirements outside the U.S., there can be no assurance that we will be able to implement similar measures in the future. Moreover, regulatory or exchange authorities may seek to increase our regulatory capital requirements in the future and any modification to our business may result in increased regulatory capital requirements.

The failure by any of these subsidiaries to maintain its required regulatory capital may lead to suspension or revocation of its broker dealer registration and its suspension or expulsion by its regulatory body. Historically, all regulatory capital needs of our broker dealers have been provided by existing cash and cash from operations. However, if existing cash together with cash from operations are not sufficient, we may need to reject orders from clients and we may ultimately breach regulatory capital requirements.

Furthermore, if our broker-dealer subsidiaries are subject to new or modified regulatory capital rules or requirements, or fines, penalties or sanctions due to increased or more stringent enforcement, it could materially limit or reduce the liquidity we may need to expand or even maintain our then-present levels of business, which could have a material adverse effect on our business, results of operations and financial condition.

As a clearing member firm in certain jurisdictions we are subject to significant default risk.

We are required to finance our clients' unsettled positions from time to time and we could be held responsible for the defaults of our clients. Default by our clients may also give rise to our incurring penalties imposed by execution venues, regulatory authorities and clearing and settlement organizations. Although we regularly review our credit exposure, default risk may arise from events or circumstances that may be difficult to detect or foresee. In addition, concerns about, or a default by, one institution could lead to significant liquidity problems, losses or defaults by other institutions that could in turn adversely affect us.

In certain jurisdictions we are dependent on third-party clearing agents and any failures by such clearing agents could materially impact our business and operating results.

In certain jurisdictions we are dependent on agents for the clearing and settlement of securities transactions. If our agents fail to properly facilitate the clearing and settlement of our customer trades, we could be subject to financial, legal and regulatory risks and costs that may impact our business and operating results. In addition, it could cause our clients to reduce or cease their trading with us, which would adversely affect our revenues and financial results.

Moreover, certain of our agreements with clearing agents may be terminated upon short notice. There is no guarantee that we could obtain alternative services in a timely manner and any interruption of the normal course of our trading and clearing operations could have a material impact on our business and results of operations.

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Our business exposes us to credit risk that could affect our operating results and profitability.

We are exposed to credit risk from third parties that owe us money, securities or other obligations, including our customers and trading counterparties. These parties may default on their obligations to us due to bankruptcy, lack of liquidity, operational failure or other reasons, and we could be held responsible for such defaults. In addition, client trading errors which they are unable or unwilling to cover may cause us to incur financial losses. Volatile securities markets, credit markets and regulatory changes may increase our exposure to our customers' credit profiles, which could adversely affect our financial condition and operating results. Our review of the credit risk of trading counterparties may not be adequate to provide sufficient protection from this risk.

We may incur material losses on foreign exchange transactions entered into on behalf of clients and be exposed to material liquidity risk due to counterparty defaults or errors.

We enable clients to settle cross border equity transactions in their local currency through the use of foreign exchange contracts. These arrangements typically involve the delivery of securities or cash to a counterparty that is not processed through a central clearing facility in exchange for a simultaneous receipt of cash or securities. We may operate as either a principal or agent in these transactions. As a result, a default by one of our counterparties prior to the settlement of their obligation could materially impact our liquidity and have a material adverse effect on our financial condition and results of operations.

In addition, we are exposed to operational risk. Employee and technological errors in executing, recording or reporting foreign exchange transactions may result in material losses due to the large size of such transactions and the underlying market risk in correcting such errors.

Our limited principal trading exposes us to risk of loss.

We engage in a limited amount of principal trading, which exposes us to risk of loss due to market fluctuations and volatility. For example, in our Canadian Operations, a limited portion of our revenues is derived from principal trading activities including the net spread on foreign exchange contracts executed to facilitate equity trades by clients in different currencies and trading exchange traded funds ("ETFs") to facilitate the creation or redemption of an ETF. In addition, in limited circumstances, we may transact on a principal basis in the normal course of agency trading by taking temporary positions in securities (including trade errors and client trade accommodations). Although we attempt to close out all our positions by the end of the day, we bear the risk of market fluctuations and we may incur losses due to changes in the prices of such securities and currencies. Any principal gains or losses resulting from these positions could have a disproportionate effect, positive or negative, on our revenues and profits, and could also result in reputational damage.

Our Canadian Operations also derive a limited portion of its revenues from the principal trading of spot and short dated forward foreign exchange contracts with clients that may not be related to equity trades. Although we seek to execute offsetting foreign exchange contracts concurrently with any client trades, earning a net spread, there can be no assurances that the trades are in fact concurrent (and therefore we bear the risk of market fluctuations). In addition, foreign exchange contracts are not centrally cleared and therefore we bear counterparty and settlement risk on such trades.

Our risk management policies and procedures may not be effective and may leave us exposed to unidentified or unexpected risks.

We seek to monitor and control our risk exposure through a risk and control framework encompassing a variety of separate but complementary financial, credit, operational, technological, compliance and legal reporting systems, internal controls, management review processes and other mechanisms that rely on a combination of technical and human controls and supervision, including our global risk committee. These policies, procedures and practices used to identify, monitor and control a variety of risks may fail to be effective. As a result, we face the risk of losses, including, for example, losses resulting from trading errors, customer defaults, fraud and money laundering.

Internal control over financial reporting, no matter how well designed, has inherent limitations. Therefore, internal control over financial reporting determined to be effective can provide only reasonable assurance with respect to financial statement preparation and may not prevent or detect all misstatements. Moreover, projections of any evaluation

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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. As such, we could lose investor confidence in the accuracy and completeness of our financial reports, which may have a material adverse effect on our stock price.

The business in which we operate is extremely competitive worldwide.

Many of our competitors have substantially greater financial, technical, marketing and other resources than we do, which, among other things, enable them to compete with the services we provide on the basis of price, including lowering prices for certain of our key services to gain business in their higher margin areas, and a willingness to commit their firms' capital to service their clients' trading needs on a principal, rather than on an agency basis. In addition, many of our competitors offer a wider range of bundled services, have broader name recognition, and have larger customer bases than we do. Some of our competitors have long standing, well established relationships with their clients, and also hold dominant positions in their trading markets. Moreover, new entrants may enter the market with alternative methods of providing trade execution and related services, and existing competitors often launch new initiatives. The trend toward increased competition in our business is expected to continue, and it is possible that our competitors may acquire increased market share. Many of our competitors have undertaken measures to link various electronic trading systems and platforms in an effort to attract order flow to off exchange venues and increase internal executions.

Although we believe that our products and services have established certain competitive advantages, our ability to maintain these advantages will require continued enhancements to our products, investment in the development of our services, additional marketing activities and enhanced customer support services. In addition, there can be no assurance that we will have sufficient resources to continue to make investments in development of our services, that our competitors will not devote significantly more resources to competing services or that we will otherwise be successful in maintaining our market position. If competitors offer superior services, our market share would be affected and this would adversely impact our business and results of operations.

We face certain challenges and risks to our international business that may adversely affect our strategy.

Global client coverage is a key component of our business plan. We have invested significant resources in our foreign operations and the globalization of our products and services. However, there are certain risks inherent in the operation of our business outside of the U.S., including, but not limited to, additional regulatory capital requirements, less developed technology and infrastructure, and higher costs for infrastructure. These risks may limit our ability to provide services to clients in certain markets. There also may be difficult processes for obtaining regulatory approvals. This could result in delays in our global business plans, difficulties in staffing foreign operations and adapting our products to foreign markets, practices and languages, exchange rate risks and the need to meet foreign regulatory requirements. Each of these could force us to alter our operational plans and this may adversely impact our strategy.

Political and economic uncertainty arising from the outcome of the June 2016 referendum in which the people of the United Kingdom voted in favor of an exit from the European Union (the "EU") could adversely impact our business, results of operations and financial condition.

There is substantial political and economic uncertainty surrounding the referendum held on June 23, 2016 in which the citizens of the United Kingdom voted in favor of an exit from the EU (often referred to as Brexit). The United Kingdom and the EU are negotiating the terms of the United Kingdom's withdrawal from the EU and the framework for their future relationship. However, there remains considerable uncertainty around the terms of the withdrawal and the United Kingdom's future relations with the EU. If a withdrawal agreement is not ratified by both sides by March 29, 2019, the United Kingdom will likely leave the EU on that date with no agreement (a so-called "hard Brexit"). It is unclear how the United Kingdom's access to the EU single market, and the wider trading, legal and regulatory environment in which we and our clients operate, will be impacted by Brexit and how this will affect our and their businesses. The announcement of Brexit caused, and further developments have caused and may continue to cause, significant volatility in global stock markets and currency exchange rate fluctuations. The uncertainty surrounding the terms of the United Kingdom's exit and its consequences, including the absence of a negotiated agreement or steps taken unilaterally by either the United Kingdom or the EU following Brexit, could adversely impact client and investor confidence, result in additional market volatility, lead to significant regulatory changes and adversely affect our businesses, including our revenues from trading activities in Europe, and our results of operations and financial condition.

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We incur risks related to our international business due to currency exchange rate fluctuations that could impact our financial results and financial position.

We have significant operations outside of the U.S., with 55% of our 2018 consolidated revenues denominated in non-U.S. dollar currencies. We currently operate and continue to expand globally, principally through our operations in Canada, Europe and Asia Pacific as well as through the development of specially tailored versions of our services to meet the needs of our clients who trade in international markets. We therefore have significant exposure to currency exchange rate fluctuations primarily between the U.S. Dollar and the British Pound Sterling, Euro, Swiss Franc, Scandinavian currencies, Australian Dollar, Canadian Dollar, Japanese Yen and Hong Kong Dollar. When the U.S. Dollar strengthens against these currencies, the U.S. Dollar value of non U.S. Dollar based revenue and profit decreases. These fluctuations may materially impact the translation of our non U.S. results of operations and financial condition into U.S. dollars as part of the preparation of our consolidated financial statements.

We are dependent on certain major customers and a decline in their use of our services could materially impact our revenues.

The chart below sets forth our dependence on our three largest clients individually, as well as on our ten largest clients in the aggregate, expressed as a percentage of total revenues:

	% of Total Consolidated Revenue					
	2018		2017		2016	
Largest customer	4.3	%	3.9	%	3.0	%
Second largest customer	2.3	%	2.4	%	2.2	%
Third largest customer	2.3	%	2.1	%	2.1	%
Ten largest customers	20.2	%	18.9	%	17.8	%

Our customers may reduce or discontinue their use of our trading execution services or other services at any time. There can be no assurance that we will be able to retain these major customers or that such customers will maintain or increase their demand for our trade execution or other services. The loss, or a significant reduction, of demand for our services from any of these customers could have a material adverse effect on our business, financial condition and results of operations.

Legislative or regulatory changes, including within the securities markets and the brokerage industry, could materially impact our business.

We currently operate POSIT in the U.S. under Regulation ATS, our European operations are subject to MiFID II and we must comply with the requirements of the U.S. PATRIOT Act and its foreign equivalents for monitoring our customers and any suspicious transactions. Moreover, most aspects of our broker dealer operations are highly regulated, such as sales and reporting practices, operational compliance, capital requirements and licensing of employees. Accordingly, we face the risk of significant intervention by regulatory authorities in all jurisdictions in which we conduct business, such as the SEC and FINRA in the U.S. and their equivalents in other countries. As we continue to operate or expand our business, we may be exposed to increased and different types of regulatory requirements.

We are subject to, and in the future we may become subject to, new regulations or changes in the interpretation or enforcement of existing regulations, which may adversely affect our business. Also, regulatory changes that impact how our customers conduct their business may impact our business and results of operations. The current U.S.

administration and other members of the U.S. federal government and other governments outside of the U.S. may implement new or revised regulatory requirements for the financial services industry. Any changes to the regulatory rules could cause us to expend more significant compliance, business and technology resources, incur additional operational costs and create additional regulatory exposure.

The SEC adopted the Consolidated Audit Trail rule ("CAT") in July 2012, which requires SROs to establish an order trail reporting system that would enable regulators to track, within 24 hours of the trade date, information related to orders in NMS securities (generally, exchange-listed stocks and exchange-listed options) and OTC equity securities received and executed across the securities markets. The SEC approved a national market system plan for implementation of the CAT that had been submitted by the exchanges and FINRA on November 15, 2016. As a non small industry member, the expected start date for us to begin reporting CAT data is November 2019, which will

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result in significant implementation costs and increased ongoing administrative expenses and burdens.

On November 19, 2014, the SEC unanimously adopted Regulation Systems Compliance and Integrity ("Regulation SCI"). The regulation became effective on February 3, 2015 and the compliance date was November 3, 2015. The rule requires SCI entities (i.e., exchanges, SROs, clearing and settlement agencies, and certain ATSs) to establish extensive policies, procedures, and/or controls to ensure the capacity, stability, integrity, and resiliency of their trading and regulatory reporting systems. Regulation SCI, among other things, also requires the reporting of certain systems issues, testing of business continuity and disaster recovery plans with mandatory participation by customers and members, the establishment of geographically diverse backup capabilities, the completion of an objective annual review of systems, and the maintenance and preservation of certain books and records concerning matters covered by the rule. To the extent Regulation SCI becomes applicable to us (as a result of POSIT or otherwise), we could experience significant implementation costs as well as increased ongoing administrative expenses and burdens.

On July 18, 2018, the SEC unanimously adopted amendments (the "Final ATS Amendments") to Regulation ATS and related rules under the Exchange Act to enhance transparency requirements on, and increase the SEC's oversight of, ATSs that facilitate transactions in National Market System stocks (generally, exchange-listed equities) ("NMS Stock ATSs"). The regulation became effective on October 9, 2018. The amendments require, among other things, a publicly-available Form ATS-N containing disclosures about the operation of the ATS and the interactions between the ATS, its affiliates, and other firm products (e.g. smart routers and algorithms). We filed our first Form ATS-N on February 8, 2019. The level of disclosure required under the Final ATS Amendments and the SEC's ongoing involvement in approving or reviewing the design and operations of NMS Stock ATSs bring the regulation of NMS Stock ATSs closer to the way in which national securities exchanges are currently regulated. The Final ATS Amendments resulted in, and is expected to continue to result in, increased administrative expenses and burdens to ensure compliance.

In addition, new regulatory obligations have been proposed, adopted or implemented that pertain to our business outside of the United States, which have also had, and may continue to have, a material impact upon our business model.

· In Europe, these include MiFID II, which took effect on January 3, 2018. In particular, under MiFID II, MTFs—the European equivalent to an SEC registered ATS—that trade in dark cash equity orders are required to cross such orders at the midpoint, open, or closing prices of the primary venue (where displayed orders in those securities are traded) and adhere to volume limits on dark trading. These limits, which took effect in March 2018, were set at 4% of all the displayed and dark regulated venue trading volume for any individual dark venue and 8% of such volume for all dark trading venues in the aggregate. The calculations are performed at an individual stock level over a 12 month rolling period. In the event that the relevant limit is breached, the crossing of that particular stock in the individual dark trading venue or in all such venues (as applicable depending on whether the 4% or 8% threshold is breached) ceases for the following 6 months. MiFID II provides an exception from these requirements for large-sized orders, which may be crossed at any price point and without regard to the above mentioned volume limits. No such exception exists for smaller-sized orders and the implementation of the volume limits has restricted the crossing of such smaller-sized orders in affected stocks in POSIT in Europe.

In addition, a financial transaction tax (the "European FTT") is being considered which would include at least ten of the twenty eight members of the EU. In addition to the impact that such tax would have on the affected securities and signatory countries, certain alternative versions of the proposals could include an extra territorial scope that may impact the trading activities of entities which are, and trade entirely outside, the European FTT zone.

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The EU also adopted a comprehensive General Data Privacy Regulation (the "GDPR") in May 2016 that replaced the 1995 European Union Directive on Data Protection and related country-specific legislation. The GDPR became fully effective in May 2018. The GDPR requires companies to satisfy new requirements regarding the monitoring of EU data subjects and the handling of their personal data, including its use, protection and the ability of persons whose data is stored to correct or delete such data about themselves. Under certain circumstances, the GDPR may require us to provide notification to affected individuals and/or data protection authorities in the event of a data breach. Failure to comply with

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GDPR requirements could result in penalties of up to the greater of €20 million or 4% of worldwide revenue. Compliance with certain of these adopted laws, rules or regulations of the various jurisdictions in which we operate could result in the loss of revenue and has caused us, and could cause us, to incur significant costs. In addition, if any new regulatory obligations are implemented, ITG could incur significant costs to establish the appropriate processes, systems, and/or controls. Last, if we fail to comply adequately with any of these laws, rules or regulations, we may be subject to censure, fines, judgments, settlements, disgorgements, penalties, injunctions, cease and desist orders, suspension of our business, suspensions of personnel, or other sanctions or relief, including revocation of our exchange or self regulatory organization memberships or our broker dealer registrations.

Increased regulatory scrutiny has led to, and will continue to lead to, increased costs associated with responding to investigations and inquiries and the potential for penalties and necessary remediation, which we expect to negatively impact our profitability and could harm our reputation.

In recent years, there has been increased regulatory scrutiny of our industry by regulators and other governmental authorities, including a focus on, among other areas, trading risk management controls, market abuse, fee and pricing transparency, undisclosed trading practices and dark pool operations, resulting in an increase in regulatory investigations, inquiries and reviews. Our broker-dealer subsidiaries are subject to, or involved in, investigations and other proceedings by government agencies and self-regulatory organizations, with respect to which we are cooperating. Our broker-dealer subsidiaries have been the subject of claims alleging the violation of securities laws, rules and regulations, some of which have resulted in the payment of disgorgement, penalties, fines, awards, judgments and settlements. Such enhanced scrutiny has caused, and we expect it to continue to cause, ITG to incur significant costs in light of the legal and compliance resources needed to respond to such investigations and proceedings, in addition to monetary penalties and increased compliance costs, that could arise from such investigations and proceedings. Such regulatory or other actions may also be directed at certain of our past and present executives, employees or directors and we may be required to indemnify these individuals in regard to these matters. The risks associated with such matters are often difficult to assess or quantify, and their existence and magnitude often remain unknown or uncertain for substantial periods of time. A settlement of, or judgment related to, such matters could result in civil or criminal liability, disgorgement, penalties, fines, restrictions or limitations on our operations and activities and other sanctions, could lead to related private litigation and could otherwise have a material adverse effect on our businesses, results of operations, financial condition and prospects. Any such investigation, inquiry or action could also cause us significant reputational harm. In addition, regardless of the outcome of such matters, we have incurred and will continue to incur significant legal and other costs, including substantial management time, dealing with such matters.

Our business has been and may continue to be adversely affected by our customers' reaction to SEC or other regulatory proceedings.

In August 2015, we paid $20.3 million to settle the SEC's investigation into a proprietary trading pilot operated in 2010 and 2011 (the "2015 SEC Settlement"), which had a significant negative impact on our business. In January 2017, we paid $24.5 million to settle the SEC's investigation into our activity with respect to pre-released American Depositary Receipts (the "2017 SEC Settlement"). In November 2018, we paid $12.0 million to settle the SEC's investigation into certain operational features of U.S. POSIT and access to U.S. POSIT data, together with related disclosures (the "2018 SEC Settlement" and, together with the 2015 SEC Settlement and the 2017 SEC Settlement, the "SEC Settlements"). Our broker-dealer subsidiaries are also subject to, or involved in, investigations and other proceedings by government agencies and self-regulatory organizations, with respect to which we are cooperating. Our customers' reaction to the SEC Settlements or the announcement or resolution of other investigations or proceedings may result in reputational and financial harm, which could have a material adverse effect on the Company.

The circumstances relating to the SEC Settlements could subject us to additional actions, including purported class action or other litigation.

In connection with the 2015 SEC Settlement, two putative class action lawsuits were filed and have since been consolidated into a single action in the U.S. District Court for the Southern District of New York against the Company and certain of its current and former executives. On April 19, 2018, the Company reached an agreement in principle to settle the consolidated securities class action lawsuit. In exchange for a release of claims and a dismissal with prejudice,

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the settlement includes a payment to class members of $18 million, which is well within the policy limits of, and is expected to be paid by, the Company's insurance carrier. On November 5, 2018, a Stipulation and Agreement of Settlement (the "Settlement") was preliminarily approved by the court. On February 21, 2019, the court approved the Settlement and entered final judgment.

In addition, a purported shareholder of the Company filed a shareholder derivative action against eleven current or former officers and directors of the Company in the Supreme Court for the State of New York relating to the 2015 SEC Settlement. The Company is named as a nominal defendant, and the plaintiff purports to seek recovery on its behalf. The complaint generally alleges that the individual defendants breached their fiduciary duties to the Company in connection with the matters that were the subject of the 2015 SEC Settlement. On January 11, 2019, the plaintiff filed a notice of voluntary discontinuance without prejudice.

Any further actions or threatened actions based on the circumstances relating to the SEC Settlements, including any governmental investigations or private litigation, and the defense and any related settlement thereof, could have a material adverse effect on the Company's consolidated financial position or on the results of operations for any particular period, and may result in significant ongoing expenses.

We could be subject to challenges by U.S. and foreign tax authorities that could result in additional taxes and penalties.

We are subject to income and other taxes in each jurisdiction in which we operate. We are also subject to reviews and audits by U.S. and foreign tax authorities. Our determination of our tax obligations in each jurisdiction requires us and our advisers to make judgment calls and estimations. Our determination may differ, even materially, from the judgment of the tax authorities and therefore cause us to incur additional taxes and related interest and penalties, which could impact our financial results.

We may not generate sufficient taxable income in future periods to utilize our loss carryforwards and tax credit carryforwards.

In the Asia Pacific and U.S. regions, we have significant carryforwards for operating losses and tax credits. If we do not generate sufficient future taxable income in these jurisdictions we may not be able to fully utilize these available carryforwards. In addition, our tax credit carryforwards in the U.S. have a limited period to be utilized due to expiration dates. We have established full valuation allowances in our consolidated financial statements for these deferred tax assets in Asia Pacific and the U.S.

Tax changes, including tax reform in the United States, could affect the Company's effective tax rate and future profitability.

The Company's future results could be affected by changes in our effective tax rate as a result of changes in the mix of our overall profitability, changes in tax legislation and the results of audits and examinations of previously filed tax returns.

In December 2017, the current U.S. administration signed into law new comprehensive tax reform legislation called the Tax Cuts and Jobs Act of 2017 (the "Tax Cuts and Jobs Act"), which makes significant changes to the U.S. income tax rules applicable to both individuals and entities, including the Company. The Tax Cuts and Jobs Act includes amendments to the applicability of the corporate alternative minimum tax, reductions in the amount of executive pay that qualifies for deduction, reductions in the U.S. corporate income tax rate and new taxes on certain foreign-sourced earnings and certain related party payments, which are referred to as the global intangible low-taxed income tax (“GILTI”) and the base erosion tax, respectively.

Inability to protect our intellectual property may result in increased competition, loss of business or other negative results on our business and financial condition.

Our success is dependent, in part, upon our intellectual property. We generally rely upon patents, copyrights, trademarks and trade secrets to establish and protect our rights in our proprietary technology, methods, products and services. We cannot assure that any of the rights granted under any patent, copyright or trademark that we may obtain will protect our competitive advantages. A third party may still try to challenge, invalidate or circumvent the protective mechanisms that we select. In addition, the laws of some foreign countries do not protect our proprietary rights to the same extent as the laws of the U.S., so we cannot predict our ability to properly protect our intellectual property in those jurisdictions. Third parties operating in jurisdictions in which we have not filed for protection may be able to obtain rights in intellectual property that we have protected in the U.S. and other jurisdictions or may be able to misappropriate our intellectual property with impunity.

Additionally, we might not detect the unauthorized use of our intellectual property. If we do detect unauthorized use, enforcing our infringed or misappropriated intellectual property rights may require significant resources. Accordingly, we might choose not to enforce our infringed or misappropriated intellectual property rights, depending on factors like the best use of our limited resources, the value of our infringed or misappropriated intellectual property rights and other outcomes peripherally related to our attempted enforcement.

There can be no assurance that we will be able to protect our intellectual property from improper disclosure or use, or that others will not develop technologies that are similar or superior to our technology without violating our intellectual property. Violations of our intellectual property by third parties could have an adverse effect on our competitiveness and business. In addition, the cost of seeking to enforce our intellectual property rights could have an adverse effect on our financial results.

If we were to unknowingly infringe third party intellectual property or be accused of doing so without merit, we could bear significant costs of defense and litigation, which could impact our financial results.

Under current law, U.S. patent applications remain secret for 18 months and may, depending on how they are prosecuted, remain secret until the issuance of a patent. In light of these factors, it is not always possible to determine in advance whether any of our products or services may infringe the present or future patent rights of others. There can be no guarantee that we will be aware of all patents and trademarks that might pose a risk of infringement by our services. From time to time, we may receive notices from others of claims or potential claims of intellectual property infringement or we may be called upon to defend our products, customers or licensees against such third-party claims. Responding to these kinds of claims, regardless of merit, could consume valuable time and result in costly litigation that could have a material adverse effect on us. Such claims could also result in our entering into royalty or licensing agreements with the third parties claiming infringement on terms that could have a material impact on our profitability.

If we cannot successfully execute on our strategic initiatives, our business and financial results may be adversely impacted.

We may not be able to implement important strategic initiatives in accordance with our expectations, including that the strategic initiatives could result in additional unanticipated costs, which may result in an adverse impact on our business and financial results. In July 2016, we completed an end-to-end review of our business, clients, people and processes initiated by our Chief Executive Officer. In connection with these findings, we announced our Strategic Operating Plan to increasingly focus our resources on our core capabilities in execution, liquidity, analytics and workflow solutions, which are our four key service offerings that revolve around the trade implementation cycle. As part of our ten-quarter Strategic Operating Plan, which was completed during 2018, we pursued significant investments in technology and people beginning in the second half of 2016 to enhance these key service offerings and sharpen our brand with the expectation of meaningfully growing market share, revenues and profitability on a global basis. If we are unable to execute or realize the benefits of other strategic initiatives, the strategic initiatives may not result in improvements in future financial performance and could have a material adverse effect on our business, financial condition, cash flows, or results of operations.

Our strategic transactions, including acquisitions and dispositions, may not result in anticipated benefits and may present risks not originally contemplated, which may adversely affect our results of operations and financial condition.

Over the last several years, we have undertaken several strategic transactions, including the acquisition of RFQ hub, a multi asset platform for global listed and OTC financial instruments, as well as the dispositions of our investment research operations. Additionally, in February 2018, we established a joint venture with Option Technology Solutions LLC to form Matrix Holding Group, a holding company for a derivatives execution and technology business. We may elect to pursue additional potential strategic transactions in the future, including acquisitions, dispositions, strategic partnerships, joint ventures, restructurings, business combinations and investments. These transactions entail

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numerous operational and financial risks, including but not limited to difficulties in valuing acquired businesses, combining personnel and firm cultures, integrating acquired products, services and operations, achieving anticipated synergies that were inherent in our valuation assumptions, exposure to unknown material liabilities, the potential loss of key vendors, clients or employees of acquired companies, incurrence of substantial debt or dilutive issuance of equity securities to pay for acquisitions, higher-than expected acquisition or integration costs, write-downs of assets or impairment charges, increased amortization expenses and decreased earnings, revenue or cash flow from dispositions. Accordingly, there can be no assurance that we will undertake or successfully complete any transactions of the nature described above, and our failure to execute on any strategic transaction in a satisfactory manner could adversely affect our future results of operations and financial condition.

Our business could be adversely affected by our inability to attract and retain talented employees, including sales, technology and development professionals.

Our business operations require highly specialized knowledge of the financial industry and of technological innovation as it applies to the financial industry. If we are unable to hire or retain the services of talented employees, including executive officers, other key management and sales, technology and development professionals, we would be at a competitive disadvantage. In addition, recruitment and retention of qualified staff could result in substantial additional costs. The loss of the services of one or more of our executive officers or other key professionals or our inability to attract, retain and motivate qualified personnel, could have a material adverse effect on our ability to operate our business.

Operational risks, such as misconduct and errors of our employees or entities with which we do business, could cause us reputational and financial harm.

Employee errors in recording or executing transactions for customers can cause us to enter into transactions that customers may disavow and refuse to settle. Such operational risks expose us to risk of loss, which can be material, until we detect the errors in question and halt, or where possible, unwind or reverse the transactions. As with any unsettled transaction, adverse movements in the prices of the securities involved in these transactions before we unwind or reverse them can increase this risk. We may incur losses as a result of these transactions that could materially impact our financial results.

In addition to trading errors by our employees, other errors or misconduct by our employees or entities with which we do business could subject us to financial losses or regulatory sanctions and seriously harm our reputation. It is not always possible to prevent employee errors or misconduct and the precautions we take to prevent and detect this activity may not be effective in all cases. Our ability to detect and prevent errors or misconduct by entities with which we do business may be even more limited. Errors could include inadvertently sharing confidential information with unauthorized parties or operational errors from the potential misuse of our products or services. Misconduct could include, among other things, hiding unauthorized activities from us, improper or unauthorized activities such as activities prohibited by rule or law or improper use of confidential information. Misconduct by our employees or entities with which we do business could result in losses, litigation, regulatory sanctions or other material adverse effects on the Company.

Our business exposes us to litigation risks.

Many aspects of our business involve substantial risks of liability and we are involved in a number of investigations and inquiries that could result in liability. These risks of liability arise from, and could result in claims regarding, among other things, potential delays or failures of trade executions, trade settlement terms and the conduct of other aspects of our business. The defense of claims, even those without merit, could involve significant legal expenses and substantial management time. An adverse resolution of any lawsuit or claim against us could have a material adverse effect on our business, financial condition and results of operations.

Item 1B. Unresolved Staff Comments

None.

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Item 2. Properties

Our principal offices are located at One Liberty Plaza, in New York, New York, where we lease approximately 132,000 square feet of office space pursuant to a lease agreement expiring in January 2029, of which we sublease approximately 44,000 square feet.

We have a regional office in Boston, Massachusetts where we lease approximately 36,000 square feet of office space pursuant to a lease expiring in November 2030, of which we sublease approximately 10,000 square feet.

We also have an additional regional office in Chicago, Illinois where we occupy approximately 4,000 square feet pursuant to a lease agreement expiring in October 2029.

We maintain a facility in Los Angeles, California where we occupy approximately 36,000 square feet of office space pursuant to a lease agreement expiring in July 2027. This facility is used primarily for technology research and development and support services. We have ceased use of and intend to sublease approximately 12,000 square feet of this space.

Canada

We have an office in Toronto where we occupy approximately 20,000 square feet of office space pursuant to a lease expiring in December 2019.

Europe

In Europe, we have offices in Dublin, London and Paris where we occupy approximately 6,000, 12,000 and 5,000 square feet of office space, respectively. The Dublin space is leased pursuant to an agreement that expires in November 2027 (with a termination option in November 2022), the London space is leased pursuant to an agreement that expires in December 2024, and the space in Paris is leased pursuant to an agreement that expires in May 2025 (with a termination option in May 2019).

Asia Pacific

In Australia we have offices in Melbourne and Sydney, where we occupy approximately 6,000 and 3,000 square feet of office space, respectively, pursuant to leases expiring in April 2020 and June 2020, respectively.

In Hong Kong we occupy approximately 11,000 square feet of office space pursuant to a lease that expires in September 2021. We also lease approximately 1,000 square feet of space for our regional office in Singapore pursuant to a lease that expires in February 2021.

