Thermo Fisher SCIENTIFIC

HEALTHIER CLEANER SAFER

Annual Report 2019

The world leader in serving science

ThermoFisher
SCIENTIFIC

nce reagents • real-time PCR technology • capillary electrophoresis sequencing • microarray technology • clinical next-ge
tography • ion chromatography • gas chromatography • elemental analysis • life sciences mass spectrometry • inorganic
s instruments • cryo-electron microscopy • molecular spectroscopy • elemental analysis • clinical diagnostics • drugs-of-a
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trials services • viral vector services • bioscience reagents • real-time PCR technology • capillary electrophoresis sequenc
nce reagents • microbiology • **Our Mission is to enable our customers to make the world** • elemental analysis • life sc
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ents • portable field safety instruments • environmental instruments • process instruments • cryo-electron microscopy •
ker testing • immunodiagnostics • allergy, asthma and autoimmunity testing • microbiology • transplant diagnostics • heal

Complementary **Segments**

21% Analytical Instruments

25% Life Sciences Solutions

15% Specialty Diagnostics

39% Laboratory Products & Services

Marc N. Casper
Chairman, President and CEO

Dear Shareholder,

I'm very pleased to report that we closed out the decade by delivering another strong year in 2019. We measure our success by how well we serve the needs of our customers, by being a great place to work for our colleagues, and by consistently delivering strong financial results for our shareholders. I can say with pride that we achieved what we set out to do in each of these aspects of our performance, and that positions us exceptionally well to capture the great opportunities we see ahead for Thermo Fisher Scientific.

We are a company that is very deliberate about *what* we want to achieve, *how* and *why*. Our Vision for 2030 outlines what we aspire to, and every successful year takes us closer to those goals. How we do it lies in the discipline we have in running our company. At the core is our PPI Business System, which empowers our more than 75,000 colleagues to continuously improve the way we work. Perhaps most important is why we come to work each day – and the answer lies in our Mission: to enable our customers to make the world healthier, cleaner and safer. This is our purpose as a company, and it's a constant reminder to our teams that we play an important role in making the world a better place.

Outstanding Results

We are a company that consistently delivers strong financial performance, and this gives us the ability to invest for growth and set ourselves up for an even brighter future. In 2019, we grew revenue by 5 percent to top the $25 billion mark, at $25.54 billion. We also achieved another excellent year in terms of the earnings we generated. Our GAAP diluted earnings per share (EPS) increased 27 percent to $9.17, and adjusted EPS* grew 11 percent to $12.35.

We also ended the year with strong cash flow and a healthy balance sheet, generating $4.1 billion of free cash flow in 2019. At the same time, we returned significant capital to our shareholders through $1.5 billion of stock buybacks and $300 million in dividends, which was a 12 percent increase in our dividend year over year. We deployed $1.8 billion on strategic acquisitions in 2019, primarily to expand our pharma services. In early March 2020, we announced our intent to acquire QIAGEN, a leader in molecular diagnostics and sample preparation technologies, for $11.5 billion. Adding these capabilities will significantly strengthen our unique value proposition for clinical and life sciences customers, and we look forward to completing this transaction in the first half of 2021.

I hit my 10-year anniversary as CEO of Thermo Fisher in 2019, and while it's incredibly fulfilling to recall everything our team has accomplished during that time, it's even more exciting to look ahead. I don't think I've ever been as energized about our future as I am right now.

We have created a culture where our customers come first. By successfully executing our growth strategy year after year, we continue to strengthen our company to be the partner they rely on to help them achieve their goals. I'll highlight some of our key achievements in 2019 according to the three pillars of our strategy:

- Continuously developing high-impact, innovative products
- Leveraging scale in high-growth and emerging markets, and
- Delivering a unique value proposition to our customers.

* Adjusted EPS, adjusted operating margin, adjusted operating income and free cash flow are non-GAAP financial measures that exclude certain items. For a reconciliation of these non-GAAP financial measures to comparable GAAP measures, see the accompanying consolidated statement of income on pages 6 and 7 of this annual report.

Continuous Innovation

Our growth strategy starts with our commitment to continuous innovation. We invested $1 billion on R&D in 2019 and targeted that investment where we believe our customers will benefit the most. As the innovation leader in our industry, we continued to develop products that set new standards for speed, accuracy and ease of use to help our customers advance their important work.

For example, our life sciences customers need powerful new tools that allow them to analyze proteins in our blood to better understand how they'll react to potential new drug treatments. They rely on our leading Thermo Scientific Orbitrap mass spectrometry franchise, which we strengthened by launching two new-generation systems. The Exploris 480 instrument gives researchers a new tool suited for rigorous, high-throughput protein analysis, and our new Eclipse Tribrid system expands their ability to study protein structures at an unprecedented level of detail. In addition, our new Krios G4 cryo-electron microscope made it possible to obtain high-resolution images of increasingly smaller protein structures.

For customers working in genetic sciences, we launched the Applied Biosystems QuantStudio 6 and 7 Pro real-time PCR systems that feature cutting-edge automation to reduce errors and downtime. We were also very excited to introduce our Ion Torrent Genexus platform, which is a game-changer for next-generation sequencing (NGS) because it delivers results in one day and requires minimal amounts of sample for analysis. Genexus is a significant milestone in our goal to ultimately bring NGS to local hospitals, so patients can get oncology test results in days compared to weeks.

We also enhanced our specialty diagnostics portfolio, from expanding our menu of allergy and autoimmunity tests to developing new tests that help clinicians prevent the risk of organ rejection in transplant patients.

These are just a few of many examples of how we use our targeted R&D investment to make a real difference for our customers.

Leveraging Scale

The second pillar of our strategy is that we leverage our scale to drive growth in emerging markets around the world. We had strong performance across these key regions in 2019. In China, our largest geographic market outside the U.S., we had another great year, growing revenue by 13 percent.

Thermo Fisher is squarely aligned with the government priorities in China's 5-year plan. With China's focus on new biologic drugs and vaccines, a cleaner environment and safer food supplies, we are the company our customers turn to for solutions. Our leading scale and depth of capabilities are key advantages in helping to address the novel coronavirus outbreak, for example. We are working with government officials, researchers and healthcare providers around the world to manage the response, particularly in analysis of the virus, diagnosis and personal protection.

Strong Track Record of **Performance**

Revenue
(In billions)

Earnings per share
(In dollars)

* Adjusted EPS is defined on page 1.

We continued to increase our presence in China during the year to meet our customers' needs. Among the highlights, we significantly expanded our clinical trials operation in Suzhou, which is now the largest in the country. We also opened new solution centers in Beijing and Shanghai to give our customers direct access to our comprehensive offerings for food and beverage, biosciences, as well as pharma and biotech applications. Thermo Fisher has used scale to gain a distinct advantage in China, and this allows us to deliver an exceptional experience for our customers.

This is a strategy that plays out across our high-growth and emerging markets around the world, including South Korea, India and Singapore. There, too, we've added new capabilities to serve local needs and position us to capture opportunities for growth. We continue to scale our business across all of these regions to more efficiently deliver products and services to our global customers and meet growing demand.

Delivering Value

The third pillar of our growth strategy is delivering a unique value proposition to our customers. A great example of this is the way we serve the pharma and biotech end market, which now represents 41% of our revenue. We've expanded our capabilities to support these customers at every stage of the drug lifecycle, from the discovery of a molecule all the way to making it a commercial medicine. They rely on us for relevant new products and value-added services. We also leverage the strength of our global commercial organization and our unmatched customer access, which includes our

Revenue **Profile**

Improving life

The first signs of Duchenne muscular dystrophy appear around the ages of two to three, and by age 15 more than 90% of patients, mostly boys, will be confined to a wheelchair. Average life expectancy is 26. A gene therapy has been developed that can repair the inherited gene defect in some patients, but until recently, bottlenecks in manufacturing limited the number of patients who could benefit from clinical trials.

Thanks to ongoing investments in new viral vector manufacturing capabilities within our pharma services business, it's now possible to grow exponentially more therapeutic cells in a single batch and to manufacture hundreds of batches a year. For those born with Duchenne, each new batch offers more chances for a better life.

Fisher Scientific channel. This is a proven formula that has delivered double-digit growth for us in the pharma and biotech end market.

Importantly, we continue to build these capabilities through a combination of internal investments and strategic M&A. Our acquisition of Patheon two years ago is a great example. The business is now fully integrated into our company and is performing very well as part of Thermo Fisher. But we didn't stop there.

We've continued to expand our pharma services network in 2019 to meet customer demand, including adding capacity for biologics production and sterile fill-finish services at our sites in the U.S. and Europe. We also completed two strategic bolt-on acquisitions. One was a facility in Ireland that we acquired from Glaxo-Smith-Kline for the manufacture of active pharmaceutical ingredients. The other was the addition of Brammer Bio, a leader in viral vector manufacturing for the high-growth gene therapy market. We've already opened a new facility for viral vector production to keep up with high demand, and we're very excited about the opportunities we have to help our customers bring innovative new therapies to patients with rare diseases.

All of these examples reinforce our commitment to strengthen our offering and create added value for our customers.

Vibrant Culture

None of our accomplishments would be possible without our team of more than 75,000 colleagues around the world. They are inspired by our Mission, and it motivates our teams to bring their best every day. It also helps us to attract and retain the best people, which is critical to our future. Beyond any product or service we provide, our culture is a key differentiator. Grounded by our 4i Values of Integrity, Intensity, Innovation and Involvement, we continue to enhance our culture to elevate our standing among the world's most admired companies.

We invest in our colleagues through numerous development programs that enrich their individual experiences, stress the importance of teams and build skills that set them up for success. In addition to specific training for developing our leaders, from graduate students to our senior executives, all colleagues have access to Thermo Fisher University, where they can take part in online training to progress to the next stage of their careers.

We've continued to create a more inclusive environment, which is necessary to reap the full benefits of diversity in our workforce. I'm particularly proud of a neurodiversity pilot program we launched in 2019. One of our data science teams hired individuals who are on the autism spectrum. We've already benefited from their unique insights, which will contribute to our growth. This is part of our PossAbilities Employee Resource Group (ERG), which is one of 10 ERGs covering 150 chapters globally, and is a great example of how inclusivity enables business performance.

We also recognize that our role as the world leader in serving science includes cultivating the next generation of scientists and leaders. Our colleagues volunteer their time and expertise to inspire students at an early age, showing them rewarding

Taking charge

The lithium-ion battery market will exceed $100 billion by 2025, and such reliance has put greater focus on safety and efficiency. Poor battery performance can limit energy output, while potentially dangerous defects create an unacceptably small window of battery life between first use and landfill disposal. This comes at great cost to society.

Today, scientists developing batteries for electric vehicles, mobile phones, energy systems and other innovations rely on our analytical instruments to improve storage potential and output, creating a more efficient, cleaner and safer energy source. They use our electron microscopy technologies to see structures at levels down to atomic scale, and spectroscopy tools to discover critical changes in materials that cause defects and inefficiency.

opportunities in science, technology, engineering and math (STEM). In 2019, our STEM programs reached more than 178,000 students around the world, from kindergarten through grade 12. Beyond our STEM initiatives, we encourage our teams to take active roles in their communities. This ensures that Thermo Fisher's talent and passion for our Mission is applied to being good corporate citizens, both locally and globally.

Business Sustainability

Doing the right thing makes good business sense. Our stakeholders – customers, employees and shareholders – want to be associated with a company that delivers outstanding performance, responsibly. As we strive to fulfill our Mission, Thermo Fisher recognizes our own obligation to global sustainability. Acting responsibly has always been integral to our work, and this applies to the way we manage our operations and how we source, manufacture and ship our products.

For example, in 2019 we saw an opportunity to improve how we ship temperature-sensitive antibodies in our biosciences business. We replaced polystyrene foam with a patented paper cooler that eliminates a significant waste stream from our customers' facilities. This innovative cooler is a notable step in our environmental sustainability journey.

We are also making a significant commitment to reduce our carbon footprint. We have done a comprehensive assessment, establishing our baseline, evaluating industry best practices and setting science-based targets. Grounded in this data, we are committed to reducing our greenhouse gas emissions 30 percent by 2030. Looking at our progress toward this goal, I am confident that this target is achievable and will position us for further carbon output reductions over time.

In addition to reducing emissions, many actions are happening at our individual sites. These employee-led efforts – often leveraging our PPI Business System – include 24 sites that are on the path to being zero-waste facilities; continuing a shift to renewable electricity sources, including solar, biomass and wind energy; and lowering water usage. Our annual corporate social responsibility report will be released this spring with further details, and I encourage you to read it.

At Thermo Fisher Scientific, our passion for our Mission is what inspires us to succeed. We can't think of a better purpose than to use our talent and expertise to enable our customers to make the world healthier, cleaner and safer for future generations. The past 10 years have been incredible. But knowing how quickly science continues to evolve, I know that our achievements will be even greater as we set our sights on 2030. As always, thank you for your support of Thermo Fisher Scientific.

Sincerely,

Marc N. Casper
Chairman, President and Chief Executive Officer
March 6, 2020

Protecting society

Shortly after scientists identified the novel coronavirus in Wuhan, China, our cross-divisional teams mobilized, starting with gene sequencing technology to identify the virus's genetic code. In parallel, our biosciences, specialty diagnostics, genetic sciences and other experts collaborated 24/7 on test development, while our Fisher Scientific channel expedited transit of critical laboratory equipment and personal protective supplies globally.

Within weeks of the first case in the U.S., the Food and Drug Administration issued emergency use authorization for production of millions of our diagnostic tests. Optimized for our real-time PCR instruments and using our master mixes and sample prep platforms and kits, these tests provide accurate results to medical personnel within four hours, enabling the U.S. and other governments to meet surging demand.

Consolidated Statement of Income

In addition to the financial measures prepared in accordance with generally accepted accounting principles (GAAP), we use certain non-GAAP financial measures, including adjusted EPS, adjusted operating income and adjusted operating margin, which exclude certain acquisition-related costs, such as charges for the sale of inventories revalued at the date of acquisition and significant transaction costs; restructuring and other costs/income; and amortization of acquisition-related intangible assets. Adjusted EPS also excludes certain other gains and losses that are either isolated or cannot be expected to occur again with any predictability, tax provisions/benefits related to the previous items, benefits from tax credit carryforwards, the impact of significant tax audits or events and the results of discontinued operations. We exclude the above items because they are outside of our normal operations and/or, in certain cases, are difficult to forecast accurately for future periods. We also use a non-GAAP measure, free cash flow, which is operating cash flow, excluding net capital expenditures, and also excludes operating cash flows from discontinued operations to provide a view of the continuing operations' ability to generate cash for use in acquisitions and other investing and financing activities. We believe that the use of non-GAAP measures helps investors to gain a better understanding of our core operating results and future prospects, consistent with how management measures and forecasts the company's performance, especially when comparing such results to previous periods or forecasts. The non-GAAP measures presented herein are not meant to be considered superior to or a substitute for our results of operations prepared in accordance with GAAP.

(In millions, except per share amounts)	2019	2018	2017	2016	2015
Consolidated Statement of Income (a) (b)					
Revenue	$25,542	$24,358	$20,918	$18,274	$16,965
Costs and Operating Expenses:					
Cost of revenue (c)	13,715	12,994	10,958	9,456	8,782
Selling, general and administrative expenses (d)	4,930	4,823	4,422	4,039	3,724
Amortization of acquisition-related intangible assets	1,713	1,741	1,594	1,378	1,315
Research and development expenses	1,003	967	887	754	692
Restructuring and other (income) costs, net (e)	(413)	50	97	189	116
	20,948	20,575	17,958	15,816	14,629
Operating Income	4,594	3,783	2,960	2,458	2,336
Other Expense, Net (f)	(524)	(521)	(531)	(434)	(400)
Income from Continuing Operations Before Income Taxes	4,070	3,262	2,429	2,024	1,936
Income Tax (Provision) Benefit (g)	(374)	(324)	(201)	1	44
Income from Continuing Operations	3,696	2,938	2,228	2,025	1,980
Loss from Discontinued Operations (net of income tax benefit of $0, $0, $2, $2 and $3)	—	—	(3)	(3)	(5)
Net Income	$ 3,696	$ 2,938	$ 2,225	$ 2,022	$ 1,975
Earnings per Share from Continuing Operations:					
Basic	$ 9.24	$ 7.31	$ 5.65	$ 5.13	$ 4.97
Diluted	$ 9.17	$ 7.24	$ 5.60	$ 5.10	$ 4.93
Earnings per Share:					
Basic	$ 9.24	$ 7.31	$ 5.64	$ 5.12	$ 4.96
Diluted	$ 9.17	$ 7.24	$ 5.59	$ 5.09	$ 4.92
Weighted Average Shares:					
Basic	400	402	395	395	399
Diluted	403	406	398	397	402
Reconciliation of Adjusted Earnings per Share					
GAAP Diluted EPS (a)	$ 9.17	$ 7.24	$ 5.59	$ 5.09	$ 4.92
Cost of Revenue Charges, Net of Tax (c)	0.03	0.02	0.21	0.16	0.01
Selling, General and Administrative Charges, Net of Tax (d)	0.12	0.06	0.17	0.18	0.05
Restructuring and Other (Income) Costs, Net of Tax (e)	(0.56)	0.09	0.18	0.30	0.19
Amortization of Acquisition-related Intangible Assets, Net of Tax	3.30	3.34	2.86	2.41	2.27
Other Expense, Net of Tax (f)	0.27	0.05	0.03	0.09	0.03
Income Tax Benefit (Provision) (g)	0.02	0.32	0.44	0.03	(0.09)
Discontinued Operations, Net of Tax	0.00	0.00	0.01	0.01	0.01
Adjusted EPS (b)	$12.35	$11.12	$ 9.49	$ 8.27	$ 7.39

(Dollars in millions)	2019		2018		2017		2016		2015	
Reconciliation of Adjusted Operating Income and Adjusted Operating Margin										
GAAP Operating Income (a)	$ 4,594	18.0%	$3,783	15.5%	$2,960	14.2%	$2,458	13.5%	$2,336	13.8%
Cost of Revenue Charges (c)	17	0.1%	12	0.1%	123	0.6%	102	0.6%	9	0.0%
Selling, General and Administrative Charges, Net (d)	62	0.2%	29	0.1%	78	0.4%	104	0.6%	46	0.3%
Restructuring and Other (Income) Costs, Net (e)	(413)	(1.6%)	50	0.2%	97	0.4%	189	1.0%	116	0.7%
Amortization of Acquisition-related Intangible Assets	1,713	6.7%	1,741	7.2%	1,594	7.6%	1,378	7.5%	1,315	7.7%
Adjusted Operating Income (b)	$5,973	23.4%	$5,615	23.1%	$4,852	23.2%	$4,231	23.2%	$3,822	22.5%
Reconciliation of Free Cash Flow										
GAAP Net Cash Provided by Operating Activities (a)	$4,973		$4,543		$4,005		$3,258		$2,942	
Net Cash Used in Discontinued Operations	—		—		1		2		9	
Purchases of Property, Plant and Equipment	(926)		(758)		(508)		(444)		(423)	
Proceeds from Sale of Property, Plant and Equipment	36		50		7		26		18	
Free Cash Flow	$4,083		$3,835		$3,505		$2,842		$2,546	

(a) "GAAP" (reported) results were determined in accordance with U.S. generally accepted accounting principles (GAAP).

(b) Adjusted results are non-GAAP measures and, for income measures, exclude certain charges/credits to cost of revenues (see note (c) for details); certain charges/credits to selling, general and administrative expenses (see note (d) for details); amortization of acquisition-related intangible assets; restructuring and other costs (income), net (see note (e) for details); certain other gains or losses that are either isolated or cannot be expected to occur again with any predictability (see note (f) for details); the tax consequences of the preceding items and certain other tax items (see note (g) for details); and results of discontinued operations.

(c) Reported results include $16, $14, $87, $75 and $7 in 2019, 2018, 2017, 2016 and 2015, respectively, of charges for the sale of inventories revalued at the date of acquisition; $1, $3, $2 and $2 in 2018, 2017, 2016 and 2015, respectively, of accelerated depreciation on manufacturing assets to be abandoned due to facility consolidations; and $1, ($3), $33 and $25 in 2019, 2018, 2017 and 2016, respectively, of (credits) charges to conform the accounting policies of recently acquired businesses to the company's accounting policies.