Item 3. Legal Proceedings

Information pertaining to legal proceedings can be found in “Item 8. Financial Statements—Note 23. Commitments and Contingencies—Legal Matters” and is incorporated herein by reference.

Item 4. Mine Safety Disclosures

Not applicable.

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PART II

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

Common Stock Data

With the consummation of the Merger on March 1, 2019, we became an indirect wholly-owned subsidiary of Virtu and our common stock was delisted from the NYSE. There is no established trading market for our equity securities as of the Closing Date of the Merger. An indirect wholly owned subsidiary of Virtu is the sole holder of record of our equity. Prior to the closing of the Merger, our common stock was traded on the NYSE under the symbol "ITG."

Dividends

In 2015, our Board of Directors initiated a dividend program under which we began to pay quarterly dividends, subject to quarterly declarations by the Board of Directors. During 2018 and 2017, our Board of Directors declared and we paid quarterly cash dividends of $0.07 per share on our common stock and, in February 2019, our Board of Directors declared a quarterly dividend of $0.07 per share on our common stock, payable on March 15, 2019 to stockholders of record as of February 27, 2019.

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Stock Repurchases

ISSUER PURCHASES OF EQUITY SECURITIES

Period	Total Number of Shares (or Units) Purchased (a)	Average Price Paid per Share (or Unit) (a)	Total Number of Shares (or Units) Purchased as Part of Publicly Announced Plans or Programs (b)	Maximum Number of Shares (or Units) that May Yet Be Purchased Under the Plans or Programs (b)
From: January 1, 2018 To: January 31, 2018	163,434	$ 21.36	13,425	548,130
From: February 1, 2018 To: February 28, 2018	401,355	19.81	144,006	4,404,124
From: March 1, 2018 To: March 31, 2018	22,902	19.69	22,902	4,381,222
From: April 1, 2018 To: April 30, 2018	25,544	19.79	24,424	4,356,798
From: May 1, 2018 To: May 31, 2018	2,955	20.44	2,500	4,354,298
From: June 1, 2018 To: June 30, 2018	76,221	21.56	75,723	4,278,575
From: July 1, 2018 To: July 31, 2018	4,589	21.23	3,716	4,274,859
From: August 1, 2018 To: August 31, 2018	7,244	22.89	—	4,274,859
From: September 1, 2018 To: September 30, 2018	12,012	21.94	—	4,274,859
To: October 1, 2018 From: October 31, 2018	17,008	27.75	—	4,274,859
To: November 1, 2018 To: November 30, 2018	801	30.08	—	4,274,859
From: December 1, 2018 To: December 31, 2018	56,668	30.01	—	4,274,859
Total	790,733	$ 21.28	286,696	

(a) This column includes the acquisition of 504,037 shares of common stock from employees in order to satisfy minimum statutory withholding tax requirements upon settlement of equity awards.

(b) In February 2018, our Board of Directors authorized the repurchase of an additional 4.0 million shares. This authorization expired at the Effective Time of the Merger as there is no established trading market for our equity securities as of the Closing Date of the Merger. As of December 31, 2018, there were 4.3 million shares remaining available for repurchase under ITG's stock repurchase program. The stock repurchase program was suspended pending the completion of the acquisition of the Company by Virtu.

During 2018, we repurchased 0.8 million shares of our common stock at a cost of $16.8 million, which was funded from our available cash. Of these shares, 0.3 million were purchased under our Board of Directors' authorization for a total cost of $5.8 million (average cost of $20.28 per share). An additional 0.5 million shares repurchased for $11.0 million pertained to the satisfaction of minimum statutory withholding tax upon the net settlement of equity awards.

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Performance Graph

The following line graph compares the total cumulative stockholder return on our common stock against the cumulative total return of the Russell 2000 Index and the mean of the NASDAQ Other Finance Index and the NYSE Arca Securities Broker/Dealer Index, for the five year period ended December 31, 2018.

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Item 6. Selected Financial Data

The selected Consolidated Statements of Operations data and the Consolidated Statements of Financial Condition data presented below for each of the years in the five year period ended December 31, 2018, are derived from our consolidated financial statements. Such selected financial data should be read in connection with the consolidated financial statements contained in this report.

	Year Ended December 31, 2018	2017	2016	2015	2014
Consolidated Statements of Operations Data:					
($ in thousands, except per share amounts)					
Total revenues	$ 509,476	$ 483,694	$ 469,052	$ 634,803	$ 559,814
Total expenses	499,377	477,169	512,292	513,577	494,827
Income (loss) before income tax expense	10,099	6,525	(43,240)	121,226	64,987
Income tax expense (benefit)	9,408	45,965	(17,322)	29,656	14,095
Net income (loss)	$ 691	$ (39,440)	$ (25,918)	$ 91,570	$ 50,892
Basic income (loss) per share	$ 0.02	$ (1.19)	$ (0.79)	$ 2.70	$ 1.44
Diluted income (loss) per share	$ 0.02	$ (1.19)	$ (0.79)	$ 2.63	$ 1.40
Dividends per share	$ 0.28	$ 0.28	$ 0.28	$ 0.21	$ —
Basic weighted average number of common shares outstanding (in millions)	33.0	33.0	32.9	33.9	35.3
Diluted weighted average number of common shares outstanding (in millions)	34.4	33.0	32.9	34.8	36.4
Consolidated Statements of Financial Condition Data:					
($ in thousands)					
Total assets	$ 1,021,075	$ 784,856	$ 775,285	$ 1,709,022	$ 1,350,849
Cash and cash equivalents	$ 267,843	$ 287,452	$ 277,977	$ 330,653	$ 275,210
Short-term bank loans	$ 78,029	$ 101,422	$ 72,150	$ 81,934	$ 78,360
Term debt	$ 1,967	$ 3,104	$ 6,367	$ 12,567	$ 17,781
Total stockholders’ equity	$ 358,671	$ 363,235	$ 405,164	$ 454,821	$ 415,596

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

The following discussion and analysis should be read in conjunction with our consolidated financial statements, including the notes thereto.

Overview

ITG is a global financial technology company that helps leading brokers and asset managers improve returns for investors around the world. ITG empowers traders to reduce the end-to-end cost of implementing investments via liquidity, execution, analytics and workflow technology solutions. ITG has offices in Asia Pacific, Europe and North America and offers execution services in more than 50 countries.

Our business is organized into four reportable operating segments: U.S. Operations, Canadian Operations, European Operations and Asia Pacific Operations (see Note 24, Segment Reporting, to the consolidated financial statements). These four operating segments provide the following categories of products and services:

- Execution Services — includes (a) liquidity matching through POSIT, (b) self-directed trading using algorithms (including single stocks and portfolio lists) and smart routing, (c) portfolio trading and single stock sales trading desks providing execution expertise and (d) futures and options trading

- Workflow Technology — includes trade order and execution management software applications in addition to network connectivity

- Analytics — includes (a) tools enabling portfolio managers and traders to improve pre-trade, real-time and post-trade execution performance, (b) portfolio construction and optimization decisions and (c) securities valuation

Regional segment results exclude the impact of Corporate activity, which is presented separately and includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within the Company's regional segments. These costs include, among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with our global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non-operating expenses.

In 2018, we changed the way we measure the profitability of our regional segments to reflect the global nature of our business operations. Certain costs for senior management, product management, marketing, management information systems and infrastructure that are incurred in the U.S. on behalf of the entire Company are now being allocated to the international segments. For comparability purposes, we have restated previously reported segment results for the prior-year periods to reflect these changes.

Sources of Revenues

Revenues from our products and services are generated from commissions and fees, recurring (subscriptions) and other sources.

Commissions and fees are derived primarily from (i) commissions charged for trade execution services, (ii) income generated on net executions, whereby equity orders are filled at different prices within or at the National Best Bid and Offer (“NBBO”), and (iii) commission sharing arrangements between ITG Net (our private value added FIX based financial electronic communications network) and third party brokers and alternative trading systems whose trading products are made available to our clients on our OMS and EMS applications, including the new Algo Wheel functionality we have embedded within Triton. The Algo Wheel is a broker-neutral tool for allocating trades to broker algorithms in an unbiased systematic fashion using a quantifiable method for evaluating and rewarding brokers for execution performance. We also have commission sharing arrangements for our Single Ticket Clearing service and our RFQ hub request for quote service. Because commissions are earned on a per transaction basis, such revenues fluctuate from period to period depending on (a) the volume of securities traded through our services in the U.S. and Canada, (b) the contract value of securities traded in Europe and the Asia Pacific region and (c) our commission rates. Certain factors that affect our volumes and contract values traded include: (i) macro trends in the global equities markets that

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affect overall institutional equity trading activity, (ii) competitive pressure, including pricing, created by the existence of electronic execution competitors and (iii) potential changes in market structure in the U.S. and other regions. In addition to share volume, revenues from net executions are also impacted by the width of spreads within the NBBO. Trade orders are delivered to us from our OMS and EMS products and other vendors' products, direct computer to computer links to customers through ITG Net and third party networks and phone orders from our customers.

Recurring revenues are derived from the following primary sources: (i) connectivity fees generated through ITG Net for the ability of the sell side to receive orders from, and send indications of interest to, the buy side and for the sell side to receive requests for quotes through RFQ hub, (ii) software and analytical products and services and (iii) maintenance and customer technical support for our OMS. Prior to the divestiture of our investment research operations in May 2016 and December 2015, recurring revenues included subscriptions from these operations.

Other revenues include: (1) the net spread on foreign exchange transactions executed on a principal basis to facilitate equity trades by clients in different currencies, as well as on other foreign exchange transactions unrelated to equity trades, (2) non-recurring consulting services, such as one-time implementation and customer training related activities, (3) investment income from treasury activity, (4) interest income on securities borrowed in connection with customers' settlement activities, (5) market gains/losses resulting from temporary positions in securities assumed in the normal course of agency trading (including trade errors and client trade accommodations), (6) non recurring gains and losses such as divestitures, (7) fees earned for clearing securities transactions on behalf of other broker-dealers, (8) income from principal trading in Canada, including within our closed arbitrage trading desk (for historical periods up until April 2016) and (9) the net interest spread earned on securities borrowed and loaned transactions within our closed U.S. matched book securities lending operations (for historical periods up until June 2016).

As a result of adopting Accounting Standards Codification ("ASC") 606, Revenue from Contracts with Customer, on January 1, 2018, we identified two key accounting changes that affect the timing of revenue recognition as it relates to bundled commission arrangements and fees for software licenses. The financial impact of these accounting changes includes (1) a deferral of revenues primarily generated in the first half of the year for commissions attributable to analytics products under bundled arrangements that will be recognized over the course of the year as the performance obligations for those analytics products are satisfied and (2) an acceleration of license fee revenues to the delivery date for software provided for a specified period. These changes only relate to the timing of when revenue is recognized and have no effect on the underlying transaction price of the products and services we perform. For more information on our evaluation of the revenue recognition standard and its impact on our financial statements, see Note 2, Summary of Significant Accounting Policies, to the consolidated financial statements.

Expenses

Compensation and employee benefits, our largest expense, consist of salaries and wages, incentive compensation, employee benefits and taxes. Incentive compensation fluctuates based on revenues, profitability and other measures, taking into account the competitive environment for key talent. Incentive compensation includes a combination of cash and deferred share based awards. Only the cash portion of incentive compensation is a variable expense in the current period. As a result, our ratio of compensation expense to revenues may fluctuate from period to period based on revenue levels.

Transaction processing expense consists of costs to access various third party execution destinations and to process, clear and settle transactions. These costs tend to fluctuate with share and trade volumes, the mix of trade execution services used by clients and the rates charged by third parties.

Occupancy and equipment expense consists primarily of rent and utilities related to leased premises, office equipment and depreciation and amortization of fixed assets and leasehold improvements.

Telecommunications and data processing expenses primarily consist of costs for obtaining market data, telecommunications services and systems maintenance.

Other general and administrative expenses primarily include software amortization, professional (including legal) fees, consulting, business development and intangible asset amortization.

Interest expense consists primarily of costs associated with outstanding debt and credit facilities.

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Non GAAP Financial Measures

To supplement our financial information presented in accordance with accounting principles generally accepted in the U.S. ("U.S. GAAP"), management uses certain "non GAAP financial measures" as such term is defined in Regulation G promulgated by the SEC. Generally, a non GAAP financial measure is a numerical measure of a company's operating performance, financial position or cash flows that excludes or includes amounts that are included in, or excluded from, the most directly comparable measure calculated and presented in accordance with U.S. GAAP. Management believes the presentation of these measures provides investors with greater transparency and supplemental data relating to our financial condition and results of operations, and therefore a more complete understanding of factors affecting our business than U.S. GAAP measures alone. In addition, management believes the presentation of these measures is useful to investors for period to period comparison of results as the items described below reflect certain unique and/or non operating items such as acquisitions, divestitures, restructuring charges, write offs and impairments, charges associated with litigation or regulatory matters together with related expenses or items outside of management's control.

Adjusted revenues, adjusted expenses, adjusted pre-tax income, adjusted income tax expense (benefit) and adjusted net income, together with related per share amounts, are non GAAP performance measures that we believe are useful to assist investors in gaining an understanding of the trends and operating results for our core business. These measures should be viewed in addition to, and not in lieu of, results reported under U.S. GAAP.

Reconciliations of adjusted revenues, adjusted expenses, adjusted pre-tax income, adjusted income tax expense (benefit) and adjusted net income to revenues, expenses, income (loss) before income tax expense (benefit), income tax expense (benefit) and net income (loss) and related per share amounts as determined in accordance with U.S. GAAP for the years ended December 31, 2018, 2017 and 2016 are provided below, as applicable (dollars in thousands, except per share amounts).

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	Year Ended December 31,		
	2018	2017	2016
Total revenues	$ 509,476	$ 483,694	$ 469,052
Less:			
Other revenues - gains (1)	—	—	(2,438)
Adjusted revenues	$ 509,476	$ 483,694	$ 466,614
Total expenses	$ 499,377	$ 477,169	$ 512,292
Less:			
Lease consolidation (2)	(402)	(8,140)	—
SEC settlement accrual and related fees (3)	(13,168)	—	—
Acquisition costs (4)	(8,020)	—	—
Restructuring (5)	(10,601)	—	(9,620)
Impairment of customer intangible asset (6)	—	(325)	—
Legal costs related to the planned formation of the derivatives venture (6)	—	(750)	—
Reserve for settlement related to ADRs and associated costs (7)	—	—	(27,371)
Upfront compensation awards for CEO (8)	—	—	(4,415)
Arbitration case with former CEO and associated costs (9)	—	—	(6,580)
Gain from currency translation adjustment (10)	—	—	1,066
Adjusted expenses	$ 467,186	$ 467,954	$ 465,372
Income (loss) before income tax expense (benefit)	$ 10,099	$ 6,525	$ (43,240)
Effect of adjustments	32,191	9,215	44,482
Adjusted pre-tax income	$ 42,290	$ 15,740	$ 1,242
Income tax expense (benefit)	$ 9,408	$ 45,965	$ (17,322)
Reduction in tax reserves (11)	1,862	—	7,320
Impact of U.S. corporate tax law changes (12)	—	843	—
Valuation allowance for historical U.S. deferred tax assets (13)	—	(41,380)	—
Tax effect of adjustments (1) (5) (7) (8) (9) (10)	—	—	7,618
Adjusted income tax expense (benefit)	$ 11,270	$ 5,428	$ (2,384)
Net income (loss)	$ 691	$ (39,440)	$ (25,918)
Net effect of adjustments	30,329	49,752	29,544
Adjusted net income	$ 31,020	$ 10,312	$ 3,626
Diluted income (loss) per share	$ 0.02	$ (1.19)	$ (0.79)
Net effect of adjustments	0.88	1.49	0.90
Adjusted diluted income per share	$ 0.90	$ 0.30	$ 0.11

Notes:

(1) In the second quarter of 2016, we received insurance proceeds of $2.4 million from our corporate insurance carrier to settle a claim for lost profits arising from an August 2015 outage in our outsourced primary data center in the U.S. Additionally, we generated a nominal gain on the completion of the sale of our investment research operations in May 2016.

(2) In the fourth quarter of 2017, we incurred an $8.1 million charge for the write-off of fixed assets and other costs associated with the consolidation of our New York office space. In 2018, we incurred an additional charge for the New York office space consolidation of $0.4 million.

(3) In the second quarter of 2018, we incurred a charge to establish an accrual of $12.0 million for a potential settlement with the SEC, which was finalized in the fourth quarter of 2018, relating to an investigation into certain operational features of U.S. POSIT and access to U.S. POSIT data, together with certain related disclosures, and incurred related legal fees of $1.2 million. Due to the non-deductibility of the settlement charge and the full valuation allowance on U.S. deferred tax assets, there is no tax effect on this adjustment.

(4) In the fourth quarter of 2018, we incurred costs of $8.0 million related to the acquisition of the Company by Virtu.

(5) In 2018, we incurred restructuring charges of $10.6 million related to the elimination of certain positions in the U.S. and the reduction of office space in Los Angeles. Due to the full valuation on U.S. deferred tax assets, there is no tax effect on this adjustment. In 2016, we incurred restructuring charges of $9.6 million related to (a) management delayering and the elimination of certain positions, (b) the reduction in our single stock sales trading and sales organizations and (c) the closing of our U.S. matched-book securities lending operations and our Canadian arbitrage trading desk.

(6) In the third quarter of 2017, we deemed the remaining value of a customer intangible asset recorded in ITG Derivatives LLC of $0.3 million fully impaired and incurred legal fees related to the formation of the Matrix derivatives venture of $0.8 million.

(7) In the third quarter of 2016, we accrued $22.1 million for a settlement with the SEC with respect to an inquiry involving discontinued activity in pre-released ADRs and incurred legal fees related to this matter of $1.6 million. In the fourth quarter of 2016, we incurred an additional charge of $2.3 million based on the final settlement amount along with legal and other related costs associated with this matter of $1.3 million.

(8) Our Chief Executive Officer, who departed the Company in connection with the Merger, was granted cash and stock awards upon the commencement of his employment in January 2016, a significant portion of which replaced awards he forfeited at his former employer. Due to U.S. tax regulations, only a small portion of the amount expensed for these awards was eligible for a tax deduction.

(9) In the first half of 2016, we incurred a charge of $4.8 million, net of an insurance recovery of $0.5 million, to settle an arbitration case with our former CEO whose employment with the Company was terminated in August 2015 and incurred legal fees of $2.7 million. In the third quarter of 2016, we recorded a reimbursement of $0.9 million of these legal fees from our insurance carrier.

(10) In the third quarter of 2016, we substantially completed the liquidation of our investment in our Israel entity that ceased operations in December 2013. During our period of ownership and through December 2013, we had accumulated foreign exchange translation gains as a component of equity, which have been reclassified as a gain that reduced other general and administrative expenses in the Consolidated Statements of Operations.

(11) In the first quarter of 2018 and the fourth quarter of 2016, we resolved multi-year tax contingencies in the U.S. and reduced tax reserves by $1.9 million and $7.3 million, respectively.

(12) In the fourth quarter of 2017, we reduced the amount recorded for a deferred tax liability in the U.S. due to the passing of the U.S. Tax Cuts and Jobs Act of 2017 (the “Tax Cuts and Jobs Act”), which lowered the U.S. corporate income tax rate from 35% to 21%.

(13) In the third quarter of 2017, we determined that it was appropriate to establish a full valuation allowance on our U.S. deferred tax assets, of which $42.3 million related to periods prior to the third quarter of 2017. In the fourth

quarter of 2017, we reduced the valuation allowance by $0.9 million as a portion of these U.S. deferred tax assets were realized following a tax method change.

Executive Summary for the Year Ended December 31, 2018

Consolidated Overview

During 2018 we achieved strong growth in our international operations, including record levels of revenue and profits in Europe and Asia Pacific. We exited the year with a stronger fourth quarter, as consolidated revenues and adjusted pre-tax income were up on both a sequential and year-over-year basis.

Our 2018 revenues were $509.5 million, 5% higher than 2017 due largely to stronger international trading activity, including increased block crossing through POSIT Alert, as well as growth in commission share revenues from Workflow Technology products globally. On a U.S. GAAP basis, we posted net income of $0.7 million, or $0.02 per diluted share in 2018, compared to a net loss of $39.4 million, or $1.19 per diluted share in 2017. GAAP net income in 2018 included (i) charges related to the November 2018 SEC POSIT settlement and related fees of $13.2 million, or $0.38 per diluted share; (ii) headcount reduction expenses of $8.3 million, or $0.24 per diluted share associated with restructuring activities; (iii) costs related to the acquisition of ITG by Virtu of $8.0 million, or $0.23 per diluted share; and (iv) lease consolidation charges of $2.7 million, or $0.08 per diluted share. These charges were partially offset by a tax benefit of $1.9 million, or $0.05 per diluted share, for the reversal of a tax settlement accrual. Excluding those items, we generated adjusted net income (see Non-GAAP Financial Measures) of $31.0 million, or $0.90 per diluted share in 2018, compared to adjusted net income of $10.3 million, or $0.30 per diluted share, in 2017.

During the year, we completed our ten-quarter Strategic Operating Plan ("SOP"), which enhanced our global capabilities in liquidity, execution, analytics and workflow technology solutions. As part of the SOP we sharpened our focus around these four key service offerings following the divestitures and closings of non-core operations. We also undertook significant investments in technology and people to bolster these key service offerings. Our total investment under the plan since inception in late July 2016 was more than $40 million, with funding for the plan coming from more than $30 million in annual savings from cost reduction measures undertaken since the third quarter of 2016.

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Segment Discussions

In 2018, we changed the way we measure the profitability of our regional segments to reflect the global nature of our business operations. Certain expenses that are incurred in the U.S. on behalf of the entire Company are now being allocated to the international segments. For comparability purposes, we have restated previously reported segment results for 2017 resulting in a decrease in U.S. expenses of $10.7 million and increases in expenses in Canada, Europe and Asia Pacific of $2.7 million, $5.1 million and $2.9 million, respectively.

In the U.S., we narrowed our profitability gap due largely to cost reduction measures and the impact of a 12% year-over-year increase in daily equity market volumes.

Our Canadian commissions and fees rose during the year due to significant market share gains and increased market-wide volumes overall. Commissions and fees were 16% higher than 2017 while daily market-wide volumes were up 9%.

Europe experienced a record year in 2018 in terms of both revenue and pre-tax profits, which grew 11% and 12%, respectively, as compared to 2017. Our executed daily value in the region grew 2% over 2017 in British pound terms, below the 5% increase in daily market-wide trading activity due to the reduction in non-block trading in POSIT following the implementation of the MIFID II volume caps in March 2018. The growth in revenues and profitability was driven in part by increased POSIT Alert trading, which is generally exempt from the caps, and strong growth in commission sharing revenues from Workflow Technology products.

In Asia Pacific, we achieved new records for both revenues and pre-tax profits in 2018, with increases of 20% and 62%, respectively, as compared to 2017. Asia Pacific commissions and fees increased 21%, outperforming the 14% growth in overall daily market-wide activity. This outperformance was driven in part by the increased use of POSIT Alert and strong growth in algorithmic trading and portfolio trading.

Corporate activity in 2018 reduced pre-tax income by $49.7 million compared to a pre-tax reduction of $32.4 million in 2016. The higher pre-tax loss reflects an increase in non-operating charges from the items noted above.

Capital Resource Allocation

During 2018, we repurchased 287,000 shares under our authorized repurchase program for $5.8 million, or an average cost of $20.28 per share, and we ended the year with 33.2 million shares outstanding, above the 32.6 million shares outstanding at the end of 2017 due to suspensions in our repurchase activity pending the final settlement of the U.S. POSIT matter with the SEC in November 2018 and pending the completion of the acquisition of the Company by Virtu. We also maintained our $0.07 quarterly dividend program, paying out $9.2 million in cash.

Results of Operations—Year Ended December 31, 2018 Compared to Year Ended December 31, 2017

U.S. Operations

$ in thousands	Year Ended December 31, 2018	2017*	Change	% Change	
Revenues:					
Commissions and fees	$ 141,577	$ 154,182	$ (12,605)	(8)	%
Recurring	46,938	47,393	(455)	(1)	%
Other	2,876	3,415	(539)	(16)	%
Total revenues	191,391	204,990	(13,599)	(7)	%
Expenses:					
Compensation and employee benefits	89,406	95,683	(6,277)	(7)	%
Transaction processing	31,836	39,601	(7,765)	(20)	%
Other expenses	78,034	83,536	(5,502)	(7)	%
Total expenses	199,276	218,820	(19,544)	(9)	%
Loss before income tax	$ (7,885)	$ (13,830)	$ 5,945	43	%

* Restated for comparability purposes, resulting in a decrease in U.S. expenses of $10.7 million for costs incurred in the U.S. on behalf of the global

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business that are now being allocated to the international segments.

Commissions and fees declined 8% from 2017 due primarily to reduced trading in our POSIT Alert block crossing system and the spin-out of our derivatives business to the Matrix joint venture in mid-February 2018. These decreases were offset in part by an increase in commission sharing revenues for trades executed with third-party brokers via Triton and the Algo Wheel.

U.S. Operations: Key Indicators*	Year Ended December 31, 2018	2017	Change	% Change
Total trading volume (in billions of shares)	34.7	34.8	(0.1)	(0) %
Average trading volume per day (in millions of shares)	138.2	138.8	(0.6)	(0) %
Average revenue per share	$ 0.0034	$ 0.0037	$ (0.0003)	(8) %
U.S. market trading days	251	251	—	— %

* Excludes activity from the trading of derivatives and Latin American equities as well as commission share arrangements.

Recurring revenues decreased 1% from the prior year due primarily to a decline in connectivity revenue.

Other revenues declined 16% from 2017 due to lower tape rebate revenue, consulting revenue and clearing ticket fee revenues, offset in part by an increase in fees earned for commission aggregation services.

Compensation and employee benefits decreased 7% from the prior year primarily due to the impact of cost savings measures taken in 2017 and the first quarter of 2018 as well as employee termination costs incurred in 2017 of $5.5 million. These decreases were offset in part by increased cost for performance stock awards.

Transaction processing costs decreased 20% from 2017 even though total trading volume in cash equities was essentially flat due primarily to the impact of the spin-out of our derivatives business to the Matrix venture in mid-February 2018 and reduced trade execution costs on cash equities from lower liquidity taking. Transaction processing costs as a percentage of commissions and fees decreased to 22.5% in 2018 from 25.7% in 2017.

Other expenses decreased 7% compared to the prior year due to a decrease in occupancy and equipment costs related to the reduction of office space in our New York headquarters completed in the fourth quarter of 2017 and the reduction of office space in Boston in late March 2017. We also had lower market data and travel and entertainment costs.

Canadian Operations

$ in thousands	Year Ended December 31, 2018	2017*	Change	% Change	
Revenues:					
Commissions and fees	$ 63,125	$ 54,389	$ 8,736	16	%
Recurring	5,078	5,152	(74)	(1)	%
Other	3,770	3,753	17	0	%
Total revenues	71,973	63,294	8,679	14	%
Expenses:					
Compensation and employee benefits	21,389	20,076	1,313	7	%
Transaction processing	12,914	11,434	1,480	13	%
Other expenses	24,446	23,842	604	3	%
Total expenses	58,749	55,352	3,397	6	%
Income before income tax	$ 13,224	$ 7,942	$ 5,282	67	%

* Restated for comparability purposes, resulting in an increase in Canadian expenses of $2.7 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

Currency translation did not result in a material change to either total Canadian revenues or expenses.

Overall commissions and fees increased 16% compared to 2017 as the average daily volume (“ADV”) in our

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Canadian broker increased by 24%, significantly outpacing the 9% growth in market-wide volumes. We also achieved growth in ADV of 26% in our MATCHNow marketplace as compared to the prior year and we had an increase in commission sharing revenues for trades executed with third-party brokers via Triton and the Algo Wheel. These gains were offset in part by a reduction in our average commission rate attributable to client mix.

Recurring revenues decreased 1% from the prior year due to a decrease in connectivity fees, partially offset by an increase in billed revenue for analytics products. Other revenues were comparable to 2017 as an increase in fees earned for commission aggregation services was offset by higher losses on client trade accommodations.

Compensation and employee benefits costs increased 7% compared to 2017 primarily due to higher incentive compensation and stock-based compensation as well as increased severance costs.

Transaction processing costs increased 13% compared to the prior year due to the growth in executed volume in our Canadian broker, offset in part by a reduction from self-clearing trades in U.S. stocks by Canadian clients. As a percentage of commissions and fees, transaction processing costs decreased to 20.5% in 2018 compared to 21.0% in 2017.

Other expenses increased 3% compared to 2017 due primarily to higher connectivity costs and increased legal and consulting expenses.

European Operations

$ in thousands	Year Ended December 31, 2018	2017*	Change	% Change	
Revenues					
Commissions and fees	$ 150,137	$ 135,944	$ 14,193	10	%
Recurring	18,971	16,131	2,840	18	%
Other	(465)	(603)	138	23	%
Total revenues	168,643	151,472	17,171	11	%
Expenses:					
Compensation and employee benefits	45,372	41,588	3,784	9	%
Transaction processing	40,610	36,787	3,823	10	%
Other expenses	42,410	37,036	5,374	15	%
Total expenses	128,392	115,411	12,981	11	%
Income before income tax	$ 40,251	$ 36,061	$ 4,190	12	%

* Restated for comparability purposes, resulting in an increase in European expenses of $5.1 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

Overall currency rate changes in the European region increased revenues and expenses by $5.0 million and $3.5 million, respectively, resulting in an increase of $1.5 million to pre-tax income. This increase in pre-tax income was largely attributable to the strengthening of the Euro as revenues and expenses that originated in British pounds largely offset.

Commissions and fees increased 10% compared to 2017, including growth of $4.6 million from currency rate changes. The remaining growth was attributable to record trading in our POSIT Alert block crossing system, growth in algorithmic trading and an increase in commission sharing revenues for trades executed with third-party brokers via Triton and the Algo Wheel. These increases were partially offset by reduced levels of non-block trading in POSIT from the implementation in March 2018 of the dark pool volume caps required under the MiFID II regulations.

Recurring revenues increased 18% from the prior year due to higher billed analytics revenues from clients that converted from bundled arrangements, higher connectivity revenue, an increase in EMS license fees and new revenues for research payment account (“RPA”) administration fees resulting from MiFID II regulations for unbundling that went into effect in January 2018. The change in other revenues reflects a lower impact from client trade accommodations.

Compensation and employee benefits increased 9% from 2017 due to increases in salaries and incentive compensation, as well as a $1.3 million increase from currency rate changes.

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Transaction processing costs increased 10% from the prior year, which included a $1.3 million increase from currency rate changes. The remaining increase was primarily attributable to an increase in value traded, higher rebates paid to introducing firms and the impact of a lower crossing rate. As a percentage of commissions and fees, transaction processing costs were 27.0% in 2018 compared to 27.1% in 2017.

Other expenses increased 15% from 2017 due to higher costs for facilities, data centers, software, and market data. In addition, other expenses increased by $0.9 million from currency rate changes.