(d) Reported results include $62, $40, $63, $72 and $12 in 2019, 2018, 2017, 2016 and 2015, respectively, of third-party transaction/integration costs related to acquisitions and a divestiture; ($1), ($11), ($8), $17 and $19 in 2019, 2018, 2017, 2016 and 2015, respectively, of (income) charges, net, associated with product liability litigation; ($3), $15, ($2) and ($3) in 2019, 2017, 2016 and 2015, respectively, of (credits) charges, net, for changes in estimates of contingent acquisition consideration; $4, $2, $9 and $18 in 2019, 2017, 2016 and 2015, respectively, of accelerated depreciation on fixed assets to be abandoned due to integration synergies and facility consolidations; and $6 and $8 in 2017 and 2016, respectively, of charges to conform the accounting policies of recently acquired businesses to the company's accounting policies.

(e) Reported results include restructuring and other (income) costs, net, consisting principally of severance, abandoned facility and other expenses of headcount reductions within several businesses and real estate consolidations; $482 of gain, principally on the sale of the Anatomical Pathology business, in 2019; $4, ($46), ($27), $24 and $20 in 2019, 2018, 2017, 2016 and 2015, respectively, of net charges (credits) for litigation-related matters; $6 and $15 in 2019 and 2015, respectively, of impairment of intangible assets; $17, $6 and $11 in 2018, 2016 and 2015, respectively, of net gains on sales of product lines and real estate; $5 and $7 in 2018 and 2017, respectively, of hurricane response/impairment costs; $19 and $8 in 2018 and 2016, respectively, of environmental remediation costs; $6 and $5 in 2017 and 2015, respectively of compensation contractually due to employees of acquired businesses; and $6 in 2017 of net charges for the settlement/curtailment of retirement plans.

(f) Reported results include $44, ($15), $17 and $13 in 2019, 2018, 2017 and 2016, respectively, of net gains (losses) on investments; $184, $3, $4, $9 and $12 in 2019, 2018, 2017, 2016 and 2015, respectively, of losses on the early extinguishment of debt; $4 and $7 in 2019 and 2018, respectively, of net charges for the settlement/curtailment of retirement plans; $32 and $22 in 2017 and 2016, respectively, of charges related to fees paid to obtain bridge financing commitments for acquisitions; $2 and $2 in 2016 and 2015, respectively, of amortization of acquisition-related intangible assets for the company's equity investments; and $7 in 2015 of costs associated with entering into interest rate swap agreements.

(g) Reported income tax provision includes $253, $411, $538, $543 and $478 in 2019, 2018, 2017, 2016 and 2015, respectively, of incremental tax benefit for the pre-tax reconciling items between GAAP and adjusted net income; $2, $68 and $204 in 2019, 2018 and 2017, respectively, of net provision from the effects of U.S. tax reform legislation; ($7), $12, $61, ($1) and $38 in 2019, 2018, 2017, 2016 and 2015, respectively, of incremental tax (provision) benefit from adjusting the company's non-U.S. deferred tax balances as a result of tax rate changes; $71 in 2018 of incremental tax provision due to net operating losses that will not be utilized as a result of the sale of the Anatomical Pathology business; and $31 and $12 in 2017 and 2016, respectively, of incremental tax provision due to the net impact of tax audits.

Shareholder Services

Shareholders of Thermo Fisher Scientific who desire information about the company are invited to contact the Investor Relations Department, Thermo Fisher Scientific Inc., 168 Third Avenue, Waltham, MA 02451, (781) 622-1111. You may also send an email to investorrelations@thermofisher.com. Material of interest to shareholders is available from the company's website at thermofisher.com, under "About Us," then "Investors."

Stock Transfer Agent

The stock transfer agent for Thermo Fisher Scientific, AST, maintains shareholder activity records. The agent will respond to questions on issuance of stock certificates, change of ownership, lost stock certificates and change of address. For these and similar matters, please direct inquiries to: AST, 6201 15th Avenue, Brooklyn, NY 11219, (800) 937-5449. You may also send an email to info@astfinancial.com, or visit the transfer agent's website at astfinancial.com.

Annual Meeting

The annual meeting of shareholders will be held as a virtual web conference on Wednesday, May 20, 2020, at 1:00 p.m., Eastern Time. Please log in to virtualshareholdermeeting.com/TMO2020 to participate.

Annual Report on Form 10-K

The accompanying Annual Report on Form 10-K for the fiscal year ended December 31, 2019, does not contain exhibits. Exhibits have been filed with the Securities and Exchange Commission. Upon request to the Investor Relations Department, the company will furnish, without charge, any such exhibits as well as copies of periodic reports filed with the Securities and Exchange Commission.

Forward-Looking Statements

This annual report contains "forward-looking statements" within the meaning of Section 21E of the Securities Exchange Act of 1934. Any statements contained herein that are not statements of historical fact may be deemed to be forward-looking statements, including, without limitation, statements regarding: projections of revenue, expenses, earnings, margins, tax rates, tax provisions, cash flows, pension and benefit obligations and funding requirements, our liquidity position; cost reductions, restructuring activities, new product and service developments, competitive strengths or market position, acquisitions or divestitures; growth, declines and other trends in markets we sell into; new or modified laws, regulations and accounting pronouncements; outstanding claims, legal proceedings, tax audits and assessments and other contingent liabilities; foreign currency exchange rates and fluctuations in those rates; general economic and capital markets conditions; the timing of any of the foregoing; assumptions underlying any of the foregoing; and any other statements that address events or developments that Thermo Fisher intends or believes will or may occur in the future. Without limiting the foregoing, the words "believes," "anticipates," "plans," "expects," "seeks," "estimates" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements are accompanied by such words. While the company may elect to update forward-looking statements in the future, it specifically disclaims any obligation to do so, even if the company's estimates change, and readers should not rely on those forward-looking statements as representing the company's views as of any date subsequent to the date of the filing of this report.

A number of important factors could cause the results of the company to differ materially from those indicated by such forward-looking statements, including those detailed under the heading, "Risk Factors" in Part I, Item 1A, in the accompanying Annual Report on Form 10-K for the fiscal year ended December 31, 2019.

Form 10-K

Consolidated Financial Statements

ThermoFisher SCIENTIFIC

HEALTHIER CLEANER SAFER

The world leader in serving science

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

FORM 10-K

☒ Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the fiscal year ended December 31, 2019
or

☐ Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

Commission file number 1-8002

THERMO FISHER SCIENTIFIC INC.

(Exact name of Registrant as specified in its charter)

Delaware — *(State of incorporation)*

04-2209186 — *(I.R.S. Employer Identification No.)*

168 Third Avenue
Waltham, Massachusetts 02451
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (781) 622-1000

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $1.00 par value	TMO	New York Stock Exchange
Floating Rate Notes due 2020	TMO /20A	New York Stock Exchange
2.150% Notes due 2022	TMO 22A	New York Stock Exchange
0.750% Notes due 2024	TMO 24A	New York Stock Exchange
0.125% Notes due 2025	TMO 25B	New York Stock Exchange
2.000% Notes due 2025	TMO 25	New York Stock Exchange
1.400% Notes due 2026	TMO 26A	New York Stock Exchange
1.450% Notes due 2027	TMO 27	New York Stock Exchange
0.500% Notes due 2028	TMO 28A	New York Stock Exchange
1.375% Notes due 2028	TMO 28	New York Stock Exchange
1.950% Notes due 2029	TMO 29	New York Stock Exchange
0.875% Notes due 2031	TMO 31	New York Stock Exchange
2.875% Notes due 2037	TMO 37	New York Stock Exchange
1.500% Notes due 2039	TMO 39	New York Stock Exchange
1.875% Notes due 2049	TMO 49	New York Stock Exchange

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

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 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 and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the Registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T during the preceding 12 months. Yes ☒ No ☐

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act. Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

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

As of June 28, 2019, the aggregate market value of the voting stock held by nonaffiliates of the Registrant was approximately $117,442,498,000 (based on the last reported sale of common stock on the New York Stock Exchange Composite Tape reporting system on June 28, 2019).

As of February 1, 2020, the Registrant had 398,828,389 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Sections of Thermo Fisher's definitive Proxy Statement for the 2020 Annual Meeting of Shareholders are incorporated by reference into Parts II and III of this report.

THERMO FISHER SCIENTIFIC INC.

ANNUAL REPORT ON FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2019

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PART I

Item 1. Business

General Development of Business

Thermo Fisher Scientific Inc. (also referred to in this document as "Thermo Fisher," "we," the "company," or the "registrant") is the world leader in serving science. Our Mission is to enable our customers to make the world healthier, cleaner and safer. We serve more than 400,000 customers working in pharmaceutical and biotech companies, hospitals and clinical diagnostic labs, universities, research institutions and government agencies, as well as environmental, industrial quality and process control settings. Our global team of more than 75,000 colleagues delivers a unique combination of innovative technologies, purchasing convenience and pharmaceutical services through our industry-leading brands, including Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific, Unity Lab Services and Patheon.

We continuously increase our depth of capabilities in technologies, software and services, and leverage our extensive global channels to address our customers' emerging needs. We do this through organic investments in research and development and through acquisitions. For example, in April 2019, we acquired, within the Laboratory Products and Services segment, Brammer Bio, expanding our contract manufacturing capabilities to include a full-range of viral vector development and manufacturing services. Our goal is to make our customers more productive in an increasingly competitive business environment, and to allow them to solve their challenges, from complex research to improved patient care, environmental and process monitoring, and consumer safety.

Thermo Fisher is a Delaware corporation and was incorporated in 1956. The company completed its initial public offering in 1967 and was listed on the New York Stock Exchange in 1980.

Forward-looking Statements

Forward-looking statements, within the meaning of Section 21E of the Securities Exchange Act of 1934 (the Exchange Act), are made throughout this Annual Report on Form 10-K. Any statements contained herein that are not statements of historical fact may be deemed to be forward-looking statements, including without limitation statements regarding: projections of revenue, expenses, earnings, margins, tax rates, tax provisions, cash flows, pension and benefit obligations and funding requirements, our liquidity position; cost reductions, restructuring activities, new product and service developments, competitive strengths or market position, acquisitions or divestitures; growth, declines and other trends in markets we sell into; new or modified laws, regulations and accounting pronouncements; outstanding claims, legal proceedings, tax audits and assessments and other contingent liabilities; foreign currency exchange rates and fluctuations in those rates; general economic and capital markets conditions; the timing of any of the foregoing; assumptions underlying any of the foregoing; and any other statements that address events or developments that Thermo Fisher intends or believes will or may occur in the future. Without limiting the foregoing, the words "believes," "anticipates," "plans," "expects," "seeks," "estimates," and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements are accompanied by such words. While the company may elect to update forward-looking statements in the future, it specifically disclaims any obligation to do so, even if the company's estimates change, and readers should not rely on those forward-looking statements as representing the company's views as of any date subsequent to the date of the filing of this report.

A number of important factors could cause the results of the company to differ materially from those indicated by such forward-looking statements, including those detailed under the heading, "Risk Factors" in Part I, Item 1A.

Business Segments and Products

We report our business in four segments – Life Sciences Solutions, Analytical Instruments, Specialty Diagnostics, and Laboratory Products and Services.

Life Sciences Solutions Segment

Through our Life Sciences Solutions segment, we provide an extensive portfolio of reagents, instruments and consumables used in biological and medical research, discovery and production of new drugs and vaccines as well as diagnosis of disease. These products and services are used by customers in pharmaceutical, biotechnology, agricultural, clinical, academic, and government markets. Life Sciences Solutions includes four primary businesses – Biosciences, Genetic Sciences, Clinical Next-Generation Sequencing, and BioProduction.

<u>Biosciences</u>

Our biosciences business includes reagents, instruments and consumables that help our customers conduct biological and medical research, discover new drugs and vaccines, and, in the case of some specific products, the diagnosis of disease.

Business (continued)

Our biosciences offerings include:

- Reagents, instruments, and consumables used for protein biology, molecular biology, sample preparation and cell imaging and analysis. The portfolio includes antibodies and products for protein purification, detection, modification, and analysis; and sequencing, detection and purification products used for high content analysis of nucleic acids. Many of these products are also used in applied markets, including agriculture, forensics, diagnostics product development, and toxicology research.
- Tools used for genetic engineering, amplification, quantification and analysis as well as RNA isolation, including stem cell reprogramming kits, transfection reagents, RNA interference reagents, along with gene editing tools and gene synthesis products.
- Cell culture media, reagents, and plastics for preserving and growing mammalian cells which are used in many life science research applications.
- Fluorescence-based technologies, which facilitate the labeling of molecules for biological research and drug discovery. These technologies include a wide range of cell analysis instruments, including flow cytometers and imaging platforms that enable fluorescence microscopy.
- Protein analysis products, including pre-cast electrophoresis gels for separating nucleic acids and proteins, and western blotting and staining tools.

Genetic Sciences

Our genetic sciences business combines a wide variety of instruments and related reagents used to provide high-value genomic solutions to assist customer decisions in the research, clinical and applied markets.

Our offerings include real-time PCR technology used to identify changes in gene expression, genotyping or proteins on an individual gene-by-gene basis; capillary electrophoresis (CE) sequencing, a core technology used in DNA sequencing and fragment analysis and forensic analysis applications; and microarray technology, used in gene expression, genotyping and reproductive health.

Our genetic analyzers served as the foundational platform used to sequence the first human genome. These systems are used in a variety of basic, commercial and clinical research applications.

Clinical Next-Generation Sequencing

Our clinical next-generation sequencing (NGS) business focuses on delivering simple, fast and cost-effective NGS technology for a range of applications. The business is focused on targeted sequencing solutions for research use and the application of NGS in oncology.

BioProduction

Our bioproduction business supports developers and manufacturers of biological-based therapeutics and vaccines with a portfolio of premium solutions and services focused on upstream cell culture, downstream purification, analytics for detection and quantitation of process/product impurities, and a suite of single-use solutions spanning the biologics workflow.

Our bioproduction offerings include:

- Single-use bioproduction solutions that provide our customers with faster turnaround and set-up times, minimal validation requirements, reduced investment and running costs, and increased flexibility of manufacturing capacity.
- Production cell culture media solutions, which are used by leading biotechnology and pharmaceutical companies to grow cells in controlled conditions and enable large scale cGMP (Current Good Manufacturing Practices) manufacturing of drugs and vaccines. We also provide our customers with the associated services to optimize the productivity of these production platforms.
- Chromatography products, which deliver superior capacity and resolution for process-scale bioseparations, and offer a broad set of scalable options for the purification of antibodies, antibody fragments and proteins.
- Rapid molecular products that deliver accurate results in less than four hours for contaminant detection, identification and quantitation.
- Scalable solutions for the manufacture of cell therapy based drugs.

Our Doe & Ingalls offerings include chemical distribution and supply chain services that provide primarily life science manufacturers with reliable, secure supply chains for their chemical raw materials.

Analytical Instruments Segment

Through our Analytical Instruments segment, we provide a broad offering of instruments, consumables, software and services that are used for a range of applications in the laboratory, on the production line and in the field. These products and services are used by customers in pharmaceutical, biotechnology, academic, government, environmental and other research and industrial markets, as well as the clinical laboratory. This segment includes three primary businesses – Chromatography and Mass Spectrometry, Chemical Analysis, and Materials and Structural Analysis.

Chromatography and Mass Spectrometry

Our chromatography and mass spectrometry (MS) business provides analytical instrumentation for organic and inorganic sample analysis across both applied technologies and life science research. These products are complemented by laboratory information management systems (LIMS); chromatography data systems (CDS); database analytical tools; automation systems; a range of consumables, such as a full line of chromatography columns; and a range of sample preparation and separation products including auto-samplers and multiplexing systems.

Chromatography is a technique for separating, identifying and quantifying individual chemical components of substances based on their specific physical and chemical characteristics. Our chromatography product line includes high performance liquid chromatography, ion chromatography and gas chromatography systems, all of which are supported by our Chromeleon chromatography data system software.

- *Liquid Chromatography (LC) Systems* analyze complex sample matrices in liquids. Our high-pressure liquid chromatography (HPLC) and ultrahigh pressure liquid chromatography (UHPLC) systems offer high throughput and sensitivity and are sold either as stand-alone systems or integrated with our mass spectrometers (LC/MS and LC/MS/MS). These systems are used for a range of applications, from complex proteomic analyses to routine industrial quality assurance and quality control (QA/QC).
- *Ion Chromatography (IC) Systems* separate ionic (charged) or highly polar molecules (e.g., sugars and carbohydrates), usually found in water-based solutions, and typically detect them based on their electrical conductivity. Our IC products are used in a wide range of applications, including scientific research, and environmental testing, as well as quality control in pharmaceutical, food and beverage, and other industrial processes.
- *Gas Chromatography (GC) Systems* analyze complex sample matrices in gases, comprising both separation and detection technology. Separation technology is common to all gas chromatography analyzers, and is paired with either a conventional detector (GC) or with different types of mass spectrometers (GC/MS). Our GC/MS offering includes a triple stage quadrupole, a single stage quadrupole, an Orbitrap, and an ion trap, for a range of applications, including food safety testing, quantitative screening of environmental samples, and complex molecular analyses.
- *Elemental Analysis Spectrometers* use atomic spectroscopy techniques to identify trace concentrations of elements in liquid and solid samples primarily in environmental, petrochemical, food safety, metallurgical, geochemical and clinical/toxicology research applications. These products are widely used in growth markets such as China, India and Latin America to support compliance with increasingly stringent international environmental and consumer safety regulations.

Mass spectrometry is a technique for analyzing chemical compounds, individually or in complex mixtures, by forming charged ions that are then analyzed according to their mass-to-charge ratios. In addition to molecular information, each discrete chemical compound generates a pattern that provides structurally identifiable information. Our comprehensive offering includes life sciences mass spectrometry systems; and inorganic mass spectrometry systems; as well as a range of sample preparation and separation products including auto-samplers and multiplexing systems.

- *Life Sciences Mass Spectrometers* include triple quadrupole and Orbitrap technologies. Our triple quadrupole systems provide high performance quantitative analysis of chemicals in biological fluids, environmental samples and food matrices. They are also used by the pharmaceutical industry for targeted quantitation during drug discovery. Our Orbitrap technologies provide high resolution and accurate mass capabilities for both research and applied markets and are well suited for drug metabolism, proteomics, environmental analysis, food safety, toxicology and clinical research applications. We also offer a comprehensive portfolio of instrument control and data analysis software to help customers simplify their workflows and obtain knowledge from often complex data.

- *Inorganic Mass Spectrometers* include four product lines: isotope ratio mass spectrometry (IRMS); multi-collector isotope ratio mass spectrometry (MC/IRMS); inductively coupled plasma mass spectrometry (ICP/MS); and high resolution trace mass spectrometry (HR Trace/MS). These products are primarily used for qualitative and quantitative analysis of inorganic matter in a range of applications, including environmental analysis, materials science and earth sciences.

Chemical Analysis

Our chemical analysis products fall into three main categories: materials and minerals instruments; field safety instruments; and environmental and process instruments. Customers use these products to quickly and accurately analyze the composition of materials to optimize workflows primarily in industrial applications or to help them comply with governmental regulations and industry safety standards. Our product lines range from those used on production lines to improve quality and efficiency, to portable systems for rapid and real-time chemical identification in the field or to analyze, measure or respond to hazardous situations.