Asia Pacific Operations

$ in thousands	Year Ended December 31, 2018	2017*	Change	% Change
Revenues:				
Commissions and fees	$ 66,594	$ 55,176	$ 11,418	21 %
Recurring	8,075	7,235	840	12 %
Other	(204)	(193)	(11)	(6) %
Total revenues	74,465	62,218	12,247	20 %
Expenses:				
Compensation and employee benefits	20,865	20,611	254	1 %
Transaction processing	16,913	12,925	3,988	31 %
Other expenses	22,506	19,937	2,569	13 %
Total expenses	60,284	53,473	6,811	13 %
Income before income tax	$ 14,181	$ 8,745	$ 5,436	62 %

* Restated for comparability purposes, resulting in an increase in Asia Pacific expenses of $2.9 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

Currency translation did not have a material impact on total Asia Pacific revenues and decreased total Asia Pacific expenses by $0.3 million, resulting in an increase of $0.3 million to pre-tax income.

Commissions and fees increased 21% over 2017 due to record trading in our POSIT Alert block crossing system and strong growth in algorithmic trading and portfolio trading. We also benefitted from higher commission sharing revenues from trades executed via Triton and the Algo Wheel and for trading technology licensed to regional broker-dealers. Our average daily value traded in the region increased by 32%, significantly outpacing the 14% increase in average daily value traded market-wide.

Recurring revenues increased 12% over the prior year due to an increase in connectivity revenue and higher billed revenue from analytics products. The change in other revenues reflects a lower impact from client trade accommodations.

Compensation and employee benefits increased 1% over 2017 primarily due to higher stock-based compensation, higher incentive compensation and an increase in employee termination costs. These increases were partially offset by an increase in capitalized compensation for software development.

Transaction processing costs increased 31% from the prior year, comparable to the increase in our average daily value executed in the region. As a percentage of commissions and fees, transaction processing costs increased to 25.4% in 2018 from 23.4% in 2017 due to the impact of a lower average commission rate.

Other expenses increased 13% over 2017 due to costs for expanded office space in Hong Kong, higher hardware and software costs and an increase in market data fees.

Corporate

Corporate activity includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within our regional segments. These costs include,

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among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with our global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non operating expenses.

In 2018, we incurred a pre-tax loss from Corporate activities of $49.7 million, reflecting $3.0 million of revenues and $52.7 million of costs, compared to a pre-tax loss of $32.4 million in 2017, reflecting $1.7 million of revenues and $34.1 million of costs. The increase in revenues during 2018 reflects higher investment income from rising interest rates. Corporate costs in 2018 included a charge of $12.0 million related to the settlement of the U.S. POSIT matter together with $1.2 million of related legal fees, headcount reduction expenses of $8.3 million associated with restructuring activities, costs of $8.0 million related to the acquisition of ITG by Virtu and lease consolidation charges of $2.7 million. In 2017, we incurred costs of $8.1 million for the write-off of fixed assets and other costs associated with the consolidation of our New York headquarters and $0.3 million of asset impairment costs and $0.8 million in legal fees associated with the formation of the Matrix derivatives venture.

Excluding the items noted above for 2018 and 2017, Corporate costs decreased by $4.4 million compared to the prior year primarily reflecting lower legal fees. Corporate costs, including legal fees, can vary from period to period as we work through litigation, regulatory and other corporate matters.

Consolidated Income Tax Expense

We incurred income tax of $9.4 million on pre-tax income of $10.1 million in 2018, for an effective tax rate of 93.2%. This high effective tax rate primarily reflects taxes incurred on pre-tax profits in Europe and Canada, together with certain state and local and foreign withholding taxes in the U.S. We did not incur tax expense on pre-tax profits in Asia Pacific and we did not record benefits on pre-tax losses in the U.S. due to fully reserved tax loss carryforwards and credits. We also had significant non-deductible expenses in the U.S., including the charge for the settlement of the U.S. POSIT matter and a portion of officers' compensation. Income tax expense in 2018 was reduced by $1.9 million for the resolution of certain contingencies. In 2017, we incurred income tax of $46.0 million on pre-tax income of $6.5 million. The significant expense in 2017 reflected the impact of a full valuation allowance on U.S. deferred tax assets, which increased income tax expense by $41.4 million for deferred tax assets that arose in periods prior to the third quarter of 2017. Income tax expense in 2017 was reduced by $0.8 million to reduce the value of our deferred tax liability in the U.S. following the enactment of the Tax Cuts and Jobs Act in December 2017, which lowered the U.S. federal corporate tax rate to 21% from 35%.

Our consolidated effective tax rate can vary from period to period depending on, among other factors, the geographic and business mix of our earnings.

Results of Operation—Year Ended December 31, 2017 Compared to Year Ended December 31, 2016

U.S. Operations

	Year Ended December 31,			
$ in thousands	2017	2016*	Change	% Change

Revenues:					
Commissions and fees	$ 154,182	$ 171,995	$ (17,813)	(10)	%
Recurring	47,393	54,799	(7,406)	(14)	%
Other	3,415	2,861	554	19	%
Total revenues	204,990	229,655	(24,665)	(11)	%
Expenses:					
Compensation and employee benefits	95,683	97,235	(1,552)	(2)	%
Transaction processing	39,601	39,131	470	1	%
Other expenses	83,536	91,970	(8,434)	(9)	%
Total expenses	218,820	228,336	(9,516)	(4)	%
(Loss) income before income tax	$ (13,830)	$ 1,319	$ (15,149)	NM	

* Restated for comparability purposes, resulting in a decrease in U.S. expenses of $12.5 million for costs incurred in the U.S. on behalf of the global

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business that are now being allocated to the international segments.

NM – Not meaningful

Commissions and fees declined 10% compared to 2016 due primarily to a decline in our overall revenue per share. Despite an 11% decrease in average daily U.S. market volumes, our ADV increased slightly by 1% over the prior year. This pushed our market share for 2017 to 2.12%, up from 1.88% in 2016. Our overall revenue per share declined 12%, from $0.0042 to $0.0037, driven by movements within the mix of our volume amongst our client segments including a decrease in single-stock sales trading following the sale of our remaining investment research operations in May 2016. ADV from our lower priced sell-side accounts increased to 54% of our overall ADV compared with 52% for the prior year.

U.S. Operations: Key Indicators*	Year Ended December 31, 2017	2016	Change	% Change	
Total trading volume (in billions of shares)	34.8	34.8	—	—	%
Average trading volume per day (in millions of shares)	138.8	138.1	0.7	1	%
Average revenue per share	$ 0.0037	$ 0.0042	$ (0.0005)	(12)	%
U.S. market trading days	251	252	(1)	(0)	%

* Excludes activity from the trading of derivatives and Latin American equities as well as commission share arrangements.

Recurring revenues decreased 14% from the prior year following the divestiture of our remaining investment research operations in May 2016 and the amendment to terminate the original energy research distribution agreement at the end of 2016, representing more than 75% of the overall decline. We also experienced lower OMS subscriptions and connectivity revenue due to client attrition.

Other revenues increased $0.6 million from 2016 due to the impact from lower client trade accommodations, which reduced other revenues by $1.2 million during the prior-year period versus $0.3 million in 2017, as well as higher market data tape rebate revenue in the current period. These increases were offset by the loss of revenue from the impact of the closing of our matched-book securities lending operations in the second quarter 2016.

Compensation and employee benefits decreased 2% from the prior year due to the impact of divesting our remaining investment research operations in May 2016, cost savings measures implemented during the second half of 2016 and throughout 2017 and lower incentive bonus compensation. These declines were offset in part by an increase in employee separation costs of $4.4 million as part of cost savings measures, higher stock-based compensation from the increased use of deferred stock awards in our incentive compensation program, an increase in headcount dedicated to helping us execute the SOP and strategic hires for our sales and coverage teams.

Transaction processing costs increased 1% from 2016, in line with the growth in our ADV. As a percentage of commissions and fees, transaction processing costs increased to 25.7% from 22.8% during the prior year period due to the impact of the 12% reduction in the average revenue per share and higher execution costs.

Other expenses declined 9% from the prior year due to the impact of divesting our remaining investment research operation in May 2016, reduced energy research costs from the amendment to terminate the original energy research distribution agreement, a reduction in travel and entertainment costs and an increase in global research and development costs charged out to other regions. These decreases were partially offset by higher costs associated with hardware and software investments.

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Canadian Operations

$ in thousands	Year Ended December 31, 2017	2016*	Change	% Change	
Revenues:					
Commissions and fees	$ 54,389	$ 51,723	$ 2,666	5	%
Recurring	5,152	5,113	39	1	%
Other	3,753	4,986	(1,233)	(25)	%
Total revenues	63,294	61,822	1,472	2	%
Expenses:					
Compensation and employee benefits	20,076	20,563	(487)	(2)	%
Transaction processing	11,434	9,384	2,050	22	%
Other expenses	23,842	23,401	441	2	%
Total expenses	55,352	53,348	2,004	4	%
Income before income tax	$ 7,942	$ 8,474	$ (532)	(6)	%

* Restated for comparability purposes, resulting in an increase in Canadian expenses of $3.1 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

Currency translation from a stronger Canadian Dollar increased total Canadian revenues and expenses by $1.0 million and $0.7 million, respectively, resulting in an increase of $0.3 million to pre-tax income.

Commissions and fees grew 5% compared to 2016 despite a 10% decline in market-wide volumes due to growth in block crossing in POSIT Alert and other buy-side trading activity, as well as higher sell-side trading activity and favorable currency translation.

Recurring revenues were comparable to the prior year as an increase in analytics product subscriptions was mostly offset by a reduction in connectivity revenue. Other revenues declined 25% largely from the closure of our arbitrage trading desk in April 2016, which more than offset the impact from lower client trade accommodations.

Compensation and employee benefits decreased by 2% from 2016 due to the impact of lower headcount.

Transaction processing costs increased 22% over the prior year, significantly exceeding the growth in commission and fees, due primarily to an increase in the proportion of our execution activity where we took liquidity, an increase in third-party order routing costs and an increase in the number of settlement tickets processed. As a percentage of commissions and fees, transaction processing costs increased to 21.0% from 18.1% in 2016.

Other expenses grew 2% over 2016 as higher charges for global research and development costs and higher costs associated with hardware and software investments were largely offset by reductions in consulting, travel and entertainment, and software amortization costs and the discontinuation of research distribution fees.

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European Operations

$ in thousands	Year Ended December 31, 2017	2016*	Change	% Change	
Revenues					
Commissions and fees	$ 135,944	$ 110,554	$ 25,390	23	%
Recurring	16,131	16,029	102	1	%
Other	(603)	(638)	35	5	%
Total revenues	151,472	125,945	25,527	20	%
Expenses:					
Compensation and employee benefits	41,588	40,656	932	2	%
Transaction processing	36,787	31,104	5,683	18	%
Other expenses	37,036	34,987	2,049	6	%
Total expenses	115,411	106,747	8,664	8	%
Income before income tax	$ 36,061	$ 19,198	$ 16,863	88	%

* Restated for comparability purposes, resulting in an increase in European expenses of $6.3 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

Overall currency rate changes in the European region reduced revenues and expenses by $0.7 million and $1.4 million, respectively, increasing pre-tax income by $0.7 million. This increase in pre-tax income was largely attributable to the strengthening of the Euro, as revenues and expenses that originated in British pounds largely offset.

Commissions and fees were 23% higher than 2016 due to strong growth in block crossing in POSIT Alert, as well as growth in single stock sales trading and algorithmic trading from institutional and hedge fund clients and higher commission sharing revenues from trades executed via our Triton EMS. This growth more than offset the impact of reduced trading from sell-side clients. Sell-side clients made up 46% of our European value traded in the current period compared to 61% in the prior-year period. This favorable change in business mix pushed our overall commission rate 18% higher than 2016.

Recurring revenues grew marginally from the prior year on higher connectivity and analytics product revenues, offset by lower RFQ-hub maintenance fees. Other revenues improved slightly over 2016 due to a reduction in client trade accommodations.

Compensation and employee benefits expense was 2% higher than the prior year due to higher technology headcount and an increase in incentive compensation from strong financial performance, together with higher associated employee benefit costs. These increases were offset by the favorable impact of currency translation and an accelerated charge for deferred stock awards in the prior-year period related to a termination.

Transaction processing costs increased 18% from 2016 reflecting a 9% growth in daily value traded, increased trading in more-costly emerging markets, higher costs to execute ETF trades and higher settlement financing costs. These increases were offset in part by the impact of currency translation. As a percentage of commissions and fees, transaction processing costs declined to 27.1%, compared to 28.1% in 2016 reflecting the increase in our average commission rate noted above.

Other expenses increased 6% from the prior year due to higher charges for global research and development costs, new exchange distribution fees and higher connectivity, as well as higher consulting, software amortization, software maintenance, licensing and recruiting costs as we continued to invest in our growth initiatives and prepare for MiFID II, partially offset in part by the favorable impact of currency translation.

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Asia Pacific Operations

$ in thousands	Year Ended December 31, 2017	2016*	Change	% Change	
Revenues:					
Commissions and fees	$ 55,176	$ 42,191	$ 12,985	31	%
Recurring	7,235	5,975	1,260	21	%
Other	(193)	(247)	54	22	%
Total revenues	62,218	47,919	14,299	30	%
Expenses:					
Compensation and employee benefits	20,611	19,899	712	4	%
Transaction processing	12,925	10,652	2,273	21	%
Other expenses	19,937	18,905	1,032	5	%
Total expenses	53,473	49,456	4,017	8	%
Income before income tax	$ 8,745	$ (1,537)	$ 10,282	NM	

* Restated for comparability purposes, resulting in an increase in Asia Pacific expenses of $3.1 million for costs incurred in the U.S. on behalf of the global business that are now being allocated to the international segments.

NM – Not meaningful

Currency translation increased total Asia Pacific revenues and expenses by $0.1 million and $0.2 million, respectively, resulting in a decrease of $0.1 million to pre-tax income.

Commissions and fees increased 31% over the prior year, far outpacing the 12% growth in overall market-wide activity. This was primarily driven by strong order flows trading into the Hong Kong, Korea and Japan markets and the increased use of our trading algorithms and our POSIT Alert block crossing system. We also had higher commission sharing revenues from trades executed via our Triton EMS and for trading technology licensed to regional broker-dealers.

Recurring revenues increased 21% from 2016 primarily due to an increase in connectivity revenue and higher billed revenue from analytics products. Other revenues increased due to a lower impact from client trade accommodations.

Compensation and employee benefits increased 4% over the prior year due to a slight increase in headcount and an increase in incentive compensation from strong financial performance.

Transaction processing costs increased 21% from 2016, which was slightly higher than the 18% growth in daily value executed due primarily to the impact of a larger proportion of our trading in markets where costs are higher. As a percentage of commissions and fees, transaction processing costs decreased to 23.4% from 25.2% due to the impact of a higher average commission rate.

Other expenses increased 5% from the comparable period in 2016 due to higher depreciation expenses associated with investments we are making to enhance redundancy and business recovery capabilities, as well as higher charges for global research and development costs, partially offset by lower recruiting and travel and entertainment expenses.

Corporate

Corporate activity includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within our regional segments. These costs include, among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with our global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non operating expenses.

In 2017, we incurred a pre-tax loss from Corporate activities of $32.4 million, reflecting $1.7 million of revenues and $34.1 million of costs, compared to a pre-tax loss of $70.7 million in 2016, reflecting $3.7 million of revenues and $74.4 million of costs. The reduction in revenues reflect the recognition of $2.4 million of insurance proceeds received in the second quarter 2016, net of related expenses, under our business interruption insurance policy for the impact of an outage at our primary outsourced data center incurred in August 2015. The reduction in costs from 2016 reflects costs incurred in 2016 for a reserve for a settlement with the SEC related to an inquiry involving discontinued activity in pre-released ADRs and related legal fees, the expensing of upfront cash and stock awards granted to our CEO who departed the Company in connection with the Merger, a significant portion of which replaced awards he forfeited at his former employer, the settlement of the arbitration claim by our former CEO whose employment with the Company was terminated in August 2015, net of insurance recoveries, together with related legal fees, and restructuring costs related to (a) the reduction in single stock sales trading headcount that was previously focused on our research products and (b) the closing of our U.S. matched-book securities lending operations and our Canadian arbitrage trading desk. Costs in 2016 were reduced by the reclassification of an accumulated foreign translation gain after we substantially liquidated our Israel entity. In 2017, we incurred costs of $8.1 million for the write-off of fixed assets and other costs associated with the consolidation of our New York headquarters and $0.3 million of asset impairment costs and $0.8 million in legal fees associated with the planned formation of the Matrix derivatives venture.

Excluding the items noted above for 2017 and 2016, Corporate costs decreased by $2.5 million compared to the prior year primarily reflecting lower legal fees. Corporate costs, including legal fees, can vary from period to period as we work through litigation, regulatory and other corporate matters.

Consolidated Income Tax Expense

For the full year 2017, we reported a tax expense of $46.0 million on pre-tax income of $6.5 million. The significant tax expense reflected the impact of a full valuation allowance on U.S. deferred tax assets made in the third quarter of 2017, giving rise to a charge of $42.3 million related to assets that arose in periods prior to the third quarter of 2017. This charge was later reduced by $0.9 million in the fourth quarter of 2017 as we realized certain deferred tax assets following a tax method change. We made our assessment to provide a full valuation allowance on our U.S. deferred tax assets after applying the appropriate weighting to both positive and negative evidence related to whether it is more-likely than not that some or all of these deferred tax assets will not be realized. In evaluating the need for a valuation allowance, we considered our cumulative pre-tax loss in the U.S. jurisdiction over the previous three years as a significant piece of negative evidence. Prevailing accounting guidance limits our ability to consider other subjective evidence to support deferred tax assets, such as projections of future profits, when objective verifiable evidence such as a cumulative loss exists. Additionally, in December, the U.S. enacted the Tax Cuts and Jobs Act, which lowers the U.S. federal corporate income tax rate to 21% from 35%. Although the rate reduction isn't effective until 2018, certain future deferred tax items are revalued to the lower tax rate. This resulted in a $0.9 million tax benefit to reduce the value of our U.S. deferred tax liability. In 2016, we reported a tax benefit of $17.3 million on a pre-tax loss of $43.2 million. The benefit in 2016 reflects the positive impact of tax reserve reversals of $7.3 million following the resolution of a multi-year tax contingency in the U.S. and the impact of strong earnings from our European Operations, where we are taxed at a lower rate, and earnings from our Asia Pacific Operations, where we do not incur tax expense due to loss carryforwards. These benefits were partially offset by the negative impact in the U.S. of a substantial portion of the $24.5 million settlement cost for the ADR matter being non-deductible.

Our consolidated effective tax rate can vary from period to period depending on, among other factors, the geographic and business mix of our earnings.

Liquidity and Capital Resources

Liquidity

Our primary source of liquidity is cash provided by operations. Our liquidity requirements result from our working capital needs, which include clearing and settlement activities, as well as our regulatory capital needs. A substantial portion of our assets is liquid, consisting of cash and cash equivalents or assets readily convertible into cash. Cash is principally invested in money market mutual funds. At December 31, 2018, unrestricted cash and cash equivalents totaled $267.8 million. Included in this amount is $107.8 million of cash and cash equivalents held by subsidiaries outside the United States. Due to the internal capital structure of our operations outside of North America

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and the inclusion of foreign earnings and profits in U.S. taxable income pursuant to the Tax Cuts and Jobs Act, we do not anticipate a need to repatriate funds from certain foreign subsidiaries to the U.S. by way of taxable dividends in the foreseeable future.

As a self clearing broker dealer in the U.S., we are subject to cash deposit requirements with clearing organizations that may be large in relation to total liquid assets and may fluctuate significantly based upon the nature and size of customers' trading activity and market volatility. At December 31, 2018, we had interest bearing security deposits totaling $35.7 million with clearing organizations in the U.S. for the settlement of equity trades. In the normal course of our U.S. settlement activities, we may also need to temporarily finance customer securities positions from short settlements or delivery failures. These financings may be funded from existing cash resources, borrowings under stock loan transactions or short term bank loans under our committed facility. On January 25, 2019, we amended our existing $150 million short-term revolving credit agreement in the U.S. with a syndicate of banks and JPMorgan Chase Bank, N.A., as Administrative Agent to extend the maturity date to March 31, 2019 (see Note 16, Borrowings). The Credit Agreement was terminated at the Effective Time of the Merger.

We also self clear equity trades in Australia, maintaining a deposit with clearing organizations of $6.4 million at December 31, 2018. In Europe, we maintained $2.6 million in restricted cash related to protected client funds and we had deposits with our clearing and settlement agents of $32.6 million at December 31, 2018. As part of our European settlement activities, we may need to temporarily finance customer securities positions from non-standard settlements or delivery failures. These financings may be funded from existing cash resources or short-term bank loans under uncommitted overdraft facilities with our settlement agent and a commercial bank.

Capital Resources

Capital resource requirements relate to capital purchases, as well as business investments, and are generally funded from operations. When required, as in the case of a major acquisition, our cash generating ability has historically allowed us to obtain debt financing.

Operating Activities

The table below summarizes the effect of the major components of operating cash flow.

	Year Ended December 31,		
(in thousands)	2018	2017	2016
Net income (loss)	$ 691	$ (39,440)	$ (25,918)
Gain on sale of investment research operations	—	—	(21)
Gain on investment in joint venture	(608)	—	—
Non-cash items included in net income (loss) (1)	76,123	107,409	53,455
Effect of changes in receivables/payables from/to customers and brokers	(20,582)	(22,968)	8,337
Effect of changes in other working capital and operating assets and liabilities	12,693	679	2,277
Net cash provided by operating activities	$ 68,317	$ 45,680	$ 38,130

(1) 2017 includes the impact of establishing a full valuation allowance for U.S. deferred tax assets of $37.7 million (after the revaluation of deferred tax assets following the passing of the Tax Cuts and Jobs Act).

Net cash provided by operating activities for 2018 was higher than 2017 due primarily to improved results in our operating segments and other working capital changes, including an increase in client research payable balances.

These increases were offset in part by an increase in non-operating cash expenses included in Corporate activities. The higher level of net cash provided by operating activities in 2017 as compared to 2016 was primarily attributable to an improvement in our results excluding non-cash items, which in 2017 included a significant non-cash item to establish a full valuation allowance for our U.S. deferred tax assets (see Note 11, Income Taxes).

In the normal course of our clearing and settlement activities worldwide, cash is typically used to fund restricted or segregated cash accounts (under regulations and otherwise), broker and customer fails to deliver/receive, securities borrowed, deposits with clearing organizations and net activity related to receivables/payables from/to customers and brokers. The cash requirements vary from day to day depending on value transacted and customer trading patterns.

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Investing Activities

Net cash used in investing activities of $42.0 million during 2018 primarily includes investments in software development projects and computer hardware and software.

Financing Activities

Net cash used in financing activities of $44.1 million in 2018 primarily reflects repayment of short-term bank borrowings that are used to support our settlement activities and long-term debt, repurchases of ITG common stock, our dividend program, and shares withheld for net settlements of share based awards.

During 2018, we repurchased 0.8 million shares of our common stock at a cost of approximately $16.8 million, which was funded from our available cash resources. Of these shares, 0.3 million were purchased under our Board of Directors' authorized stock repurchase program for a total cost of $5.8 million, or an average cost of $20.28 per share. An additional 0.5 million shares ($11.1 million) pertained solely to the satisfaction of minimum statutory withholding tax upon the net settlement of equity awards. On February 15, 2018, the Board of Directors increased our share repurchase authorization by 4.0 million. As of December 31, 2018, the total remaining number of shares currently available for repurchase under ITG's stock repurchase program was 4.3 million. The stock repurchase program was suspended pending the completion of the acquisition of the Company by Virtu, and the Board's authorization expired at the Effective Time of the Merger as there is no established trading market for our equity securities as of the Closing Date of the Merger.

In April 2015, our Board of Directors initiated a dividend program under which we began to pay quarterly dividends, subject to quarterly declarations by the Board of Directors. During 2018, our Board of Directors declared and we paid quarterly cash dividends of $0.07 per share totaling $9.2 million, in the aggregate, and issued stock dividends of $0.1 million.

Regulatory Capital

ITG Inc. and AlterNet are subject to the SEC's Uniform Net Capital Rule (Rule 15c3 1), which requires the maintenance of minimum net capital. ITG Inc. has elected to use the alternative method permitted by Rule 15c3 1, which requires that ITG Inc. maintain minimum net capital equal to the greater of $1.0 million or 2% of aggregate debit balances arising from customer transactions, as defined. AlterNet has elected to use the basic method permitted by Rule 15c3 1, which requires that AlterNet maintain minimum net capital equal to the greater of 6$\frac{2}{3}$% of aggregate indebtedness or $100,000. Dividends or withdrawals of capital cannot be made if capital is needed to comply with regulatory requirements.

Net capital balances and the amounts in excess of required net capital at December 31, 2018 for the U.S. Operations are as follows (dollars in thousands):

U.S. Operations	Net Capital	Excess
ITG Inc.	$ 86,683	$ 85,683
AlterNet	5,796	5,696

As of December 31, 2018, ITG Inc. had $5.9 million of cash in a Special Reserve Bank Account for the benefit of customers under the Customer Protection Rule pursuant to SEC Rule 15c3-3, Computation for Determination of Reserve Requirements and $4.6 million under agreements for proprietary accounts of broker-dealers.

In addition, our Canadian, European and Asia Pacific Operations have subsidiaries with regulatory capital requirements. The regulatory net capital balances and amount of regulatory capital in excess of the minimum requirements applicable to each business at December 31, 2018, is summarized in the following table (dollars in thousands):

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	Net Capital	Excess
Canadian Operations		
Canada	$ 21,126	$ 20,760
European Operations		
Ireland	42,485	17,152
U.K.	1,337	384
Asia Pacific Operations		
Australia	30,899	21,818
Hong Kong	2,761	2,223
Singapore	1,156	1,083

Liquidity and Capital Resource Outlook

Historically, our working capital, stock repurchase, dividend program and investment activity requirements have been funded from cash from operations and short term loans, with the exception of strategic acquisitions, which at times have required long term financing. We believe that our cash flow from operations, existing cash balances and our available credit facilities will be sufficient to meet our ongoing operating cash and regulatory capital needs. However, our ability to borrow additional funds may be impacted by financial lending institutions' ability or willingness to lend to us on commercially acceptable terms and we may become subject to covenants even more restrictive than those contained in our current credit facilities. If, for any reason, we are unable to comply with the covenants under our existing or future credit facilities, we may not be able to borrow additional funds under commercially acceptable terms or may not be granted waivers or amendments to such restrictions, such waivers or amendments may be provided at significant additional cost to us or we may not be able to refinance our debt on terms acceptable to us, or at all. The lenders under our current credit facilities also have the right to terminate any commitments they have to provide further borrowings in certain circumstances and, in an event of default, if not cured or waived, could result in the acceleration of all or substantially all of our debt or the loss of the assets securing our debt.

Off Balance Sheet Arrangements and Aggregate Contractual Obligations

We are a member of various U.S. and non U.S. exchanges and clearing houses that trade and clear, respectively, equities and/or derivative contracts. Associated with our membership, we may be required to pay a proportionate share of financial obligations of another member who may default on its obligations to the exchanges or the clearing house. While the rules governing different exchange or clearinghouse memberships vary, in general, our guarantee obligations would arise only if the exchange had previously exhausted its resources. The maximum potential payout under these memberships cannot be estimated. We have not recorded any contingent liability in the consolidated financial statements for these agreements and believe that any potential requirement to make payments under these agreements is remote. We are also subject to indemnification provisions within agreements with third-party clearing brokers in certain jurisdictions whereby we are obligated to reimburse the clearing broker, without limit, for losses incurred due to a counterparty's failure to satisfy its contractual obligations.

Aggregate Contractual Obligations

As of December 31, 2018, our contractual obligations and other commercial commitments amounted to $175.8 million in the aggregate and consisted of the following (dollars in thousands):

Payments due by period

Contractual obligations	Total	Less than 1 year	1 - 3 years	3 - 5 years	More than 5 years
Purchase of goods and services	$ 50,516	$ 35,562	$ 12,098	$ 2,856	$ —
Long term debt	1,967	1,015	952	—	—
Operating lease obligations	116,860	14,287	26,753	23,110	52,710
Minimum payments under certain employment arrangements (a)	6,454	6,368	32	32	22
Total	$ 175,797	$ 57,232	$ 39,835	$ 25,998	$ 52,732

(a) Pursuant to employment arrangements, in the event of termination of employment without cause on December 31, 2018, we would be obligated to pay separation payments totaling $6.5 million.

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The above information excludes $5.9 million of gross unrecognized tax benefits discussed in Note 11, Income Taxes, to the consolidated financial statements, because it is not possible to estimate the time period when, or if, it might be paid to tax authorities.

As part of our existing $150 million short-term revolving credit agreement, we are required to pay a commitment fee of 0.75% on any unborrowed amounts.

New Accounting Pronouncements

In January 2017, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2017 04, Intangibles – Goodwill and other (Topic 350): Simplifying the test for goodwill impairment. The amendments in this ASU address concerns over the cost and complexity of the two-step goodwill impairment test and remove the second step of the test. An entity will apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. The new guidance does not amend the optional qualitative assessment of goodwill impairment. ASU 2017 04 is effective for annual or any interim goodwill impairment tests in fiscal years beginning after December 15, 2019. We are currently evaluating the new guidance and have not yet determined the impact of adoption on our financial statements.

Critical Accounting Estimates

Our consolidated financial statements and accompanying notes are prepared in accordance with accounting principles generally accepted in the U.S. In many instances, the application of such principles requires management to make estimates or to apply subjective principles to particular facts and circumstances. A change in the estimates or a variance in the application, or interpretation of accounting principles generally accepted in the U.S. could yield a materially different accounting result. Below is a summary of our critical accounting estimates where we believe that the estimations, judgments or interpretations that we made, if different, would have yielded the most significant differences in our consolidated financial statements. In addition, for a summary of all of our significant accounting policies see Note 2, Summary of Significant Accounting Policies, in the notes to the consolidated financial statements.

Goodwill Impairment: Testing Methodology and Valuation Considerations

We obtained goodwill and intangible assets as a result of the acquisitions of certain of our subsidiaries. Goodwill represents the excess of the cost over the fair market value of net assets acquired. We are required to periodically assess whether any of our goodwill is impaired. In order to do this, we apply judgment in determining our reporting units, which represent our business segments. Our annual goodwill impairment assessment involves assessing qualitative factors to determine whether the existence of events or circumstances leads to a determination that it is more likely than not that the fair value of a reporting unit is less than its carrying amount. If the results of our qualitative analysis suggests that the carrying value of the reporting unit exceeds its fair value, additional steps are required to calculate a potential impairment loss using a two step impairment test. The two step impairment testing process is as follows:

· Step one—the fair value of each reporting unit is compared to its carrying value in order to identify potential impairment. If the fair value of a reporting unit exceeds the carrying value of its net assets, goodwill is not considered impaired and no further testing is required. If the carrying value of the net assets exceeds the fair value of a reporting unit, potential impairment is indicated at the reporting unit level and step two of the impairment test is performed in order to determine the implied fair value of the reporting unit's goodwill and measure the potential impairment loss.

- Step two—when potential impairment is indicated in step one, we compare the implied fair value of goodwill with the carrying amount of that goodwill. Determining the implied fair value of goodwill requires a valuation of the reporting unit's tangible and (non goodwill) intangible assets and liabilities in a manner similar to the allocation of the purchase price in a business combination. Any excess in the value of a reporting unit over the amounts assigned to its assets and liabilities is referred to as the implied fair value of goodwill. If the carrying amount of the reporting unit goodwill exceeds the implied fair value of that goodwill, an impairment loss is recognized in an amount equal to that excess.

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Intangible Assets Subject to Amortization

Intangible assets with definite useful lives are subject to amortization and are evaluated for recoverability when events or changes in circumstances indicate that an intangible asset's carrying amount may not be recoverable in accordance with ASC 360, Property, Plant, and Equipment. If such an event or change occurs, we estimate cash flows directly associated with the use of the intangible asset to test its recoverability and assess its remaining useful life. The projected cash flows require assumptions related to revenue growth, operating margins and other relevant market, economic and regulatory factors. If the expected undiscounted future cash flows from the use and eventual disposition of a finite lived intangible asset or asset group are not sufficient to recover the carrying value of the asset, we then compare the carrying amount to its current fair value. We estimate the fair value using market prices for similar assets, if available, or by using a discounted cash flow model. We then recognize an impairment loss for the amount by which the carrying amount exceeds its fair value. While we believe our assumptions are reasonable, changes in these assumptions may have a material impact on our financial results.

Share Based Compensation

In accordance with ASC 718, Compensation—Stock Compensation, share based payment transactions require the application of a fair value methodology that involves various assumptions. The fair value of options awarded is estimated on the date of grant using the Black Scholes option valuation model that uses the following assumptions: expected life of the option, risk free interest rate, expected volatility of our common stock price and expected dividend yield. We estimate the expected life of the options using historical data and the volatility of our common stock is estimated based on a combination of the historical volatility and the implied volatility from traded options. The fair value of restricted stock unit awards with a market condition is estimated on the date of grant using a Monte Carlo simulation model. A Monte Carlo simulation is an iterative technique designed to estimate future payouts by taking into account our current stock price, the volatility of our common stock, risk free rates, and a risk neutral valuation methodology. The fair value of restricted stock unit awards with a performance condition is estimated throughout the life of the award based on the probability of achieving the performance condition.

Although both models meet the requirements of ASC 718, the fair values generated by the model may not be indicative of the actual fair values of the underlying awards, as it does not consider other factors important to those share based compensation awards, such as continued employment, periodic vesting requirements and limited transferability.

Contingencies and Uncertainties

The use of estimates is important in determining provisions for potential losses that may arise from litigation, mediation, arbitration, regulatory proceedings and various contingencies and uncertainties. Our accounting for contingencies and uncertainties follows the guidance prescribed under ASC 450, Contingencies, which requires that losses be accrued when they are probable of occurring and can be reasonably estimated. We review the status of each significant matter and evaluate its potential financial exposure on a regular basis. If the potential loss from any exposure is considered probable and the amount can be reasonably estimated, we accrue a liability for the estimated loss. Significant judgment is required in both the determination of probability and the determination as to whether an exposure is reasonably estimable. Because of the inherent uncertainties in the evaluation process, accruals are based only on the best information available at the time, so actual losses may be different from the originally estimated provision. As additional information becomes available, our reassessment of the potential liability may lead to a revision in our estimates. These revisions in the estimates of the potential liabilities could have a material impact on the company's results of operations for any particular period.

Income Taxes

ASC 740, Income Taxes, establishes financial accounting and reporting standards for the effect of income taxes. The objectives of accounting for income taxes are to recognize the amount of taxes payable or refundable for the current year and deferred tax liabilities and assets for the future tax consequences of events that have been recognized in an entity's financial statements or tax returns. A valuation allowance may be recorded against deferred tax assets if it is more likely than not that those assets will not be realized. 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 materially impact our financial position or results of operations.

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We recognize the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities, based on the technical merits of the position. The tax benefits recognized in the financial statements from such a position are measured based on the largest benefit for each such position that has a greater than fifty percent likelihood of being realized upon ultimate resolution. We consider many factors when evaluating and estimating our tax positions and tax benefits. Such estimates involve interpretations of regulations, rulings, case law, etc. and are inherently complex. Our estimates may require periodic adjustments and may not accurately anticipate actual outcomes as resolution of income tax treatments in individual jurisdictions typically would not be known for several years after completion of any fiscal year. The impact of our reassessment of uncertain tax positions in accordance with ASC 740 did not have a material impact on the results of operations, financial condition or liquidity.

The Tax Cuts and Jobs Act was enacted on December 22, 2017 and introduced significant changes to U.S, income tax law. Effective in 2018, the Tax Cuts and Jobs Act reduces the U.S. statutory corporate tax rate from 35% to 21% and creates new taxes on certain foreign-sourced earnings and certain related party payments, which are referred to as GILTI and the base erosion tax, respectively. In addition, under the Tax Cuts and Jobs Act, in 2017 we were subject to the mandatory inclusion in U.S. taxable income of all accumulated foreign subsidiary earnings not previously subject to U.S. tax. The mandatory inclusion did not result in any incremental U.S. tax expense in 2017 due to the impact of a U.S. tax loss in the current year and the utilization of foreign tax credits. We have selected the period cost method as our accounting policy for GILTI and will treat any taxes due on future GILTI inclusions in U.S. taxable income as a current period expense when incurred.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Market risk refers to the potential for adverse changes in the value of a company’s financial instruments as a result of changes in market conditions. We are exposed to market risk associated with changes in interest rates, foreign currency exchange rates and equity prices. We do not hold financial instruments for trading purposes on a long term basis. We continually evaluate our exposure to market risk and oversee the establishment of policies, procedures and controls to ensure that market risks are identified and analyzed on an ongoing basis.

We have performed sensitivity analyses on different tests of market risk as described in the following sections to estimate the impacts of a hypothetical change in market conditions on the U.S. Dollar value of non U.S. Dollar based profits associated with our Canadian, European and Asia Pacific Operations. Estimated potential losses assume the occurrence of certain adverse market conditions. Such estimates do not consider the potential effect of favorable changes in market factors and also do not represent management’s expectations of projected losses in fair value. We do not foresee any significant changes in the strategies we use to manage interest rate risk, foreign currency risk or equity price risk in the near future.

Interest Rate Risk

Our exposure to interest rate risk relates primarily to interest sensitive financial instruments in our investment portfolio and our revolving credit facility. Given that our terminated $150 million credit facility was specifically earmarked for limited short term borrowings to support U.S. brokerage clearing operations, the impact of any adverse change in interest rates on this facility would not have been material. Similarly, because our term debt is all fixed rate, we would not be impacted by any adverse change in interest rates. Interest sensitive financial instruments in our investment portfolio will decline in value if interest rates increase. Our interest bearing investment portfolio primarily consists of short term, high credit quality money market mutual funds. The aggregate fair market value of our portfolio including restricted cash was $254.0 million and $270.0 million as of December 31, 2018 and 2017, respectively. Our interest bearing investments are not insured and, because of the short term high quality nature of the investments, are not likely to fluctuate significantly in market value.

Foreign Currency Risk

We currently operate and continue to expand globally, principally through our operations in Canada, Europe and Asia Pacific as well as through the development of specially tailored versions of our services to meet the needs of our clients who trade in international markets. Our investments and development activities in these countries expose us to currency exchange rate fluctuations primarily between the U.S. Dollar and the British Pound Sterling, Euro, Swiss Franc, Scandinavian currencies, Australian Dollar, Canadian Dollar, Japanese Yen and Hong Kong Dollar. When the

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U.S. Dollar strengthens against these currencies, the U.S. Dollar value of non U.S. Dollar based profits decreases. To the extent that our international activities recorded in local currencies increase in the future, our exposure to fluctuations in currency exchange rates will correspondingly increase. We have not engaged in derivative financial instruments as a means of hedging this financial statement risk. Non U.S. Dollar cash balances held overseas are generally kept at levels necessary to meet current operating and capitalization needs.

Approximately 55% and 51% of our revenues for the years ended December 31, 2018 and 2017, respectively, were denominated in non U.S. Dollar currencies. For the years ended December 31, 2018 and 2017, respectively, we estimate that a hypothetical 10% adverse change in the above mentioned foreign exchange rates would have resulted in a decrease in net income of $8.7 million and $7.2 million, respectively.

Equity Price Risk

Equity price risk results from exposure to changes in the prices of equity securities on positions held due to trading errors, including client errors and our own errors, and from limited principal trading activities in Canada. Equity price risk can arise from liquidating all such principal positions. Accordingly, we maintain policies and procedures regarding the management of our principal trading accounts, which require review by a supervisory principal. It is our policy to attempt to trade out of all positions by the end of the day. However, at times, we hold positions overnight if we are unable to trade out of positions during the day. In addition, certain positions may be liquidated over a period of time in an effort to minimize market impact, and we may incur losses relating to such positions. We may also have positions in ETFs with offsetting positions in the underlying securities as part of an ETF creation and redemption service that we provide to clients.

We manage equity price risk associated with open positions through the establishment and monitoring of trading policies and through controls and review procedures that ensure communication and timely resolution of trading issues. In addition, our operations and trading departments review all trades that are open at the end of the day.

Cash Management Risk

Our cash management strategy seeks to optimize excess liquid assets by preserving principal, maintaining liquidity to satisfy capital requirements, minimizing risk and maximizing our after tax rate of return. Our policy is to invest in high quality credit issuers, limit the amount of credit exposure to any one issuer and invest in tax efficient strategies. Our first priority is to reduce the risk of principal loss. We seek to preserve our invested funds by limiting default risk, market risk, and re investment risk. We attempt to mitigate default risk by investing principally in money market mutual funds.

For working capital purposes, we invest only in money market instruments. Cash balances that are not needed for normal operations may be invested in a tax efficient manner in instruments with appropriate maturities and levels of risk to correspond to expected liquidity needs. To the extent that we invest in equity securities, we ensure portfolio liquidity by investing in marketable mutual fund securities with active secondary or resale markets. We do not use derivative financial instruments in our investment portfolio. At December 31, 2018 and 2017, our unrestricted cash and cash equivalents and mutual fund securities owned were $268.2 million and $288.9 million, respectively.

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Item 8. Financial Statements and Supplementary Data

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Report of Independent Registered Public Accounting Firm

To the Board of Managers
Virtu ITG Holdings LLC:

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated statement of financial condition of Investment Technology Group, Inc. and subsidiaries (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive (loss) income, changes in stockholders' equity, and cash flows for each of the years in the three year period ended December 31, 2018, and the related notes (collectively, the consolidated financial statements). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the years in the three year period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission, and our report dated March 14, 2019 expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated 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 consolidated 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 consolidated 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 consolidated 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 consolidated financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ KPMG LLP

We have served as the Company's auditor since 1993.

New York, New York
March 14, 2019

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Consolidated Statements of Financial Condition

(In thousands, except share amounts)

	December 31, 2018	December 31, 2017
Assets		
Cash and cash equivalents	$ 267,843	$ 287,452
Cash restricted or segregated under regulations and other	13,603	18,599
Deposits with clearing organizations	74,702	57,388
Securities owned, at fair value	311	1,559
Receivables from brokers, dealers and clearing organizations	274,746	193,907
Receivables from customers	226,858	74,695
Premises and equipment, net	48,055	53,960
Capitalized software, net	42,862	41,259
Goodwill	10,408	11,054
Intangibles, net	12,915	14,040
Income taxes receivable	—	3,917
Deferred tax assets	4,735	4,902
Other assets	44,037	22,124
Total assets	$ 1,021,075	$ 784,856
Liabilities and Stockholders’ Equity		
Liabilities:		
Accounts payable and accrued expenses	$ 211,638	$ 166,495
Short-term bank loans	78,029	101,422
Payables to brokers, dealers and clearing organizations	328,194	119,278
Payables to customers	36,825	23,568
Securities sold, not yet purchased, at fair value	6	1
Income taxes payable	3,876	6,003
Deferred tax liabilities	1,869	1,750
Term debt	1,967	3,104
Total liabilities	662,404	421,621
Commitments and contingencies		
Stockholders’ Equity:		
Preferred stock, $0.01 par value; 1,000,000 shares authorized; no shares issued or outstanding	—	—
Common stock, $0.01 par value; 100,000,000 shares authorized; 52,778,945 and 52,639,823 shares issued at December 31, 2018 and December 31, 2017, respectively	528	526
Additional paid-in capital	260,305	250,216
Retained earnings	478,348	486,957
Common stock held in treasury, at cost; 19,578,461 and 20,038,809 shares at December 31, 2018 and December 31, 2017, respectively	(347,710)	(353,067)
Accumulated other comprehensive loss (net of tax)	(32,800)	(21,397)

Total stockholders’ equity	358,671	363,235
Total liabilities and stockholders’ equity	$ 1,021,075	$ 784,856

See accompanying Notes to Consolidated Financial Statements.

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Consolidated Statements of Operations

(In thousands, except per share amounts)

	Year Ended December 31,		
	2018	2017	2016
Revenues:			
Commissions and fees	$ 421,433	$ 399,691	$ 376,463
Recurring	79,061	75,911	81,916
Other	8,982	8,092	10,673
Total revenues	509,476	483,694	469,052
Expenses:			
Compensation and employee benefits	183,917	184,716	188,886
Transaction processing	102,273	100,747	90,271
Occupancy and equipment	60,829	68,563	56,189
Telecommunications and data processing services	51,507	48,477	56,643
Restructuring charges	10,601	—	9,620
Other general and administrative	88,300	72,641	108,466
Interest expense	1,950	2,025	2,217
Total expenses	499,377	477,169	512,292
Income (loss) before income tax expense (benefit)	10,099	6,525	(43,240)
Income tax expense (benefit)	9,408	45,965	(17,322)
Net income (loss)	$ 691	$ (39,440)	$ (25,918)
Income (loss) per share:			
Basic	$ 0.02	$ (1.19)	$ (0.79)
Diluted	$ 0.02	$ (1.19)	$ (0.79)
Basic weighted average number of common shares outstanding	33,003	33,009	32,906
Diluted weighted average number of common shares outstanding	34,407	33,009	32,906

See accompanying Notes to Consolidated Financial Statements.

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Statements of Comprehensive Income (Loss)

(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Net income (loss)	$ 691	$ (39,440)	$ (25,918)
Other comprehensive (loss) income, net of tax:			
Currency translation adjustment	(11,403)	12,580	(14,482)
Other comprehensive (loss) income	(11,403)	12,580	(14,482)
Comprehensive loss	$ (10,712)	$ (26,860)	$ (40,400)

See accompanying Notes to Consolidated Financial Statements.

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Statements of Changes in Stockholders' Equity

For the Years Ended December 31, 2018, 2017 and 2016

(In thousands, except share amounts)

	Preferred Stock	Common Stock	Additional Paid-in Capital	Retained Earnings	Common Stock Held in Treasury	Accumulated Other Comprehensive Income/(Loss)	Total Stockholders' Equity
Balance at December 31, 2015	$ —	$ 523	$ 239,090	$ 571,626	$ (336,923)	$ (19,495)	$ 454,821
Net loss	—	—	—	(25,918)	—	—	(25,918)
Other comprehensive loss	—	—	—	—	—	(14,482)	(14,482)
Issuance of common stock in connection with stock option exercises (24,498 net settled shares) and for restricted stock unit awards (1,133,183 shares), including a net excess tax benefit of $0.02 million	—	1	(16,600)	—	19,237	—	2,638
Issuance of common stock for the employee stock purchase plan (95,981 shares)	—	1	1,320	—	—	—	1,321
Shares withheld for net settlements of share-based awards (391,195 shares)	—	—	—	—	(6,795)	—	(6,795)
Purchase of common stock for treasury (1,336,132 shares)	—	—	—	—	(22,112)	—	(22,112)

Dividends declared on common stock	—	—	4	(9,358)	111	—	(9,243)
Share-based compensation	—	—	24,934	—	—	—	24,934
Balance at December 31, 2016	$ —	$ 525	$ 248,748	$ 536,350	$ (346,482)	$ (33,977)	$ 405,164
Net loss	—	—	—	(39,440)	—	—	(39,440)
Other comprehensive income	—	—	—	—	—	12,580	12,580
Issuance of common stock in connection with restricted stock unit awards (1,311,239 shares)	—	1	(20,749)	—	21,026	—	278
Issuance of common stock for the employee stock purchase plan (74,551 shares)	—		1,098	—	—	—	1,098
Shares withheld for net settlements of share-based awards (531,346 shares)	—	—	—	—	(10,779)	—	(10,779)
Purchase of common stock for treasury (885,285 shares)	—	—	—	—	(16,933)	—	(16,933)
Dividends declared on common stock	—	—	15	(9,310)	101	—	(9,194)
Share-based compensation	—	—	20,238	—	—	—	20,238
Cumulative effect of accounting change	—	—	866	(643)	—	—	223
Balance at December 31, 2017	$ —	$ 526	$ 250,216	$ 486,957	$ (353,067)	$ (21,397)	$ 363,235
Net income	—	—	—	691	—	—	691
Other comprehensive loss	—	—	—	—	—	(11,403)	(11,403)
Issuance of common stock in connection with employee stock option exercises (65,611 shares) and for restricted stock unit awards (1,258,400 shares)	—	2	(20,738)	—	22,093	—	1,357
	—	—	1,040	—	—	—	1,040

Issuance of common stock for the employee stock purchase plan (61,239 shares)							
Shares withheld for net settlements of share-based awards (504,037 shares)	—	—	—	—	(11,011)	—	(11,011)
Purchase of common stock for treasury (286,696 shares)	—	—	—	—	(5,814)	—	(5,814)
Dividends declared on common stock	—	—	25	(9,254)	89	—	(9,140)
Share-based compensation	—	—	29,762	—	—	—	29,762
Cumulative effect of accounting change	—	—	—	(46)		—	(46)
Balance at December 31, 2018	$ —	$ 528	$ 260,305	$ 478,348	$ (347,710)	$ (32,800)	$ 358,671

See accompanying Notes to Consolidated Financial Statements.

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Consolidated Statements of Cash Flows

(In thousands)

	Year ended December 31, 2018	2017	2016
Cash Flows from Operating Activities:			
Net income (loss)	$ 691	$ (39,440)	$ (25,918)
Adjustments to reconcile net income (loss) to net cash used in operating activities:			
Gain on sale of investment research operations	—	—	(21)
Depreciation and amortization	43,860	45,153	43,523
Deferred income tax expense (benefit)	570	33,826	(15,755)
Provision for doubtful accounts	593	375	67
Non-cash share-based compensation	29,762	20,238	25,620
Leasehold asset write-off	1,444	7,492	—
Other intangible asset impairment	—	325	—
Gain on investment in joint venture	(608)	—	—
Changes in operating assets and liabilities:			
Deposits with clearing organizations	(20,047)	8,661	1,420
Securities owned, at fair value	1,248	1,004	3,048
Receivables from brokers, dealers and clearing organizations	(97,543)	(26,701)	871,317
Receivables from customers	(162,725)	(11,832)	(11,738)
Accounts payable and accrued expenses	49,565	(11,292)	13,034
Payables to brokers, dealers and clearing organizations	224,821	7,658	(853,923)
Payables to customers	14,865	7,907	2,681
Securities sold, not yet purchased, at fair value	5	(247)	(2,397)
Income taxes receivable/payable	1,706	2,892	(11,889)
Excess tax benefit from share-based payment arrangements	—	—	(880)
Other, net	(19,890)	(339)	(59)
Net cash provided by operating activities	68,317	45,680	38,130
Cash Flows from Investing Activities:			
Proceeds from sale of investment research operations, net of deal costs	—	—	6,125
Investment in joint venture	(612)	—	—
Capital purchases	(13,801)	(19,402)	(21,315)
Capitalization of software development costs	(27,587)	(27,782)	(24,617)
Net cash used in investing activities	(42,000)	(47,184)	(39,807)
Cash Flows from Financing Activities:			
Repayments of long term debt	(1,137)	(3,963)	(6,200)
Proceeds from (repayments of) borrowing under short-term bank loans	(18,628)	29,272	(9,784)

Debt issuance costs	(751)	(762)	(810)
Excess tax benefit from share-based payment arrangements	—	—	880
Common stock issued	2,397	1,376	3,743
Common stock repurchased	(5,814)	(16,933)	(22,112)
Dividends paid	(9,165)	(9,156)	(9,124)
Shares withheld for net settlements of share-based awards	(11,011)	(10,779)	(6,795)
Net cash used in financing activities	(44,109)	(10,945)	(50,202)
Effect of exchange rate changes on cash, cash equivalents and restricted cash	(6,813)	170	1,704
Net decrease in cash, cash equivalents and restricted cash	(24,605)	(12,279)	(50,175)
Cash, cash equivalents and restricted cash—beginning of period	306,051	318,330	368,505
Cash, cash equivalents and restricted cash—end of period	$ 281,446	$ 306,051	$ 318,330
Supplemental cash flow information:			
Interest paid	$ 4,734	$ 4,960	$ 6,116
Income taxes paid, net	$ 6,991	$ 10,515	$ 9,880
Supplemental disclosure of non-cash investing and financing activities:			
Investment in joint venture	$ 1,393	$ —	$ —
Capital expenditures funded by financing from seller	$ —	$ 400	$ —

See accompanying Notes to Consolidated Financial Statements.

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INVESTMENT TECHNOLOGY GROUP, INC. AND SUBSIDIARIES

Notes to Consolidated Financial Statements

(1) Organization and Basis of Presentation

Investment Technology Group, Inc. (the "Company" or "ITG") was formed as a Delaware corporation on July 22, 1983. Its principal subsidiaries include: (1) ITG Inc., AlterNet Securities, Inc. ("AlterNet") and ITG Derivatives LLC (through February 16, 2018) ("ITG Derivatives"), institutional broker-dealers in the United States ("U.S."), (2) ITG Canada Corp., an institutional broker-dealer in Canada, (3) Investment Technology Group Limited, an institutional broker-dealer in Europe, (4) ITG Australia Limited, an institutional broker-dealer in Australia, (5) ITG Hong Kong Limited, an institutional broker-dealer in Hong Kong, (6) ITG Software Solutions, Inc., the Company's intangible property, software development and maintenance subsidiary in the U.S., and (7) ITG Solutions Network, Inc., a holding company for ITG Analytics, Inc., a provider of pre- and post-trade analysis, fair value and trade optimization services, and ITG Platforms Inc., a provider of workflow technology solutions and network connectivity services for the financial community.

ITG is a global financial technology company that helps leading brokers and asset managers improve returns for investors around the world. ITG empowers traders to reduce the end-to-end cost of implementing investments via liquidity, execution, analytics and workflow technology solutions. ITG has offices in Asia Pacific, Europe and North America and offers execution services in more than 50 countries.

The Company's business is organized into four reportable operating segments: U.S. Operations, Canadian Operations, European Operations and Asia Pacific Operations (see Note 24, Segment Reporting).

The four operating segments offer a wide range of solutions for asset managers and broker dealers in the areas of execution services, workflow technology and analytics. These offerings include trade execution services and solutions for portfolio management, as well as pre trade analytics and post trade analytics and processing.

Regional segment results exclude the impact of Corporate activity, which is presented separately and includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within the Company's regional segments. These costs include, among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with the Company's global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non-operating expenses.

The consolidated financial statements and accompanying notes are prepared in accordance with accounting principles generally accepted in the U.S. ("U.S. GAAP"). All material intercompany balances and transactions have been eliminated in consolidation. The consolidated financial statements reflect all adjustments which, in the opinion of management, are necessary for the fair presentation of the financial statements.

On March 1, 2019 (the "Closing Date"), the Company completed its merger with and into Impala Merger Sub, Inc. ("Merger Sub"), a Delaware corporation and an indirect wholly owned subsidiary of Virtu, surviving the Merger as an indirect wholly owned subsidiary of Virtu (the "Merger"). The Merger was completed pursuant to that certain Agreement and Plan of Merger, dated as of November 6, 2018 (the "Merger Agreement"), by and among the Company, Virtu and Merger Sub, which has been filed by the Company as Exhibit 2.1 to its Current Report on Form 8-K filed with the Securities and Exchange Commission ("SEC") on November 8, 2018. At the effective time of the Merger (the "Effective Time"), each share of the Company's common stock, par value $0.01 per share, issued and outstanding immediately prior to the Effective Time (other than certain shares specified in the Merger Agreement) was cancelled and converted into the right to receive $30.30 in cash without interest (the "Merger Consideration"), less any applicable withholding taxes. Shares of the Company's common stock ceased trading on the New York Stock Exchange (the "NYSE") prior to the open of trading on March 1, 2019. Additionally, immediately following the Effective Time, the Company was converted from a Delaware corporation into a Delaware limited liability company with the name "Virtu ITG Holdings LLC". Certain of the Company's other subsidiaries were converted from a Delaware corporation into a Delaware limited liability company and/or were renamed, including the following principal subsidiaries:

· ITG Inc. became "Virtu ITG LLC";

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- AlterNet Securities, Inc. became “Virtu AlterNet Securities LLC”;
- ITG Canada Corp. became “Virtu ITG Canada Corp.”;
- ITG Australia Limited became “Virtu ITG Australia Limited”;
- ITG Hong Kong Limited became “Virtu ITG Hong Kong Limited”;
- ITG Software Solutions, Inc. became “Virtu ITG Software Solutions LLC”;
- ITG Solutions Network, Inc. became “Virtu ITG Solutions Network LLC”;
- ITG Analytics, Inc. became “Virtu ITG Analytics LLC”; and
- ITG Platforms Inc. became “Virtu ITG Platforms LLC”.

On March 1, 2019, the NYSE filed Form 25 to delist the Company’s shares of common stock. The Company intends to file Form 15 to terminate registration under Section 12(g) of the Exchange Act, and its duty to file reports under Sections 13 and 15(d) of the Exchange Act.

For additional information related to the Merger and the transactions contemplated by the Merger Agreement, please refer to the Company’s Current Report on Form 8-K filed with the SEC on March 1, 2019.

(2) Summary of Significant Accounting Policies

Principles of Consolidation

The consolidated financial statements represent the consolidation of the accounts of ITG and its subsidiaries in conformity with U.S. GAAP. All intercompany accounts and transactions have been eliminated in consolidation. Investments in unconsolidated companies (generally 20 to 50 percent ownership), in which the Company has the ability to exercise significant influence but neither has a controlling interest nor is the primary beneficiary, are accounted for under the equity method. Investments in entities in which the Company does not have the ability to exercise significant influence are measured at fair value or if there is no readily determinable fair value, at cost adjusted for impairment and changes resulting from observable price changes in identical or a similar investment of the same issuer in accordance with Accounting Standards Update (“ASU”) 2016-01, Financial Instruments. Under certain criteria indicated in Accounting Standards Codification (“ASC”) 810, Consolidation, a partially owned affiliate would be consolidated as a variable interest entity when it has less than a 50% ownership if the Company was the primary beneficiary of that entity. At the present time, there are no interests in variable interest entities.

Use of Estimates

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

Revenue Recognition

Under ASC 606, Revenues from Contracts with Customers, revenues are recognized when control of the promised goods or services is transferred to customers in an amount that reflects the consideration the Company expects to be entitled to in exchange for transferring those goods or services. The following is a description of the Company's revenue recognition policies and balances as it relates to revenue from contracts with customers.

Execution Services

The Company earns commissions for providing equity trade execution services to customers, with each trade executed on the client's behalf representing a separate performance obligation that is satisfied at a point in time. Commission rates are fixed and revenue is recognized on the trade date. These revenues are presented within the commissions and fees line item on the Company's Consolidated Statements of Operations.

The Company also permits institutional customers to allocate a portion of their gross commissions to pay for research, commonly known as soft dollars. The customer controls the use of the soft dollars and directs payments to third party service providers on its behalf. All amounts allocated to soft dollar arrangements are netted against commission revenues.

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Workflow Technology

Through its front-end workflow solutions and network capabilities, the Company provides order and trade execution management and order routing services.

The Company provides trade order routing from its execution management system (“EMS”) to its execution services offerings, with each trade order routed through the EMS representing a separate performance obligation that is satisfied at a point in time. A portion of the commissions earned on the trade is then allocated to Workflow Technology based on the stand-alone selling price paid by third-party brokers for order routing. The remaining commission is allocated to Execution Services using a residual allocation approach. Commissions earned are fixed and revenue is recognized on the trade date. Commissions are presented within the commissions and fees line item on the Company’s Consolidated Statements of Operations.

The Company participates in commission share arrangements, where trade orders are routed to third-party brokers from its EMS and its order management system (“OMS”). Commission share revenues from third-party brokers are generally fixed and revenue is recognized at a point in time on the trade date. Commission share revenues are presented within the commissions and fees line item on the Company’s Consolidated Statements of Operations.

The Company provides OMS and related software products and connectivity services to customers and recognizes license fee revenues and monthly connectivity fees. License fee revenues, generated for the use of the Company’s OMS and other software products, is fixed and recognized at the point in time at which the customer is able to use and benefit from the license. Connectivity revenue is variable in nature, based on the number of live connections, and is recognized over time on a monthly basis using a time-based measure of progress. These revenues are presented within the recurring line item on the Company’s Consolidated Statements of Operations.

Analytics

The Company provides customers with analytics products and services, including trading and portfolio analytics tools.

The Company provides analytics products and services to customers and recognizes subscription fees, which are fixed for the contract term, based on when the products and services are delivered. Analytics services can be delivered either over time (when customers are provided with distinct ongoing access to analytics data) or at a point in time (when reports are only delivered to the customer on a periodic basis). Over time performance obligations are recognized using a time-based measure of progress on a monthly basis, since the analytics products and services are continually provided to the client. Point in time performance obligations are recognized when the analytics reports are delivered to the client. These revenues are presented within the recurring line item on the Company's Consolidated Statements of Operations.

Analytics products and services can also be paid for through variable bundled arrangements with trade execution services. Customers agree to pay for analytics products and services with commissions generated from trade execution services, and commissions are allocated to the analytics performance obligation(s) using:

(i) the commission value for each customer for the products and services it receives, which is priced using the value for similar stand-alone subscription arrangements; and
(ii) a calculated ratio of the commission value for the products and services relative to the total amount of commissions generated from the customer.

For these bundled commission arrangements, the allocated commissions to each analytics performance obligation are then recognized as revenue when the analytics product is delivered, either over time or at a point in time. These allocated commissions may be deferred if the allocated amount exceeds the amount recognizable based on delivery. Commissions are presented within the commissions and fees line item on the Company's Consolidated Statements of Operations.

Prior to the Company's divestitures of its investment research operations in May 2016 recurring revenues included subscriptions for these services.

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Other revenues include: (1) the net spread on foreign exchange transactions executed on a principal basis to facilitate equity trades by clients in different currencies, as well as on other foreign exchange transactions unrelated to equity trading, (2) non-recurring consulting services, such as one-time implementation and customer training related activities (3) investment income from treasury activity, (4) interest income on securities borrowed in connection with customers' settlement activities, (5) market gains/losses resulting from temporary positions in securities assumed in the normal course of agency trading (including trade errors and client trade accommodations), (6) non-recurring gains and losses such as divestitures, (7) fees earned for clearing securities transactions on behalf of other broker-dealers, (8) income from principal trading in Canada, including within the Company's closed arbitrage trading desk (for historical periods up until April 2016) and (9) the net interest spread earned on securities borrowed and loaned transactions within the Company's closed U.S. matched-book securities lending operations (for historical periods up until June 2016).

Revenues from professional services, which are sold as a multiple element arrangement with the implementation of software, are deferred until go live (or acceptance, if applicable) of the software and recognized in the same manner as the subscription over the remaining term of the initial contract. Professional services that are not connected with the implementation of software are recognized on a time and material basis as incurred.

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents.

Fair Value of Financial Instruments

All of the Company's financial instruments are carried at fair value or amounts approximating fair value. Cash and cash equivalents, securities owned and securities sold, not yet purchased and certain payables are carried at market value or fair value.