- *Materials and Minerals Instruments* include production line process monitoring, and control systems for a range of industrial applications. For example, we offer on-line instruments that analyze bulk materials non-invasively and in real time to improve quality control and ensure safe operation in a mine or cement manufacturing plant, as well as systems that enable high-speed weighing during bulk materials handling. We also offer gauging systems that employ ionizing and non-ionizing technologies to measure the total thickness, basis weight and coating thickness of flat-sheet materials, such as steel, plastics, foil, rubber and glass. We also offer on-line analyzers based on a variety of technologies such as X-ray imaging and ultra-trace chemical detection, to inspect packaged goods for physical contaminants, validate fill quantities, or check for missing or broken parts on-line and at high speeds in the food and beverage, pharmaceutical production and packaging industries to maintain safety and quality standards.
- *Field Safety Instruments* are rugged handheld products that provide rapid, precise, real-time analysis at the point of need. Our main product categories are elemental analyzers, optical analyzers and radiation detection instruments. Our portable elemental analyzers use X-ray fluorescence (XRF) technology for identifying metal alloys in scrap metal recycling; QA/QC; precious metals analysis; environmental analysis; and lead screening in a range of consumer products. Our portable optical analyzers utilize Raman, Fourier transform infrared (FTIR) and near-infrared (NIR) technologies for use in the field by first responders, and law enforcement and military personnel who need to quickly and accurately identify chemicals and explosives in critical safety and security situations. Other applications include QA/QC in pharmaceutical production and identification of counterfeit drugs. Our radiation measurement products are used to monitor, detect and identify specific forms of radiation in nuclear power, environmental, industrial, medical, and security applications. Our primary customers include national, regional, and local government agencies responsible for monitoring cargo, vehicles and people traveling across borders. These products are also used by first-responders in safety and security situations, and for worker safety in the nuclear power and other industrial markets.
- *Environmental and Process Instruments* include fixed and portable instrumentation that help our customers protect people and the environment as well as comply with government regulations and industry safety standards. Our products are used by environmental regulatory agencies and power plant operators to measure ambient air, and stack gas emissions for compliance with regulated emissions standards for criteria pollutant gases. Our products are also used in ambient particulate monitoring applications by customers in mining environments to provide continuous measurements and logging of real-time concentrations and median particle sizes of airborne dust, smoke, mist and fumes to improve efficiency and increase worker safety.

In addition to our broad product offerings, we offer a variety of specialized services to our customers, including equipment servicing, instrument calibration services, asset management and training.

Materials and Structural Analysis

Our materials and structural analysis business includes electron microscopy, molecular spectroscopy and laboratory elemental analysis instruments that are used by customers in life sciences, materials sciences and industrial markets to accelerate breakthrough discoveries.

- *Electron Microscopy Instruments* include transmission electron microscopes which provide imaging and characterization at the atomic scale, with applications in semiconductor development, materials science research and the characterization of protein structure and function. We also offer scanning electron microscopes which resolve features from the optical regime down to the nanometer length scale and are used for a wide variety of applications from materials characterization in science and engineering to applications in natural resources, manufacturing, and biological systems. Our DualBeam focused ion beam-scanning electron microscope systems are used for sample

preparation, 3D characterization, nanoprototyping, and industrial failure analysis. Our focused ion beam microscopes are used in a range of process control, failure analysis, and materials research applications. We also offer electrical failure analysis instruments which are used in root cause failure analysis and quality control, microCT instruments which are micro-computed tomography solutions for quantitative analysis of a broad range of materials, providing 3D visualization of large volumes non-destructively and 3D visualization software that turns the data and images generated by a broad range of instruments into 3D visualizations of the microscopic sample, allowing quantitative analysis of material properties.

- *Molecular Spectroscopy Instruments* are divided into four primary techniques: FTIR, Raman, NIR and ultraviolet/visible (UV/Vis) spectroscopy. These technologies are typically used in the laboratory to provide information on the structure of molecules to identify, verify and quantify organic materials in pharmaceutical, biotechnology, polymer, chemical, and forensic sciences. Our material characterization instruments include rheometers and extruders that measure viscosity, elasticity, processability, and temperature-related mechanical changes of various materials. We also provide a range of surface analysis instruments commonly used in the semiconductor, metals, coatings, and polymer industries as a product development and failure analysis tool.
- *Laboratory Elemental Analysis Instruments* and analyzers use X-ray fluorescence (XRF), X-ray diffraction (XRD), and arc spark optical emission (OES) techniques for accurate and precise analysis of bulk materials in the metals, cement, minerals, and petrochemicals industries.

Specialty Diagnostics Segment

Our Specialty Diagnostics segment offers a wide range of diagnostic test kits, reagents, culture media, instruments and associated products in order to serve customers in healthcare, clinical, pharmaceutical, industrial, and food safety laboratories. Our healthcare products are used to increase the speed and accuracy of diagnoses, which improves patient care in a more cost efficient manner. This segment has five primary businesses – Clinical Diagnostics, ImmunoDiagnostics, Microbiology, Transplant Diagnostics and our Healthcare Market Channel. In June 2019, the company sold its Anatomical Pathology business, previously reported in this segment. The business offered products primarily for cancer diagnosis and medical research in histology, cytology and hematology applications.

Clinical Diagnostics

Our clinical diagnostics products include a broad offering of liquid, ready-to-use and lyophilized immunodiagnostic reagent kits, calibrators, controls and calibration verification fluids. In particular, we provide products used for drugs-of-abuse testing; therapeutic drug monitoring, including immunosuppressant drug testing; thyroid hormone testing; serum toxicology; clinical chemistry; immunology; hematology; coagulation; glucose tolerance testing; first trimester screening; tumor markers testing; and biomarkers testing for sepsis, acute myocardial infarction and congestive heart failure. We also private label many of our reagents and controls for major *in vitro* diagnostics companies through OEM arrangements. In many instances, we will work with customers or partners to develop new products and applications for their instrument platforms.

We have developed one of the broadest menus for drugs-of-abuse immunoassays. We also provide a broad offering of immunosuppressant drug immunoassays that can be used on a variety of clinical chemistry analyzers.

Our clinical chemistry systems include analyzers and reagents to analyze and measure routine blood and urine chemistry, such as glucose and cholesterol; and advanced testing for specific proteins, therapeutic drug monitoring and drugs-of-abuse. Our diagnostic test range currently covers approximately 80 different validated methods. We also provide pre- and post-analytical automation for preparation of blood specimens before and after analysis, and specialty diagnostic tests based on patented biomarkers for sepsis, cardiovascular and pulmonary diseases, as well as intensive care treatments and prenatal screening.

ImmunoDiagnostics

Our immunodiagnostics offerings include developing, manufacturing and marketing complete blood-test systems to support the clinical diagnosis and monitoring of allergy, asthma and autoimmune diseases. In addition, we offer antibody tests for approximately 20 indications to help diagnose autoimmune diseases such as rheumatoid arthritis, celiac disease, lupus and scleroderma. Our products include ImmunoCAP for allergy and asthma tests and EliA for autoimmunity tests.

Microbiology

Our microbiology offerings include dehydrated and prepared culture media, collection and transport systems, instrumentation and consumables to detect pathogens in blood, diagnostic and rapid direct specimen tests, quality-control products and associated products for the microbiology laboratory. Our products help customers worldwide to diagnose

infectious disease; determine appropriate antimicrobial therapy; implement effective infection control programs; and detect microbial contamination of their products or manufacturing facilities.

Within the food and pharmaceutical industries, our products are used to assure the safety and quality of consumer products by monitoring production environments; raw materials and end products for bacterial contamination; and animal health in the dairy industry.

Transplant Diagnostics

Our transplant diagnostics products include human leukocyte antigen (HLA) typing and testing for the organ transplant market. Our diagnostic tests are used by transplant centers for tissue typing, primarily to determine the compatibility of donors and recipients pre-transplant, and to detect the presence of antibodies post-transplant that can lead to transplant rejection. These transplant diagnostic tests are widely used across the transplant-testing workflow to improve patient outcomes. Our transplant diagnostic offerings include several lines of HLA typing and antibody detection assays utilizing serological, molecular, enzyme-linked immunosorbent assays (ELISA), flow, and multiplexing technologies.

Healthcare Market Channel

Our healthcare market channel offerings include a broad array of consumables, diagnostic kits and reagents, equipment, instruments, solutions and services for hospitals, clinical laboratories, reference laboratories, physicians' offices and other clinical testing facilities. These products are manufactured by Thermo Fisher and third parties and are primarily used in clinical diagnosis.

Laboratory Products and Services Segment

Our Laboratory Products and Services segment offers virtually everything needed for the laboratory. Our unique combination of self-manufactured and sourced products and extensive service offering, enables our customers to focus on their core activities and helps them to be more efficient, productive and cost effective. The segment also includes a comprehensive offering of outsourced services used by the pharmaceutical and biotech industries for drug development, clinical trials logistics and commercial drug manufacturing. We serve the pharmaceutical, biotechnology, academic, government and other research and industrial markets, as well as the clinical laboratory through four key businesses: Laboratory Products, Laboratory Chemicals, Research and Safety Market Channel, and Pharma Services.

Laboratory Products

Our laboratory products are used primarily by pharmaceutical companies for drug discovery and development and by biotechnology companies and universities for life science research to advance the prevention and cure of diseases and enhance quality of life. This offering consists of equipment, accessories, and services for sample preparation, storage and protection, and analysis:

- *Laboratory Equipment Technologies* includes our leading laboratory refrigerators and freezers, ultralow-temperature freezers and cryopreservation storage tanks for maintaining samples in a cold environment to protect them from degradation. We also offer temperature control products such as heated bath circulators, immersion coolers, recirculating chillers, water baths, and dry baths in a range of sizes, temperatures and configurations for life science, analytical chemistry, manufacturing and quality-control applications. In addition, we offer sample preparation and preservation equipment, which protects our customers' chemical and biological samples and supports the growth of cells and organisms in optimal conditions such as temperature, carbon dioxide and humidity as well as incubators and related products. We also offer centrifugation products, which are used to separate biological matrices and inorganic materials, including microcentrifuges, general use bench-top centrifuges and floor models. Additionally, we offer biological safety cabinets, which enable technicians to handle samples without risk to themselves or their environment and without risk of cross-contamination of samples.
- *Water and Laboratory Products* include water analysis instruments such as meters, electrodes and solutions for the measurement of pH, ions, conductivity, dissolved oxygen, turbidity and other key parameters in the lab and production line. We also offer other laboratory equipment such as water purification systems, shakers, vacuum concentrators, microbiological incubators, ovens, furnaces, hotplates, stirrers, stirring hotplates, and other related products.
- *Laboratory Plastics Essentials* include a leading offering of laboratory pipette tips and a complementary range of handheld and automated pipetting systems, supporting low-through high-throughput activity. These products optimize productivity and ergonomics, and ensure accurate results. We also offer sample preparation and storage products such as centrifugation consumables as well as vials and organization systems for ultralow temperature and cryogenic storage, with specific products designed for low protein binding and low DNA binding and containers for packaging

life science and diagnostic reagents as well for the storage and transport of bulk intermediates and active pharmaceutical ingredients. Additionally, our offerings include a complete selection of clinical specimen collection products, drug-of-abuse collection kits and environmental and food-safety glass and plastic vials, bottles and containers, plastic transfer pipettes, general purpose clinical laboratory consumables and containers for breast milk collection, storage and feeding primarily used in neo-natal units and by lactation specialists. We also provide OEM and custom kit assembly services for clinical and drugs-of-abuse test kits.

Laboratory Chemicals

Our laboratory chemicals offering comprises a broad range of chemicals, solvents and reagents supporting virtually every laboratory application – from research to drug discovery and development and manufacturing. This portfolio includes organic chemicals used to synthesize new materials; essential laboratory chemicals used by scientists to purify, extract, separate, identify and manufacture products; high-purity analytical reagents, bioreagents used in many different applications, from cell growth to detailed protein analysis; novel chemical building blocks, reactive intermediates and screening libraries used to accelerate drug discovery; and precious metals, salts and solutions used in a broad range of applications where highly specific reactions are desired. We provide bulk volumes of many products for scale-up from research to development and customized services for chemical procurement, processing, production, testing, and packaging.

Research and Safety Market Channel

Our research and safety market channel serves academic, pharmaceutical, biotechnology, government and industrial customers. We go to market through our expert sales force, segment-relevant printed collateral and digital content in five languages, a state-of-the-art website, www.fishersci.com, containing full product content for more than 1.5 million products, and our global network of resellers and distributors.

We have an international network of warehouses in our primary markets through which we maintain inventory and coordinate product delivery. With specialized product vaults and warehouse management systems, we are able to handle the complete range of products we offer to our customers. Our transportation capabilities include our dedicated fleet of delivery vehicles as well as parcel shipping capabilities that are closely integrated with our third-party parcel carriers. Throughout the product delivery process, we provide our customers with convenient access to comprehensive electronic systems that offer automated catalog search, product order and invoicing, and payment capabilities.

Our channel offers a mix of products that are manufactured by Thermo Fisher, by third parties for us on a private-label basis, and by third parties under their brand but offered for sale exclusively through us. We also offer a broad range of third-party products representing leading industry brand names on a non-exclusive basis.

Our research products include a complete offering of laboratory products, ranging from capital equipment and instruments to chemicals to consumable products. Our safety products include clean-room and controlled-environment supplies, personal protective equipment, firefighting, military, and first responder equipment and supplies, and environmental monitoring and sampling equipment. Our education products include science-related and laboratory products for the K-12 and secondary education market.

In addition to our broad product offerings, we offer a variety of specialized services to our customers through our Unity Lab Services team, including training, equipment servicing and asset management, and dedicated supply management personnel. We also offer scientific support services including desktop delivery, coordination of instrument calibration and service, and on-site customer service.

Pharma Services

We provide the entire spectrum of development, manufacturing and clinical trials services for both small-molecule and large-molecule pharmaceuticals. This includes i) development of a suitable formulation and manufacturing process for the active pharmaceutical ingredient (API) or biologic; ii) technology transfer to scale up the manufacturing; iii) labeling, packaging, distribution and logistics for clinical trials; and iv) commercial scale manufacturing and packaging.

- *Drug Substance Services* - Our service offerings address small molecules, produced through chemical synthesis, and large molecules such as antibodies and proteins produced through mammalian cell culture. We provide development and manufacturing services for small molecule APIs and the biologically active component of pharmaceutical products under current good manufacturing practice (cGMP) conditions from early development through commercial production.
- *Drug Product Services* - We manufacture both small-molecule and large-molecule products for customers in conventional and specialized dosage forms. We differentiate ourselves by our breadth of dosage forms and specialized

capabilities in both oral solid and sterile dosage forms. We provide a wide spectrum of advanced formulation, production and technical services and scientific expertise and solutions, from the early stages of a product's development to regulatory approval and commercial scale production.

- *Clinical Trials Services* - We provide global services for pharmaceutical and biotechnology companies engaged in clinical trials, including comparator sourcing; specialized packaging; over-encapsulation; multi-lingual and specialized labeling and distribution for phase I through phase IV clinical trials; biological-specimen management and biobanking services; specialty pharmaceutical logistics; and clinical supply-chain planning and management.
- *Viral Vector Services* - We provide a full-range of viral vector development and manufacturing services for customers developing and commercializing gene and cell therapies, including process development, optimization, scale-up, analytical development and qualification of viral vectors for commercial manufacturing. Our breadth of vector platform includes the five most widely used virus types, providing extensive coverage across the gene and cell therapy landscape.

Sales and Marketing

We market and sell our products and services through a direct sales force, customer-service professionals, electronic commerce, third-party distributors and various catalogs.

We offer our products and services through leading brands including:

- The Thermo Scientific brand offers customers in research, diagnostics, industrial, and applied markets a complete range of high-end analytical instruments as well as laboratory equipment, software, services, consumables and reagents. Our portfolio of products includes innovative technologies for mass spectrometry, chromatography, elemental analysis, electron microscopy, molecular spectroscopy, sample preparation, informatics, chemical research and analysis, cell culture, bioprocess production, cellular, protein and molecular biology research, allergy testing, drugs-of-abuse testing, therapeutic drug monitoring testing, microbiology, as well as environmental monitoring and process control.
- The Applied Biosystems brand offers customers in research, clinical and applied markets integrated instrument systems, reagents, and software for genetic analysis. Our portfolio includes innovative technologies for genetic sequencing and real-time, digital and end point polymerase chain reaction (PCR), that are used to determine meaningful genetic information in applications such as cancer diagnostics, human identification testing, and animal health, as well as inherited and infectious disease.
- The Invitrogen brand offers life science customers a broad range of consumables and instruments that accelerate research and ensure consistency of results. Our portfolio of products includes innovative solutions for cellular analysis and biology, flow cytometry, cell culture, protein expression, synthetic biology, molecular biology and protein biology.
- Fisher Scientific is our channels brand, offering customers a complete portfolio of laboratory equipment and consumables, chemicals, supplies and services used in scientific research, healthcare, safety, and education markets. These products are offered through an extensive network of direct sales professionals, segment-relevant printed collateral and digital content, a state-of-the-art website, and supply-chain management services.
- Unity Lab Services is our instrument and equipment services brand, offering a complete portfolio of services from enterprise level engagements to individual instruments and laboratory equipment, regardless of the original manufacturer. Through our network of world-class service and support personnel, we provide services that are designed to help our customers improve productivity, reduce costs, and drive decisions with better data.
- Patheon is our contract development and manufacturing brand, representing the comprehensive offering of services that we provide to customers ranging from small biotech to large pharmaceutical companies. We support our customers' development of innovative medicines, including biologics, gene therapies and vaccines. By leveraging our expanding global network of facilities, we deliver high-quality services at all stages of the drug lifecycle, from discovery to development through clinical trials and commercial manufacturing.

We have approximately 13,000 sales personnel including highly trained technical specialists who enable us to better meet the needs of our more technical end-users. We also provide customers with product standardization and other supply-chain-management services to reduce procurement costs.

Business (continued)

New Products and Research and Development

Our business includes the development and introduction of new products and may include entry into new business segments. We anticipate that we will continue to make significant expenditures for research and development as we seek to provide a continuing flow of innovative products to maintain and improve our competitive position.

Raw Materials

Our management team believes that we have a readily available supply of raw materials for all of our significant products from various sources. We do not anticipate any difficulties obtaining the raw materials essential to our business.

Raw material and fuel prices are subject to fluctuations due to market conditions. We employ many strategies, including the use of alternative materials, to mitigate the effect of these fluctuations on our results.

Patents, Licenses and Trademarks

Patents are important in many aspects of our business. No particular patent, or related group of patents, is so important, however, that its loss would significantly affect our operations as a whole. Where appropriate, we seek patent protection for inventions and developments made by our personnel that are incorporated into our products or otherwise fall within our fields of interest. Patent rights resulting from work sponsored by outside parties do not always accrue exclusively to the company and may be limited by agreements or contracts.

We protect some of our technology as trade secrets and, where appropriate, we use trademarks or register trademarks used in connection with products. We also enter into license agreements with others to grant and/or receive rights to patents and know-how.

Seasonal Influences

Revenues in the fourth quarter are historically stronger than in other quarters due to the capital spending patterns of industrial, pharmaceutical and government customers. Sales of flu tests and related diagnostic products vary quarter to quarter and year to year based on the severity and duration of each period's flu season. Sales of allergy tests vary quarter to quarter and year to year based on the severity and duration of each period's airborne pollen allergens.

Working Capital Requirements

There are no special inventory requirements or credit terms extended to customers that would have a material adverse effect on our working capital.

Dependency on a Single Customer

There is no single customer the loss of which would have a material adverse effect on our business. No customer accounted for more than 5% of our total revenues in any of the past three years.

Backlog

Our backlog of firm orders at year-end 2019 and 2018 was as follows:

(In millions)	2019	2018
Life Sciences Solutions	$ 893	$ 647
Analytical Instruments	2,198	2,243
Specialty Diagnostics	172	187
Laboratory Products and Services	4,577	2,042
Eliminations	(72)	(32)
	$ 7,768	$ 5,087

We believe that approximately 63% of our backlog at the end of 2019 will be filled during 2020.

Government Contracts

Although the company transacts business with various government agencies, no government contract is of such magnitude that a renegotiation of profits or termination of the contract at the election of the government agency would have a material adverse effect on the company's financial results.

Business (continued)

Competition

The company encounters aggressive and able competition in virtually all of the markets we serve. Because of the diversity of our products and services, we face many different types of competitors and competition. Our competitors include a broad range of manufacturers and third-party distributors. Competitive climates in many of the markets we serve are characterized by changing technology and customer demands that require continuing research and development. Our success primarily depends on the following factors:

- technical performance and advances in technology that result in new products and improved price/performance ratios;
- product differentiation, availability and reliability;
- the depth of our capabilities;
- our reputation among customers as a quality provider of products and services;
- customer service and support;
- active research and application-development programs; and
- relative prices of our products and services.