Securities Transactions

Receivables from brokers, dealers and clearing organizations include amounts receivable for fails to deliver, cash deposits for securities borrowed, the net amounts receivable on open transactions from clearing organizations and non-U.S. broker-dealers and billed amounts for commissions and fees and balance transfers on client commission arrangements, net of an allowance for doubtful accounts. Payables to brokers, dealers and clearing organizations include amounts payable for fails to receive, securities loaned and execution cost payables. Receivables from customers consist of fails to deliver, the net amounts receivable on open transactions from non-U.S. customers, as well as billed amounts for commissions and fees, net of an allowance for doubtful accounts. Payables to customers primarily consist of fails to receive. Commissions and fees and related expenses for all securities transactions are recorded on a trade date basis.

Securities owned, at fair value consist of common stock and mutual funds. Securities sold, not yet purchased, at fair value consist of common stock. Marketable securities owned are valued using market quotes from third parties. Unrealized gains and losses are included in other revenues in the Consolidated Statements of Operations.

Securities Borrowed and Loaned

Securities borrowed and securities loaned transactions are reported as collateralized financings. Securities borrowed transactions require the Company to deposit cash, letters of credit, or other collateral with the lender. With respect to securities loaned, the Company receives collateral in the form of cash or other collateral in amounts generally in excess of the fair value of securities loaned. The Company monitors the fair value of securities borrowed and loaned on a daily basis, with additional collateral obtained or refunded as necessary. Securities borrowed and securities loaned transactions are recorded at the amount of cash collateral advanced or received, adjusted for additional collateral advanced or received.

The Company currently engages in securities borrowed and securities loaned transactions solely as part of its clearing process primarily to facilitate customer transactions, including for shortened or extended settlement activities and for failed settlements. On these transactions, interest income for securities borrowed is recorded in other revenue while interest expense from securities loaned is recorded in transaction processing expense on the Consolidated Statements of Operations.

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Client Commission Arrangements

Institutional customers are permitted to allocate a portion of their gross commissions to pay for research products and other services provided by third parties and the Company's subsidiaries. The amounts allocated for those purposes are commonly referred to as client commission arrangements. The cost of independent research and directed brokerage arrangements is accounted for on an accrual basis. Commission revenue is recorded when earned on a trade date basis. Payments relating to client commission arrangements are netted against the commission revenues. Research receivable, including prepaid research on behalf of customers and balance transfers due from other broker dealers, net of an allowance is included in receivables from customers and receivables from brokers, dealers and clearing organizations, while accrued research payable is included in accounts payable and accrued expenses in the Consolidated Statements of Financial Condition.

Client commissions allocated for research and related research receivable and accrued research payable balances for the years ended December 31, 2018, 2017 and 2016 were as follows (dollars in millions):

	2018	2017	2016
Client commissions allocated for research	$ 79.3	$ 96.3	$ 100.7
Research receivable, gross	$ 5.4	$ 5.3	$ 3.0
Allowance for research receivable	(0.1)	(0.1)	(0.1)
Research receivable, net of allowance	$ 5.3	$ 5.2	$ 2.9
Accrued research payable	$ 74.2	$ 51.3	$ 45.8

Capitalized Software

Software development costs are capitalized when the technological feasibility of a product has been established. Technological feasibility is established when all planning, designing, coding and testing activities have been devised to ensure that the product can be produced to meet its design specifications, including functions, features, and technical performance requirements. All costs incurred to establish technological feasibility are expensed as incurred. Capitalized software costs are amortized using the straight line method over a three year period beginning when the product is available for general release to customers.

Research and Development

All research and development costs are expensed as incurred. Research and development costs, which are primarily included in other general and administrative expenses and compensation and employee benefits in the Consolidated Statements of Operations, were approximately $33.9 million, $32.8 million and $31.8 million, excluding routine maintenance, for the years ended December 31, 2018, 2017 and 2016, respectively.

Business Combinations, Goodwill and Other Intangibles

Assets acquired and liabilities assumed are recorded at their fair values on the date of acquisition. The cost to be allocated in a business combination includes consideration paid to the sellers, including cash and the fair values of assets distributed and the fair values of liabilities assumed. Both direct (e.g., legal and professional fees) and indirect costs of the business combination are expensed as incurred. Certain agreements to acquire entities include potential additional consideration that is payable, contingent on the acquired company maintaining or achieving specified earnings levels in future periods. The fair value of any contingent consideration is recognized on the acquisition date with subsequent changes in that fair value reflected in the results of operations. The consolidated financial statements and results of operations reflect an acquired business from the date of acquisition.

An intangible asset is recognized as an asset apart from goodwill if it arises from contractual or other legal rights or if it is separable (i.e., capable of being separated or divided from the acquired entity and sold, transferred, licensed, rented, or exchanged). Goodwill represents the excess of the cost of each acquired entity over the amounts assigned to the tangible and identifiable intangible assets acquired and liabilities assumed.

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The judgments that are made in determining the estimated fair value assigned to each class of assets acquired and liabilities assumed, as well as asset lives, can materially impact net income in periods following a business combination. Traditional approaches used to determine fair value include the income, cost and market approaches. The income approach presumes that the value of an asset can be estimated by the net economic benefit to be received over the life of the asset, discounted to present value. The cost approach presumes that an investor would pay no more for an asset than its replacement or reproduction cost. The market approach estimates value based on what other participants in the market have paid for reasonably similar assets. Although each valuation approach is considered in valuing the assets acquired, the approach or combination of approaches ultimately selected is based on the characteristics of the asset and the availability of information.

Any goodwill is assessed no less than annually for impairment. The guidance for goodwill impairment testing allows an entity to assess qualitative factors to determine whether the existence of events or circumstances leads to a determination that it is more likely than not that the fair value of a reporting unit is less than its carrying amount or to proceed directly to performing the two-step impairment test. The fair values used in the Company's two-step impairment testing are determined by the discounted cash flow method (an income approach) and where appropriate, a combination of the discounted cash flow method and the guideline company method (a market approach). An impairment loss is indicated if the estimated fair value of a reporting unit is less than its net book value. In such a case, the impairment loss is calculated as the amount by which the carrying value of goodwill exceeds its implied fair value. In determining the fair value of each of the Company's reporting units, the discounted cash flow analyses employed require significant assumptions and estimates about the future operations of each reporting unit. Significant judgments inherent in these analyses include the determination of appropriate discount rates, the amount and timing of expected future cash flows and growth rates. The cash flows employed in the Company's discounted cash flow analyses are based on financial budgets and forecasts developed internally by management. The Company's discount rate assumptions are based on a determination of its required rate of return on equity capital.

Other intangibles with definite lives are amortized over their useful lives. All other intangibles are assessed at least annually for impairment. If impairment is indicated, an impairment loss is calculated as the amount by which the carrying value of an intangible asset exceeds its estimated fair value.

Premises and Equipment

Furniture, fixtures and equipment are carried at cost and are depreciated using the straight line method over the estimated useful lives of the assets (generally three to seven years). Leasehold improvements are carried at cost and are amortized using the straight line method over the lesser of the estimated useful lives of the related assets or the non cancelable lease term.

Impairment of Long Lived Assets

Long lived assets to be held and used are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Determination of recoverability is generally based on an estimate of undiscounted future cash flows resulting from the use of the asset and its eventual disposition, as well as specific appraisal in certain instances. Measurement of an impairment loss for long lived assets that management expects to hold and use is based on the fair value of the asset as estimated using a cash flow model. Long lived assets to be disposed of are reported at the lower of carrying amount or fair value less costs to sell.

Contingencies and Uncertainties

The Company may be subject to losses that arise from litigation, mediation, arbitration, regulatory proceedings and various contingencies and uncertainties. Liabilities are recognized when a loss is probable and can be reasonably estimated.

Income Taxes

Income taxes are accounted for using the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. A valuation allowance is recorded against deferred tax assets if it is more likely than not that such assets will not be realized. An uncertain tax position is recognized based on the determination of whether or not a tax position is more likely than not to be sustained upon examination based upon the technical merits of the position. If this recognition threshold is met, the tax benefit is then measured based on the largest benefit that has a greater than fifty percent likelihood of being realized upon ultimate resolution.

Taxes Collected from Customers and Remitted to Governmental Authorities

Taxes assessed by a governmental authority that are directly imposed on a revenue producing transaction between the Company and its customers, including but not limited to sales, use, value added and some excise taxes are presented in the consolidated financial statements on a net basis (excluded from revenues).

Earnings per Share

Basic earnings per share is determined by dividing earnings by the average number of shares of common stock outstanding, while diluted earnings per share is determined by dividing earnings by the average number of shares of common stock adjusted for the dilutive effect of common stock equivalents by application of the treasury stock method. Common stock equivalents are excluded from the diluted calculation if their effect is anti-dilutive.

Share based Compensation

Share based compensation expense requires measurement of compensation cost for share based awards at fair value and recognition of compensation cost over the vesting period. For awards with graded vesting schedules that only have service conditions, the Company recognizes compensation cost evenly over the requisite service period for the entire award using the straight line attribution method. For awards with service conditions as well as performance or market conditions, the Company recognizes compensation cost on a straight line basis over the requisite service period for each separately vesting portion of the award as if the award was, in substance, multiple awards.

The fair value of stock options granted is estimated using the Black Scholes option pricing model, which considers, among other factors, the expected term of the award and the expected volatility of the Company's stock price. Although the Black Scholes model meets the requirements of ASC 718, Compensation—Stock Compensation, the fair values generated by the model may not be indicative of the actual fair values of the underlying awards, as it does not consider other factors important to those share based compensation awards, such as continued employment, periodic vesting requirements and limited transferability.

The risk-free interest rate used in the Black-Scholes option-pricing model is based on the U.S. Treasury yield curve in effect at the time of grant. The expected option life is based on historical experience of employee exercise behavior. Expected volatility is based on historical volatility, implied volatility, price observations taken at regular intervals and other factors deemed appropriate. Expected dividend is based upon the current dividend rate.

The fair value of restricted stock unit awards is based on the fair value of the Company's common stock on the grant date.

Certain restricted stock unit awards granted have both service and market conditions. Awards with market conditions are valued based on (a) the grant date fair value of the award for equity-based awards or (b) the period-end fair value for liability-based awards. Grant date fair value for market condition based awards is determined using a Monte Carlo simulation model to simulate a range of possible future stock prices for the Company's common stock. Compensation costs for awards with market conditions are recognized for each separately vesting portion of the award over the estimated service period calculated by the Monte Carlo simulation model. For restricted stock unit awards with a performance condition, fair value is estimated throughout the life of the award based on the probability of achieving the performance condition.

Excess tax benefits (which represent the excess of actual tax benefits received at the date of vesting or settlement over the benefits recognized over the vesting period or upon issuance of share-based payments) and tax deficiencies (which represent the amount by which actual tax benefits received at the date of vesting or settlement is lower than the benefits recognized over the vesting period or upon issuance of share-based payments) are recorded in the income statement as an increase or decrease in income taxes when the awards vest or are settled.

Cash flows related to income tax deductions, if any, in excess of the compensation cost recognized on share based awards exercised or vested during the period presented (excess tax benefit) were classified in financing cash flows in the Consolidated Statements of Cash Flows through December 31, 2016. As of January 1, 2017, due to the adoption of ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, excess tax benefits, along with other income tax cash flows, are recorded as an operating activity in the statement of cash flows rather than, as previously required, a financing activity. For more information on the impact of this standard to the consolidated financial statements, see "Recently Adopted Accounting Standards" below.

Phantom stock awards are settled in cash and are therefore classified as liability awards. The fair value of the liability is remeasured at each reporting date until final settlement using the fair value of the Company's common stock on that date. At December 31, 2018, the Company did not have any phantom awards outstanding, as the Company discontinued granting phantom share awards effective January 1, 2014 and the last awards outstanding vested on February 22, 2016.

Foreign Currency Translation

Assets and liabilities denominated in non-U.S. currencies are translated at rates of exchange prevailing on the date of the Consolidated Statements of Financial Condition, and revenues and expenses are translated at average rates of exchange during the fiscal year. Gains or losses on translation of the financial statements of a foreign operation, where the functional currency is other than the U.S. Dollar, together with the after-tax effect of exchange rate changes on intercompany transactions of a long-term investment nature, are reflected as a component of accumulated other comprehensive income in stockholders' equity. Gains or losses on foreign currency transactions are included in other general and administrative expenses in the Consolidated Statements of Operations.

Common Stock Held in Treasury, at Cost

The purchase of treasury stock is accounted for under the cost method with the shares of stock repurchased reflected as a reduction to stockholders' equity and included in common stock held in treasury, at cost, in the Consolidated Statements of Financial Condition. When treasury shares are reissued, they are recorded at the average cost of the treasury shares acquired. The Company held 19.6 million and 20.0 million shares of common stock in treasury as of December 31, 2018 and 2017, respectively.

Recently Adopted Accounting Standards

In February 2016, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") 2016-02, Leases (Topic 842), which requires lessees to recognize leases on the balance sheet and disclose key information about leasing arrangements. The standard created ASC 842, Leases, ("ASC 842"), requiring a lessee to recognize an asset and lease liability on the balance sheet for all leases with a term longer than 12 months. Leases will be classified as finance or operating, with classification affecting the pattern of expense recognition in the income statement. Classification will be based on criteria that are largely similar to those applied in current lease accounting, but more significant management judgment will be required. The new standard is effective for the Company on January 1, 2019, with early adoption permitted.

In July 2018, the FASB issued ASU 2018-11, Leases (Topic 842) – Targeted Improvements, which provides entities with an alternative transition method of adoption in addition to the previously required modified retrospective transition approach. Under the new transition method, comparative periods presented in the financial statements in the period of adoption will not need to be restated, whereas under the modified retrospective transition approach, leases are to be recognized and measured at the beginning of the earliest period presented in the financial statements. This additional transition method changes only when an entity is required to initially apply the transition requirements of the new leases standard; it does not change how those requirements apply.

On January 1, 2019, the Company adopted ASC 842 using the additional (and optional) transition method of adoption outlined in ASU 2018-11. Real estate leases pertaining to office space and data centers make up the majority of the Company's lease arrangements, and equipment leases and embedded leases within service contracts are immaterial. The standard had a material impact on the consolidated balance sheet due to the recognition of a right-of-use asset and lease liability for all of the Company's long-term leases, but did not have an impact on the Consolidated Income Statement.

Upon adoption, the Company:

· Recorded a right-of-use asset estimated to be in the range of \$80 - \$90 million;
· Recorded a lease liability estimated to be in the range of \$100 - \$110 million;
· Elected the optional practical expedient to not separate lease and non-lease components;
· Elected the optional use-of-hindsight practical expedient for transition; and
· Did not elect the optional package of practical expedients upon transition.

We are currently in the implementation phase of our assessment, which includes:

· Validating the key data inputs required to calculate the right-of-use asset and lease liability; and
· Finalizing a formal accounting policy, including updates to processes and internal controls.

In June 2018, the FASB issued ASU 2018-07, Compensation—Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting. The amendments in this ASU expand the scope of ASC 718 to include share-based payment awards to nonemployees, which were previously covered under Subtopic 505-50: Equity – Equity-Based Payments to Non-Employees. ASU 2018-07 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within that fiscal year. Early adoption is permitted, but no earlier than an entity's adoption date of Topic 606. This new guidance was adopted on January 1, 2019 and had no impact on the Company's financial statements.

In May 2014, the FASB issued ASU 2014 09, Revenue from Contracts with Customers. This standard created ASC 606, providing companies with a single five step revenue recognition model for use in accounting for revenue arising from contracts with customers and supersedes current revenue recognition guidance, including industry specific revenue guidance. The core principle of the model is to recognize revenue to depict the transfer of 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. It also requires significant additional qualitative and quantitative disclosures describing the nature, amount, timing, and uncertainty of revenues and cash flows arising from contracts with customers, along with detailed information regarding the nature of the Company's performance obligations and contracts and the timing of recognition and payment, among other items. ASC 606 is effective for annual and interim reporting periods beginning after December 15, 2017. On January 1, 2018, the Company adopted ASC 606, using the modified retrospective transition method applied to all contracts as of January 1, 2018.

The Company identified two key accounting changes that affect the timing of revenue recognition upon adoption relating to bundled commission arrangements and fees for licenses of functional intellectual property. The financial impact of these accounting changes includes (1) a deferral of revenues primarily generated in the first half of the year for commissions attributable to analytics products under bundled arrangements that will be recognized over the course of the year as the performance obligations for those analytics products are satisfied and (2) an acceleration of license fee revenues to the delivery date for software provided for a specified period. These changes only relate to the timing of when revenue is recognized and have no effect on the underlying transaction price of the products and services the Company performs.

Upon adoption, the Company recorded a net cumulative-effect decrease to opening retained earnings of approximately $0.04 million as of January 1, 2018, which is primarily related to:

(i) the deferral of commissions allocated to analytics products in bundled commission arrangements where the analytics services have not yet been transferred to the customer as of December 31, 2017 but whose commissions were appropriately recognized in the previous year under the superseded revenue recognition guidance, and
(ii) the acceleration of revenue for certain product license fees associated with the licenses of functional intellectual property recognized at the point in time the customer is able to use and benefit from the license instead of being appropriately recognized over the license period under the superseded revenue recognition guidance.

In May 2017, the FASB issued ASU 2017-09, Compensation – Stock Compensation (Topic 718): Scope of Modification Accounting. The amendments in this ASU clarify which changes to the terms or conditions of a share-based payment award must be accounted for as modifications. The new guidance allows entities to make non-substantive changes to awards without accounting for them as modifications, which results in fewer changes to the terms of an award being accounted for as modifications and reduces diversity in practice when applying modification accounting. ASU 2017-09 is effective for annual periods beginning after December 15, 2017, including interim periods within those annual periods. This new guidance was adopted on January 1, 2018 and did not have a material effect on the Company's financial statements.

In November 2016, the FASB issued ASU 2016 18, Statement of Cash Flows (Topic 230): Restricted Cash. The amendments in this ASU require that the statement of cash flows explain the change during the period in the total of cash, cash equivalents and restricted cash. Amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016 18 is effective for annual reporting periods beginning after December 15, 2017, including interim periods within those fiscal years, with early adoption permitted. This new guidance was adopted on January 1, 2018 and did not have a material effect on the Company's financial statements.

In August 2016, the FASB issued ASU 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments. The amendments in this ASU provide specific guidance for eight specific cash flow classification issues, with the objective of reducing the existing diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows under Topic 230, Statement of Cash Flows. These amendments are effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years, with early adoption permitted. This new guidance was adopted on January 1, 2018 and had no impact on the Company's financial statements.

In March 2016, the FASB issued ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, which changes the accounting for certain aspects of share-based payments to employees. The new guidance requires, among its other provisions, that excess tax benefits (which represent the excess of actual tax benefits received at the date of vesting or settlement over the benefits recognized over the vesting period or upon issuance of share-based payments) and tax deficiencies (which represent the amount by which actual tax benefits received at the date of vesting or settlement is lower than the benefits recognized over the vesting period or upon issuance of share-based payments) be recorded in the statement of operations as an increase or decrease in income tax expense (benefit) when the awards vest or are settled. This is in contrast to the prior requirement that these excess tax benefits be recognized in additional paid-in capital and these tax deficiencies be recognized either as an offset to accumulated excess tax benefits, if any, or in the statement of operations. The new guidance also requires excess tax benefits to be classified along with other income tax cash flows as an operating activity in the statement of cash flows rather than, as previously required, a financing activity. The new guidance is effective for annual and interim reporting periods beginning after December 15, 2016 and as such was implemented on January 1, 2017.

As a result of this adoption, the Company:

- Recognized excess tax benefits and tax deficiencies in income tax benefit in the Consolidated Statements of Operations prospectively.
- Elected to adopt the cash flow presentation of the excess tax benefits prospectively during the year ended December 31, 2017, where these benefits are classified along with other income tax cash flows as an operating activity in the Consolidated Statements of Cash Flows.
- Elected to account for forfeitures as they occur rather than under the previous method of estimating the number of stock-based awards expected to vest in order to determine the amount of compensation cost to be recognized in each

period. This resulted in an adjustment for the cumulative effect of this accounting change as of January 1, 2017 to reduce retained earnings by $0.6 million and to increase deferred tax assets and additional paid-in capital by $0.3 million and $0.9 million, respectively.

- Did not change its policy on statutory withholding requirements. Amounts paid by the Company to taxing authorities when directly withholding shares associated with employees' income tax

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withholding obligations are classified as a financing activity in the Consolidated Statements of Cash Flows.
- Excluded the excess tax benefits from the assumed proceeds available to repurchase shares in the computation of diluted earnings per share prospectively.

In April 2015, the FASB issued ASU 2015-03, Simplifying the Presentation of Debt Issuance Costs, which changes the presentation of debt issuance costs in financial statements. ASU 2015-03 requires an entity to present such costs in the balance sheet as a direct deduction from the related debt liability rather than as an asset. Amortization of the costs will continue to be reported as interest expense. The new standard was adopted on January 1, 2016 and did not have a material effect on the Company’s financial statements.

(3) Fair Value Measurements

Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. In determining fair value, various methods are used including market, income and cost approaches. Based on these approaches, certain assumptions that market participants would use in pricing the asset or liability are used, including assumptions about risk and/or the risks inherent in the inputs to the valuation technique. These inputs can be readily observable, market corroborated, or generally unobservable firm inputs. Valuation techniques that are used maximize the use of observable inputs and minimize the use of unobservable inputs. Based on the observability of the inputs used in the valuation techniques, fair value measured financial instruments are categorized according to the fair value hierarchy prescribed by ASC 820, Fair Value Measurements and Disclosures. The fair value hierarchy ranks the quality and reliability of the information used to determine fair values. Financial assets and liabilities carried at fair value are classified and disclosed in one of the following three categories:

* Level 1: Fair value measurements using unadjusted quoted market prices in active markets for identical, unrestricted assets or liabilities.
* Level 2: Fair value measurements using correlation with (directly or indirectly) observable market based inputs, unobservable inputs that are corroborated by market data, or quoted prices in markets that are not active.
* Level 3: Fair value measurements using inputs that are significant and not readily observable in the market.

Level 1 consists of financial instruments whose value is based on quoted market prices such as exchange traded mutual funds and listed equities.

Level 2 includes financial instruments that are valued based upon observable market based inputs.

Level 3 is comprised of financial instruments whose fair value is estimated based on internally developed models or methodologies utilizing significant inputs that are generally less readily observable.

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Fair value measurements for those items measured on a recurring basis are as follows (dollars in thousands):

December 31, 2018	Total	Level 1	Level 2	Level 3
Assets				
Cash and cash equivalents:				
Money market mutual funds	$ 1	$ 1	$ —	$ —
Securities owned, at fair value:				
Corporate stocks - trading securities	3	3	—	—
Mutual funds	308	308	—	—
Total	$ 312	$ 312	$ —	$ —
Liabilities				
Securities sold, not yet purchased, at fair value:				
Corporate stocks - trading securities	6	6	—	—
Total	$ 6	$ 6	$ —	$ —

December 31, 2017	Total	Level 1	Level 2	Level 3
Assets				
Securities owned, at fair value:				
Corporate stocks - trading securities	$ 78	$ 78	$ —	$ —
Mutual funds	1,481	1,481	—	—
Total	$ 1,559	$ 1,559	$ —	$ —
Liabilities				
Securities sold, not yet purchased, at fair value:				
Corporate stocks - trading securities	1	1	—	—
Total	$ 1	$ 1	$ —	$ —

Cash and cash equivalents other than bank deposits are measured at fair value and primarily include money market mutual funds.

Securities owned, at fair value and securities sold, not yet purchased, at fair value include corporate stocks, equity index mutual funds and bond mutual funds, all of which are exchange traded.

Certain of the Company’s assets and liabilities are carried at contracted amounts that approximate fair value. Assets and liabilities that are recorded at contracted amounts approximating fair value consist primarily of receivables from and payables to brokers, dealers, clearing organizations and customers. These receivables and payables to brokers, dealers, clearing organizations and customers are short-term in nature and, following December 31, 2018, substantially all have settled at the contracted amounts.

The Company believes the carrying amounts of its term-debt obligations at December 31, 2018 and 2017 approximate fair value because the interest rates on these instruments change with, or approximate, market interest rates.

(4) Revenue from Contracts with Customers

Revenue from contracts with customers was $502.8 million for the year ended December 31, 2018. The majority of the Company's revenues fall under the scope of ASC 606, with the exception of investment and dividend income, gains and losses on temporary securities positions assumed and other miscellaneous income, all of which are presented within the other revenue line item on the Consolidated Statements of Operations. The tables within Note 24, Segment Reporting, provide revenue disaggregated by reportable geographic operating segment and by product group.

The net impacts to the Consolidated Statements of Operations of adopting ASC 606 for the year ended December 31, 2018 were as follows (dollars in thousands):

	Year Ended December 31, 2018
Net change in commissions and fees	$ 274

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Net change in recurring revenues	409
Net change in total revenues	$ 683

At December 31, 2018, the Consolidated Statements of Financial Condition include an increase to receivables from customers of $1.1 million related to the acceleration of license fees and an increase to accounts payable and accrued expenses of $0.6 million related to the deferral of commissions in bundled commission arrangements.

For more information regarding the Company's revenue recognition policy, including detailed information on material performance obligations and how revenue is recognized, refer to Note 2, Summary of Significant Accounting Policies.

Remaining Performance Obligations and Revenue Recognized from Past Performance Obligations

The Company elected not to disclose information about remaining performance obligations pertaining to (i) contracts with an original expected length of one year or less or (ii) contracts with variable consideration that cannot be estimated, as permitted under the guidance.

The Company's remaining unsatisfied performance obligations that do not meet the criteria above primarily relate to analytics products and services that have fixed subscription fees. As of December 31, 2018, the future revenue the Company expects to recognize for these performance obligations is not material.

For the year ended December 31, 2018, the Company did not recognize any revenue related to performance obligations satisfied in prior years.

Contract Balances

The timing of the Company's revenue recognition may differ from the timing of payment by customers. The Company records a receivable when revenue is recognized prior to payment and has an unconditional right to payment. Alternatively, when payment precedes the provision of the related services, the Company records deferred revenue until the performance obligations are satisfied.

Receivables related to contracts with customers were $42.1 million and $38.2 million as of December 31, 2018 and December 31, 2017, respectively. The Company did not identify any contract assets. There were no impairment losses on receivables as of December 31, 2018.

Deferred revenue primarily relates to deferred commissions allocated to analytics products and subscription fees billed in advance of satisfying the performance obligations. Deferred revenue related to contracts with customers was $8.1 million and $6.9 million as of December 31, 2018 and 2017, respectively. During the year ended December 31, 2018, the Company recognized revenue of $1.4 million that was initially recorded as deferred revenue.

The Company has not identified any costs to obtain or fulfill associated with its contracts under ASC 606.

(5) Equity Investment

In February 2018, the Company established a venture with Option Technology Solutions LLC ("Optech") to form Matrix Holding Group ("Matrix"), a derivatives execution and technology business. The operating subsidiaries of Matrix offer derivatives trading technology and execution services to broker dealers, professional traders and select hedge funds. These entities have dedicated sales, client services, operations, and technology staff located in Chicago and New York.

The Company contributed the ITG Derivatives entity, including its broker-dealer license and professional trader client base with revenues of $5.3 million during the year ended December 31, 2017, along with certain derivatives-focused software and technology for an initial minority stake of approximately 20%. Optech contributed the management team, a retail-focused trading and analytics platform and capital. The board of directors of Matrix consists of two members appointed by Optech and one member appointed by the Company. Unanimous approval of the full

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board is required for all significant operating activities, including but not limited to: approval and amendment of annual business plans or operating budgets, establishing an incentive compensation plan, approving significant loans and expenditures, appointment of officers and entering into material agreements.

The Company's initial investment in Matrix was recorded at $2.0 million, representing the fair value of the net assets contributed. This investment included cash and restricted cash of $0.6 million and net non-cash assets of $1.4 million. No gain or loss was recognized upon the closing of this transaction as the book value of the contributed net assets approximated fair value.

In December 2018, MH II LLC ("MH II"), a subsidiary of Matrix that owns the operating subsidiaries, received a $5.0 million contribution from a third-party for a 17% interest in that entity, diluting the Company's indirect minority stake in MH II to approximately 17%. The Company recorded a non-cash gain of $0.6 million on this transaction. The Company's investment in Matrix was $1.8 million at December 31, 2018.

In January 2019, Matrix sold a 34% interest in MH II for $10.0 million. This transaction reduced the Company's indirect minority stake in MH II to approximately 10% and resulted in a gain of $1.3 million for the Company.

The Company's interest in Matrix is accounted for in the Consolidated Financial Statements using the equity method.

(6) Divestitures

ITG Investment Research, LLC

On May 27, 2016, the Company completed the sale of ITG Investment Research, LLC ("Investment Research"), a wholly owned subsidiary of the Company, to a wholly owned subsidiary of Leucadia National Corporation for $12 million in cash consideration.

Upon completion of the sale, the Company recorded a pre-tax gain of approximately $21,000 and an after-tax gain of approximately $50,000. The pre-tax gain is recorded in other revenue on the Consolidated Statements of Operations as of December 31, 2016. The pre-tax gain is net of direct costs to sell Investment Research, including professional fees, cash compensation and the acceleration of previously issued restricted stock unit awards.

The following table summarizes the components of the pre-tax gain (dollars in thousands):

Cash proceeds from sale	$ 12,000
Carrying value of net assets disposed	(7,502)
Direct selling costs	(4,477)
Pre-tax gain on sale	$ 21

As a result of this divestiture, the Company reduced the headcount within its U.S. single stock sales trading operation. For more information, see Note 7, Restructuring Charges.

The Company determined that the sale of Investment Research did not meet the requirements to be treated as a discontinued operation. As such, the results of Investment Research through the sale completion date of May 27, 2016 are included in continued operations on the Consolidated Statements of Operations, primarily in the U.S. Operations segment.

(7) Restructuring Charges

2018 Restructuring

In the first and third quarters of 2018, the Company implemented restructuring plans to improve margins and enhance stockholder returns through the elimination of certain positions in the U.S. and the reduction of office space in Los Angeles.

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Activity and liability balances recorded as part of the restructuring plan through December 31, 2018 are as follows (dollars in thousands):

	Employee Separation Costs	Consolidation of Leased Facilities	Total
Restructuring charges recognized - March 31, 2018	$ 7,165	$ —	$ 7,165
Restructuring charges recognized - September 30, 2018	1,135	2,301	3,436
Total Restructuring Charges - 2018	8,300	2,301	10,601
Cash payments	(5,106)	(461)	(5,567)
Acceleration of share-based compensation	(2,702)	—	(2,702)
Asset write-off	—	(390)	(390)
Balance at December 31, 2018	$ 492	$ 1,450	$ 1,942

The payment of the accrued costs for the 2018 restructuring is expected to continue through the first quarter of 2019. The payment of the remaining accrued costs related to the vacated leased facilities will continue through July 2027.

2016 Restructuring

As part of an end-to-end review of its business in 2016, the Company determined that its strategy is to increasingly focus its resources on its core capabilities in liquidity, execution, analytics and workflow technology solutions. To that end, in 2016, the Company implemented restructuring plans to (i) reduce headcount in its single stock sales trading and sales organizations, (ii) close its U.S. matched-book securities lending operations and its Canadian arbitrage trading desk and (iii) identify additional annual cost savings from management delayering and the elimination of certain positions.