Environmental Matters

We are subject to various laws and governmental regulations concerning environmental matters and employee safety and health in the United States and other countries. U.S. federal environmental legislation that affects us includes the Toxic Substances Control Act, the Resource Conservation and Recovery Act, the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). We are also subject to regulation by the Occupational Safety and Health Administration (OSHA) concerning employee safety and health matters. The United States Environmental Protection Agency (USEPA), OSHA, and other federal agencies have the authority to promulgate regulations that have an effect on our operations.

In addition to these federal activities, various states have been delegated certain authority under the aforementioned federal statutes as well as having authority over these matters under state laws. Many state and local governments have adopted environmental and employee safety and health laws and regulations, some of which are similar to federal requirements.

A number of our operations involve the handling, manufacturing, use or sale of substances that are or could be classified as toxic or hazardous materials within the meaning of applicable laws. Consequently, some risk of environmental harm is inherent in our operations and products, as it is with other companies engaged in similar businesses.

Our expenses for environmental requirements are incurred generally for ongoing compliance and historical remediation matters. Based on current information, we believe that these compliance costs are not material. For historical remediation obligations, our expenditures relate primarily to the cost of permitting, installing, and operating and maintaining groundwater-treatment systems and other remedial measures.

Our Fair Lawn and Somerville, New Jersey facilities entered into administrative consent orders with the New Jersey Department of Environmental Protection in 1984 to maintain groundwater-remediation activities at these sites, and are currently under the State's Licensed Site Remediation Professional Program. As the owner of the Fair Lawn facility, we are listed as a potentially responsible party for remediation within an area called the Fair Lawn Wellfields Superfund Site, and, in 2008, the company and certain other parties entered into a consent order with the USEPA to complete a Remedial Investigation/ Feasibility Study. In 2018, the USEPA issued a Record of Decision, including the scope of required remediation work based on findings of this study. In 2019, the company and another responsible party signed a proposed consent decree that, once approved by the court, requires the parties to finance and perform the required remediation work with USEPA oversight. In 2011, our Life Technologies subsidiary entered into a consent decree with the USEPA and other responsible parties to implement a groundwater remedy at the former Davis Landfill Superfund site in Smithfield, Rhode Island.

We record accruals for environmental liabilities based on current interpretations of environmental laws and regulations when it is probable that a liability has been incurred and the amount of such liability can be reasonably estimated. We calculate estimates based upon several factors, including reports prepared by environmental specialists and management's knowledge and experience with these environmental matters. We include in these estimates potential costs for investigation, remediation and operation and maintenance of cleanup sites. Accrued liabilities for environmental matters totaled $66 million at December 31, 2019.

These environmental liabilities do not include third-party recoveries to which we may be entitled. We believe that our accrual is adequate for the environmental liabilities we currently expect to incur. As a result we believe that our ultimate liability with respect to environmental matters will not have a material adverse effect on our financial position, results of

operations or cash flows. However, we may be subject to remedial or compliance costs due to future events, such as changes in existing laws and regulations, changes in agency direction or enforcement policies, developments in remediation technologies, changes in the conduct of our operations, and the effect of changes in accounting rules, which could have a material adverse effect on our financial position, results of operations or cash flows.

Regulatory Affairs

Our operations, and some of the products we offer, are subject to a number of complex and stringent laws and regulations governing the production, handling, transportation and distribution of chemicals, drugs and other similar products, including the operating and security standards of the Food and Drug Administration, the Drug Enforcement Administration, the Bureau of Alcohol, Tobacco, Firearms and Explosives, and various state boards of pharmacy as well as comparable state and foreign agencies. As Thermo Fisher's businesses also include export and import activities, we are subject to pertinent laws enforced by the U.S. Departments of Commerce, State and Treasury. In addition, our logistics activities must comply with the rules and regulations of the Department of Transportation, the Federal Aviation Administration and similar foreign agencies. While we believe we are in compliance in all material respects with such laws and regulations, any noncompliance could result in substantial fines or otherwise restrict our ability to provide competitive distribution services and thereby have an adverse effect on our financial condition. To date, none has had a material impact on our operations.

We are subject to laws and regulations governing government contracts, and failure to address these laws and regulations or comply with government contracts could harm our business by leading to a reduction in revenue associated with these customers. We have agreements relating to the sale of our products to government entities and, as a result, we are subject to various statutes and regulations that apply to companies doing business with the government. We are also subject to investigation for compliance with the regulations governing government contracts. A failure to comply with these regulations could result in suspension of these contracts, criminal, civil and administrative penalties or debarment.

Number of Employees

We have more than 75,000 employees.

Available Information

The company files annual, quarterly and current reports, proxy statements and other documents with the Securities and Exchange Commission (SEC) under the Exchange Act. The SEC maintains a website that contains reports, proxy and information statements and other information that issuers, including the company, file electronically with the SEC. The public can obtain any documents that we file with the SEC at www.sec.gov. We also make available free of charge on or through our own website at www.thermofisher.com our Annual Report on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and, if applicable, amendments to those reports filed or furnished pursuant to Section 13(a) of the Exchange Act as soon as reasonably practicable after we electronically file such material with, or furnish it to, the SEC. In addition, paper copies of these documents may be obtained free of charge by writing to the company care of its Investor Relations Department at our principal executive office located at 168 Third Avenue, Waltham, Massachusetts 02451.

Business (continued)

Information about Our Executive Officers

Name	Age	Present Title (Fiscal Year First Became Executive Officer)	Other Positions Held
Marc N. Casper	51	Chairman, President and Chief Executive Officer (2001)	President and Chief Executive Officer (2009-2020) Chief Operating Officer (2008-2009) Executive Vice President (2006-2009)
Mark P. Stevenson	57	Executive Vice President and Chief Operating Officer (2014)	Executive Vice President and President, Life Sciences Solutions (2014-2017) President and Chief Operating Officer, Life Technologies Corporation (2008-2014)
Michel Lagarde	46	Executive Vice President (2017)	Senior Vice President and President, Pharma Services (2017-2019) President and Chief Operating Officer, Patheon N.V. (2016-2017) Managing Director, JLL Partners* (2008-2016)
Michael A. Boxer	58	Senior Vice President and General Counsel (2018)	Executive Vice President and Group General Counsel, Luxottica Group S.p.A. (2011-2017)
Syed A. Jafry	56	Senior Vice President and President, Regions (2019)	Senior Vice President, Asia-Pacific and Emerging Markets (2011-2017)
Stephen Williamson	53	Senior Vice President and Chief Financial Officer (2015)	Vice President, Financial Operations (2008-2015)
Peter E. Hornstra	60	Vice President and Chief Accounting Officer (2001)	Corporate Controller (1996-2007)

*JLL Partners is a private equity firm focused on healthcare.

Item 1A. Risk Factors

Set forth below are the risks that we believe are material to our investors. This section contains forward-looking statements. You should refer to the explanation of the qualifications and limitations on forward-looking statements in Item 1. Business under the caption “Forward-looking Statements”.

We must develop new products, adapt to rapid and significant technological change and respond to introductions of new products by competitors to remain competitive. Our growth strategy includes significant investment in and expenditures for product development. We sell our products in several industries that are characterized by rapid and significant technological changes, frequent new product and service introductions and enhancements and evolving industry standards. Competitive factors include technological innovation, price, service and delivery, breadth of product line, customer support, e-business capabilities and the ability to meet the special requirements of customers. Our competitors may adapt more quickly to new technologies and changes in customers’ requirements than we can. Without the timely introduction of new products, services and enhancements, our products and services will likely become technologically obsolete over time, in which case our revenue and operating results would suffer.

Many of our existing products and those under development are technologically innovative and require significant planning, design, development and testing at the technological, product and manufacturing-process levels. Our customers use many of our products to develop, test and manufacture their own products. As a result, we must anticipate industry trends and develop products in advance of the commercialization of our customers’ products. If we fail to adequately predict our customers’ needs and future activities, we may invest heavily in research and development of products and services that do not lead to significant revenue.

It may be difficult for us to implement our strategies for improving internal growth. Our growth depends in part on the growth of the markets which we serve. Any decline or lower than expected growth in our served markets could diminish demand for our products and services, which would adversely affect our results of operations and financial condition. To address this issue, we are pursuing a number of strategies to improve our internal growth, including:

- strengthening our presence in selected geographic markets;
- allocating research and development funding to products with higher growth prospects;
- developing new applications for our technologies;
- expanding our service offerings;

- continuing key customer initiatives;
- combining sales and marketing operations in appropriate markets to compete more effectively;
- finding new markets for our products; and
- continuing the development of commercial tools and infrastructure to increase and support cross-selling opportunities of products and services to take advantage of our depth in product offerings.

We may not be able to successfully implement these strategies, and these strategies may not result in the expected growth of our business.

Our business is affected by general economic conditions and related uncertainties affecting markets in which we operate. Our business is affected by general economic conditions, both inside and outside the U.S. If the global economy and financial markets, or economic conditions in Europe, the U.S. or other key markets, are unstable, it could adversely affect the business, results of operations and financial condition of the company and its customers, distributors, and suppliers, having the effect of

- reducing demand for some of our products;
- increasing the rate of order cancellations or delays;
- increasing the risk of excess and obsolete inventories;
- increasing pressure on the prices for our products and services;
- causing supply interruptions which could disrupt our ability to produce our products; and
- creating longer sales cycles and greater difficulty in collecting sales proceeds.

Our growth could suffer if the markets into which we sell our products and services decline, do not grow as anticipated or experience cyclicality. Our growth depends in part on the growth of the markets which we serve. Any decline or lower than expected growth in our served markets could diminish demand for our products and services, which would adversely affect our financial statements. Certain of our businesses operate in industries that may experience periodic, cyclical downturns.

Demand for some of our products depends on capital spending policies of our customers and on government funding policies. Our customers include pharmaceutical and chemical companies, laboratories, universities, healthcare providers, government agencies and public and private research institutions. Many factors, including public policy spending priorities, available resources and product and economic cycles, have a significant effect on the capital spending policies of these entities.

Spending by some of these customers fluctuates based on budget allocations and the timely passage of the annual federal budget. An impasse in federal government budget decisions could lead to substantial delays or reductions in federal spending.

Economic, political, foreign currency and other risks associated with international sales and operations could adversely affect our results of operations. International markets contribute a substantial portion of our revenues, and we intend to continue expanding our presence in these regions. The exposure to fluctuations in currency exchange rates takes on different forms. International revenues and costs are subject to the risk that fluctuations in exchange rates could adversely affect our reported revenues and profitability when translated into U.S. dollars for financial reporting purposes. These fluctuations could also adversely affect the demand for products and services provided by us. As a multinational corporation, our businesses occasionally invoice third-party customers in currencies other than the one in which they primarily do business (the “functional currency”). Movements in the invoiced currency relative to the functional currency could adversely impact our cash flows and our results of operations. As our international sales grow, exposure to fluctuations in currency exchange rates could have a larger effect on our financial results. In 2019, currency translation had an unfavorable effect of $440 million on revenues due to the strengthening of the U.S. dollar relative to other currencies in which the company sells products and services.

In addition, many of our employees, contract manufacturers, suppliers, job functions, outsourcing activities and manufacturing facilities are located outside the United States. Accordingly, our future results could be harmed by a variety of factors, including:

- interruption to transportation flows for delivery of parts to us and finished goods to our customers;
- changes in a specific country's or region's political, economic or other conditions;
- changes in diplomatic and trade relationships, including new tariffs, trade protection measures, import or export licensing requirements, trade embargoes and sanctions and other trade barriers;

- tariffs imposed by the U.S. on goods from other countries and tariffs imposed by other countries on U.S. goods, including the tariffs recently adopted by the U.S. government on various imports from China and by the Chinese government on certain U.S. goods;
- the impact of public health epidemics on the global economy, such as the coronavirus currently impacting China;
- negative consequences from changes in tax laws;
- difficulty in staffing and managing widespread operations;
- differing labor regulations;
- differing protection of intellectual property;
- unexpected changes in regulatory requirements; and
- geopolitical uncertainty or turmoil, including terrorism and war.

For example, on January 31, 2020, the United Kingdom formally withdrew from the European Union, or EU and entered a transition period during which it will negotiate a trade deal with the EU. This withdrawal has created political and economic uncertainty, particularly in the United Kingdom and the EU, and this uncertainty may last for years. Our business could be affected during this period of uncertainty, and perhaps longer, by the impact of the United Kingdom's withdrawal from the EU. In addition, our business could be negatively affected by new trade agreements between the United Kingdom and other countries, including the United States, and by the possible imposition of trade or other regulatory barriers in the United Kingdom. These possible negative impacts, and others resulting from the United Kingdom's withdrawal from the EU, may adversely affect our operating results and our customers' businesses.

Our inability to protect our intellectual property could have a material adverse effect on our business. In addition, third parties may claim that we infringe their intellectual property, and we could suffer significant litigation or licensing expense as a result. We place considerable emphasis on obtaining patent and trade secret protection for significant new technologies, products and processes because of the length of time and expense associated with bringing new products through the development process and into the marketplace. Our success depends in part on our ability to develop patentable products and obtain and enforce patent protection for our products both in the United States and in other countries. We own numerous U.S. and foreign patents, and we intend to file additional applications, as appropriate, for patents covering our products. Patents may not be issued for any pending or future patent applications owned by or licensed to us, and the claims allowed under any issued patents may not be sufficiently broad to protect our technology. Any issued patents owned by or licensed to us may be challenged, invalidated or circumvented, and the rights under these patents may not provide us with competitive advantages. In addition, competitors may design around our technology or develop competing technologies. Intellectual property rights may also be unavailable or limited in some foreign countries, which could make it easier for competitors to capture increased market position. We could incur substantial costs to defend ourselves in suits brought against us or in suits in which we may assert our patent rights against others. An unfavorable outcome of any such litigation could materially adversely affect our business and results of operations.

We also rely on trade secrets and proprietary know-how with which we seek to protect our products, in part, by confidentiality agreements with our collaborators, employees and consultants. These agreements may be breached and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become known or be independently developed by our competitors.

Third parties may assert claims against us to the effect that we are infringing on their intellectual property rights. In the event that a claim relating to intellectual property is asserted against us, or third parties not affiliated with us hold pending or issued patents that relate to our products or technology, we may seek licenses to such intellectual property or challenge those patents. However, we may be unable to obtain these licenses on commercially reasonable terms, if at all, and our challenge of the patents may be unsuccessful. Our failure to obtain the necessary licenses or other rights could prevent the sale, manufacture, or distribution of our products and, therefore, could have a material adverse effect on our business, financial condition and results of operations.

Changes in governmental regulations may reduce demand for our products or increase our expenses. We compete in many markets in which we and our customers must comply with federal, state, local and international regulations, such as environmental, health and safety and food and drug regulations. We develop, configure and market our products to meet customer needs created by those regulations. Any significant change in regulations could reduce demand for our products or increase our expenses. For example, we manufacture pharmaceuticals and many of our instruments are marketed to the

pharmaceutical industry for use in discovering and developing drugs. Changes in the U.S. Food and Drug Administration's regulation of the drug discovery and development process could have an adverse effect on the demand for these products.

Our pharma services offerings are highly complex, and if we are unable to provide quality and timely offerings to our customers, our business could suffer. Our pharma services offerings are highly exacting and complex, due in part to strict quality and regulatory requirements. Our operating results in this business depend on our ability to execute and, when necessary, improve our quality management strategy and systems, and our ability to effectively train and maintain our employee base with respect to quality management. A failure of our quality control systems could result in problems with facility operations or preparation or provision of products. In each case, such problems could arise for a variety of reasons, including equipment malfunction, failure to follow specific protocols and procedures, problems with raw materials or environmental factors and damage to, or loss of, manufacturing operations. Such problems could affect production of a particular batch or series of batches of products, requiring the destruction of such products or a halt of facility production altogether.

In addition, our failure to meet required quality standards may result in our failure to timely deliver products to our customers, which in turn could damage our reputation for quality and service. Any such failure could, among other things, lead to increased costs, lost revenue, reimbursement to customers for lost drug product, registered intermediates, registered starting materials, and active pharmaceutical ingredients, other customer claims, damage to and possibly termination of existing customer relationships, time and expense spent investigating the cause and, depending on the cause, similar losses with respect to other batches or products. Production problems in our drug and biologic manufacturing operations could be particularly significant because the cost of raw materials for such manufacturing is often high. If problems in preparation or manufacture of a product or failures to meet required quality standards for that product are not discovered before such product is released to the market, we may be subject to adverse regulatory actions, including product recalls, product seizures, injunctions to halt manufacture and distribution, restrictions on our operations, civil sanctions, including monetary sanctions, and criminal actions. In addition, such problems or failures could subject us to litigation claims, including claims from our customers for reimbursement for the cost of lost or damaged active pharmaceutical ingredients, the cost of which could be significant.

We are subject to product and other liability risks for which we may not have adequate insurance coverage. We may be named as a defendant in product liability lawsuits, which may allege that products or services we have provided from our pharma services offerings have resulted or could result in an unsafe condition or injury to consumers. Additionally, products currently or previously sold by our environmental and process instruments and radiation measurement and security instruments businesses include fixed and portable instruments used for chemical, radiation and trace explosives detection. These products are used in airports, embassies, cargo facilities, border crossings and other high-threat facilities for the detection and prevention of terrorist acts. If any of these products were to malfunction, it is possible that explosive or radioactive material could fail to be detected by our product, which could lead to product liability claims. There are also many other factors beyond our control that could lead to liability claims, such as the reliability and competence of the customers' operators and the training of such operators.

Any such product liability claims brought against us could be significant and any adverse determination may result in liabilities in excess of our insurance coverage. Although we carry product liability insurance, we cannot be certain that our current insurance will be sufficient to cover these claims or that it can be maintained on acceptable terms, if at all.

Our inability to complete any pending acquisitions or to successfully integrate any new or previous acquisitions could have a material adverse effect on our business. Our business strategy includes the acquisition of technologies and businesses that complement or augment our existing products and services. Certain acquisitions may be difficult to complete for a number of reasons, including the need for antitrust and/or other regulatory approvals. Any acquisition we may complete may be made at a substantial premium over the fair value of the net identifiable assets of the acquired company. Further, we may not be able to integrate acquired businesses successfully into our existing businesses, make such businesses profitable, or realize anticipated cost savings or synergies, if any, from these acquisitions, which could adversely affect our business.

Moreover, we have acquired many companies and businesses. As a result of these acquisitions, we recorded significant goodwill and indefinite-lived intangible assets (primarily tradenames) on our balance sheet, which amount to approximately $25.71 billion and $1.25 billion, respectively, as of December 31, 2019. In addition, we have definite-lived intangible assets totaling $12.76 billion as of December 31, 2019. We assess the realizability of goodwill and indefinite-lived intangible assets annually as well as whenever events or changes in circumstances indicate that these assets may be impaired. We assess the realizability of definite-lived intangible assets whenever events or changes in circumstances indicate that these assets may be impaired. These events or circumstances would generally include operating losses or a significant decline in earnings associated with the acquired business or asset. Our ability to realize the value of the goodwill and intangible assets will depend on the future cash flows of these businesses. These cash flows in turn depend in part on how well we have integrated these businesses.

If we are not able to realize the value of the goodwill and intangible assets, we may be required to incur material charges relating to the impairment of those assets.

We are subject to laws and regulations governing government contracts, and failure to address these laws and regulations or comply with government contracts could harm our business by leading to a reduction in revenue associated with these customers. We have agreements relating to the sale of our products to government entities and, as a result, we are subject to various statutes and regulations that apply to companies doing business with the government. The laws governing government contracts differ from the laws governing private contracts and government contracts may contain pricing terms and conditions that are not applicable to private contracts. We are also subject to investigation for compliance with the regulations governing government contracts. A failure to comply with these regulations could result in suspension of these contracts, criminal, civil and administrative penalties or debarment.

Because we compete directly with certain of our larger customers and product suppliers, our results of operations could be adversely affected in the short term if these customers or suppliers abruptly discontinue or significantly modify their relationship with us. Our largest customer in the laboratory products business is also a significant competitor. Our business may be harmed in the short term if our competitive relationship in the marketplace with certain of our large customers results in a discontinuation of their purchases from us. In addition, we manufacture products that compete directly with products that we source from third-party suppliers. We also source competitive products from multiple suppliers. Our business could be adversely affected in the short term if any of our large third-party suppliers abruptly discontinues selling products to us.

Because we rely heavily on third-party package-delivery services, a significant disruption in these services or significant increases in prices may disrupt our ability to ship products, increase our costs and lower our profitability. We ship a significant portion of our products to our customers through independent package delivery companies, such as Federal Express in the U.S. and DHL in Europe. We also maintain a small fleet of vehicles dedicated to the delivery of our products and ship our products through other carriers, including national and regional trucking firms, overnight carrier services and the U.S. Postal Service. If one or more of these third-party package-delivery providers were to experience a major work stoppage, preventing our products from being delivered in a timely fashion or causing us to incur additional shipping costs we could not pass on to our customers, our costs could increase and our relationships with certain of our customers could be adversely affected. In addition, if one or more of these third-party package-delivery providers were to increase prices, and we were not able to find comparable alternatives or make adjustments in our delivery network, our profitability could be adversely affected.

We are required to comply with a wide variety of laws and regulations, and are subject to regulation by various federal, state and foreign agencies. We are subject to various local, state, federal, foreign and transnational laws and regulations, which include the operating and security standards of the U.S. Federal Drug Administration (the FDA), the U.S. Drug Enforcement Agency (the DEA), various state boards of pharmacy, state health departments, the U.S. Department of Health and Human Services (the DHHS), the European Medicines Agency (the EMA), in Europe, the EU member states and other comparable agencies and, in the future, any changes to such laws and regulations could adversely affect us. In particular, we are subject to laws and regulations concerning current good manufacturing practices and drug safety. Our subsidiaries may be required to register for permits and/or licenses with, and may be required to comply with the laws and regulations of the DEA, the FDA, the DHHS, foreign agencies including the EMA, and other various state boards of pharmacy, state health departments and/or comparable state agencies as well as certain accrediting bodies depending upon the type of operations and location of product distribution, manufacturing and sale.

The manufacture, distribution and marketing of many of our products and services, including medical devices and pharma services, are subject to extensive ongoing regulation by the FDA, the DEA, the EMA, and other equivalent local, state, federal and non-U.S. regulatory authorities. In addition, we are subject to inspections by these regulatory authorities. Failure by us or by our customers to comply with the requirements of these regulatory authorities, including without limitation, remediating any inspectional observations to the satisfaction of these regulatory authorities, could result in warning letters, product recalls or seizures, monetary sanctions, injunctions to halt manufacture and distribution, restrictions on our operations, civil or criminal sanctions, or withdrawal of existing or denial of pending approvals, including those relating to products or facilities. In addition, such a failure could expose us to contractual or product liability claims, contractual claims from our customers, including claims for reimbursement for lost or damaged active pharmaceutical ingredients, as well as ongoing remediation and increased compliance costs, any or all of which could be significant. We are the sole manufacturer of a number of pharmaceuticals for many of our customers and a negative regulatory event could impact our customers' ability to provide products to their customers.

We are also subject to a variety of federal, state, local and international laws and regulations that govern, among other things, the handling, transportation and manufacture of substances that could be classified as hazardous, and we are required to

comply with various import laws and export control and economic sanctions laws, which may affect our transactions with certain customers. In certain circumstances, export control and economic sanctions regulations may prohibit the export of certain products, services and technologies. In other circumstances, we may be required to obtain an export license before exporting the controlled item. Compliance with the various import laws that apply to our businesses can restrict our access to, and increase the cost of obtaining, certain products and at times can interrupt our supply of imported inventory. Any noncompliance by us with applicable laws and regulations or the failure to maintain, renew or obtain necessary permits and licenses could result in criminal, civil and administrative penalties and could have an adverse effect on our results of operations.

Our reputation, ability to do business and financial statements may be impaired by improper conduct by any of our employees, agents or business partners. We have internal controls and compliance systems to protect the company against acts committed by employees, agents or businesses that we acquire that would violate U.S. and/or non-U.S. laws, including the laws governing payments to government officials, bribery, fraud, kickbacks and false claims, pricing, sales and marketing practices, conflicts of interest, competition, employment practices and workplace behavior, export and import compliance, money laundering and data privacy, but we cannot provide assurance that these controls and systems will prevent every such wrongful act. In particular, the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act and similar anti-bribery laws in other jurisdictions generally prohibit companies and their intermediaries from making improper payments to government officials for the purpose of obtaining or retaining business, and we operate in many parts of the world that have experienced governmental corruption to some degree. Any such improper actions or allegations of such acts could damage our reputation and subject us to civil or criminal investigations in the United States and in other jurisdictions and related shareholder lawsuits, could lead to substantial civil and criminal, monetary and nonmonetary penalties and could cause us to incur significant legal and investigatory fees. In addition, the government may seek to hold us liable for violations committed by companies which we acquire. We also rely on our suppliers to adhere to our supplier standards of conduct, and material violations of such standards of conduct could occur that could have a material effect on our business, reputation and financial statements.

Natural disasters, public health crises, political crises, and other catastrophic events or other events outside of our control may disrupt our facilities or the facilities of third parties on which we depend, and could impact customer spending. We have significant operations in California, near major earthquake faults, which make us susceptible to earthquake risk. An earthquake or other natural disaster such as a fire or hurricane or power shortages or outages could disrupt our operations or impair our critical systems. Any of these disruptions or other events outside of our control, such as strikes or other labor unrest, could have an adverse effect on our results of operations. In addition, if any of our facilities, including our manufacturing or warehouse facilities, or the facilities of our suppliers, third-party service providers, or customers, is affected by natural disasters, such as earthquakes, tsunamis, power shortages or outages, floods or monsoons, public health crises, such as pandemics and epidemics, political crises, such as terrorism, war, political instability or other conflict, or other events outside of our control, such as strikes or other labor unrest, our results of operations could be adversely affected. Moreover, these types of events could negatively impact customer spending in the impacted regions or depending upon the severity, globally, which could also adversely impact our operating results. For example, in December 2019, a strain of coronavirus surfaced in Wuhan, China which could have a material adverse effect on our business and results of operations. The effects could include restrictions on our ability to travel to support our sites in China or our customers located there, disruptions in our ability to distribute products, and/or temporary closures of our facilities in China or the facilities of our suppliers or customers. Related disruption, inside or outside of China, to our operations or the operations of our suppliers or customers would likely impact our sales and operating results. At this point, the extent to which the coronavirus may impact our results of operations is uncertain.

Fluctuations in our effective tax rate may adversely affect our results of operations and cash flows. As a global company, we are subject to taxation in numerous countries, states and other jurisdictions. In preparing our financial statements, we record the amount of tax that is payable in each of the countries, states and other jurisdictions in which we operate. Our future effective tax rate, however, may be lower or higher than experienced in the past due to numerous factors, including a change in the mix of our profitability from country to country, changes in accounting for income taxes and recently enacted and future changes in tax laws in jurisdictions in which we operate. Any of these factors could cause us to experience an effective tax rate significantly different from previous periods or our current expectations, which could have an adverse effect on our business, results of operations and cash flows.

We may incur unexpected costs from increases in fuel and raw material prices, which could reduce our earnings and cash flow. Our primary commodity exposures are for fuel, petroleum-based resins and steel. While we may seek to minimize the impact of price increases through higher prices to customers and various cost-saving measures, our earnings and cash flows could be adversely affected in the event these measures are insufficient to cover our costs.

Our reliance upon sole or limited sources of supply for certain materials or components could cause production interruptions, delays and inefficiencies. Some of our businesses purchase certain materials from sole or limited source suppliers for reasons of quality assurance, regulatory requirements, cost effectiveness, availability or uniqueness of design. If

these or other suppliers encounter financial, operating or other difficulties or if our relationship with them changes, we might not be able to quickly establish or qualify replacement sources of supply. The supply chains for our businesses could also be disrupted by supplier capacity constraints, bankruptcy or exiting of the business for other reasons, decreased availability of key raw materials or commodities and external events such as natural disasters, pandemic health issues, war, terrorist actions, governmental actions and legislative or regulatory changes. Any of these factors could result in production interruptions, delays, extended lead times and inefficiencies.

A significant disruption in, or breach in security of, our information technology systems or violation of data privacy laws could adversely affect our business. As a part of our ongoing effort to upgrade our current information systems, we periodically implement new enterprise resource planning software and other software applications to manage certain of our business operations. As we implement and add functionality, problems could arise that we have not foreseen. Such problems could disrupt our ability to provide quotes, take customer orders and otherwise run our business in a timely manner. When we upgrade or change systems, we may suffer interruptions in service, loss of data or reduced functionality. In addition, if our new systems fail to provide accurate pricing and cost data our results of operations and cash flows could be adversely affected.

We also rely on our information technology systems to process, transmit and store electronic information (including sensitive data such as confidential business information and personally identifiable data relating to employees, customers and other business partners) and to manage or support a variety of critical business processes and activities (such as interacting with suppliers, selling our products and services, fulfilling orders and billing, collecting and making payments, shipping products, providing services and support to customers, tracking customer activity, fulfilling contractual obligations and otherwise conducting business). Our systems may be vulnerable to damage or interruption from natural disasters, power loss, telecommunication failures, terrorist attacks, computer hackers, computer viruses, ransomware, phishing, computer denial-of-service attacks, unauthorized access to customer or employee data or company trade secrets, and other attempts to harm our systems. Certain of our systems are not redundant, and our disaster recovery planning is not sufficient for every eventuality. Despite any precautions we may take, such problems could result in, among other consequences, interruptions in our services, which could harm our reputation and financial results. Any of the cyber-attacks, breaches or other disruptions or damage described above, if significant, could materially interrupt our operations, delay production and shipments, result in theft of our and our customers' intellectual property and trade secrets, damage customer, business partner and employee relationships and our reputation or result in defective products or services, legal claims and proceedings, liability and penalties under privacy laws and increased cost for security and remediation, each of which could adversely affect our business and financial results.

If we are unable to maintain reliable information technology systems and appropriate controls with respect to global data privacy and security requirements and prevent data breaches, we may suffer regulatory consequences in addition to business consequences. As a global organization, we are subject to data privacy and security laws, regulations, and customer-imposed controls in numerous jurisdictions as a result of having access to and processing confidential, personal and/or sensitive data in the course of our business. For example, in the United States, individual states regulate data breach and security requirements and multiple governmental bodies assert authority over aspects of the protection of personal privacy. European laws require us to have an approved legal mechanism to transfer personal data out of Europe, and the EU General Data Protection Regulation imposes significantly stricter requirements in how we collect and process personal data. Several countries, such as China and Russia, have passed laws that require personal data relating to their citizens to be maintained on local servers and impose additional data transfer restrictions. Government enforcement actions can be costly and interrupt the regular operation of our business, and data breaches or violations of data privacy laws can result in fines, reputational damage and civil lawsuits, any of which may adversely affect our business, reputation and financial statements.

Our debt may restrict our investment opportunities or limit our activities. As of December 31, 2019, we had approximately $17.75 billion in outstanding indebtedness. In addition, we have availability to borrow under a revolving credit facility that provides for up to $2.50 billion of unsecured multi-currency revolving credit. We may also obtain additional long-term debt and lines of credit to meet future financing needs, which would have the effect of increasing our total leverage.

Our leverage could have negative consequences, including increasing our vulnerability to adverse economic and industry conditions, limiting our ability to obtain additional financing and limiting our ability to acquire new products and technologies through strategic acquisitions.

Our ability to make scheduled payments, refinance our obligations or obtain additional financing will depend on our future operating performance and on economic, financial, competitive and other factors beyond our control. Our business may not generate sufficient cash flow to meet our obligations. If we are unable to service our debt, refinance our existing debt or obtain additional financing, we may be forced to delay strategic acquisitions, capital expenditures or research and development expenditures.

Additionally, the agreements governing our debt require that we maintain certain financial ratios, and contain affirmative and negative covenants that restrict our activities by, among other limitations, limiting our ability to incur additional indebtedness, merge or consolidate with other entities, make investments, create liens, sell assets and enter into transactions with affiliates. The covenants in our revolving credit facility (the Facility) include a Consolidated Leverage Ratio (total debt-to-Consolidated EBITDA) and a Consolidated Interest Coverage Ratio (Consolidated EBITDA to Consolidated Interest Expense), as such terms are defined in the Facility. Specifically, the company has agreed that, so long as any lender has any commitment under the Facility, any letter of credit is outstanding under the Facility, or any loan or other obligation is outstanding under the Facility, it will maintain a maximum Consolidated Leverage Ratio of 3.5:1.0. The company has also agreed that so long as any lender has any commitment under the Facility or any letter of credit is outstanding under the Facility, or any loan or other obligation is outstanding under the Facility, it will maintain a minimum Consolidated Interest Coverage Ratio of 3.0:1.0 as of the last day of any fiscal quarter.

Our ability to comply with these financial restrictions and covenants is dependent on our future performance, which is subject to prevailing economic conditions and other factors, including factors that are beyond our control such as foreign exchange rates and interest rates. Our failure to comply with any of these restrictions or covenants may result in an event of default under the applicable debt instrument, which could permit acceleration of the debt under that instrument and require us to prepay that debt before its scheduled due date. Also, an acceleration of the debt under certain of our debt instruments would trigger an event of default under other of our debt instruments.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

The company owns and leases office, engineering, laboratory, production and warehouse space throughout the world.

Item 3. Legal Proceedings

There are various lawsuits and claims against the company involving product liability, intellectual property, employment and commercial issues. See “Note 12 to our Consolidated Financial Statements – Commitments and Contingencies.”

Item 4. Mine Safety Disclosures

Not applicable.

PART II

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

Market Price of Common Stock

Our common stock is traded on the New York Stock Exchange under the symbol TMO.

Holders of Common Stock

As of February 1, 2020, the company had 3,154 holders of record of its common stock. This does not include holdings in street or nominee names.

Issuer Purchases of Equity Securities

A summary of the share repurchase activity for the company's fourth quarter of 2019 follows:

Period	Total Number of Shares Purchased	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs (1)	Maximum Dollar Amount of Shares That May Yet Be Purchased Under the Plans or Programs (1) (in millions)
Fiscal October (Sep. 29 - Nov. 2)	2,636,305	$ 284.49	2,636,305	$ 500
Fiscal November (Nov. 3 - Nov. 30)	—		—	2,500
Fiscal December (Dec. 1 - Dec. 31)	—		—	2,500
Total Fourth Quarter	2,636,305	$ 284.49	2,636,305	$ 2,500

(1) On September 7, 2018, the Board of Directors authorized the repurchase of up to $2.00 billion of the company's common stock. All of the shares of common stock repurchased by the company during the fourth quarter of 2019 were purchased under this program. On November 8, 2019, the Board of Directors replaced the existing authorization to repurchase the company's common stock, of which $500 million was remaining, with a new authorization to repurchase up to $2.50 billion of the company's common stock. At February 26, 2020, authorization remained for $1.00 billion of future repurchases of the company's common stock.

Item 6. Selected Financial Data

(In millions except per share amounts)	2019 (a)	2018 (b)	2017 (c)	2016 (d)	2015 (e)
Statement of Income Data					
Revenues	$ 25,542	$ 24,358	$ 20,918	$ 18,274	$ 16,965
Income from Continuing Operations	3,696	2,938	2,228	2,025	1,980
Net Income	3,696	2,938	2,225	2,022	1,975
Earnings per Share from Continuing Operations:					
Basic	9.24	7.31	5.65	5.13	4.97
Diluted	9.17	7.24	5.60	5.10	4.93
Earnings per Share:					
Basic	9.24	7.31	5.64	5.12	4.96
Diluted	9.17	7.24	5.59	5.09	4.92
Balance Sheet Data					
Total Assets	$ 58,381	$ 56,232	$ 56,669	$ 45,908	$ 40,834
Long-term Obligations	17,076	17,719	18,873	15,372	11,420
Cash Dividend Declared per Common Share	$ 0.76	$ 0.68	$ 0.60	$ 0.60	$ 0.60

The caption "restructuring and other costs/income" in the notes below includes amounts charged to cost of revenues, primarily for the sale of inventories revalued at the date of acquisition, and charges/credits to selling, general and administrative expense primarily for significant acquisition transaction costs.

(a) Reflects $334 million of pre-tax income from gains on sale of businesses, net of restructuring and other costs and $184 million of pre-tax losses on the early extinguishment of debt.

(b) Reflects $91 million of pre-tax charges for restructuring and other costs.

(c) Reflects $298 million of pre-tax charges for restructuring and other costs. Also reflects the acquisition of Patheon N.V. in August 2017.

(d) Reflects $395 million of pre-tax charges for restructuring and other costs. Also reflects the acquisitions of Affymetrix, Inc. in March 2016 and FEI Company in September 2016.

(e) Reflects $171 million of pre-tax charges for restructuring and other costs.

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

Reference is made throughout this Management's Discussion and Analysis of Financial Condition and Results of Operations to Notes to the Consolidated Financial Statements, which begin on page F-1 of this report. Management's discussion and analysis of financial condition and results of operations for 2017 is included in Item 7 of the company's 2018 Annual Report on Form 10-K filed with the Securities and Exchange Commission.

Overview

The company develops, manufactures and sells a broad range of products that are sold worldwide. The company expands the product lines and services it offers by developing and commercializing its own technologies and by making strategic acquisitions of complementary businesses. The company's operations fall into four segments (see Note 4): Life Sciences Solutions, Analytical Instruments, Specialty Diagnostics and Laboratory Products and Services.

Recent Acquisitions and Divestiture

The company's strategy is to augment internal growth at existing businesses with complementary acquisitions. The company's principal recent acquisitions and divestiture are described below.

On October 25, 2018, the company acquired, within the Life Sciences Solutions segment, Becton Dickinson and Company's Advanced Bioprocessing business for $477 million in cash. This North America-based business adds complementary cell culture products that expand the segment's bioproduction offerings to help customers increase yield during production of biologic drugs. The Advanced Bioprocessing business reported revenues of $100 million in 2017.

On April 30, 2019, the company acquired, within the Laboratory Products and Services segment, Brammer Bio for approximately $1.67 billion in cash. Brammer Bio is a leading viral vector contract development and manufacturing organization for gene and cell therapies. The acquisition expands the segment's contract manufacturing capabilities. Brammer Bio reported revenues of approximately $140 million in 2018.

On June 28, 2019, the company sold its Anatomical Pathology business to PHC Holdings Corporation for $1.13 billion, net of cash divested. The business was part of the Specialty Diagnostics segment. The sale of this business resulted in a pre-tax gain of approximately $478 million, included in restructuring and other (income) costs, net. Revenues in 2019, through the date of sale, and the full year 2018 of the business sold were approximately $115 million and $238 million, respectively, net of retained sales through the company's healthcare market and research and safety market channel businesses.

Overview of Results of Operations and Liquidity

(Dollars in millions)	2019		2018	
Revenues				
Life Sciences Solutions	$ 6,856	26.8 %	$ 6,269	25.7 %
Analytical Instruments	5,522	21.6 %	5,469	22.5 %
Specialty Diagnostics	3,718	14.6 %	3,724	15.3 %
Laboratory Products and Services	10,599	41.5 %	10,035	41.2 %
Eliminations	(1,153)	(4.5)%	(1,139)	(4.7)%
	$ 25,542	100 %	$ 24,358	100 %

Sales in 2019 were $25.54 billion, an increase of $1.18 billion from 2018. Sales increased $153 million due to acquisitions, net of a divestiture. The unfavorable effects of currency translation resulted in a decrease in revenues of $440 million in 2019. Aside from the effects of acquisitions/divestitures and currency translation, revenues increased $1.47 billion (6%) primarily due to increased demand. Sales to customers in each of the company's primary end markets grew with particular strength in sales to customers in the biotech and pharmaceutical industry. Sales growth was strong in each of the company's primary geographic areas in 2019. In the fourth quarter of 2019, sales to industrial customers declined and sales growth in Asia was modest due to weaker end market conditions off of a strong fourth quarter in 2018.