Activity and liability balances recorded as part of the restructuring plan through December 31, 2018 are as follows (dollars in thousands):

	Amount
Balance at December 31, 2017	$ 6
Asset write-off	(6)
Balance at December 31, 2018	$ —

(8) Goodwill and Other Intangibles

Goodwill

The following table presents the changes in the carrying amount of goodwill held entirely within the Company’s European Operations segment for the year ended December 31, 2018 (dollars in thousands):

	Total
Balance at December 31, 2016	$ 10,102
Currency translation adjustment	952
Balance at December 31, 2017	$ 11,054
Currency translation adjustment	(646)
Balance at December 31, 2018	$ 10,408

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Other Intangible Assets

Acquired other intangible assets consisted of the following at December 31, 2018 and 2017 (dollars in thousands):

	December 31, 2018		December 31, 2017		
	Gross Carrying Amount	Accumulated Amortization	Gross Carrying Amount	Accumulated Amortization	Useful Lives (Years)
Trade name	$ 8,521	$ —	$ 8,529	$ —	—
Customer-related intangibles	9,617	6,282	10,217	6,219	17.0
Proprietary software	23,215	22,545	23,321	22,197	8.5
Trading rights	339	—	339	—	—
Other	50	—	50	—	—
Total	$ 41,742	$ 28,827	$ 42,456	$ 28,416	

At December 31, 2018, indefinite lived intangibles not subject to amortization amounted to $8.9 million, of which $8.4 million related to the POSIT trade name.

Amortization expense for definite lived intangibles was $1.0 million, $1.3 million and $1.9 million for the years ended December 31, 2018, 2017 and 2016, respectively. These amounts are included in other general and administrative expense in the Consolidated Statements of Operations.

During the third quarter of 2017, the Company deemed the remaining value of a customer intangible asset recorded in ITG Derivatives of $0.3 million fully impaired.

The Company’s estimate of future amortization expense for acquired other intangibles that exist at December 31, 2018 is as follows (dollars in thousands):

Year	Estimated Amortization
2019	$ 844
2020	643
2021	563
2022	563
2023	563
Thereafter	829
Total	$ 4,005

The following table represents the changes in the carrying amount of net intangible assets for the years ended December 31, 2018 and 2017 (dollars in thousands):

	Total
Balance at December 31, 2016	$ 15,390
Amortization	(1,276)
Impairment charge	(325)
Currency translation adjustment	251
Balance at December 31, 2017	$ 14,040
Amortization	(1,010)
Currency translation adjustment	(115)
Balance at December 31, 2018	$ 12,915

(9) Cash

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents.

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Cash Restricted or Segregated Under Regulations and Other

Cash restricted or segregated under regulations and other represents (i) a special reserve bank account for the exclusive benefit of customers ("Special Reserve Bank Account") maintained by ITG Inc. in accordance with Rule 15c3-3 of the Securities Exchange Act of 1934, as amended ("Customer Protection Rule"), or agreements for proprietary accounts of broker dealers ("PABs"), (ii) funds on deposit for Canadian and European trade clearing and settlement activity, (iii) segregated balances under a collateral account control agreement for the benefit of certain customers, and (iv) funds relating to the securitization of bank guarantees supporting the Company's Australian and French leases.

The following table provides a reconciliation of cash and cash equivalents together with restricted cash as reported within the Consolidated Statements of Financial Condition to the sum of the same such amounts shown in the Consolidated Statements of Cash Flows (dollars in thousands):

	December 31, 2018	December 31, 2017
Cash and cash equivalents	$ 267,843	$ 287,452
Cash restricted or segregated under regulations and other	13,603	18,599
Total cash, cash equivalents and restricted cash shown in the statement of cash flows	$ 281,446	$ 306,051

(10) Securities Owned and Sold, Not Yet Purchased

The following is a summary of securities owned and securities sold, not yet purchased (dollars in thousands):

	Securities Owned		Securities Sold, Not Yet Purchased	
	December 31, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Corporate stocks - trading securities	$ 3	$ 78	$ 6	$ 1
Mutual funds	308	1,481	—	—
Total	$ 311	$ 1,559	$ 6	$ 1

Trading securities owned and sold, not yet purchased primarily consists of temporary positions obtained in the normal course of agency trading activities, including positions held in connection with the creation and redemption of exchange traded funds on behalf of clients.

(11) Income Taxes

Income tax expense (benefit) consisted of the following components (dollars in thousands):

	2018	2017	2016
Current:			
Federal	$ (1,711)	$ (423)	$ (9,918)
State	249	1,072	(624)
Foreign	10,300	11,490	8,975
	8,838	12,139	(1,567)
Deferred:			
Federal	736	25,797	(12,687)
State	57	7,694	(2,217)
Foreign	(223)	335	(851)
	570	33,826	(15,755)
Total	$ 9,408	$ 45,965	$ (17,322)

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Income (loss) before income taxes consisted of the following (dollars in thousands):

	2018	2017 (1)	2016 (1)
U.S.	$ (57,502)	$ (56,465)	$ (81,579)
Foreign	67,601	62,990	38,339
Total	$ 10,099	$ 6,525	$ (43,240)

(1) Pre-tax amounts for 2017 and 2016 noted above do not include the restatement recorded for segment reporting for U.S. expenses now being allocated to the international segments as such amounts were not adjusted for income tax purposes (see Note 24, Segment Reporting).

The components of the Company's net deferred tax asset are as follows (dollars in thousands):

	2018	2017
Deferred tax assets:		
Compensation and benefits	$ 6,427	$ 5,912
Net operating loss and capital loss carryover	17,555	18,974
Share-based compensation	5,548	5,092
Research and development credits	8,215	7,438
Foreign tax credits	10,240	11,117
Tax benefits on uncertain tax positions	697	831
Goodwill and other intangibles	4,007	6,363
Depreciation	3,969	3,527
Capitalized software	3,132	383
Rent	2,844	3,013
Other	1,297	700
Total deferred tax assets	63,931	63,350
Less: valuation allowance	(58,879)	(58,448)
Total deferred tax assets, net of valuation allowance	5,052	4,902
Deferred tax liabilities:		
Indefinite life intangible	(1,859)	(1,695)
Other	(328)	(55)
Total deferred tax liabilities	(2,187)	(1,750)
Net deferred tax assets	$ 2,865	$ 3,152

Under ASC 740, Income Taxes, the Company regularly assesses the need for a valuation allowance against its deferred taxes. In making that assessment, both positive and negative evidence is considered related to the likelihood of realization of the deferred tax assets to determine, based on the weight of available evidence, whether it is more-likely than not that some or all of its deferred tax assets will not be realized. In evaluating the need for a valuation allowance, the Company considered its cumulative pre-tax loss in the U.S. jurisdiction over the previous three years as a significant piece of negative evidence. Prevailing accounting guidance limits the ability to consider other subjective evidence to support deferred tax assets, such as projections of future profits, when objective verifiable evidence such as a cumulative loss exists. As a result, the Company recorded a full valuation allowance against its U.S. deferred tax assets in the third quarter 2017, resulting in a non-cash charge of $48.1 million, which included $42.3 million related to deferred tax assets that existed at June 30, 2017.

At December 31, 2018, the Company believes that it is more-likely-than-not that future reversals of its existing taxable temporary differences and future generation of sufficient taxable income in the appropriate jurisdiction will enable the Company to realize the carrying value of its net deferred tax assets. The Company's valuation allowance increased $0.4 million to $58.9 million at December 31, 2018 and is primarily the result of the usage of historical net operating losses in the Asia Pacific entities, where a full valuation allowance is maintained for all deferred assets and net operating losses, as well as certain state tax credits and net operating losses. The Company has foreign tax credit carryforwards of $10.2 million that begin to expire in 2024 and research and development tax credits of $8.2 million that begin to expire in 2034.

The Tax Cuts and Jobs Act of 2017 (the "Tax Cuts and Jobs Act") was enacted on December 22, 2017, and introduced significant changes to U.S, income tax law. Effective in 2018, the Tax Cuts and Jobs Act reduces the U.S.

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statutory corporate tax rate from 35% to 21% and creates new taxes on certain foreign-sourced earnings and certain related party payments, which are referred to as the global intangible low-taxed income tax (“GILTI”) and the base erosion tax, respectively. In addition, under the Tax Cuts and Jobs Act, in 2017 the Company was subject to the mandatory inclusion in U.S. taxable income of all accumulated foreign subsidiary earnings not previously subject to U.S. tax. The mandatory inclusion did not result in any incremental U.S. tax expense in 2017 due to the impact of a U.S. tax loss and the utilization of foreign tax credits. In 2018, the GILTI inclusion did not result in any incremental U.S. tax expense due to the impact of a current year U.S. tax loss and the utilization of foreign tax credits. The Company is not subject to the base erosion tax. The Company completed the final accounting for the tax effects of the Tax Cuts and Jobs Act on the 2017 consolidated financial statements with no changes to the provisional amounts recorded in 2017.

Net operating loss carryforwards expire as follows (dollars in thousands):

	Amount	Years remaining
Hong Kong and Australia	$ 68,878	Indefinite
State and local (United States)	41,037	12 - 20 years

The effective tax rate varied from the U.S. federal statutory income tax rate due to the following:

	2018		2017		2016	
U.S. federal statutory income tax rate	21.0	%	35.0	%	35.0	%
State and local income taxes, net of U.S. federal income tax effect	(0.64)		0.6		5.2	
Foreign tax impact, net	(32.4)		(81.8)		6.2	
Valuation allowance	86.1		585.8		—	
Tax impact of Tax Cuts and Jobs Act	—		149.2		—	
Stock windfall/shortfall	(3.8)		(13.5)		—	
Reserves released upon tax settlement	(16.8)		—		18.6	
Non-deductible costs (1)	43.0		21.3		(22.8)	
Other, net	(3.3)		7.9		(2.1)	
Effective income tax rate	93.2	%	704.5	%	40.1	%

(1) Includes the impact of the non-deductible payments in 2018 and 2016 to the Securities and Exchange Commission (the “SEC”). Additionally, 2018, 2017 and 2016 includes non-deductible officer’s compensation.

The Company has selected the period cost method as its accounting policy for GILTI and will treat any taxes due on future GILTI inclusions in U.S. taxable income as a current period expense when incurred.

Tax Uncertainties

Under ASC 740, Income Taxes, a tax benefit from an uncertain tax position may be recognized only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities. The tax benefits recognized in the financial statements from such a position are measured based on the largest benefit that has a greater than fifty percent likelihood of being realized upon ultimate resolution.

A reconciliation of the beginning and ending amounts of unrecognized tax benefits is as follows (dollars in thousands):

Uncertain Tax Benefits	2018	2017	2016
Balance, January 1	$ 7,693	$ 7,356	$ 15,553
Additions based on tax positions related to the current year	322	591	66
Additions based on tax positions of prior years	38	4	406
Reductions for tax positions of prior years	—	(13)	—
Reductions due to settlements with taxing authorities	(987)	(64)	(2,153)
Reductions due to expiration of statute of limitations	(1,209)	(181)	(6,516)
Balance, December 31	$ 5,857	$ 7,693	$ 7,356

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The unrecognized tax benefits were $5.9 million and $7.7 million, respectively, at December 31, 2018 and 2017. At December 31, 2018 and 2017, $4.6 million and $4.5 million, respectively, of the unrecognized tax benefits was netted against fully reserved U.S. deferred tax assets.

With limited exception, the Company is no longer subject to U.S. federal, state, local or foreign income tax audits by taxing authorities for years preceding 2015. Certain foreign, state and local returns are also currently under various stages of audit for the tax years 2013 through 2014. The Company does not anticipate a significant change to the total of unrecognized tax benefits within the next twelve months.

At December 31, 2018, interest expense of $1.7 million was accrued related to unrecognized tax benefits. As a continuing policy, interest accrued related to unrecognized tax benefits is recorded as income tax expense. During 2018, the Company recognized net reductions of $0.4 million of tax-related interest expense. During 2017 and 2016, the Company recognized a net reduction of $0.1 million and a net addition of $2.5 million, respectively, of tax-related interest expense. Tax penalties of $0.1 million were recorded during 2017. No penalties were recorded in 2018 or 2016.

(12) Receivables and Payables

Receivables from, and Payables to, Brokers, Dealers and Clearing Organizations

The following is a summary of receivables from, and payables to, brokers, dealers and clearing organizations at December 31 (dollars in thousands):

	Receivables from		Payables to	
	December 31, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Broker-dealers	$ 247,214	$ 189,817	$ 200,579	$ 105,022
Clearing organizations	940	708	33,367	10,011
Securities borrowed	27,713	4,246	—	—
Securities loaned	—	—	94,248	4,245
Allowance for doubtful accounts	(1,121)	(864)	—	—
Total	$ 274,746	$ 193,907	$ 328,194	$ 119,278

Receivables from, and Payables to, Customers

The following is a summary of receivables from, and payables to, customers at December 31 (dollars in thousands):

	Receivables from		Payables to	
	December 31, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Customers	$ 227,334	$ 75,062	$ 36,825	$ 23,568
Allowance for doubtful accounts	(476)	(367)	—	—

Net	$ 226,858	$ 74,695	$ 36,825	$ 23,568

Allowance for Doubtful Accounts

The Company maintains an allowance for doubtful accounts based upon an estimate of the amount of potential credit losses in existing accounts receivable, as determined from a review of past due balances, historical collection experience and other specific account data. Account balances are written off against the allowance when it is determined that the receivable is uncollectible. The allowance was increased by $0.6 million in 2018 and $0.4 million in 2017. Write offs were $0.2 million in 2018 and 2017 had no write offs.

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Securities Borrowed and Loaned

In 2016, the Company closed its U.S. matched-book securities lending operations. At December 31, 2018 and 2017, the balances for securities borrowed and securities loaned related to customer settlement activities.

The gross amounts of interest earned on cash provided to counterparties as collateral for securities borrowed, and interest incurred on cash received from counterparties as collateral for securities loaned within the U.S. matched-book operations prior to the wind-down of all balances, and the resulting net amount included in other revenue on the Consolidated Statements of Operations for 2016 were as follows (dollars in thousands):

	2016
Interest earned	$ 1,961
Interest incurred	(1,132)
Net	$ 829

Deposits paid for securities borrowed and deposits received for securities loaned are recorded at the amount of cash collateral advanced or received. Deposits paid for securities borrowed transactions require the Company to deposit cash with the lender. With respect to deposits received for securities loaned, the Company receives collateral in the form of cash in an amount generally in excess of the market value of the securities loaned. The Company monitors the market value of the securities borrowed and loaned on a daily basis, with additional collateral obtained or refunded, as necessary.

The Company's securities borrowing and lending is generally done under industry standard agreements ("Master Securities Lending Agreements") that may allow, following an event of default by either party, the prompt close-out of all transactions (including the liquidation of securities held) and the offsetting of obligations to return cash or securities, as the case may be, by the non defaulting party. Events of default under the Master Securities Lending Agreements generally include, subject to certain conditions: (a) failure to timely deliver cash or securities as required under the transaction, (b) a party's insolvency, bankruptcy, or similar proceeding, (c) breach of representation, and (d) a material breach of the agreement. The counterparty that receives the securities in these transactions generally has unrestricted access in its use of the securities. For financial statement purposes, the Company does not offset securities borrowed and securities loaned.

The following table summarizes the transactions under certain Master Securities Lending Agreements that may be eligible for offsetting if an event of default occurred and a right of offset was legally enforceable (dollars in thousands):

	Gross Amounts of Recognized Assets/ (Liabilities)	Gross Amounts Offset in the Consolidated Statement of Financial Condition	Net Amounts Presented in the Consolidated Statement of Financial Condition	Collateral Received or Pledged (including Cash)	Net Amount
As of December 31, 2018:					
Deposits paid for securities borrowed	$ 27,713	$ —	$ 27,713	$ 27,713	$ —
Deposits received for securities loaned	94,248	—	94,248	95,223	(975)

As of December 31, 2017:					
Deposits paid for securities borrowed	$ 4,246	$ —	$ 4,246	$ 4,246	$ —
Deposits received for securities loaned	(4,245)	—	(4,245)	(4,229)	(16)

In accordance with ASU 2014-11, Repurchase-to-Maturity Transactions, Repurchase Financings, and Disclosures, the gross obligations of deposits received for securities loaned was $93.3 million and $4.2 million for equity securities at December 31, 2018 and 2017, respectively. The remaining contractual maturities of these agreements were overnight and continuous.

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(13) Premises and Equipment

The following is a summary of premises and equipment at December 31 (dollars in thousands):

	2018	2017
Furniture, fixtures and equipment	$ 145,615	$ 149,366
Leasehold improvements	43,643	45,543
	189,258	194,909
Less: accumulated depreciation and amortization	141,203	140,949
Total	$ 48,055	$ 53,960

Depreciation and amortization expense relating to premises and equipment amounted to $17.5 million, $18.3 million and $16.5 million during the years ended December 31, 2018, 2017 and 2016, respectively, and are included in occupancy and equipment expense in the Consolidated Statements of Operations. During 2018, premises and equipment costs and related accumulated depreciation and amortization were reduced by $14.3 million for assets that are no longer in use. During 2018, the Company also wrote off leasehold assets of $1.4 million, net of accumulated depreciation, related to the reduction of office space in Los Angeles.

(14) Capitalized Software

The following is a summary of capitalized software costs at December 31 (dollars in thousands):

	2018	2017
Capitalized software costs	$ 85,398	$ 86,316
Less: accumulated amortization	42,536	45,057
Total	$ 42,862	$ 41,259

Software costs totaling $27.6 million and $27.8 million were capitalized in 2018 and 2017, respectively, related to the continued development of new features and functionalities across the entire ITG product line. During 2018, capitalized software costs and related accumulated amortization were each reduced by $28.3 million for fully amortized costs.

Other general and administrative expenses in the Consolidated Statements of Operations included $25.4 million, $25.6 million and $25.1 million related to the amortization of capitalized software costs in 2018, 2017 and 2016, respectively. As of December 31, 2018 and 2017, there were no capitalized software costs not subject to amortization.

(15) Accounts Payable and Accrued Expenses

The following is a summary of accounts payable and accrued expenses at December 31 (dollars in thousands):

	December 31, 2018	December 31, 2017
Accrued research payables	$ 74,175	$ 51,275
Accrued compensation and benefits	38,802	37,911
Accrued costs for potential class action lawsuit settlement	18,000	—
Accrued rent	13,003	14,821
Trade payables	17,436	20,820
Deferred revenue	9,558	8,057
Deferred compensation	1,448	2,525
Accrued restructuring	1,942	6
Accrued transaction processing	5,055	3,257
Other	32,219	27,823
Total	$ 211,638	$ 166,495

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(16) Borrowings

Short-term Bank Loans

The Company's international securities clearing and settlement activities are funded with operating cash or with short-term bank loans in the form of overdraft facilities. At December 31, 2018, there was $78.0 million outstanding under these facilities at a weighted average interest rate of approximately 1.92% primarily associated with international settlement activities.

In the U.S., securities clearing and settlement activities are funded with operating cash, securities loaned or with short-term bank loans under the 2018 Credit Agreement described below.

ITG Inc., as borrower, and Investment Technology Group, Inc. (the "Parent Company"), as guarantor, maintain a $150 million revolving credit agreement (the "2018 Credit Agreement") with a syndicate of banks and JPMorgan Chase Bank, N.A., as Administrative Agent that was originally scheduled to mature in January 2019. On January 25, 2019, the 2018 Credit Agreement was amended to extend the maturity date to expire on March 31, 2019 to maintain financing availability under the 2018 Credit Agreement until the closing of the acquisition of the Company by Virtu. The 2018 Credit Agreement was terminated at the Effective Time of the Merger. The purpose of this credit line was to provide liquidity for the Company's U.S. brokerage operations to satisfy clearing margin requirements and to finance temporary positions from delivery failures or non-standard settlements. As a result, the Parent Company had additional flexibility with its existing cash and future cash flows from operations, including to selectively invest in growth initiatives and to return capital to stockholders. Depending on the borrowing base, availability under the 2018 Credit Agreement was limited to either (i) a percentage of the clearing deposit required by the National Securities Clearing Corporation, or (ii) a percentage of the market value of temporary positions pledged as collateral. Under the 2018 Credit Agreement, interest accrued at a rate equal to (a) a base rate, determined by reference to the federal funds rate plus (b) a margin of 2.50%. Available but unborrowed amounts under the 2018 Credit Agreement were subject to an unused commitment fee of 0.75%. Among other restrictions, the terms of the 2018 Credit Agreement included (a) negative covenants related to liens, (b) financial covenant requirements for maintaining a consolidated leverage ratio (as defined) and a liquidity ratio (as defined), as well as requirements for maintaining minimum levels of tangible net worth (as defined) and regulatory capital (as defined), and (c) restrictions on investments, dispositions and other restrictions customary for financings of this type.

The events of default under the 2018 Credit Agreement included, among others, payment defaults, cross defaults with certain other indebtedness, breaches of covenants, loss of collateral, judgments, and changes in control and bankruptcy events. In the event of non-payment, the 2018 Credit Agreement required ITG Inc. to pay incremental interest at the rate of 2.0%. In the event of a default and depending on the nature thereof, the commitments either automatically terminated and all unpaid amounts immediately became due and payable, or the lenders may in their discretion have terminated their commitments and declared due all unpaid amounts outstanding.

At December 31, 2018, there was $1.2 million outstanding under the 2018 Credit Agreement.

Term Debt

At December 31, term debt is comprised of the following (dollars in thousands):

	December 31, 2018	December 31, 2017
Term loans	$ 1,967	$ 3,104

Total	$ 1,967	$ 3,104

On December 21, 2017, the Company entered into a three year, $0.7 million note and security agreement with Hewlett-Packard Financial Services (“H-P Veritas Loan”), under which purchases of new software licenses and support were financed. The loan principal is payable in three installments of $239,996 in January 2018, and $229,994 in both January and March of 2019. The loan does not accrue interest.

On December 30, 2015, the Company entered into a five year, $3.6 million note and security agreement with Hewlett-Packard Financial Services (“H-P Loan”), under which purchases of new server equipment, software license

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fees, maintenance fees and fees for other services were financed. The loan principal is payable in twenty quarterly installments of $195,000 beginning in April 2016 and accrues interest at 2.95%. The reductions to the principal balance applying the interest method to the required payments are as follows (dollars in thousands):

Year	Aggregate Amount
2019	$ 554
2020	759
2021	193
	$ 1,506

Parent Company had previously entered into a $5.0 million master lease facility with Bank of America ("Master Lease Agreement"), under which purchases of new equipment were financed. Each equipment lease under the Master Lease Agreement was structured as a capital lease and had a separate 48 month term from its inception date, at the end of which Parent Company could purchase the underlying equipment for $1. At December 31, 2017, all capital leases under this facility were fully paid.

On August 10, 2012, Parent Company entered into a $25.0 million master lease facility with BMO Harris Equipment Finance Company ("BMO") to finance equipment and construction expenditures related to the build out of the Company's new headquarters in lower Manhattan. The original amount borrowed of $21.2 million had a 3.39% fixed rate term financing structured as a capital lease with a 48 month term that began upon the substantial completion of the build-out, at the end of which Parent Company may purchase the underlying assets for $1. At December 31, 2018 and 2017, the loan outstanding under the BMO facility was fully paid.

Interest expense on the 2018 Credit Agreement, the Master Lease Agreement and the BMO facility, including commitment fees and the amortization of debt issuance costs totaled $1.9 million, $2.0 million and $2.2 million in 2018, 2017 and 2016, respectively.

(17) Accumulated Other Comprehensive Income

The components and allocated tax effects of other comprehensive income for the periods ended December 31, 2018 and December 31, 2017 are as follows (dollars in thousands):

Year Ended December 31, 2018	
Balance at December 31, 2017	$ (21,397)
Other comprehensive loss	(11,403)
Balance at December 31, 2018	$ (32,800)
Year Ended December 31, 2017	
Balance at December 31, 2016	$ (33,977)
Other comprehensive income	12,580
Balance at December 31, 2017	$ (21,397)

Deferred taxes have not been provided on the cumulative undistributed earnings of foreign subsidiaries or the cumulative translation adjustment related to those investments due to the inclusion of foreign earnings and profits in U.S. taxable income pursuant to the Tax Cuts and Jobs Act.

(18) Net Capital Requirement

ITG Inc. and AlterNet are subject to the SEC’s Uniform Net Capital Rule (Rule 15c3 1), which requires the maintenance of minimum net capital. ITG Inc. has elected to use the alternative method permitted by Rule 15c3 1, which requires that ITG Inc. maintain minimum net capital equal to the greater of $1.0 million or 2% of aggregate debit balances arising from customer transactions, as defined. AlterNet has elected to use the basic method permitted by Rule 15c3 1, which requires that AlterNet maintain minimum net capital equal to the greater of 6 2/3% of aggregate indebtedness or $100,000. Dividends or withdrawals of capital cannot be made if capital is needed to comply with regulatory requirements.

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Net capital balances and the amounts in excess of required net capital at December 31, 2018 for the U.S. Operations are as follows (dollars in thousands):

	Net Capital	Excess
U.S. Operations		
ITG Inc.	$ 86,683	85,683
AlterNet	5,796	5,696

As of December 31, 2018, ITG Inc. had $5.9 million of cash in a Special Reserve Bank Account for the benefit of customers under the Customer Protection Rule pursuant to SEC Rule 15c3 3, Computation for Determination of Reserve Requirements and $4.6 million under PABs.

In addition, the Company's Canadian, European and Asia Pacific Operations have subsidiaries with regulatory capital requirements. The regulatory net capital balances and amount of regulatory capital in excess of the minimum requirements applicable to each business at December 31, 2018, is summarized in the following table (dollars in thousands):

	Net Capital	Excess
Canadian Operations		
Canada	$ 21,126	20,760
European Operations		
Ireland	42,485	17,152
U.K.	1,337	384
Asia Pacific Operations		
Australia	30,899	21,818
Hong Kong	2,761	2,223
Singapore	1,156	1,083

(19) Stockholders' Equity

The Company's current policy, which is reviewed continually, is to retain earnings to finance the operations and expansion of its businesses as well as return capital to stockholders through share repurchases and dividends on common stock.

Stock Repurchase Program

To facilitate its stock repurchase program, designed to return value to stockholders and minimize dilution from stock issuances, the Company repurchases shares in the open market and through automatic share repurchase programs under SEC Rule 10b5-1. The table below summarizes the Company’s share repurchases beginning January 1, 2016 under its Board of Directors’ authorizations:

chase Program Authorization Date	Expiration Date	Amount Authorized by Board (Shares in millions)	Total Shares Repurchased (millions)	Shares Remaining Under Board Authorization (millions)	Shares Repurchased Under Board Authorization 2018	2017	201
er 2014	none	4.0	3.7	0.3	0.3	0.9	1.
ary 2018	none	4.0	—	4.0	—	—	–
hares repurchased under ization					0.3	0.9	1.
millions)					$ 5.8	$ 16.9	$ 2
ge share price					$ 20.28	$ 19.13	$ 1

The Board authorized stock repurchase program expired at the Effective Time of the Merger as there is no established trading market for our equity securities as of the Closing Date of the Merger. The Company also repurchased approximately 0.5 million, 0.5 million and 0.4 million shares of common stock from employees, respectively, during each of 2018, 2017 and 2016 to satisfy the minimum statutory employee withholding tax upon the net settlement of restricted stock unit awards.

Dividend Program

In 2015, the Company's Board of Directors initiated a dividend program under which the Company began to pay quarterly dividends, subject to quarterly declarations by the Board of Directors. During 2018, the Board of Directors declared and the Company paid quarterly cash dividends of $0.07 per share totaling $9.2 million in the aggregate and issued stock dividends of $0.1 million.

(20) Off-Balance Sheet Risk and Concentration of Credit Risk

The Company is a member of various U.S. and non-U.S. exchanges and clearing houses that trade and clear, respectively, equities and/or derivative contracts. Associated with the Company's membership, the Company may be required to pay a proportionate share of financial obligations of another member who may default on its obligations to the exchanges or the clearing house. While the rules governing different exchange or clearing house memberships vary, in general, the Company's obligations would arise only if the exchanges and clearing houses had previously exhausted other remedies. The maximum potential payout under these memberships cannot be estimated. The Company has not recorded any contingent liability in the consolidated financial statements for these agreements and believes that any potential requirement to make payments under these agreements is remote. In the ordinary course of business, the Company guarantees obligations of subsidiaries which may arise from third-party clearing relationships and trading counterparties. The activities of the subsidiaries covered by these guarantees are included in the Company's consolidated financial statements. The Company is also subject to indemnification provisions within agreements with third-party clearing brokers in certain jurisdictions whereby the Company is obligated to reimburse the clearing broker, without limit, for losses incurred due to a counterparty's failure to satisfy its contractual obligations.

The Company's customer financing and securities settlement activities may require the Company to pledge customer securities as collateral in support of various secured financing transactions such as bank loans. In the event the financing counterparty is unable to meet its contractual obligation to return customer securities pledged as collateral, the Company may be exposed to the risk of acquiring the securities at prevailing market prices in order to satisfy its customer obligations. The Company controls this risk by monitoring the market value of securities pledged on a daily basis and by requiring adjustments of collateral levels in the event of excess market exposure.

Financial instruments that potentially subject the Company to concentrations of credit risk are primarily cash and cash equivalents, securities owned at fair value, receivables from brokers, dealers and clearing organizations and receivables from customers. Cash and cash equivalents and securities owned, at fair value are deposited with high credit quality financial institutions.

In connection with customer settlement activities, the Company loans securities temporarily to other brokers. The Company receives cash as collateral for the securities loaned. Increases in security prices may cause the market value of the securities loaned to exceed the amount of cash received as collateral. In the event the counterparty to these transactions does not return the loaned securities, the Company may be exposed to the risk of acquiring the securities at prevailing market prices in order to satisfy its client obligations. The Company controls this risk by requiring credit approvals for counterparties, by monitoring the market value of securities loaned on a daily basis, and by requiring additional cash as collateral or returning collateral when necessary.

The Company also borrows securities temporarily from other brokers in connection with customer settlement activities. The Company deposits cash as collateral for the securities borrowed. Decreases in security prices may cause the market value of the securities borrowed to fall below the amount of cash deposited as collateral. In the event the counterparty to these transactions does not return collateral, the Company may be exposed to the risk of selling the securities at prevailing market prices. The Company controls this risk by requiring credit approvals for counterparties, by monitoring the collateral values on a daily basis, and by depositing additional collateral with counterparties or receiving cash when deemed necessary.

The Company may at times maintain inventories in equity securities on both a long and short basis. Whereas long inventory positions represent the Company’s ownership of securities, short inventory positions represent obligations of the Company to deliver specified securities at a contracted price, which may differ from market prices

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prevailing at the time of completion of the transaction. Accordingly, both long and short inventory positions may result in losses or gains to the Company as market values of securities fluctuate. To mitigate the risk of losses, long and short positions are marked to market daily and are continuously monitored by the Company.

(21) Employee and Non Employee Director Stock and Benefit Plans

The 2007 Omnibus Equity Compensation Plan (the “2007 Plan”) was approved by the Company’s stockholders and became effective on May 8, 2007 (the “Effective Date”) and was last amended and restated effective June 8, 2017. As of the Effective Date, the Amended and Restated Investment Technology Group, Inc. Directors’ Retainer Fee Subplan (the “Directors’ Retainer Fee Subplan”) and the Amended and Restated Investment Technology Group, Inc. Directors’ Equity Subplan (the “Directors’ Equity Subplan,” and collectively with the Directors’ Retainer Fee Subplan, the “Subplans”) were merged with and into the 2007 Plan. Since the Effective Date, the Subplans have continued to be, and shall continue to be, in effect as subplans of the 2007 Plan and grants and/or deferrals may continue to be made. In October 2008, the Compensation Committee of the Company's Board of Directors adopted the Equity Deferral Award Program, another subplan under the 2007 Plan. This subplan, last amended and restated on January 23, 2017, is now known as the Variable Compensation Stock Unit Award Program Subplan, and continues to be a subplan under the 2007 Plan (the “VCSUA Subplan”).