Overview of Results of Operations and Liquidity (continued)

In 2019, total company operating income and operating income margin were $4.59 billion and 18.0%, respectively, compared with $3.78 billion and 15.5%, respectively, in 2018. The increase in operating income was primarily due to profit on higher sales, the gain on the sale of the Anatomical Pathology business and, to a lesser extent, productivity improvements, net of inflationary cost increases. These increases were offset in part by strategic growth investments, sales mix and unfavorable foreign currency exchange. The company's references to strategic growth investments generally refer to targeted spending for enhancing commercial capabilities, including expansion of geographic sales reach and e-commerce platforms, marketing initiatives, expanded service and operational infrastructure, focused research projects and other expenditures to enhance the customer experience. The company's references throughout this discussion to productivity improvements generally refer to improved cost efficiencies from its Practical Process Improvement (PPI) business system, reduced costs resulting from global sourcing initiatives, a lower cost structure following restructuring actions, including headcount reductions and consolidation of facilities, and low cost region manufacturing.

The company recorded a $374 million provision for income taxes in 2019 including $191 million related to the gain on the sale of the Anatomical Pathology business. In 2019, the company recorded a $62 million income tax benefit related to a foreign exchange loss for tax purposes on certain intercompany financing arrangements, implemented foreign tax credit planning in Sweden which resulted in $75 million of foreign tax credits, with no related incremental U.S. income tax expense, and recorded a $79 million income tax benefit related to the deferred tax implications of intra-entity transactions which included a tax benefit to release a valuation allowance against net operating losses previously determined to be unrealizable.

The company recorded a $324 million provision for income taxes in 2018 including a net provision of $68 million to adjust the estimated initial effects of the Tax Cuts and Jobs Act of 2017 (the Tax Act) recorded in 2017, consisting of an incremental provision of $117 million offset in part by a $49 million reduction of related unrecognized tax benefits established in 2017. These adjustments were required based on new U.S. Treasury guidance and further analysis of available tax accounting methods and elections, legislative updates, regulations, earnings and profit computations and foreign taxes. In 2018, the provision for income taxes also included a $71 million charge to establish a valuation allowance against net operating losses that will not be utilized as a result of the 2019 sale of the Anatomical Pathology business.

The effective tax rate in both 2019 and 2018 was also affected by relatively significant earnings in lower tax jurisdictions. Due primarily to the non-deductibility of intangible asset amortization for tax purposes, the company's cash payments for income taxes were higher than its income tax expense for financial reporting purposes and totaled $896 million and $591 million in 2019 and 2018, respectively.

The company expects its effective tax rate in 2020 will be between 8% and 10% based on currently forecasted rates of profitability in the countries in which the company conducts business and expected generation of foreign tax credits. The effective tax rate can vary significantly from period to period as a result of discrete income tax factors and events.

Income from continuing operations increased to $3.70 billion in 2019, from $2.94 billion in 2018 principally due to increase in operating income in 2019 (discussed above) offset in part by $184 million of losses on the early extinguishment of debt in 2019 (Note 10).

During 2019, the company's cash flow from operations totaled $4.97 billion compared with $4.54 billion for 2018. The increase primarily resulted from higher income before amortization and depreciation and lower investment in working capital in the 2019 period.

As of December 31, 2019, the company's short-term debt totaled $676 million, including $672 million of senior notes due within the next twelve months. The company has a revolving credit facility with a bank group that provides up to $2.50 billion of unsecured multi-currency revolving credit. If the company borrows under this facility, it intends to leave undrawn an amount equivalent to outstanding commercial paper to provide a source of funds in the event that commercial paper markets are not available. As of December 31, 2019, no borrowings were outstanding under the company's revolving credit facility, although available capacity was reduced by approximately $72 million as a result of outstanding letters of credit.

The company believes that its existing cash and cash equivalents of $2.40 billion as of December 31, 2019 and its future cash flow from operations together with available borrowing capacity under its revolving credit agreement will be sufficient to meet the cash requirements of its existing businesses for the foreseeable future, including at least the next 24 months.

Critical Accounting Policies and Estimates

The company's discussion and analysis of its financial condition and results of operations is based upon its financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these financial statements requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue and expenses and related disclosure of contingent liabilities. On an on-going basis, management evaluates its estimates, including those related to intangible assets and goodwill, income taxes and contingencies and litigation. Management believes the most complex and sensitive judgments, because of their significance to the consolidated financial statements, result primarily from the need to make estimates about the effects of matters that are inherently uncertain. Management bases its estimates on historical experience, current market and economic conditions and other assumptions that management believes are reasonable. The results of these estimates form the basis for judgments about the carrying value of assets and liabilities where the values are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions.

The company believes the following represent its critical accounting policies and estimates used in the preparation of its financial statements:

(a) *Intangible Assets and Goodwill*

The company uses assumptions and estimates in determining the fair value of assets acquired and liabilities assumed in a business combination. The determination of the fair value of intangible assets, which represent a significant portion of the purchase price in many of the company's acquisitions, requires the use of significant judgment with regard to (i) the fair value; and (ii) whether such intangibles are amortizable or non-amortizable and, if the former, the period and the method by which the intangible asset will be amortized. The company estimates the fair value of acquisition-related intangible assets principally based on projections of cash flows that will arise from identifiable intangible assets of acquired businesses. The projected cash flows are discounted to determine the present value of the assets at the dates of acquisition. Definite-lived intangible assets totaled $12.76 billion at December 31, 2019. The company reviews definite-lived intangible assets for impairment when indication of potential impairment exists, such as a significant reduction in cash flows associated with the assets. Actual cash flows arising from a particular intangible asset could vary from projected cash flows which could imply different carrying values from those established at the dates of acquisition and which could result in impairment of such asset.

The company evaluates goodwill and indefinite-lived intangible assets for impairment annually and when events occur or circumstances change that would more-likely-than-not reduce the fair value of the asset below its carrying amount. Events or circumstances that might require an interim evaluation include unexpected adverse business conditions, economic factors, unanticipated technological changes or competitive activities, loss of key personnel and acts by governments and courts. Goodwill and indefinite-lived intangible assets totaled $25.71 billion and $1.25 billion, respectively, at December 31, 2019. Estimates of discounted future cash flows require assumptions related to revenue and operating income growth rates, discount rates and other factors. For the goodwill impairment tests, the company considers (i) peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the respective reporting units and (ii) estimated weighted average costs of capital. Different assumptions from those made in the company's analysis could materially affect projected cash flows and the company's evaluation of goodwill and indefinite-lived intangible assets for impairment.

For reporting units where the company performed the quantitative goodwill impairment test, indications of fair value based on projections of profitability and on peer revenues and earnings trading multiples were sufficient to conclude that no impairment of goodwill or indefinite-lived intangible assets existed at the end of the tenth fiscal month of 2019, the date of the company's annual impairment testing. There can be no assurance, however, that an economic downturn will not materially adversely affect peer trading multiples and the company's businesses such that they do not achieve their forecasted profitability and these assets become impaired. Should the fair value of the company's goodwill or indefinite-lived intangible assets decline because of reduced operating performance, market declines, or other indicators of impairment, or as a result of changes in the discount rate, charges for impairment may be necessary.

(b) Income Taxes

In the ordinary course of business there is inherent uncertainty in quantifying the company's income tax positions. The company assesses income tax positions and records tax benefits for all years subject to examination based upon management's evaluation of the facts, circumstances and information available at the reporting date. For those tax

Critical Accounting Policies and Estimates (continued)

positions where it is more likely than not that a tax benefit will be sustained, the company has recorded the largest amount of tax benefit with a greater than 50 percent likelihood of being realized upon ultimate settlement with a taxing authority that has full knowledge of all relevant information. For those income tax positions where it is not more likely than not that a tax benefit will be sustained, no tax benefit has been recognized in the financial statements. Should tax return positions that the company expects are sustainable not be sustained upon audit, the company could be required to record an incremental tax provision for such taxes. The company's liability for these unrecognized tax benefits totaled $1.55 billion at December 31, 2019.

The company operates in numerous countries under many legal forms and, as a result, is subject to the jurisdiction of numerous domestic and non-U.S. tax authorities, as well as to tax agreements and treaties among these governments. Determination of taxable income in any jurisdiction requires the company to interpret the related tax laws and regulations and the use of estimates and assumptions regarding significant future events, such as the amount, timing and character of deductions, permissible revenue recognition methods under the tax law and the sources and character of income and tax credits. Changes in tax laws, regulations, agreements and treaties, currency exchange restrictions or the company's level of operations or profitability in each taxing jurisdiction could have an impact upon the amount of current and deferred tax balances and hence the company's net income.

The company estimates the degree to which tax assets will result in a benefit, after consideration of all positive and negative evidence, and provides a valuation allowance for tax assets that it believes will more likely than not go unused. In situations in which the company has been able to determine that its deferred tax assets will be realized, that determination generally relies on future reversals of taxable temporary differences and expected future taxable income. If it becomes more likely than not that a tax asset will be used, the company reverses the related valuation allowance. Any such reversals are recorded as a reduction of the company's tax provision. The company's tax valuation allowance totaled $408 million at December 31, 2019. Should the company's actual future taxable income by tax jurisdiction vary from estimates, additional allowances or reversals thereof may be necessary.

The company has not provided U.S. state income taxes or additional non-U.S. taxes on certain of its non-U.S. subsidiaries' undistributed earnings, as such amounts are intended to be reinvested outside the United States indefinitely in the respective jurisdictions based on specific business plans and tax strategies. These business plans and tax strategies consider: short-term and long-term forecasts and budgets of the U.S. parent and non-U.S. subsidiaries; working capital and other needs in locations where earnings are generated; the company's past practices regarding non-U.S. subsidiary dividends; sources of financing by the U.S. parent, such as issuing debt or equity; and uses of cash by the U.S. parent that are more discretionary in nature, such as business combinations and share repurchase programs. However, should the company change its business plans and tax strategies in the future and decide to repatriate a portion of these earnings to one of its U.S. subsidiaries, including cash maintained by these non-U.S. subsidiaries, the company would recognize additional tax liabilities. It is not practicable to estimate the amount of additional U.S. state income tax and non-U.S. tax liabilities that the company would incur. The company's intent is to only make distributions from non-U.S. subsidiaries in the future when they can be made at no net tax costs.

(c) Contingencies and Litigation

The company records accruals for various contingencies, including legal proceedings, environmental, workers' compensation, product, general and auto liabilities, and other claims that arise in the normal course of business. The accruals are based on management's judgment, historical claims experience, the probability of losses and, where applicable, the consideration of opinions of internal and/or external legal counsel and actuarial estimates. Accruals of acquired businesses, including product liability and environmental accruals, are initially recorded at fair value and discounted to their net present value. Additionally, the company records receivables from third-party insurers when recovery has been determined to be probable.

Results of Operations

2019 Compared With 2018

(In millions)	2019	2018	Total Change	Currency Translation / Other *	Acquisitions/ Divestitures	Operations
Revenues						
Life Sciences Solutions	$ 6,856	$ 6,269	$ 587	$ (122)	$ 89	$ 620
Analytical Instruments	5,522	5,469	53	(96)	—	149
Specialty Diagnostics	3,718	3,724	(6)	(66)	(126)	186
Laboratory Products and Services	10,599	10,035	564	(227)	187	604
Eliminations	(1,153)	(1,139)	(14)	71	3	(88)
Consolidated Revenues	$ 25,542	$ 24,358	$ 1,184	$ (440)	$ 153	$ 1,471

* Currency Translation/Other for the Laboratory Products and Services segment includes a reduction of revenue of $60 million for the impact of a change in the method of reporting certain intersegment sales with no impact on consolidated results.

Sales in 2019 were $25.54 billion, an increase of $1.18 billion from 2018. Sales increased $153 million due to acquisitions. The unfavorable effects of currency translation resulted in a decrease in revenues of $440 million in 2019. Aside from the effects of acquisitions and currency translation, revenues increased $1.47 billion (6%) primarily due to increased demand. Sales to customers in each of the company's primary end markets grew with particular strength in sales to customers in the biotech and pharmaceutical industry. Sales growth was strong in each of the company's primary geographic areas in 2019. In the fourth quarter of 2019, sales to industrial customers declined and sales growth in Asia was modest due to weaker end market conditions off of a strong fourth quarter in 2018.

In 2019, total company operating income and operating income margin were $4.59 billion and 18.0%, respectively, compared with $3.78 billion and 15.5%, respectively, in 2018. The increase in operating income was primarily due to profit on higher sales, the gain on the sale of the Anatomical Pathology business and, to a lesser extent, productivity improvements, net of inflationary cost increases. These increases were offset in part by strategic growth investments, sales mix and unfavorable foreign currency exchange.

In 2019, the company recorded restructuring and other income, net, of $334 million, including $482 million of net gains on the sale of businesses, principally the Anatomical Pathology business (see Note 2). The company also recorded $17 million of charges to cost of revenues primarily for the sale of inventories revalued at the date of acquisition, and $62 million of net charges to selling, general and administrative expenses, principally transaction and integration-related costs related to acquisitions and a divestiture. In addition, the company recorded $52 million of cash restructuring charges, net, primarily for employee severance and abandoned facilities costs associated with the closure and consolidation of facilities in the U.S. and Europe (see Note 16).

In 2018, the company recorded restructuring and other costs, net, of $91 million, including $12 million of charges to cost of revenues primarily for the sale of inventories revalued at the date of acquisition. The company recorded $29 million of net charges to selling, general and administrative expenses, primarily for third-party transaction and integration costs associated with recent and pending acquisitions, offset in part by income from favorable results of product liability litigation. In addition, the company recorded $88 million of cash restructuring costs, in its continued effort to streamline operations, including severance at several businesses and abandoned facility expenses at businesses that have been or are being consolidated in the U.S. and Europe. The company also recorded $38 million of other income, net, principally for resolution of a litigation matter.

As of February 26, 2020, the company has identified restructuring actions that will result in additional charges of approximately $65 million, primarily in 2020, and expects to identify additional actions during 2020 which will be recorded when specified criteria are met, such as communication of benefit arrangements or when the costs have been incurred. Approximately 25% of the additional charges will be incurred in the Life Sciences Solutions segment, 30% in the Analytical Instruments segment, 35% in the Laboratory Products and Services segment, and 10% in the Specialty Diagnostics segment. The restructuring projects for which charges were incurred in 2019 are expected to result in annual cost savings of approximately $60 million beginning in part in 2019 and, to a greater extent, in 2020, including $20 million in the Life Sciences Solutions segment, $15 million in the Analytical Instruments segment, $5 million in the Specialty Diagnostics segment and $20

Results of Operations (continued)

million in the Laboratory Products and Services segment. The restructuring actions for which charges were incurred in 2018 resulted in annual cost savings of approximately $65 million beginning in part in 2018 and to a greater extent in 2019, including $20 million in the Life Sciences Solutions segment, $10 million in the Analytical Instruments segment, $5 million in the Specialty Diagnostics segment and $30 million in the Laboratory Products and Services segment.

Segment Results

The company's management evaluates segment operating performance using operating income before certain charges/credits to cost of revenues and selling, general and administrative expenses, principally associated with acquisition-related activities; restructuring and other costs/income including costs arising from facility consolidations such as severance and abandoned lease expense and gains and losses from the sale of real estate and product lines; and amortization of acquisition-related intangible assets. The company uses this measure because it helps management understand and evaluate the segments' core operating results and facilitate comparison of performance for determining compensation (Note 4). Accordingly, the following segment data is reported on this basis.

(Dollars in millions)	2019	2018	Change
Revenues			
Life Sciences Solutions	$ 6,856	$ 6,269	9 %
Analytical Instruments	5,522	5,469	1 %
Specialty Diagnostics	3,718	3,724	— %
Laboratory Products and Services	10,599	10,035	6 %
Eliminations	(1,153)	(1,139)	1 %
Consolidated Revenues	$ 25,542	$ 24,358	5 %
Segment Income			
Life Sciences Solutions	$ 2,446	$ 2,158	13 %
Analytical Instruments	1,273	1,247	2 %
Specialty Diagnostics	930	952	(2)%
Laboratory Products and Services	1,324	1,258	5 %
Subtotal Reportable Segments	5,973	5,615	6 %
Cost of Revenues Charges	(17)	(12)	
Selling, General and Administrative Charges, Net	(62)	(29)	
Restructuring and Other (Costs) Income, Net	413	(50)	
Amortization of Acquisition-related Intangible Assets	(1,713)	(1,741)	
Consolidated Operating Income	$ 4,594	$ 3,783	21 %
Reportable Segments Operating Income Margin	23.4 %	23.1 %	
Consolidated Operating Income Margin	18.0 %	15.5 %	

Income from the company's reportable segments increased 6% to $5.97 billion in 2019 due primarily to profit on higher sales and, to a lesser extent, productivity improvements, net of inflationary cost increases, offset in part by strategic growth investments, sales mix and unfavorable foreign currency exchange.

Life Sciences Solutions

(Dollars in millions)	2019	2018	Change
Revenues	$ 6,856	$ 6,269	9 %
Operating Income Margin	35.7 %	34.4 %	1.3 pt

Results of Operations (continued)

Sales in the Life Sciences Solutions segment increased $587 million to $6.86 billion in 2019. Sales increased $620 million (10%) due to higher revenues at existing businesses and $89 million due to an acquisition. The unfavorable effects of currency translation resulted in a decrease in revenues of $122 million. The increase in revenue at existing businesses was primarily due to increased demand in each of the segment's principal businesses with particular strength in sales of bioproduction and biosciences products.

Operating income margin was 35.7% in 2019 compared to 34.4% in 2018. The increase in operating margin resulted primarily from profit on higher sales offset in part by strategic growth investments and, to a lesser extent, sales mix and unfavorable foreign currency exchange.

Analytical Instruments

(Dollars in millions)	2019	2018	Change
Revenues	$ 5,522	$ 5,469	1 %
Operating Income Margin	23.1 %	22.8 %	0.3 pt

Sales in the Analytical Instruments segment increased $53 million to $5.52 billion in 2019. Sales increased $149 million (3%) due to higher revenues at existing businesses. The unfavorable effects of currency translation resulted in a decrease in revenues of $96 million. The increase in revenue at existing businesses was due to increased demand for products sold by each of the segment's primary businesses with particular strength in chromatography and mass spectrometry instruments. Sales decreased in the fourth quarter of 2019 due to industrial end market conditions off of a strong fourth quarter of 2018.

Operating income margin was 23.1% in 2019 compared to 22.8% in 2018. The increase resulted primarily from profit on higher sales and productivity improvements, net of inflationary cost increases. These increases were offset in part by sales mix and strategic growth investments.

Specialty Diagnostics

(Dollars in millions)	2019	2018	Change
Revenues	$ 3,718	$ 3,724	— %
Operating Income Margin	25.0 %	25.6 %	-0.6 pt

Sales in the Specialty Diagnostics segment remained flat at $3.72 billion in 2019. Sales increased $186 million (5%) due to higher revenues at existing businesses. The unfavorable effects of currency translation resulted in a decrease in revenues of $66 million and the divestiture of the Anatomical Pathology business decreased revenues by $126 million. The increase in revenue at existing businesses was due to increased demand for products sold through the segment's healthcare market channel as well as clinical diagnostic and immunodiagnostic products.

Operating income margin was 25.0% in 2019 and 25.6% in 2018. The decrease was primarily due to strategic growth investments and, to a lesser extent, sales mix and the divestiture of the Anatomical Pathology business. These decreases were offset in part by profit on higher sales and, to a lesser extent, productivity improvements, net of inflationary cost increases. Following multi-year extensions of several expiring licensing arrangements with commercial partners, segment revenues and operating income in 2020 will both be unfavorably affected by approximately $30 million.

Laboratory Products and Services

(Dollars in millions)	2019	2018	Change
Revenues	$ 10,599	$ 10,035	6 %
Operating Income Margin	12.5 %	12.5 %	0 pt

Sales in the Laboratory Products and Services segment increased $564 million to $10.60 billion in 2019. Sales increased $604 million (6%) due to higher revenues at existing businesses and $187 million due to acquisitions. The unfavorable effects of currency translation resulted in a decrease in revenues of $167 million. A change in the method of reporting certain intersegment sales reduced segment revenues by $60 million with no impact to consolidated results. The increase in revenue at

Results of Operations (continued)

existing businesses was primarily due to increased demand in each of the segment's principal businesses with particular strength in service offerings of its pharma services business and products sold through its research and safety market channel business.

Operating income margin was 12.5% in both 2019 and 2018. Increases from profit on higher sales and productivity improvements, net of inflationary cost increases, were offset by strategic growth investments and, to a lesser extent, sales mix.

Other Expense/Income, Net

In 2019, the company recorded $184 million of losses on the early extinguishment of debt, offset in part by $44 million of net gains on investments. The investment gains include a $28 million gain on the sale of a joint venture for net proceeds of $42 million. In 2018, the company recorded $15 million of net losses on investments.

Provision for Income Taxes

The company recorded a $374 million provision for income taxes in 2019 including $191 million related to the gain on the sale of the Anatomical Pathology business. In 2019, the company recorded a $62 million income tax benefit related to a foreign exchange loss for tax purposes on certain intercompany financing arrangements, implemented foreign tax credit planning in Sweden which resulted in $75 million of foreign tax credits, with no related incremental U.S. income tax expense, and recorded a $79 million income tax benefit related to the deferred tax implications of intra-entity transactions which included a tax benefit to release a valuation allowance against net operating losses previously determined to be unrealizable.

The company recorded a $324 million provision for income taxes in 2018 including a net provision of $68 million to adjust the estimated initial effects of the Tax Cuts and Jobs Act of 2017 recorded in 2017, consisting of an incremental provision of $117 million offset in part by a $49 million reduction of related unrecognized tax benefits established in 2017. These adjustments were required based on new U.S. Treasury guidance and further analysis of available tax accounting methods and elections, legislative updates, regulations, earnings and profit computations and foreign taxes. In 2018, the provision for income taxes also included a $71 million charge to establish a valuation allowance against net operating losses that will not be utilized as a result of the 2019 sale of the Anatomical Pathology business.

The effective tax rate in both 2019 and 2018 was also affected by relatively significant earnings in lower tax jurisdictions. Due primarily to the non-deductibility of intangible asset amortization for tax purposes, the company’s cash payments for income taxes were higher than its income tax expense for financial reporting purposes and totaled $896 million and $591 million in 2019 and 2018, respectively.

The company expects its effective tax rate in 2020 will be between 8% and 10% based on currently forecasted rates of profitability in the countries in which the company conducts business and expected generation of foreign tax credits. The effective tax rate can vary significantly from period to period as a result of discrete income tax factors and events.

The company has operations and a taxable presence in approximately 50 countries outside the U.S. Some of these countries have lower tax rates than the U.S. The company’s ability to obtain a benefit from lower tax rates outside the U.S. is dependent on its relative levels of income in countries outside the U.S. and on the statutory tax rates in those countries. Based on the dispersion of the company’s non-U.S. income tax provision among many countries, the company believes that a change in the statutory tax rate in any individual country is not likely to materially affect the company’s income tax provision or net income, aside from any resulting one-time adjustment to the company’s deferred tax balances to reflect a new rate.

Recent Accounting Pronouncements

A description of recently issued accounting standards is included under the heading “*Recent Accounting Pronouncements*” in Note 1.

Contingent Liabilities

The company is contingently liable with respect to certain legal proceedings and related matters. An unfavorable outcome that differs materially from current accrual estimates, if any, for one or more of the matters described under the headings “*Product Liability, Workers Compensation and Other Personal Injury Matters*,” and “*Intellectual Property Matters*” in Note 12 could have a material adverse effect on the company’s financial position as well as its results of operations and cash flows.

Liquidity and Capital Resources

Consolidated working capital (current assets less current liabilities) was $5.70 billion at December 31, 2019, compared with $4.48 billion at December 31, 2018, primarily due to lower short-term debt and higher cash balances. Included in working capital were cash and cash equivalents of $2.40 billion at December 31, 2019 and $2.10 billion at December 31, 2018.

2019

Cash provided by operating activities was $4.97 billion during 2019. Cash provided by income was offset in part by increased investments in working capital. Increases in accounts receivable and inventories used cash of $225 million and $458 million, respectively, primarily to support growth in sales. An increase in other assets used cash of $408 million primarily due to the timing of customer billings and tax refunds. Other liabilities increased by $210 million primarily due to advance payments from customers. Cash payments for income taxes increased to $896 million during 2019, compared with $591 million in 2018. The company made cash contributions to its pension and postretirement benefit plans totaling $50 million during 2019. Payments for restructuring actions, principally severance costs and lease and other expenses of real estate consolidation, used cash of $69 million during 2019.

During 2019, the company's investing activities used $1.49 billion of cash. Acquisitions used cash of $1.84 billion. Proceeds from the sale of the Anatomical Pathology business provided $1.13 billion. The company's investing activities also included the purchase of $926 million of property, plant and equipment.

The company's financing activities used $3.12 billion of cash during 2019. Repayment of senior notes used cash of $6.36 billion. New long-term borrowings provided cash of $5.64 billion. A net decrease in commercial paper obligations used cash of $683 million. The company's financing activities also included the repurchase of $1.50 billion of the company's common stock and the payment of $297 million in cash dividends, offset in part by $153 million of net proceeds from employee stock option exercises. On November 8, 2019, the Board of Directors replaced the existing authorization to repurchase the company's common stock, of which $500 million was remaining, with a new authorization to repurchase up to $2.50 billion of the company's common stock. At February 26, 2020, authorization remained for $1.00 billion of future repurchases of the company's common stock.

As of December 31, 2019, the company's short-term debt totaled $676 million, including $672 million of senior notes due within the next twelve months. The company has a revolving credit facility with a bank group that provides up to $2.50 billion of unsecured multi-currency revolving credit. If the company borrows under this facility, it intends to leave undrawn an amount equivalent to outstanding commercial paper to provide a source of funds in the event that commercial paper markets are not available. As of December 31, 2019, no borrowings were outstanding under the company's revolving credit facility, although available capacity was reduced by approximately $72 million as a result of outstanding letters of credit.

Approximately half of the company's cash balances and cash flows from operations are from outside the U.S. The company uses its non-U.S. cash for needs outside of the U.S. including acquisitions and repayment of acquisition-related intercompany debt to the U.S. In addition, the company also transfers cash to the U.S. using non-taxable returns of capital as well as dividends where the related U.S. dividend received deduction or foreign tax credit equals any tax cost arising from the dividends. As a result of using such means of transferring cash to the U.S., the company does not expect any material adverse liquidity effects from its significant non-U.S. cash balances for the foreseeable future.

The company believes that its existing cash and cash equivalents of $2.40 billion as of December 31, 2019 and its future cash flow from operations together with available borrowing capacity under its revolving credit agreement will be sufficient to meet the cash requirements of its existing businesses for the foreseeable future, including at least the next 24 months.

2018

Cash provided by operating activities was $4.54 billion during 2018. Cash provided by income was offset in part by investments in working capital. Increases in accounts receivable and inventories used cash of $366 million and $324 million, respectively, primarily to support growth in sales. Cash payments for income taxes increased to $591 million during 2018, compared with $479 million in 2017. The company made cash contributions to its pension and postretirement benefit plans totaling $93 million during 2018. Payments for restructuring actions, principally severance costs and lease and other expenses of real estate consolidation, used cash of $83 million during 2018.

During 2018, the company's investing activities used $1.25 billion of cash. Acquisitions used cash of $536 million. The company's investing activities also included the purchase of $758 million of property, plant and equipment.

Liquidity and Capital Resources (continued)

The company's financing activities used $2.24 billion of cash during 2018. Repayment of senior notes used cash of $2.05 billion. New long-term borrowings provided cash of $690 million. A net decrease in commercial paper obligations used cash of $194 million. The company's financing activities also included the repurchase of $500 million of the company's common stock and the payment of $266 million in cash dividends, offset in part by $136 million of net proceeds from employee stock option exercises.

Off-Balance Sheet Arrangements

The company did not use special purpose entities or other off-balance-sheet financing arrangements in 2017, 2018 or 2019, except for letters of credit, bank guarantees, residual value guarantees under three lease agreements, surety bonds and other guarantees disclosed in the table or discussed below. The amounts disclosed in the table below for letters of credit, bank guarantees, surety bonds and other guarantees relate to guarantees of the company's performance, primarily in the ordinary course of business.

Contractual Obligations and Other Commercial Commitments

The table below summarizes, by period due or expiration of commitment, the company's contractual obligations and other commercial commitments as of December 31, 2019.

	Payments due by Period or Expiration of Commitment				
(In millions)	2020	2021 and 2022	2023 and 2024	2025 and Thereafter	Total
Contractual Obligations and Other Commercial Commitments					
Debt principal, including short-term debt (a)	$ 673	$ 562	$ 3,122	$ 13,593	$ 17,950
Finance lease obligations	3	6	1	—	10
Interest	371	742	652	2,694	4,459
Operating lease obligations	197	282	160	197	836
Unconditional purchase obligations (b)	830	283	86	4	1,203
Letters of credit and bank guarantees	232	23	9	8	272
Surety bonds and other guarantees	45	16	—	—	61
Pension obligations on balance sheet	42	91	100	336	569
Asset retirement obligations accrued on balance sheet	7	14	5	15	41
Acquisition-related contingent consideration accrued on balance sheet	11	20	8	16	55
	$ 2,411	$ 2,039	$ 4,143	$ 16,863	$ 25,456

(a) Amounts represent the expected cash payments for debt and do not include any deferred issuance costs.

(b) Unconditional purchase obligations include agreements to purchase goods, services or fixed assets that are enforceable and legally binding and that specify all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable at any time without penalty.

Reserves for unrecognized tax benefits of $1.55 billion have not been included in the above table due to the inability to predict the timing of tax audit resolutions.

The company has no material commitments for purchases of property, plant and equipment, other than those included in the above table, but expects that for 2020, such expenditures will be between $1 and $1.1 billion.

Guarantees of residual value under lease arrangements for three facilities have not been included in the above table due to the inability to predict if and when the guarantees may require payment (see Note 11). The residual value guarantees become operative at the end of the leases for up to a maximum of $147 million. The terms of these leases end in 2020, 2023 and 2024.

A guarantee of pension plan obligations of a divested business has not been included in the preceding table due to the inability to predict if and when the guarantee may require payment. The purchaser of the divested business has agreed to pay for the pension benefits, however the company was required to guarantee payment of these pension benefits should the purchaser fail to do so. The amount of the guarantee at December 31, 2019 was $41 million.

Liquidity and Capital Resources (continued)

In disposing of assets or businesses, the company often provides representations, warranties and/or indemnities to cover various risks including, for example, unknown damage to the assets, environmental risks involved in the sale of real estate, liability to investigate and remediate environmental contamination at waste facilities, and unidentified tax liabilities and related legal fees. The company does not have the ability to estimate the potential liability from such indemnities because they relate to unknown conditions. However, the company has no reason to believe that these uncertainties would have a material adverse effect on its financial position, annual results of operations or cash flows.

The company has recorded liabilities for known indemnifications included as part of environmental liabilities. See Item 1. Business – Environmental Matters for a discussion of these liabilities.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

The company is exposed to market risk from changes in interest rates and currency exchange rates, which could affect its future results of operations and financial condition. The company manages its exposure to these risks through its regular operating and financing activities. The company has periodically hedged interest rate risks of fixed-rate instruments with offsetting interest rate swaps. Additionally, the company uses short-term forward and option contracts primarily to hedge certain balance sheet and operational exposures resulting from changes in currency exchange rates. Such exposures result from purchases, sales, cash and intercompany loans that are denominated in currencies other than the functional currencies of the respective operations. The currency-exchange contracts principally hedge transactions denominated in Swiss franc, euro, Canadian dollars, Swedish kronor, British pounds sterling, Japanese yen and Czech koruna. Income and losses arising from these derivative contracts are recognized as offsets to losses and income resulting from the underlying exposure being hedged. The company does not enter into speculative derivative agreements.

Interest Rates

The company is exposed to changes in interest rates while conducting normal business operations as a result of ongoing investing and financing activities, which affect the company's debt as well as cash and cash equivalents. As of December 31, 2019, the company's debt portfolio was comprised primarily of fixed rate borrowings. The fair market value of the company's fixed interest rate debt is subject to interest rate risk. Generally, the fair market value of fixed interest rate debt will increase as interest rates fall and decrease as interest rates rise. The total estimated fair value of the company's debt at December 31, 2019 was $18.67 billion (see Note 14). Fair values were determined from available market prices using current interest rates and terms to maturity. If interest rates were to decrease by 100 basis points, the fair value of the company's debt at December 31, 2019 would increase by approximately $1.49 billion. If interest rates were to increase by 100 basis points, the fair value of the company's debt at December 31, 2019 would decrease by approximately $1.50 billion.

In addition, interest rate changes would result in a change in the company's interest expense due to variable-rate debt instruments including swap arrangements. In 2019, a 100 basis point increase in interest rates on the swap arrangements and variable-rate debt would have increased the company's annual pre-tax interest expense by approximately $16 million.

Currency Exchange Rates

The company views its investment in international subsidiaries with a functional currency other than the U.S. dollar as permanent. The company's investment in international subsidiaries is sensitive to fluctuations in currency exchange rates. The functional currencies of the company's international subsidiaries are principally denominated in British pounds sterling, Swedish kronor, euro, Canadian dollars, Swiss franc, Norwegian kroner and Danish kroner. The effect of a change in the period ending currency exchange rates on the company's net investment in international subsidiaries is reflected in the "accumulated other comprehensive items" component of shareholders' equity. The company also uses foreign currency-denominated debt to partially hedge its net investments in foreign operations against adverse movements in exchange rates. A 10% depreciation in year-end 2019 functional currencies, relative to the U.S. dollar, would result in a reduction of shareholders' equity of $1.14 billion.

The fair value of forward currency-exchange contracts is sensitive to changes in currency exchange rates. The fair value of forward currency-exchange contracts is the estimated amount that the company would pay or receive upon termination of the contract, taking into account the change in currency exchange rates. A 10% depreciation in year-end 2019 non-functional currency exchange rates related to the company's contracts would result in an additional unrealized loss on forward currency-exchange contracts of $243 million. A 10% appreciation in year-end 2019 non-functional currency exchange rates related to the company's contracts would result in an unrealized gain on forward currency-exchange contracts of $203 million. The

Quantitative and Qualitative Disclosures About Market Risk (continued)

unrealized gains or losses on forward currency-exchange contracts resulting from changes in currency exchange rates are expected to approximately offset losses or gains on the exposures being hedged.

Certain of the company's cash and cash equivalents are denominated in currencies other than the functional currency of the depositor and are sensitive to changes in currency exchange rates. A 10% depreciation in the related year-end 2019 non-functional currency exchange rates applied to such cash balances would result in a negative impact of $32 million on the company's net income.

Item 8. Financial Statements and Supplementary Data

This data is submitted as a separate section to this report. See Item 15 "Exhibits and Financial Statement Schedules."

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

Not applicable.

Item 9A. Controls and Procedures

Management's Evaluation of Disclosure Controls and Procedures

The company's management, with the participation of the company's chief executive officer and chief financial officer, has evaluated the effectiveness of the company's disclosure controls and procedures (as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this report. Based on such evaluation, the company's chief executive officer and chief financial officer concluded that, as of the end of such period, the company's disclosure controls and procedures were effective at the reasonable assurance level.

Changes in Internal Control over Financial Reporting

There have been no changes in the company's internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) during the fiscal quarter ended December 31, 2019, that have materially affected or are reasonably likely to materially affect the company's internal control over financial reporting.

Management's Annual Report on Internal Control Over Financial Reporting

The company's management, including the company's chief executive officer and chief financial officer, is responsible for establishing and maintaining adequate internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company. 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. The company's management conducted an assessment of the effectiveness of the company's internal control over financial reporting as of December 31, 2019 based on criteria established in "Internal Control - Integrated Framework" (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). Based on this assessment, the company's management concluded that, as of December 31, 2019, the company's internal control over financial reporting was effective.

The company's independent registered public accounting firm, PricewaterhouseCoopers LLP, has audited the effectiveness of the company's internal control over financial reporting as of December 31, 2019, as stated in their report that appears on page F-2 of this Annual Report on Form 10-K.

Item 9B. Other Information

Not applicable.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information with respect to directors required by this Item will be contained in our definitive proxy statement to be filed with the SEC not later than 120 days after the close of business of the fiscal year (2020 Definitive Proxy Statement) and is incorporated in this report by reference.

The information with respect to executive officers required by this Item is included in Item 1 of Part I of this report.

The other information required by this Item will be contained in our 2020 Definitive Proxy Statement and is incorporated in this report by reference.

Item 11. Executive Compensation

The information required by this Item will be contained in our 2020 Definitive Proxy Statement and is incorporated in this report by reference.

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

The information required by this Item will be contained in our 2020 Definitive Proxy Statement and is incorporated in this report by reference.

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

The information required by this Item will be contained in our 2020 Definitive Proxy Statement and is incorporated in this report by reference.

Item 14. Principal Accountant Fees and Services

The information required by this Item will be contained in our 2020 Definitive Proxy Statement and is incorporated in this report by reference.

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) The following documents are filed as part of this report:

(1) Consolidated Financial Statements (see Index on page F-1 of this report)

Report of Independent Registered Public Accounting Firm
Consolidated Balance Sheet
Consolidated Statement of Income
Consolidated Statement of Comprehensive Income
Consolidated Statement of Cash Flows
Consolidated Statement of Shareholders' Equity
Notes to Consolidated Financial Statements

(2) All schedules are omitted because they are not applicable or not required, or because the required information is included either in the consolidated financial statements or in the notes thereto.

(b) Exhibits

See the Exhibit Index on page 37.

Item 16. Form 10-K Summary

None.

SIGNATURES

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

Date: February 26, 2020

THERMO FISHER SCIENTIFIC INC.

By: /s/ Marc N. Casper
Marc N. Casper
Chairman, President and Chief Executive Officer

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities indicated, as of February 26, 2020.