As of December 31, 2018, there were 2,068,246 shares of common stock remaining available for issuance under the 2007 Plan. Shares of common stock which are attributable to awards which have expired, terminated, cash settled or been canceled or forfeited during any calendar year are generally available for issuance or use in connection with future awards. Shares of common stock surrendered in payment of the exercise price of a stock option and shares withheld or surrendered for payment of taxes are not available for re-issuance under the 2007 Plan. Options outstanding as of December 31, 2018 that have been granted under the 2007 Plan are exercisable until January 2024. The 2007 Plan will remain in effect until June 10, 2025, unless terminated, or extended, by the Board of Directors with the approval of the Company’s stockholders. After this date, no further awards shall be granted pursuant to the 2007 Plan, but previously granted awards will remain outstanding in accordance with their applicable terms and conditions.

In January 2006, the Board of Directors adopted the Directors’ Equity Subplan which became effective January 1, 2006 and merged into the 2007 Plan as referenced above. The Directors’ Equity Subplan was last amended and restated on January 23, 2017. The Directors’ Equity Subplan provides for the grant of restricted stock unit awards to non employee directors of the Company. Under the Directors’ Equity Subplan, a newly appointed non employee director will be granted restricted stock unit awards valued at $100,000 at, or shortly after, the time of appointment to the Board of Directors. Such initial restricted stock unit awards will vest annually in three equal installments, beginning on the first anniversary of the date of grant so long as the director has continued to serve on the Board of Directors from the grant date to the applicable vesting date. In addition, non employee directors are granted restricted stock unit awards annually on the day of each of the Company’s annual meetings of stockholders at which directors are elected or reelected by the Company’s stockholders. The value of these annual restricted stock unit awards is determined by the Compensation Committee. Currently, the value of restricted stock unit awards granted to the Chairman of the Board of Directors is $120,000 and the value of restricted stock unit awards granted to the other non-employee directors is $80,000. Such annual restricted stock unit awards vest in full on the day immediately preceding the Company’s next annual meeting of stockholders at which directors are elected or reelected by the Company’s stockholders so long as the director has continued to serve on the Board of Directors from the grant date through the vesting date.

Under the 2007 Plan, the Company is permitted to grant time based stock options, in addition to performance-based option awards to employees and directors. In 2016, the Company granted time-based options for 196,851 shares to the Company's new Chief Executive Officer. These stock options have an eight-year term and vest annually in three equal installments, beginning on the first anniversary of the grant date, if the Chief Executive Officer remains continuously employed by the Company, and is in good standing on, each applicable vesting date. The Company did not grant any option awards under the 2007 Plan during 2017 or 2018. The Company recognizes share based compensation expense (see Note 2, Summary of Significant Accounting Policies) for time based option awards over the vesting period.

On December 13, 2018, the Compensation Committee of the Board of Directors of the Company took certain actions, effective on December 17, 2018, to preserve certain compensation-related corporate income tax deductions for the Company that might otherwise be disallowed through the operation of Sections 280G and 4999 of the Internal Revenue Code of 1986, as amended (the "Code"), in connection with the Merger. Specifically, the Committee approved the accelerated vesting of equity awards held by certain senior executives (the "280G Accelerated Vesting

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Actions”). These actions were also taken to mitigate or eliminate the amount of excise tax that may be payable by these employees pursuant to Sections 280G and 4999 of the Code.

Pursuant to the 280G Accelerated Vesting Actions, the Committee approved the accelerated vesting of stock options to purchase 65,611 shares of common stock of the Company at an exercise price of $16.18 per share, which were scheduled to vest on January 15, 2019.

The tables below summarize the Company’s outstanding stock options as of December 31, 2018, 2017 and 2016 and changes during the years then ended:

Options Outstanding	Number of Shares	Weighted Average Exercise Price
Outstanding at December 31, 2015	42,665	$ 12.17
Granted	196,851	16.18
Exercised	(42,665)	12.17
Forfeited	—	—
Outstanding at December 31, 2016	196,851	$ 16.18
Granted	—	—
Exercised	—	—
Forfeited	—	—
Outstanding at December 31, 2017	196,851	$ 16.18
Granted	—	—
Exercised	(65,611)	16.18
Forfeited	—	—
Outstanding at December 31, 2018	131,240	$ 16.18
Amount exercisable at December 31,		
2018	131,240	$ 16.18
2017	65,630	$ 16.18
2016	—	$ —

	Options Outstanding			Options Exercisable	
Exercise Price	Number Outstanding	Weighted Average Remaining Contractual Life (Years)	Weighted Average Exercise Price	Number Exercisable	Weighted Average Exercise Price
$ 16.18	131,240	5.04	$ 16.18	131,240	$ 16.18

For the years ended December 31, 2018, 2017 and 2016, the Company recorded share-based compensation expense of $1.1 million (including $0.8 million related to the 280G Accelerated Vesting Actions described above), $0.3 million and $0.3 million, respectively, related to outstanding stock options, which had no income tax benefit in 2018 or 2017 and which was offset by a benefit of $0.1 million in 2016. There were 131,240 stock options exercisable at December

31, 2018. The weighted average remaining contractual term of stock options currently exercisable is 5.0 years.

All of the stock options outstanding at December 31, 2018 were time based.

Prior to the adoption of ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, the provision for income taxes excluded excess current tax benefits related to the exercise of stock options. Effective January 1, 2017, all subsequent excess tax benefits and deficiencies are recognized in the statement of operations as an increase or decrease in income taxes when the awards vest or are settled. See discussion in Note 2, Summary of Significant Accounting Policies. During 2018, the exercise of 65,611 stock options gave rise to a current tax shortfall of $0.1 million. During 2017, there were no exercises of stock options and therefore no corresponding excess tax benefits or deficiencies. During 2016, the exercise of 42,655 stock options gave rise to an excess tax benefit of $0.1 million.

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The following table summarizes information about stock options at December 31, 2018, 2017 and 2016:

($ in thousands)	2018	2017	2016
Total intrinsic value of stock options exercised	$ 908	$ —	$ 220
Weighted average grant date fair value of stock options granted during period, per share	—	—	16.18
Cash received from stock option exercises	$ 1,062	$ —	$ 208

The total intrinsic value for outstanding and exercisable stock options at December 31, 2018 was $1.8 million.

As of December 31, 2018, all compensation costs related to outstanding stock options had been recognized. Stock option exercises are settled from issuance of shares of the Company's common stock held in treasury to the extent available.

Under the 2007 Plan, the Company is permitted to grant restricted stock unit awards to employees. Generally, and except for awards granted under the VCSUA Subplan, restricted stock unit awards vest in one of the following manners: (a) serial vesting on each of the first, second and third anniversaries of the grant date, (b) one-third on the second anniversary of the grant date and two-thirds on the third anniversary of the grant date, (c) cliff vesting on the third anniversary of the grant date, (d) for new hire awards only, vesting terms that closely parallel the vesting terms of any awards that the new hire will forfeit upon joining the Company, except that no such new hire award or portion thereof shall vest prior to the one-year anniversary of the date of grant unless otherwise permitted by the 2007 Plan, or (e) serial vest on each of the second, third and fourth anniversaries of the date of grant so long as the award recipient is employed on the applicable vesting date and the 90-day average of the Company's common stock price preceding each of the vesting dates is greater than the 90-day average of the Company's common stock price preceding the grant date (market-based restricted stock units). Accordingly, not all restricted stock units awarded will vest and be delivered. The Company recognizes share-based compensation expense (see Note 2, Summary of Significant Accounting Policies) over the vesting period.

Under the VCSUA Subplan, each eligible participant was granted a number of basic stock units on the date the year-end variable compensation is communicated to participants equal to (i) the amount by which the participant's variable compensation is reduced as determined by the Compensation Committee of the Board of Directors, divided by (ii) the fair market value of a share of the Company's common stock on the date of grant. In addition, each participant may be granted an additional number of matching stock units on the date of grant equal to 10% of the number of time-based or market-based basic stock units granted. Basic stock units under the VCSUA Subplan that are time-based typically vest in equal annual installments on each of the first, second and third anniversaries of the date of grant, if the participant remains continuously employed by the Company, and is in good standing on, each applicable vesting date. Time-based matching stock units will vest 100% on the third anniversary of the date of grant, if the participant remains continuously employed by the Company through, and is in good standing on, such vesting date. Basic units under the VCSUA Subplan that are market-based (which were granted in February 2014 to members of senior management) vest in equal installments on each of the second, third and fourth anniversaries of the date of grant so long as the award recipient is employed on the applicable vesting date and the 90 day average of the Company's common stock price preceding each of the vesting dates is greater than the 90 day average of the Company's common stock price preceding the grant date. Matching stock units on market-based awards will vest 100% on the fourth anniversary of the date of grant so long as the award recipient is employed on the applicable vesting date and the 90 day average of the Company's common stock price preceding the vesting date is greater than the 90 day average of the Company’s common stock price preceding the grant date.

The Company has also issued to members of its senior management basic stock units under the VCSUA that vest in one of the following manners: (a) for awards granted in February 2015, in equal installments on each of the first, second, and third anniversaries of the date of grant based upon the level of the Company’s adjusted return-on-equity (“ROE”) achieved for each of the three fiscal years, respectively, that ends immediately prior to the applicable vesting date, (b) for awards granted in February 2016, in equal installments on each of the second and third anniversaries of the date of grant based upon the level of ROE achieved for each of the two fiscal years, respectively, that ends immediately prior to the applicable vesting date (each of (a) and (b), ROE-based restricted stock units), (c) for awards granted in January 2017, in equal installments on February 5, 2019 and February 5, 2020 based on the levels of revenue and pre-tax margin achieved for the 2018 fiscal year, or (d) for awards granted in January 2018, in equal installments on February 5, 2019, February 5, 2020 and February 5, 2021 based on the levels of revenue and pre-tax margin achieved for each of the three fiscal years, respectively, that ends immediately prior to the applicable vesting date (each of (c) and (d), performance-based restricted stock units). In addition to the performance criteria being achieved under each of these awards, the participant must remain continuously employed by the Company through, and be in good standing on, each applicable vesting date. The number of ROE-based restricted basic stock units awarded will be earned in each of the relevant performance periods if the target ROE is achieved at 100% and such number may increase or decrease if the actual ROE achieved is above or below the target ROE. In addition, certain senior employees have received matching ROE-based restricted stock units and such awards vest on the third anniversary of the date of grant based upon the average of the ROE achieved during the three-year period that ends immediately prior to the applicable vesting date. The number of matching ROE-based restricted stock units awarded will be earned if the target average ROE is achieved at 100% and such number may increase or decrease if the actual average ROE achieved is above or below the target average ROE. The number of performance-based restricted stock units earned is determined pursuant to a payout matrix established by the Committee that sets forth a range of payout percentages relative to the Company's actual revenue and pre-tax margin results achieved for the relevant fiscal year, with each performance metric weighted equally. All vested stock units are settled in shares of ITG common stock within 30 days after the date on which such stock units vest.

During 2016, the Company granted two Inducement Awards in conjunction with the hiring of its new Chief Executive Officer, which replaced awards he forfeited at his former employer. Under the first inducement award, the Chief Executive Officer was granted 135,353 restricted stock units that vested in three equal annual installments beginning on the first anniversary of the grant date. Under the second inducement award, the Chief Executive Officer was granted 156,051 restricted stock units which vested on the following vesting dates: (i) 38% vested on January 31, 2016 and were subject to a 12-month holding requirement; (ii) 41% vested on January 31, 2017; and (iii) the remaining 21% vested on January 31, 2018.

Pursuant to the 280G Accelerated Vesting Actions taken by the Compensation Committee described above, with respect to restricted stock unit awards, the Committee approved the accelerated vesting of an aggregate of (a) 39,815 time-based restricted stock units, which were scheduled to vest on January 24, 2019, (b) 4,509 time-based restricted stock units, which were scheduled to vest on February 11, 2019, (c) 45,804 time-based restricted stock units, which were scheduled to vest on January 24, 2020 and (d) 25,796 time-based restricted stock units, which were scheduled to vest on January 24, 2021.

The Company recorded share based compensation expense of $28.4 million (including $2.6 million related to the 280G Accelerated Vesting Actions described above), $19.6 million and $24.9 million for the years ended December 31, 2018, 2017 and 2016, respectively, related to restricted stock unit awards which were offset by related income tax benefits of approximately $1.2 million, $0.9 million and $8.9 million respectively.

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A summary of the status of the Company's restricted stock unit awards as of December 31, 2018, 2017 and 2016 and changes during the years then ended are presented below:

	Number of Shares Underlying ROE-Based, Market-Based or Performance-Based Restricted Stock Units	Number of Shares underlying Time-Based Restricted Stock Units	Total Number of Shares	Weighted Average Grant Date Fair Value
Outstanding at December 31, 2015	377,475	2,793,561	3,171,036	$ 16.75
Granted	228,895	1,437,021	1,665,916	16.16
Vested	(73,243)	(968,995)	(1,042,238)	16.06
Forfeited	(190,757)	(540,693)	(731,450)	16.88
Outstanding at December 31, 2016	342,370	2,720,894	3,063,264	$ 16.63
Granted	140,796	1,118,596	1,259,392	19.81
Vested	(51,498)	(1,279,523)	(1,331,021)	16.60
Forfeited	(38,324)	(45,766)	(84,090)	18.99
Outstanding at December 31, 2017	393,344	2,514,201	2,907,545	$ 18.10
Granted	122,424	1,184,933	1,307,357	21.18
Vested	(45,065)	(1,232,484)	(1,277,549)	18.84
Forfeited	(144,715)	(112,384)	(257,099)	19.35
Outstanding at December 31, 2018	325,988	2,354,266	2,680,254	$ 19.50

At December 31, 2018, 62,768 of the outstanding awards were ROE-based restricted stock units and 263,220 were performance-based restricted stock units.

On May 27, 2016, the Company sold Investment Research (See Note 6, Divestitures). Upon the closing of the transaction, the Company accelerated the vesting of 226,802 restricted stock unit awards held by employees that were part of Investment Research and are included in the table above. The cost to modify the vesting schedule of these shares resulted in an expense reversal of $0.7 million that is included as part of the gain in other revenues in the Consolidated Statements of Operations.

As of December 31, 2018, there was $25.2 million of total unrecognized compensation cost related to outstanding restricted stock unit awards. These costs are expected to be recognized over a weighted average period of approximately 1.2 years. During 2018, restricted stock unit awards with a fair value of approximately $23.9 million vested.

Prior to the adoption of ASU 2016-09, Improvements to Employee Share-Based Payment Accounting, the provision for income taxes excluded excess current tax benefits related to the vesting of restricted share units. Effective January 1, 2017 all subsequent excess tax benefits and deficiencies are recognized in the statement of operations. See discussion in Note 2, Summary of Significant Accounting Policies.

For the year ended December 31, 2018, the excess tax benefits totaled $0.6 million and tax shortfalls (arising from cancellations or deficits due to the vest date fair market value being less than the grant date fair market value) were $0.1 million. For the year ended December 31, 2017, the excess tax benefits totaled $1.5 million while tax shortfalls were $0.1 million. For the year ended December 31, 2016, the excess tax benefits totaled $0.8 million while tax shortfalls were $0.7 million. For 2016, such tax benefits are reflected as an increase in additional paid-in capital while tax shortfalls arising from the tax deduction being less than the cumulative book compensation cost is reflected as a decrease in additional paid-in capital.

Under the 2007 Plan and the VCSUA Subplan, the Company is permitted to grant phantom share awards. Phantom share awards vest like any other award granted under the 2007 Plan and VCSUA Subplan as described above and are settled in cash. The Company recognizes share based compensation expense (see Note 2, Summary of Significant Accounting Policies) over the applicable vesting period. For the year ended December 31, 2016, the Company recorded share based compensation expense of $0.1 million related to phantom share awards offset by related tax benefits of less than $0.1 million.

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A summary of the status of the Company's phantom share awards as of December 31, 2016 and changes during the year then ended are presented below:

	Number of Shares	Weighted Average Grant Date Fair Value
Outstanding at December 31, 2015	57,798	$ 12.24
Granted	—	—
Vested	(57,798)	12.24
Forfeited	—	—
Outstanding at December 31, 2016	—	$ —

At December 31, 2016, there were no outstanding phantom share awards and none were granted in 2017 or 2018. The Company discontinued granting phantom share awards effective January 1, 2014 and the remaining awards outstanding vested on February 22, 2016.

Notwithstanding the foregoing, at the Effective Time of the Merger, (i) each stock option of the Company that was outstanding and unexercised was converted at the Effective Time into an option to purchase Class A common stock, par value $0.00001 per share, of Virtu ("Virtu Common Stock"), with the number of shares of Virtu Common Stock and the exercise price applicable to such option based on an exchange ratio, the numerator of which is the Merger Consideration and the denominator of which is the volume-weighted average price per share of Virtu Common Stock for the ten trading days prior to the Effective Time (the "Exchange Ratio"); (ii) each outstanding award of restricted stock units or deferred stock units with respect to shares of the Company's common stock (other than awards with performance-based vesting or delivery requirements) (a "Company RSU Award") that was granted on or after January 23, 2017 and was not held by a non-employee director, former employee or employee whose employment was terminated involuntarily without cause immediately following the Effective Time was converted into the right to receive restricted stock units of Virtu on the same terms and conditions as were applicable under the Company RSU Award, with the number of shares of Virtu Common Stock subject to such replacement restricted stock unit award based on the number of shares of the Company's common stock subject to such Company RSU Award and the Exchange Ratio; (iii) each outstanding Company RSU Award other than those described in the preceding clause (ii) became fully vested at the Effective Time and converted into the right to receive the Merger Consideration with respect to the number of shares of the Company's common stock subject to such Company RSU Award; (iv) each outstanding award of restricted stock units with respect to shares of the Company's common stock with performance-based vesting or delivery requirements (a "Company PSU Award") that was granted on or after January 23, 2017 and was not held by a non-employee director, former employee or employee whose employment was terminated involuntarily without cause immediately following the Effective Time was converted into the right to receive restricted stock units of Virtu on the same terms and conditions as were applicable under the Company PSU Award (other than the performance-based vesting schedule, which was converted into a service-based vesting schedule in accordance with the applicable award agreement), with the number of shares of Virtu Common Stock subject to such replacement restricted stock unit award based on the number of shares of the Company's common stock deemed earned at the Effective Time and the Exchange Ratio; and (v) each outstanding Company PSU Award other than those described in the preceding clause (iv) became fully vested at the Effective Time and converted into the right to receive the Merger Consideration with respect to the number of shares of the Company's common stock deemed earned at the Effective Time.

ITG Employee and Non Employee Director Benefit Plans

All U.S. employees are eligible to participate in the Investment Technology Group, Inc. Retirement Savings Plan ("RSP"). The RSP applies to all eligible compensation up to the Internal Revenue Service annual maximum which was $275,000 during 2018. Since January 1, 2012, the Company matching contribution applies to 50% of voluntary employee contributions, on a maximum of 4% of eligible compensation per year. The Company may still make discretionary contributions based on consolidated profits. Most of the Company's international employees are eligible to participate in similar defined contribution plans. The costs for these benefits were approximately $4.0 million, $4.3 million, and $4.4 million in 2018, 2017 and 2016, respectively, and are included in compensation and employee benefits in the Consolidated Statements of Operations.

In November 1997, the Board of Directors approved the ITG Employee Stock Purchase Plan ("ESPP"), an employee stock purchase plan qualified under Section 423 of the Code. The ESPP became effective February 1, 1998

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and allows all full time employees to purchase shares of ITG common stock at a 15% discount. In accordance with the provisions of ASC 718, the ESPP is compensatory. The Company recorded share based compensation expense related to the ESPP of $0.2 million, $0.3 million and $0.4 million for the years ended December 31, 2018, 2017 and 2016, respectively. Shares distributed under the ESPP are newly-issued shares. The ESPP was suspended after the Company entered into the Merger Agreement with Virtu.

During 2018, each non employee director received a general Board retainer fee of $70,000, with the exception of the Chairman who received $105,000. Each non-employee director was also eligible to receive a Committee Chair retainer fee and Committee member retainer fee depending on their role on the Board's Committees. Under the Directors' Retainer Fee Subplan, which was adopted in 2002, these retainer fees are payable, at the election of each director, either in (i) cash, (ii) Company common stock with a value equal to the retainer fee on the grant date or (iii) under a deferred compensation plan which provides deferred share units with a value equal to the retainer fee on the grant date which convert to freely sellable shares when the director retires from the Board of Directors. Directors who chose common stock or deferred share units, in the aggregate, received 13,812 units or shares, 11,115 units or shares and 12,363 units or shares in 2018, 2017 and 2016, respectively. At December 31, 2018, there were 150,765 deferred share units outstanding, of which 19,825 shares were vested and deferred in 2018. The cost of the Directors' Retainer Fee Subplan including share based awards and cash fees was approximately $0.8 million, $0.8 million and $0.8 million in 2018, 2017 and 2016, respectively, and is included in other general and administrative expenses in the Consolidated Statements of Operations.

(22) Earnings Per Share

The following is a reconciliation of the basic and diluted earnings per share computations (dollars in thousands, except per share amounts):

	December 31, 2018	2017	2016
Net income (loss) for basic and diluted income (loss) per share	$ 691	$ (39,440)	$ (25,918)
Shares of common stock and common stock equivalents:			
Average common shares used in basic computation	33,003	33,009	32,906
Effect of dilutive securities	1,404	—	—
Average common shares used in diluted computation	34,407	33,009	32,906
Income (loss) per share:			
Basic	$ 0.02	$ (1.19)	$ (0.79)
Diluted	$ 0.02	$ (1.19)	$ (0.79)

At December 31, 2018, approximately 1.4 million share equivalents (based on the treasury stock method) were not included in the computation of diluted earnings per share because their effects would have been anti dilutive. For 2017 and 2016, there were no anti-dilutive securities due to the fact that the Company incurred a loss during the year.

(23) Commitments and Contingencies

Legal Matters

On November 7, 2018, ITG Inc. and AlterNet reached a final settlement with the SEC to resolve an investigation of certain operational features of the U.S. POSIT alternative trading system and access to U.S. POSIT data, together with related disclosures. According to the terms of the settlement, the Company paid a $12 million civil penalty.

With regard to the operational features of U.S. POSIT, the resolution was focused on: (i) the technological infrastructure supporting the matching engine from 2010 through mid-2014, which affected the ability of mainly clients engaged in low-latency trading to interact with other POSIT flow and (ii) a delay feature added in 2014 to ITG's Liquidity Guard anti-gaming technology designed to prevent latency arbitrage by temporarily preventing day orders submitted by certain clients engaged in low-latency trading from interacting with day orders from other clients. The resolution was also focused on: (i) overbroad internal access to, and internal sharing of, U.S. POSIT data, (ii) between October 2010 and July 2015, the sharing of anonymized lists of the top 100 symbols executed in U.S. POSIT and the top

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100 symbols sent to U.S. POSIT as immediate-or-cancel orders on the prior trading day mainly with clients or prospective clients engaged in low-latency trading, (iii) between June 2009 and November 2017, the sharing of a venue analysis report that contained up to 15 symbols (and associated aggregated, anonymized volume) executed in U.S. POSIT on the prior trading day with users of the Company's algorithms and (iv) instances of sharing of anonymized U.S. POSIT execution information with clients.

The Company has remediated the conduct described in the SEC's order. The order acknowledges ITG's cooperation and several of the Company's most significant remedial actions, including enhanced compliance procedures, stricter limits on access to POSIT data and additional training of employees concerning the handling of POSIT data.

In addition to the above, the Company's broker-dealer subsidiaries are regularly subject to, or involved in, investigations and other proceedings by government agencies and self-regulatory organizations, with respect to which the Company is cooperating. Such investigations and other proceedings may result in judgments, settlements, fines, disgorgements, penalties, injunctions or other relief. Given the inherent uncertainties and the current stage of these inquiries, and the Company's ongoing reviews, the Company is unable to predict the outcome of these matters at this time.

The Company is not a party to any pending material legal proceedings other than claims and lawsuits arising in the ordinary course of business, except a putative class action lawsuit and a derivative action have been filed with respect to the Company and certain of its current and former directors and/or executives in connection with the Company's announcement of the SEC matter described in the following paragraph (and other related actions could be filed).

On August 12, 2015, the Company reached a final settlement with the SEC in connection with the SEC's investigation into a proprietary trading pilot operated within AlterNet for sixteen months in 2010 through mid-2011. The investigation was focused on customer disclosures, Form ATS regulatory filings and customer information controls relating to the pilot's trading activity, which included (a) crossing against sell-side clients in POSIT and (b) violations of Company policy and procedures by a former employee. These violations principally involved information breaches for a period of several months in 2010 regarding sell-side parent orders flowing into ITG's algorithms and executions by all customers in non-POSIT markets that were not otherwise available to ITG clients. According to the terms of the settlement, the Company paid an aggregate amount of $20.3 million, representing a civil penalty of $18 million, disgorgement of approximately $2.1 million in trading revenues and prejudgment interest of approximately $0.25 million.

In connection with the announcement of the SEC investigation regarding AlterNet, two putative class action lawsuits were filed with respect to the Company and certain of its current and former executives, which were consolidated into a single action captioned In re Investment Technology Group, Inc. Securities Litigation before the U.S. District Court for the Southern District of New York. The complaint alleges, among other things, that the defendants made material misrepresentations or omitted to disclose material facts concerning, among other subjects, the matters that were the subject of the SEC settlement regarding AlterNet and the SEC investigation that led to the SEC settlement. The complaint seeks an unspecified amount of damages under the federal securities laws. On April 26, 2017, the court granted in part and denied in part the Company's motion to dismiss the complaint and granted the plaintiff leave to file a motion to amend its complaint. On June 12, 2017, the plaintiff filed a motion to amend its complaint against certain of the individual defendants who were dismissed from the case in the court's April opinion. On March 23, 2018, the court denied plaintiff's motion to amend, thereby affirming its dismissal of certain of the individual defendants from the case.

On April 19, 2018, the Company reached an agreement in principle to settle the consolidated securities class action lawsuit. In exchange for a release of claims and a dismissal with prejudice, the settlement includes a payment to class members of $18 million, which is well within the policy limits of, and is expected to be paid by, the Company's insurance carrier. The Consolidated Statements of Financial Condition as of December 31, 2018 include a payable to class members of $18.0 million in accounts payable and accrued expenses (also, see Note 15, Accounts Payable and Accrued Expenses) that is fully offset by a receivable from the Company's insurance carrier in other assets. As a result, the settlement is not expected to impact the Company's results. The settlement reached is solely to eliminate the uncertainties, burden and expense of further protracted litigation and does not constitute an admission of liability by the Company or its current or former executives or directors. Specifically, the Company and its current and former executives and directors deny any liability or responsibility for the claims made and make no admission of any wrongdoing. On August 8, 2018, the parties filed a Stipulation and Agreement of Settlement (the "Settlement") with the court, which was amended on October 26, 2018 and preliminarily approved by the court on November 5, 2018. On February 21, 2019, the court approved the Settlement and entered final judgment.

On November 27, 2015, a purported shareholder of the Company filed a shareholder derivative action captioned Watterson v. Gasser et al. against eleven current or former officers and directors of the Company in the Supreme Court for the State of New York. The Company is named as a nominal defendant, and the plaintiff purports to seek recovery on its behalf. The complaint generally alleges that the individual defendants breached their fiduciary duties to the Company in connection with the matters that were the subject of the SEC settlement regarding AlterNet. On January 11, 2019, the plaintiff filed a notice of voluntary discontinuance without prejudice.

Lease Commitments

The Company has entered into lease and sublease agreements with third parties for certain offices and equipment, which expire at various dates through 2030. Rent expense for each of the years ended December 31, 2018, 2017 and 2016 was $11.1 million, $11.8 million and $12.7 million, respectively, and is recorded in occupancy and equipment expense in the Consolidated Statements of Operations. The Company recognizes rent expense for escalation clauses, rent holidays, leasehold improvement incentives and other concessions using the straight line method over the minimum lease term. Minimum future rental commitments under non cancelable operating leases follow (dollars in thousands):

Year Ending December 31,	Aggregate Amount
2019	$ 14,287
2020	13,656
2021	13,097
2022	12,436
2023	10,674
2024 and thereafter	52,710
Total	$ 116,860

Other Commitments

Pursuant to employment arrangements, in the event of termination of employment without cause on December 31, 2018, the Company would be obligated to pay separation payments totaling $6.5 million.

Pursuant to contracts expiring through 2023, the Company is obligated to purchase market data, maintenance and other services totaling $50.5 million.

(24) Segment Reporting

The Company is organized into four geographic operating segments through which the Company's chief operating decision maker manages the Company's business. The U.S., Canadian, European and Asia Pacific Operations segments provide the following categories of products and services:

- Execution Services — includes (a) liquidity matching through POSIT, our Alternative Trading System (“ATS”), (b) self-directed trading using algorithms (including single stocks and portfolio lists) and smart routing, (c) portfolio trading and single stock sales trading desks providing execution expertise and (d) futures and options trading

- Workflow Technology — includes trade order and execution management software applications in addition to network connectivity

- Analytics — includes (a) tools enabling portfolio managers and traders to improve pre-trade, real-time and post-trade execution performance, (b) portfolio construction and optimization decisions and (c) securities valuation

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The accounting policies of the reportable segments are the same as those described in Note 2, Summary of Significant Accounting Policies. The Company allocates resources to, and evaluates the performance of, its reportable segments based on income or loss before income tax expense (benefit). Consistent with the Company's resource allocation and operating performance evaluation approach, the effects of inter-segment activities are eliminated except in limited circumstances where certain technology related costs are allocated to a segment to support that segment's revenue producing activities. Commissions and fees revenue for trade executions and commission share revenues are principally attributed to each segment based upon the location of execution of the related transaction except that commissions and fees for trade executions by Canadian clients in the U.S. market are attributed to the Canadian Operations instead of the U.S. Operations. Recurring revenues are principally attributed based upon the location of the client using the respective service.

Regional segment results exclude the impact of Corporate activity, which is presented separately and includes investment income from treasury activity, certain non-operating revenues and other gains as well as costs not associated with operating the businesses within the Company's regional segments. These costs include, among others, (a) the costs of being a public company, such as certain staff costs, a portion of external audit fees, and reporting, filing and listing costs, (b) intangible asset amortization, (c) interest expense, (d) professional fees associated with the Company's global transfer pricing structure, (e) foreign exchange gains or losses and (f) certain non-operating expenses.

A summary of the segment financial information is as follows (dollars in thousands):

	U.S. Operations	Canadian Operations	European Operations	Asia Pacific Operations	Corporate	Consolidated
2018						
Total revenues	$ 191,391	$ 71,973	$ 168,643	$ 74,465	$ 3,004	$ 509,476
(Loss) income before income tax expense (benefit) (1) (2) (3) (4)	(7,885)	13,224	40,251	14,181	(49,672)	10,099
Identifiable assets	478,254	132,815	325,660	84,346	—	1,021,075
Capital purchases	6,701	1,413	3,332	2,355	—	13,801
Depreciation and amortization	31,818	2,187	6,416	2,357	1,082	43,860
Non-cash share-based compensation	11,446	3,108	6,468	1,508	7,232	29,762
2017						
Total revenues	$ 204,990	$ 63,294	$ 151,472	$ 62,218	$ 1,720	$ 483,694
(Loss) income before income tax expense (benefit) (4) (5) (6)	(13,830)	7,942	36,061	8,745	(32,393)	6,525
Identifiable assets	342,487	108,457	274,836	59,076	—	784,856
Capital purchases	13,278	1,183	3,289	1,652	—	19,402
Depreciation and amortization	33,307	2,420	6,094	1,994	1,338	45,153
Non-cash share-based compensation	9,543	2,390	5,267	959	2,079	20,238

2016						
Total revenues	$ 229,655	$ 61,822	$ 125,945	$ 47,919	$ 3,711	$ 469,052
(Loss) income before income tax expense (7) (8) (9) (10) (11) (12) (13)	1,319	8,474	19,198	(1,537)	(70,694)	(43,240)
Identifiable assets	396,419	80,943	236,071	61,852	—	775,285
Capital purchases	15,547	2,549	1,886	1,333	—	21,315
Depreciation and amortization	32,896	2,402	6,741	1,484	—	43,523
Non-cash share-based compensation	10,642	2,383	5,948	925	5,722	25,620

(1) In the second quarter of 2018, the Company incurred a charge to establish an accrual of $12.0 million for a potential settlement with the SEC, which was finalized in the fourth quarter of 2018, related to an investigation into the operational features of U.S. POSIT and access to U.S. POSIT data, together with certain related disclosures, and incurred related legal fees of $1.2 million. Due to the non-deductibility of the settlement charge and the full valuation allowance on U.S. deferred tax assets, there is no tax effect on this adjustment.

(2) In the fourth quarter of 2018, the Company incurred costs of $8.0 million related to the acquisition of the Company by Virtu.

(3) In 2018, the Company incurred restructuring charges of $10.6 million related to the elimination of certain positions in the U.S. and the reduction of office space in Los Angeles.

(4) In the fourth quarter of 2017, the Company incurred an $8.1 million charge for the write-off of fixed assets and other costs associated with the consolidation of ITG’s New York office space. In 2018, we incurred an additional charge for the New York office space consolidation of $0.4 million.

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(5) The Company has restated segment results for the year ended December 31, 2017, resulting in a decrease in U.S. expenses of $10.7 million and increases in expenses in Canada, Europe and Asia Pacific of $2.7 million, $5.1 million and $2.9 million, respectively.

(6) In the third quarter of 2017, the Company deemed the remaining value of a customer intangible asset recorded in ITG Derivatives of $0.3 million fully impaired and incurred legal fees related to the planned formation of the Matrix derivatives venture of $0.8 million.

(7) The Company has restated segment results for the year ended December 31, 2016, resulting in a decrease in U.S. expenses of $12.5 million and increases in expenses in Canada, Europe and Asia Pacific of $3.1 million, $6.3 million and $3.1 million, respectively.

(8) In the second quarter of 2016, the Company received insurance proceeds of $2.4 million from its corporate insurance carrier to settle a claim for lost profits arising from an August 2015 outage in its outsourced primary data center in the U.S. Additionally, the Company generated a nominal gain on the completion of the sale of its investment research operations in May 2016.

(9) In the second half of 2016, the Company incurred $24.5 million for a settlement with the SEC with respect to an inquiry involving pre-released ADRs and incurred legal and other related costs associated with this matter of $2.9 million.

(10) During the second quarter of 2016, the Company incurred restructuring charges of $4.3 million related to (a) the reduction in its single stock sales trading and sales organizations and (b) the closing of its U.S. matched-book securities lending operations and its Canadian arbitrage trading desk. In the fourth quarter of 2016, the Company incurred additional restructuring charges of $5.3 million related to management delayering and the elimination of certain positions.

(11) The Company’s Chief Executive Officer, who departed the Company in connection with the Merger, was granted cash and stock awards upon the commencement of his employment in January 2016, a significant portion of which replaced awards he forfeited at his former employer. Due to U.S. tax regulations, only a small portion of the amount expensed for these awards was eligible for a tax deduction.

(12) In the first half of 2016, the Company incurred a charge of $4.8 million, net of an insurance recovery of $0.5 million, to settle an arbitration case with its former CEO whose employment with the Company was terminated in August 2015 and incurred legal fees of $2.7 million. In the third quarter of 2016, the Company recorded a reimbursement of $0.9 million of these legal fees from its insurance carrier.

(13) In the third quarter of 2016, the Company substantially completed the liquidation of its investment in its Israel entity that ceased operations in December 2013. During the Company's period of ownership and through December 2013, the Company had accumulated foreign exchange translation gains as a component of equity, which have been reclassified as a gain that reduced other general and administrative expenses in the Consolidated Statements of Operations.

The table below details the total revenues for the categories of products and services provided by the Company for the years ended December 31, 2018, 2017 and 2016 (dollars in thousands):

	December 31, 2018	2017	2016
Revenues:			
Execution Services	$ 359,300	$ 344,192	$ 328,252
Workflow Technology	104,064	92,533	92,891
Analytics	43,108	45,249	44,198
Corporate (non-product)	3,004	1,720	3,711
Total Revenues	$ 509,476	$ 483,694	$ 469,052

The product group revenues noted above are consistent with the revenues recognized under ASC 606, except that the table includes revenue of $2.1 million for the year ended December 31, 2018 in Analytics for functionality that is not a separate performance obligation from products and services provided by Workflow Technology and Execution Services.

Long lived assets, classified by the geographic region in which the Company operates, are as follows (dollars in thousands):

	2018	2017	2016
Long-lived Assets at December 31,			
United States	$ 80,081	$ 86,345	$ 92,509
Canada	3,235	3,841	6,972
Europe	25,907	26,130	22,883
Asia Pacific	5,081	4,060	3,726
Total	$ 114,304	$ 120,376	$ 126,090

The Company's long lived assets primarily consist of premises and equipment, capitalized software, goodwill, other intangibles and debt issuance costs.

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(25) Supplementary Financial Information (unaudited)

The following tables set forth certain unaudited financial data for the Company’s quarterly operations in 2018 and 2017. The following information has been prepared on the same basis as the annual information presented elsewhere in this report and, in the opinion of management, includes all adjustments, consisting only of normal recurring adjustments, necessary for a fair presentation of the information for the quarterly periods presented. The operating results for any quarter are not necessarily indicative of results for any future period.

	(Unaudited) December 31, 2018				(Unaudited) December 31, 2017			
ands, expect per share	Fourth Quarter	Third Quarter	Second Quarter	First Quarter	Fourth Quarter	Third Quarter	Second Quarter	Firs Qua
enues	$ 128,746	$ 120,769	128,477	131,484	$ 126,747	$ 114,531	$ 121,581	$ 1
:								
ation and employee	47,787	45,244	45,099	45,787	45,283	46,755	45,994	4
on processing	25,931	23,293	25,969	27,080	26,981	23,428	25,482	2
y and equipment	15,073	15,926	15,055	14,775	23,316	14,945	14,680	1
nunications and data g services	13,263	12,653	12,988	12,603	12,132	12,189	12,129	1
ring charges	1	3,436	—	7,165	—	—	—	-
eral and administrative	24,507	16,969	29,132	17,691	18,957	18,670	17,699	1
xpense	487	489	488	486	496	499	510	5
enses	127,049	118,010	128,731	125,587	127,165	116,486	116,494	1
oss) before income tax benefit)	1,697	2,759	(254)	5,897	(418)	(1,955)	5,087	3
x expense (benefit)	2,577	2,530	2,781	1,520	2,000	45,012	444	(
income	$ (880)	$ 229	$ (3,035)	$ 4,377	$ (2,418)	$ (46,967)	$ 4,643	$ 5
s) income per share	$ (0.03)	$ 0.01	(0.09)	0.13	$ (0.07)	$ (1.42)	$ 0.14	$ 0
oss) income per share	$ (0.03)	$ 0.01	(0.09)	0.13	$ (0.07)	$ (1.42)	$ 0.14	$ 0
ghted average number on shares outstanding	33,003	33,002	33,035	32,890	32,855	33,105	33,125	3
eighted average f common shares ng	33,003	34,421	33,035	33,993	32,855	33,105	34,222	3

Earnings per share for quarterly periods are based on the weighted average common shares outstanding in individual quarters; thus, the sum of earnings per share of the quarters may not equal the amounts reported for the full year.

	(Unaudited) December 31, 2018				(Unaudited) December 31, 2017			
entage evenues	Fourth Quarter (a)(b)(c)	Third Quarter (b)(c)(d)	Second Quarter (c)	First Quarter (d)	Fourth Quarter (e)(f)(g)	Third Quarter (g)(h)	Second Quarter	Fi Q
nues	100 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	10
ation and benefits	37.1	37.5	35.1	34.8	35.7	40.8	37.8	38

on g	20.1	19.3	20.2	20.6	21.3	20.5	21.0	20
y and t	11.7	13.2	11.7	11.2	18.4	13.0	12.1	12
unications rocessing	10.3	10.5	10.1	9.6	9.6	10.6	10.0	10
ring	0.0	2.8	—	5.4	—	—	—	—
eral and ative	19.0	14.1	22.7	13.5	15.0	16.3	14.6	14
pense	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.
enses	98.7	97.7	100.2	95.5	100.4	101.6	95.9	96
oss) before x expense	1.3	2.3	(0.2)	4.5	(0.4)	(1.6)	4.1	3.
x expense	2.0	2.1	2.2	1.2	1.6	39.3	0.4	(1
income	(0.7) %	0.2 %	(2.4) %	3.3 %	(2.0) %	(40.9) %	3.7 %	4.

(a) In the fourth quarter of 2018, the Company incurred costs of $8.0 million related to the acquisition of the Company by Virtu.

(b) In the third quarter of 2018, the Company increased its accrual for the consolidation of ITG's New York office space by $0.9 million and then reduced the accrual by $0.5 million in the fourth quarter of 2018.

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(c) In the second quarter of 2018 the Company incurred a charge to establish an accrual of $12.0 million for a potential settlement with the SEC, which was finalized in the fourth quarter of 2018, related to an investigation into the operational features of U.S. POSIT and access to U.S. POSIT data, together with certain related disclosures. The Company incurred legal fees related to this matter of $0.1 million, $0.9 million and $0.2 million in the fourth quarter of 2018, the third quarter of 2018 and the second quarter of 2018, respectively.

(d) In the third quarter of 2018, the Company incurred a restructuring charge $3.4 million to eliminate certain positions and reduce its office space in Los Angeles. In the first quarter of 2018, the Company incurred a restructuring charge of $7.2 million to eliminate certain positions.

(e) In the fourth quarter of 2017, the Company incurred an $8.1 million charge for the write-off of fixed assets and other costs associated with the consolidation of ITG's New York office space.

(f) In the fourth quarter of 2017, the Company reduced the amount recorded for a deferred tax liability in the U.S. due to the passing of the Tax Cuts and Jobs Act, which lowered the U.S. corporate income tax rate from 35% to 21%.

(g) In the third quarter of 2017, the Company determined that it was appropriate to establish a full valuation allowance on its U.S. deferred tax assets, of which $42.3 million related to periods prior to the third quarter of 2017. In the fourth quarter of 2017, the Company reduced the valuation allowance by $0.9 million as a portion of these U.S. deferred tax assets were realized following a tax method change.

(h) In the third quarter of 2017, the Company deemed the remaining value of a customer intangible asset recorded in ITG Derivatives of $0.3 million fully impaired and incurred legal fees related to the formation of the Matrix derivatives venture of $0.8 million.

(i)

(26) Subsequent Events

Merger

On March 1, 2019, the Company completed its merger with and into Merger Sub, surviving the Merger as an indirect wholly owned subsidiary of Virtu. For additional information regarding the Merger, see Note 1, Organization and Basis of Presentation.

Amendment and Termination of Credit Agreement

On January 25, 2019, the 2018 Credit Agreement was amended to extend the maturity date to expire on March 31, 2019 to maintain financing availability under the 2018 Credit Agreement until the closing of the acquisition of the Company by Virtu. The 2018 Credit Agreement was terminated at the Effective Time of the Merger. For additional information regarding the 2018 Credit Agreement, see Note 16, Borrowings.

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

There were no changes in, or disagreements with, accountants reportable herein.

Item 9A. Controls and Procedures

Conclusion Regarding the Effectiveness of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our disclosure controls and procedures, as such term is defined under Rule 13a 15(e) promulgated under the Exchange Act. Based on this evaluation, our principal executive officer and our principal financial officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this annual report.

Changes in Internal Control over Financial Reporting

There were no changes in the Company’s internal control over financial reporting that occurred during the quarter ended December 31, 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Management’s Report on Internal Control Over Financial Reporting

The management of ITG is responsible for establishing and maintaining adequate internal control over financial reporting. ITG’s internal control over financial reporting is a process designed under the supervision of ITG’s chief executive and chief financial officers, and affected by ITG's board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of ITG's financial statements for external reporting purposes in accordance with U.S. GAAP and includes policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of ITG, (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with U.S. GAAP, and that receipts and expenditures of ITG are being made only in accordance with authorizations of ITG's management and directors and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of ITG'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 the 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 policies and procedures may deteriorate.

Management assessed the effectiveness of ITG's internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in Internal Control—Integrated Framework (2013). Based on its assessment and those criteria, management has concluded that ITG maintained effective internal control over financial reporting as of December 31, 2018.

The effectiveness of ITG's internal control over financial reporting as of December 31, 2018 has been audited by KPMG LLP, ITG's independent registered public accounting firm, as stated in their report on the following page, which expressed an unqualified opinion on the effectiveness of ITG's internal control over financial reporting as of December 31, 2018.

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Report of Independent Registered Public Accounting Firm

To the Board of Managers
Virtu ITG Holdings LLC:

Opinion on Internal Control Over Financial Reporting

We have audited Investment Technology Group, Inc. and subsidiaries (the Company) internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated statement of financial condition of the Company as of December 31, 2018 and 2017, the related consolidated statements of operations, comprehensive (loss) income, change in stockholders' equity, and cash flows for each of the years in the three-year period ended December 31, 2018, and the related notes (collectively, the consolidated financial statements), and our report dated March 14, 2019 expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

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

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included 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/ KPMG LLP

New York, New York

March 14, 2019

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Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The Registrant meets the conditions set forth in General Instruction I(1)(a) and (b) of Form 10-K and has omitted the information called for by this Item pursuant to General Instruction I(2)(c) of Form 10-K.

Item 11. Executive Compensation

The Registrant meets the conditions set forth in General Instruction I(1)(a) and (b) of Form 10-K and has omitted the information called for by this Item pursuant to General Instruction I(2)(c) of Form 10-K.

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

The Registrant meets the conditions set forth in General Instruction I(1)(a) and (b) of Form 10-K and has omitted the information called for by this Item pursuant to General Instruction I(2)(c) of Form 10-K.

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

The Registrant meets the conditions set forth in General Instruction I(1)(a) and (b) of Form 10-K and has omitted the information called for by this Item pursuant to General Instruction I(2)(c) of Form 10-K.

Item 14. Principal Accountant Fees and Services

KPMG LLP ("KPMG") was our independent registered public accounting firm for the years ended December 31, 2018 and 2017.

Fees to our Independent Registered Public Accounting Firm

The following table presents fees for professional services rendered by KPMG for the audit of our annual financial statements for the years ended December 31, 2018 and 2017, and fees billed for audit related services, tax services and all other services rendered by KPMG for such periods.

	2018	2017
	(in thousands)	
Audit fees(1)	$ 2,369	$ 2,378
Audit related fees(2)	10	23
Tax fees(3)	335	368
All other fees(4)	297	317
Total	$ 3,011	$ 3,086

(1)The aggregate fees incurred include amounts for the audit of our annual financial statements, the reviews of the financial statements included in our Quarterly Reports on Form 10 Q and amounts for the audit of our internal controls pursuant to Section 404 of the Sarbanes Oxley Act of 2002, including in each case services related thereto such as statutory audits, consents, and assistance with, and review of, documents filed with the SEC and other regulatory bodies.

(2)The audit related fees for 2018 primarily relate to attestation services provided to our two U.S. broker dealers and the audit related fees for 2017 primarily relate to attestation services provided to our three U.S. broker dealers and a regulatory related attestation engagement.

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(3)The aggregate fees incurred for tax services include amounts in connection with tax compliance and tax consulting services.

(4)The all other fees for 2018 primarily relate to services in connection with a SOC2 audit report and the all other fees for 2017 primarily relate to services in connection with a SOC2 audit report.

Pre approval of Services by the Independent Registered Public Accounting Firm

The Audit Committee adopted policies and procedures for pre approval of audit and permitted non audit services by our independent auditor. The Audit Committee considered annually and, if appropriate, approved the provision of audit services by its independent auditor and, if appropriate, pre approved the provision of certain defined audit and non audit services. The Audit Committee also considered on a case by case basis and, if appropriate, pre approved specific engagements that were not previously pre approved. Any proposed engagement that did not fit within the definition of a pre approved service was presented to the Audit Committee for consideration at its next regular meeting or earlier if required.

The Audit Committee authorized the Company’s Chief Financial Officer to engage the Company’s independent auditor to perform special non audit projects (including tax compliance projects), provided that (a) to the extent that the aggregate fees payable in respect of one or more projects between scheduled meetings of the Audit Committee were less than or equal to $100,000, the Company’s Chief Financial Officer would obtain prior approval from the Audit Committee’s Chair, and the independent auditor would provide a written description and be available to discuss the service with the Audit Committee’s Chair prior to approval, (b) to the extent the fees payable in respect of a project were expected to exceed $100,000, or the project would result in the Audit Committee’s Chair exceeding the aggregate $100,000 limit between scheduled meetings of the Audit Committee, separate prior Audit Committee approval would be obtained and the independent auditor would provide a written description and be available to discuss the service with the Committee prior to approval and (c) the subject matter of such projects was permitted to be performed under the SEC’s and the PCAOB’s independence rules. Any projects approved in accordance with (a) was brought to the attention of the Audit Committee at its next meeting.

The Audit Committee regularly reviewed summary reports detailing all services being provided to ITG by its independent auditor.

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PART IV

Item 15. Exhibits and Financial Statement Schedules

(a)(1) Financial Statements

Included in Part II of this report:

(a)(2) Schedules

Schedules are omitted because the required information either is not applicable or is included in the financial statements or the notes thereto.

(a)(3) Exhibits

Exhibits Number	Description
2.1	Agreement and Plan of Merger, dated November 6, 2018, by and among Virtu Financial, Inc., Impala Merger Sub, Inc. and Investment Technology Group, Inc. (incorporated by reference to Exhibit 2.1 to the Current Report on Form 8-K filed on November 8, 2018).
3.1	Certificate of Incorporation of the Company (incorporated by reference to Exhibit 3.1 to the Annual Report on

	Form 10 K for the year ended December 31, 1999).
3.2	Amended and Restated By laws of the Company (incorporated by reference to Exhibit 3.1 to the Current Report on Form 8 K filed on February 27, 2017).
4.1	Form of Certificate for Common Stock of the Company (incorporated by reference to Exhibit 4.1 to the Annual Report on Form 10 K for the year ended December 31, 1999).
10.1	Credit Agreement, dated January 27, 2017 by and among ITG Inc., Investment Technology Group, Inc., the several banks and other financial institutions or entities from time to time parties thereto as lenders, Bank of America, N.A. and Bank of Montreal, as syndication agents, and JPMorgan Chase Bank, N.A. as administrative agent (incorporated by reference to Exhibit 10.2 to the Annual Report on Form 10-K for the year ended December 31, 2016).
10.2	Credit Agreement, dated January 26, 2018 by and among ITG Inc., Investment

	Technology Group, Inc., the several banks and other financial institutions or entities from time to time parties thereto as lenders, Bank of America, N.A. and Bank of Montreal, as syndication agents, and JPMorgan Chase Bank, N.A. as administrative agent (incorporated by reference to Exhibit 10.2 to the Annual Report on Form 10-K for the year ended December 31, 2017).
10.2.1	First Amendment to the Credit Agreement, dated January 25, 2019, by and among ITG Inc., Investment Technology Group, Inc., the several banks and other financial institutions or entities from time to time parties thereto as lenders, Bank of America, N.A. and Bank of Montreal, as syndication agents, and JPMorgan Chase Bank, N.A. as administrative agent (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8 K filed on January 30, 2019).
10.3	Lease, dated as of February 24, 2012, between Brookfield Properties OLP Co. LLC and Investment Technology

Group, Inc. (incorporated by reference to Exhibit 10.47 to the Annual Report on Form 10 K for the year ended December 31, 2011).

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Exhibits Number	Description
10.4(†)	Amended and Restated Investment Technology Group, Inc. Pay For Performance Incentive Plan (incorporated by reference to Exhibit 10.13.2 to the Annual Report on Form 10 K for the year ended December 31, 2007).
10.4.1(†)	Amended and Restated Investment Technology Group, Inc. Pay For Performance Incentive Plan (2014) (incorporated by reference to Exhibit 10.5.1 to the Annual Report on Form 10 K for the year ended December 31, 2014).
10.5(†)	Investment Technology Group, Inc. Amended and Restated 2007 Omnibus Equity Compensation Plan (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended June 30, 2010).
10.5.1(†)	Investment Technology Group, Inc. Amended and

	Restated 2007 Omnibus Equity Compensation Plan (2014) (incorporated by reference to Exhibit 10.6.1 to the Annual Report on Form 10 K for the year ended December 31, 2014).
10.5.2(†)	Investment Technology Group, Inc. Amended and Restated 2007 Omnibus Equity Compensation Plan (2015) (incorporated by reference to Exhibit 99.1 to Form S-8 filed on September 25, 2015).
10.5.3(†)	Investment Technology Group, Inc. Amended and Restated 2007 Omnibus Equity Compensation Plan (2017) (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8 K filed on January 26, 2017).
10.5.4(†)	Investment Technology Group, Inc. Amended and Restated 2007 Omnibus Equity Compensation Plan (2017) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2017).

10.6(†)	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement for Employees (2014) (incorporated by reference as Exhibit 10.7.1 to the Annual Report on Form 10-K for the year ended December 31, 2013).
10.6.1(†)	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement for Employees (2017) (incorporated by reference to Exhibit 10.3 to the Current Report on Form 8 K filed on January 26, 2017).
10.6.2(†)*	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement for Canadian Employees (2019).
10.7(†)	Investment Technology Group, Inc. 2007 Omnibus Equity Compensation Plan Variable Compensation Stock Unit Award Program Subplan (incorporated by reference to Exhibit 10.2 to the Quarterly Report on Form 10 Q for the quarter ended September 30, 2011).
10.7.1(†)	

	Amended and Restated Investment Technology Group, Inc. 2007 Omnibus Equity Compensation Plan Variable Compensation Stock Unit Award Program Subplan (2014) (incorporated by reference to Exhibit 10.10.2 to the Annual Report on Form 10 K for the year ended December 31, 2014).
10.7.2(†)	Amended and Restated Investment Technology Group, Inc. 2007 Omnibus Equity Compensation Plan Variable Compensation Stock Unit Award Program Subplan (2015) (incorporated by reference to Exhibit 10.2 to the Current Report on Form 8 K filed on February 9, 2015).
10.7.3(†)	Amended and Restated Investment Technology Group, Inc. 2007 Omnibus Equity Compensation Plan Variable Compensation Stock Unit Award Program Subplan (2015) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended June 30, 2015).

10.7.4(†)	Amended and Restated Investment Technology Group, Inc. 2007 Omnibus Equity Compensation Plan Variable Compensation Stock Unit Award Program Subplan (2017) (incorporated by reference to Exhibit 10.2 to the Current Report on Form 8 K filed on January 26, 2017).
10.8(†)	Form of Grant Notice (ExCo ROE Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and Executive Committee Members of the Company (2015) (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8 K filed on February 9, 2015).
10.9(†)	Form of Grant Notice (ExCo ROE Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and Executive Committee

Members of the Company (2016) (incorporated by reference to Exhibit 10.14 to the Annual Report on Form 10-K for the year ended December 31, 2015).

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Exhibits Number	Description
10.10(†)	Form of Grant Notice (MD ROE Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and certain employees of the Company (2015) (incorporated by reference to Exhibit 10.14 to the Annual Report on Form 10 K for the year ended December 31, 2014).
10.11(†)	Form of Grant Notice (ExCo Performance-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and Executive Committee Members of the Company (2017) (incorporated by reference to Exhibit 10.13 to the Annual Report on Form 10 K for the year ended

	December 31, 2016).
10.12(†)	Form of Grant Notice (ExCo Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and Executive Committee Members of the Company (2017) (incorporated by reference to Exhibit 10.14 to the Annual Report on Form 10 K for the year ended December 31, 2016).
10.13(†)	Form of Grant Notice (Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and certain employees of the Company (2017) (incorporated by reference to Exhibit 10.15 to the Annual Report on Form 10 K for the year ended December 31, 2016).
10.14(†)	

	Form of Grant Notice (OpCo Performance-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and Operating Committee Members of the Company (2018) (incorporated by reference to Exhibit 10.15 to the Annual Report on Form 10-K for the year ended December 31, 2017).
10.15(†)*	Form of Grant Notice (OpCo Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and non-Canadian Operating Committee Members of the Company (2019).
10.16(†)*	Form of Grant Notice (OpCo Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation

	Stock Unit Award Program Subplan between the Company and Canadian Operating Committee Members of the Company (2019).
10.17(†)*	Form of Grant Notice (Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and certain non-Canadian employees of the Company (excluding Canada) (2019).
10.18(†)*	Form of Grant Notice (Time-Based Awards) under the Investment Technology Group, Inc. Variable Compensation Stock Unit Award Program Subplan between the Company and certain Canadian employees of the Company (2019).
10.19(†)	Amended and Restated Investment Technology Group, Inc. Employee Stock Purchase Plan (incorporated by reference to Exhibit 10.19 to the Annual Report on

	Form 10 K for the year ended December 31, 2014).
10.19.1(†)	Amended and Restated Investment Technology Group, Inc. Employee Stock Purchase Plan (2015) (incorporated by reference to Exhibit 10.16.1 to the Annual Report on Form 10-K for the year ended December 31, 2015).
10.19.2(†)	Amended and Restated Investment Technology Group, Inc. Employee Stock Purchase Plan (2018) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended June 30, 2018).
10.20(†)	Form of Amended and Restated Change in Control Agreement (incorporated by reference to Exhibit 10.10 to the Annual Report on Form 10 K for the year ended December 31, 2010).
10.21(†)	Form of Change in Control Agreement (2017) (incorporated by reference to Exhibit 10.1 to the

	Quarterly Report on Form 10-Q for the quarter ended March 31, 2017).
10.22(†)	Amended and Restated Investment Technology Group, Inc. Directors' Retainer Fee Subplan (incorporated by reference to Exhibit 10.19.2 to the Annual Report on Form 10 K for the year ended December 31, 2007).
10.22.1(†)	Amended and Restated Investment Technology Group, Inc. Directors' Retainer Fee Subplan (2015) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended June 30, 2015).

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Exhibits Number	Description
10.22.2(†)	Amended and Restated Investment Technology Group, Inc. Directors' Retainer Fee Subplan (2016) (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended September 30, 2016).
10.23(†)	Amended and Restated Investment Technology Group, Inc. Directors' Equity Subplan (incorporated by reference to Exhibit 10.5.3 to the Annual Report on Form 10 K for the year ended December 31, 2007).
10.23.1(†)	Amended and Restated Investment Technology Group, Inc. Directors' Equity Subplan (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended March 31, 2012).
10.23.2(†)	Amended and Restated Investment Technology Group, Inc. Directors' Equity Subplan (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended June 30, 2015).
10.23.3(†)	Amended and Restated Investment Technology Group, Inc. Directors' Equity Subplan (2017) (incorporated by reference to Exhibit 10.19.3 to the Annual Report on Form 10-K for the year ended December 31, 2016).
10.24(†)	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement for Non Employee Directors (incorporated by reference to Exhibit 10.4 to Form 10 Q for the quarter ended September 30, 2007).
10.24.1(†)	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement (Initial Stock Units) for Non Employee Directors (2017) (incorporated by reference to Exhibit 10.20.1 to the Annual Report on Form 10-K for the year ended December 31, 2016).
10.25(†)	Form of Investment Technology Group, Inc. Stock Unit Grant Agreement (Annual Stock Units) for Non Employee Directors (2017) (incorporated by reference to Exhibit 10.21.1 to the Annual Report on Form 10-K for the year ended December 31, 2016).
10.26(†)	Employment Agreement, dated October 16, 2015, between Investment Technology Group, Inc. and Francis J. Troise, including forms of Stock Unit Grant Agreements and a form of a Nonqualified Stock Option Grant Agreement (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8 K filed on October 19, 2015).
10.26.1(†)	First Amendment to Employment Agreement, dated as of November 6, 2018, between Investment Technology Group, Inc. and Francis J. Troise (incorporated by reference to Exhibit 10.1 to the Current Report on Form 8-K filed on November 8, 2018).

10.27(†)	Offer letter dated December 21, 2009 between Steven R. Vigliotti and Investment Technology Group, Inc. (incorporated by reference to Exhibit 10.40 to the Annual Report on Form 10 K for the year ended December 31, 2009).
10.28(†)	Amended and Restated Employee Advisor Agreement, dated May 30, 2008, between Investment Technology Group, Inc. and Raymond L. Killian, Jr. (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10 Q for the quarter ended June 30, 2008).
10.29(†)	Separation Agreement dated as of March 23, 2018 between James P. Selway III and Investment Technology Group, Inc. (incorporated by reference to Exhibit 10.1 to the Quarterly Report on Form 10-Q for the quarter ended March 31, 2018).
10.30(†)	Offer letter dated as of June 20, 2016 between Brian Pomraning and Investment Technology Group, Inc. (incorporated by reference to Exhibit 10.2 to the Quarterly Report on Form 10-Q for the quarter ended March 31, 2018).
31.1*	Rule 13a 14(a) Certification.
31.2*	Rule 13a 14(a) Certification.
32.1**	Section 1350 Certification.
101.INS*	XBRL Report Instance Document.
101.SCH*	XBRL Taxonomy Extension Schema Document.
101.PRE*	XBRL Taxonomy Presentation Linkbase Document.
101.CAL*	XBRL Calculation Linkbase Document.
101.LAB*	XBRL Taxonomy Label Linkbase Document.
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document.

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*Filed herewith.

**Furnished herewith.

(†) Management contracts or compensatory plans or arrangements.

See list of exhibits at Item 15(a)(3) above and exhibits following.

Item 16. Form 10-K Summary

Not applicable

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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.

VIRTU ITG HOLDINGS LLC

By: /s/ DOUGLAS A. CIFU
Douglas A. Cifu
Chief Executive Officer and
Duly Authorized Signatory of Registrant

Dated: March 14, 2019

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 and on the dates indicated.

Signature	Title	Date
/s/ DOUGLAS A. CIFU Douglas A. Cifu	Chief Executive Officer and Manager (Principal Executive Officer)	March 14, 2019
/s/ JOSEPH MOLLUSO Joseph Molluso	Chief Financial Officer and Manager (Principal Financial Officer and Principal Accounting Officer)	March 14, 2019