By: /s/ Marc N. Casper
Marc N. Casper
Chairman, President and Chief Executive Officer
(Principal Executive Officer)

By: /s/ Stephen Williamson
Stephen Williamson
Senior Vice President and Chief Financial Officer
(Principal Financial Officer)

By: /s/ Peter E. Hornstra
Peter E. Hornstra
Vice President and Chief Accounting Officer
(Principal Accounting Officer)

By: /s/ Nelson J. Chai
Nelson J. Chai
Director

By: /s/ C. Martin Harris
C. Martin Harris
Director

By: /s/ Tyler E. Jacks
Tyler E. Jacks
Director

By: /s/ Judy C. Lewent
Judy C. Lewent
Director

By: /s/ Thomas J. Lynch
Thomas J. Lynch
Director

By: /s/ Jim P. Manzi
Jim P. Manzi
Director

By: /s/ James C. Mullen
James C. Mullen
Director

By: /s/ Lars R. Sørensen
Lars R. Sørensen
Director

By: /s/ Debora L. Spar
Debora L. Spar
Director

By: /s/ Scott M. Sperling
Scott M. Sperling
Director

By: /s/ Elaine S. Ullian
Elaine S. Ullian
Director

By: /s/ Dion J. Weisler
Dion J. Weisler
Director

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
3.1	Amended and Restated Certificate of Incorporation of the Registrant (filed as Exhibit 3.1 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2005 [File No. 1-8002] and incorporated in this document by reference).
3.2	Amendment to Thermo Fisher Scientific Inc.'s Third Amended and Restated Certificate of Incorporation (filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed November 14, 2006 [File No. 1-8002] and incorporated in this document by reference).
3.3	Certificate of Elimination of the Series B Junior Participating Preferred Stock of the Company, dated November 13, 2015 (filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed November 16, 2015 [File No. 1-8002] and incorporated in this document by reference).
3.4	By-Laws of the Registrant, as amended and effective as of March 1, 2017 (filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed March 2, 2017 [File No. 1-8002] and incorporated in this document by reference).
	The Registrant agrees, pursuant to Item 601(b)(4)(iii)(A) of Regulation S-K, to furnish to the Commission, upon request, a copy of each instrument with respect to long-term debt of the Registrant or its consolidated subsidiaries.
4.1	Indenture dated as of November 20, 2009 between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 99.1 to the Registrant's Current Report on Form 8-K filed November 20, 2009 [File No. 1-8002] and incorporated in this document by reference).
4.2	Sixth Supplemental Indenture, dated as of December 11, 2013, between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 99.2 to the Registrant's Current Report on Form 8-K filed December 11, 2013 [File No. 1-8002] and incorporated in this document by reference).
4.3	Eighth Supplemental Indenture, dated as of November 24, 2014, among the Company, The Bank of New York Mellon Trust Company, N.A., as trustee, and The Bank of New York Mellon, London Branch, as paying agent (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed November 24, 2014 [File No. 1-8002] and incorporated in this document by reference).
4.4	Ninth Supplemental Indenture, dated as of July 21, 2015, among the Company, The Bank of New York Mellon Trust Company, N.A., as trustee, and The Bank of New York Mellon, London Branch, as paying agent (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed July 21, 2015 [File No. 1-8002] and incorporated in this document by reference).
4.5	Eleventh Supplemental Indenture, dated as of December 9, 2015, between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed December 9, 2015 [File No. 1-8002] and incorporated in this document by reference).
4.6	Twelfth Supplemental Indenture, dated as of April 13, 2016, between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed April 13, 2016 [File No. 1-8002] and incorporated in this document by reference).
4.7	Thirteenth Supplemental Indenture, dated as of September 12, 2016, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed September 12, 2016 [File No. 1-8002] and incorporated in this document by reference).
4.8	Fourteenth Supplemental Indenture, dated as of September 19, 2016, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed September 19, 2016 [File No. 1-8002] and incorporated in this document by reference).
4.9	Fifteenth Supplemental Indenture, dated as of March 16, 2017, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed March 16, 2017 [File No. 1-8002] and incorporated in this document by reference).
4.10	Sixteenth Supplemental Indenture, dated as of July 24, 2017, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed July 24, 2017 [File No. 1-8002] and incorporated in this document by reference).
4.11	Seventeenth Supplemental Indenture, dated as of August 14, 2017, between the Company and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed August 14, 2017 [File No. 1-8002] and incorporated in this document by reference).
4.12	Eighteenth Supplemental Indenture, dated as of September 30, 2019, between the Company, as issuer, and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed September 30, 2019 [File No. 1-8002] and incorporated in this document by reference).
4.13	Nineteenth Supplemental Indenture, dated as of October 8, 2019, between the Company, as issuer, and the Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed October 8, 2019 [File No. 1-8002] and incorporated in this document by reference).
4.14	Indenture, dated as of August 9, 2016, among Thermo Fisher Scientific (Finance I) B.V., as issuer, the Company, as guarantor, and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.1 to the Registrant's Current Report on Form 8-K filed August 9, 2016 [File No. 1-8002] and incorporated in this document by reference).
4.15	Second Supplemental Indenture, dated as of August 8, 2018, among Thermo Fisher Scientific (Finance I) B.V., as issuer, the Company, as guarantor, and The Bank of New York Mellon Trust Company, N.A., as trustee (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed August 8, 2018 [File No. 1-8002] and incorporated in this document by reference).

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
4.16	Description of the Registrant's Securities.
10.1	Thermo Fisher Scientific Inc. Deferred Compensation Plan for Directors of the Registrant, as amended and restated on September 12, 2007 (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended September 29, 2007 [File No. 1- 8002] and incorporated in this document by reference).*
10.2	Thermo Electron Corporation Deferred Compensation Plan, effective November 1, 2001 (filed as Exhibit 10.13 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 29, 2001 [File No. 1-8002] and incorporated in this document by reference).*
10.3	Form of Amended and Restated Indemnification Agreement between the Registrant and its directors and officers (filed as Exhibit 10.2 to the Registrant's Registration Statement on Form S-4 [Reg. No. 333-90661] and incorporated in this document by reference).*
10.4	Summary of Thermo Fisher Scientific Inc. Annual Director Compensation.*
10.5	Summary of 2019 Annual Cash Incentive Plan Matters (set forth in Item 5.02 to the Registrant's Current Report on Form 8-K filed February 28, 2019 [File No.1-8002] under the heading "Compensatory Arrangements of Certain Officers" and incorporated in this document by reference).*
10.6	Form of Noncompetition Agreement between the Registrant and certain key employees and executive officers (filed as Exhibit 10.25 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.7	Retirement Plan for Non-Employee Directors of Fisher Scientific International Inc. (filed as Exhibit 10.12 to Fisher Scientific International Inc.'s Annual Report on Form 10-K for the year ended December 31, 1992 [File No. 1-10920] and incorporated in this document by reference).*
10.8	First Amendment to the Fisher Scientific International Inc. Retirement Plan for Non-Employee Directors (filed as Exhibit 10.04 to Fisher Scientific International Inc.'s Quarterly Report on Form 10-Q for the quarter ended March 31, 2005 [File No. 1-10920] and incorporated in this document by reference).*
10.9	Amendment to Retirement Plan for Non-Employee Directors of Fisher Scientific International Inc. (filed as Exhibit 10.02 to Fisher Scientific International Inc.'s Current Report on Form 8-K filed March 7, 2006 [File No. 1-10920] and incorporated in this document by reference).*
10.10	Thermo Fisher Scientific Inc. Amended and Restated 2005 Deferred Compensation Plan, effective January 1, 2009 (filed as Exhibit 10.43 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2008 [File No. 1-8002] and incorporated in this document by reference).*
10.11	Thermo Fisher Scientific Inc. 2008 Stock Incentive Plan (filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed May 22, 2008 [File No. 1-8002] and incorporated in this document by reference).*
10.12	Amendment No. 1 to Thermo Fisher Scientific Inc. Amended and Restated 2005 Deferred Compensation Plan (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 27, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.13	2009 Restatement of Executive Severance Agreement, between Marc Casper and the Registrant, dated November 21, 2009 (filed as Exhibit 10.5 to the Registrant's Current Report on Form 8-K filed November 25, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.14	Executive Change In Control Retention Agreement, between Marc Casper and the Registrant, dated November 21, 2009 (filed as Exhibit 10.6 to the Registrant's Current Report on Form 8-K filed November 25, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.15	Noncompetition Agreement, between Marc Casper and the Registrant, dated November 21, 2009 (filed as Exhibit 10.7 to the Registrant's Current Report on Form 8-K filed November 25, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.16	Amendment No. 1 to 2009 Restatement of Executive Severance Agreement, dated February 25, 2010, between the Registrant and Marc N. Casper (filed as Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed February 25, 2010 [File No. 1-8002] and incorporated in this document by reference).*
10.17	Amendment No. 2 to 2009 Restatement of Executive Severance Agreement, dated November 30, 2010, between the Registrant and Marc N. Casper (filed as Exhibit 10.55 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 [File No. 1-8002] and incorporated in this document by reference).*
10.18	Amendment No. 1 to Executive Change In Control Retention Agreement, dated November 30, 2010, between Marc N. Casper and the Registrant (filed as Exhibit 10.56 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 [File No. 1-8002] and incorporated in this document by reference).*
10.19	Amendment No. 2 to Executive Change in Control Retention Agreement, dated March 16, 2018, between Marc N. Casper and the Registrant (filed as Exhibit 10.3 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018 [File No. 1-8002] and incorporated in this document by reference).*
10.20	Form of Executive Change in Control Retention Agreement for Officers (other than Marc Casper) (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2018 [File No. 1-8002] and incorporated in this document by reference).*
10.21	Amendment to 2008 Stock Incentive Plan dated November 10, 2010 (filed as Exhibit 10.57 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 [File No. 1-8002] and incorporated in this document by reference).*

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.22	Form of Thermo Fisher Scientific Inc.'s Restricted Stock Unit Agreement for Directors (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended April 2, 2011 [File No. 1-8002] and incorporated in this document by reference).*
10.23	Form of Thermo Fisher Scientific Inc.'s Performance Restricted Stock Unit Agreement (filed as Exhibit 10.4 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.24	Form of Thermo Fisher Scientific Inc.'s Restricted Stock Unit Agreement (filed as Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.25	Form of Performance Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc Casper (filed as Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.26	Form of Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc Casper (filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.27	Form of Stock Option Agreement between Thermo Fisher Scientific Inc. and Marc Casper (filed as Exhibit 10.5 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.28	Thermo Fisher Scientific Inc. 2013 Stock Incentive Plan (filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed May 23, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.29	Supplemental Executive Retirement Plan effective as of December 31, 2005, as amended and restated as of August 28, 2006 (filed as Exhibit 10.3 to Applera Corporation's Quarterly Report on Form 10-Q for the quarter ended September 30, 2006 [File No. 1-04389] and incorporated in this document by reference).*
10.30	Amendment to Supplemental Executive Retirement Plan, effective as of January 1, 2010 (filed as Exhibit 10.1 to Life Technologies Corporation's Current Report on Form 8-K filed December 18, 2009 [File No. 000-25317] and incorporated in this document by reference).*
10.31	Noncompetition Agreement between the Registrant and Mark Stevenson, dated September 10, 2015 (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended September 26, 2015 [File No. 1-8002] and incorporated in this document by reference).*
10.32	Form of Thermo Fisher Scientific Inc.'s Stock Option Agreement for Officers (filed as Exhibit 10.44 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2016 [File No. 1-8002] and incorporated in this document by reference).*
10.33	Patheon N.V. 2016 Omnibus Incentive Plan (filed as Exhibit 10.2 to the Current Report on Form 8-K filed by Patheon N.V. on July 26, 2016 [File No. 001-37837] and incorporated in this document by reference).*
10.34	Amendment to Patheon N.V. 2016 Omnibus Incentive Plan, dated March 7, 2017 (filed as exhibit 4.5 to the Registrant's Registration Statement on Form S-8 filed August 29, 2017 [File No. 1-8002] and incorporated in this document by reference).*
10.35	Amendment to Patheon N.V. 2016 Omnibus Incentive Plan, dated August 23, 2017 (filed as exhibit 4.6 to the Registrant's Registration Statement on Form S-8 filed August 29, 2017 [File No. 1-8002] and incorporated in this document by reference).*
10.36	Credit Agreement, dated July 1, 2016, among the Company, certain Subsidiaries of the Company from time to time party thereto, each lender from time to time party thereto, and Bank of America, N.A. (filed as Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed July 1, 2016 [File No. 1-8002] and incorporated in this document by reference).
10.37	Form of Performance Restricted Stock Unit Agreement effective February 26, 2019 (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 30, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.38	Form of Performance Restricted Stock Unit Agreement for Marc Casper effective February 26, 2019 (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 30, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.39	Letter Agreement between the Registrant and Michel Lagarde dated August 28, 2017.*
10.40	Option Agreement Under the Patheon N.V. 2016 Omnibus Incentive Plan between Patheon N.V. and Michel Lagarde dated July 20, 2016.*
10.41	Restricted Share Unit Award Agreement between Patheon N.V. and Michel Lagarde dated March 23, 2017 as amended.*
10.42	Option Agreement Under the Patheon N.V. 2016 Omnibus Incentive Plan between Patheon N.V. and Michel Lagarde dated March 23, 2017.*
10.43	Thermo Fisher Scientific Inc. Executive Severance Policy (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 29, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.44	Form of Noncompetition Agreement between the Registrant and certain key employees and executive officers (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 29, 2019 [File No. 1-8002] and incorporated in this document by reference).*

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.45	Form of Thermo Fisher Scientific Inc.'s Performance Restricted Stock Unit Agreement.*
10.46	Form of Thermo Fisher Scientific Inc.'s Restricted Stock Unit Agreement.*
10.47	Form of Thermo Fisher Scientific Inc.'s Stock Option Agreement for Officers.*
10.48	Form of Performance Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc Casper.*
10.49	Form of Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc Casper.*
10.50	Form of Stock Option Agreement between Thermo Fisher Scientific Inc. and Marc Casper.*
21	Subsidiaries of the Registrant.
23.1	Consent of PricewaterhouseCoopers LLP, an Independent Registered Public Accounting Firm.
31.1	Certification of Chief Executive Officer required by Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Chief Financial Officer required by Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of Chief Executive Officer required by Exchange Act Rules 13a-14(b) and 15d-14(b), as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.**
32.2	Certification of Chief Financial Officer required by Exchange Act Rules 13a-14(b) and 15d-14(b), as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.**
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema Document.
101.CAL	XBRL Taxonomy Calculation Linkbase Document.
101.DEF	XBRL Taxonomy Definition Linkbase Document.
101.LAB	XBRL Taxonomy Label Linkbase Document.
101.PRE	XBRL Taxonomy Presentation Linkbase Document.
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101).

*Indicates management contract or compensatory plan, contract or arrangement.

** Certification is not deemed "filed" for purposes of Section 18 of the Exchange Act or otherwise subject to the liability of that section. Such certification is not deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act except to the extent that the registrant specifically incorporates it by reference.

THERMO FISHER SCIENTIFIC INC.

INDEX OF CONSOLIDATED FINANCIAL STATEMENTS

The following Consolidated Financial Statements of the Registrant and its subsidiaries are required to be included in Item 15:

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Consolidated Balance Sheet as of December 31, 2019 and 2018	F-6
Consolidated Statement of Income for the years ended December 31, 2019, 2018 and 2017	F-7
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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Shareholders of Thermo Fisher Scientific Inc.

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheet of Thermo Fisher Scientific Inc. and its subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of income, of comprehensive income, of shareholders' equity and of cash flows for each of the three years in the period ended December 31, 2019, including the related notes (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, the Company changed the manner in which it accounts for leases in 2019.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (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 audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements 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. Our audit of internal control over financial reporting included

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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 audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

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 (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) 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 (iii) 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.

Critical Audit Matters

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

Goodwill impairment assessment

As described in Note 1 to the consolidated financial statements, the Company's consolidated goodwill balance was $25,714 million as of December 31, 2019. Management evaluates goodwill impairment at the reporting unit level annually and when events occur or circumstances change that would more-likely-than-not reduce the fair value of the reporting unit below its carrying amount. In performing the assessment, management estimates the fair values of its reporting units by using forecasts of discounted future cash flows and peer market multiples. As disclosed by management, estimates of discounted future cash flows require management to make assumptions related to revenue and operating income growth rates, discount rates and other factors. Management also considers peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the respective reporting units and estimates weighted average costs of capital.

The principal considerations for our determination that performing procedures relating to the goodwill impairment assessment is a critical audit matter are there was significant judgment by management when estimating the fair value of the reporting units. This in turn led to a high

degree of auditor judgment, subjectivity and effort in performing procedures to evaluate management's cash flow projections and significant assumptions, including revenue and operating income growth rates, discount rates and peer market multiples. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained from these procedures.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the goodwill impairment assessment, including controls over the development of assumptions used by management to estimate the fair values of the Company's reporting units. These procedures also included, among others, testing management's process for developing the fair value estimates; evaluating the appropriateness of the discounted cash flow models; testing the completeness, accuracy, and relevance of underlying data used in the models; and evaluating the reasonableness of the assumptions used, including revenue and operating income growth rates, discount rates and peer market multiples. Evaluating the reasonableness of management's assumptions related to revenue and operating income growth rates involved evaluating whether the assumptions used were reasonable considering (i) the current and past performance of the reporting units and (ii) whether the assumptions were consistent with evidence obtained in other areas of the audit. Evaluating the reasonableness of the peer market multiples assumption involved evaluating the population of peer companies used in the analyses and testing selected market data used by management to determine the multiples by comparison to publicly available information. Professionals with specialized skill and knowledge were used to assist in evaluating the appropriateness of the Company's discounted cash flow model and certain significant assumptions, including the discount rates.

Income taxes

As described in Notes 1 and 8 to the consolidated financial statements, the Company's total income tax expense for the period ended December 31, 2019 was $374 million. The Company has deferred income tax liabilities, net, of $1,619 million (including a valuation allowance of $408 million) and unrecognized income tax benefits of $1,552 million as of December 31, 2019. As disclosed by management, the Company operates in numerous countries under many legal forms and, as a result, is subject to the jurisdiction of numerous domestic and non-U.S. tax authorities, as well as to tax agreements and treaties among these governments. Determination of taxable income in any jurisdiction requires management to interpret the related tax laws and regulations and to use estimates and assumptions regarding significant future events, such as the amount, timing and character of deductions, permissible revenue recognition methods under the tax law and the sources and character of income and tax credits. Management assesses income tax positions and records tax benefits for all years subject to examination based upon evaluation of the facts, circumstances and information available at the reporting date. For those tax positions where it is more likely than not that a tax benefit will be sustained, management has recorded the largest amount of tax benefit with a greater than 50 percent likelihood of being realized upon ultimate settlement with a taxing authority that has full knowledge of all relevant information. For those income tax positions where it is not more likely than not that a tax benefit will be sustained, no tax benefit has been recognized in the financial statements. Management estimates the degree to which tax assets will result in a benefit, after consideration of all positive and negative evidence, and provides a valuation allowance for tax assets that it believes will more likely than not go unused. In situations in which management has been able to determine that the Company's deferred tax assets will be realized, that determination generally relies on future reversals of taxable temporary differences and expected future taxable income. If it becomes more likely than not that a tax asset will be used, management reverses the related valuation allowance.

The principal considerations for our determination that performing procedures relating to income taxes is a critical audit matter are there was significant judgment by management when determining the provision for income taxes, deferred tax assets and liabilities, and liabilities for unrecognized tax benefits due to numerous and complex tax laws, the frequency of tax filings, as well as judgments regarding the realizability of deferred tax assets. This in turn led to a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence related to the provision for income taxes, deferred tax assets and liabilities, and liabilities for unrecognized tax benefits. In addition, the audit effort involved the use of professionals with specialized skill and knowledge to assist in performing these procedures and evaluating the audit evidence obtained from these procedures.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the financial statements. These procedures included testing the effectiveness of controls relating to the provision for income taxes, deferred tax assets and liabilities, and liabilities for unrecognized tax benefits, including controls over management's assessment of the realizability of deferred tax assets. These procedures also included, among others, (i) testing the accuracy of the income tax provision, including the rate reconciliation and permanent and temporary differences, (ii) evaluating whether the data utilized in the calculation of the provision for income taxes was appropriate and consistent with evidence obtained in other areas of the audit, (iii) evaluating management's assessment of the realizability of deferred tax assets on a jurisdictional basis, (iv) evaluating the identification of reserves for unrecognized tax benefits and the reasonableness of the "more likely than not" determination in consideration of jurisdictions, court decisions, legislative actions, statutes of limitations, and developments in tax examinations, (v) testing the calculation of the liability for unrecognized tax benefits by jurisdiction, including estimates of the amount of tax benefit expected to be sustained, and (vi) evaluating the adequacy of the Company's disclosures. Professionals with specialized skill and knowledge were used to assist in evaluating the reasonableness of management's judgments and estimates, including application of foreign and domestic tax laws and regulations.

PricewaterhouseCoopers LLP

Boston, Massachusetts
February 26, 2020

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

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED BALANCE SHEET

(In millions except share and per share amounts)	December 31, 2019	December 31, 2018
Assets		
Current Assets:		
Cash and cash equivalents	$ 2,399	$ 2,103
Accounts receivable, less allowances of $102 and $117	4,349	4,136
Inventories	3,370	3,005
Contract assets, net	603	459
Other current assets	1,172	922
Total current assets	11,893	10,625
Property, Plant and Equipment, Net	4,749	4,165
Acquisition-related Intangible Assets, Net	14,014	14,978
Other Assets	2,011	1,117
Goodwill	25,714	25,347
Total Assets	$ 58,381	$ 56,232
Liabilities and Shareholders' Equity		
Current Liabilities:		
Short-term obligations and current maturities of long-term obligations	$ 676	$ 1,271
Accounts payable	1,920	1,615
Accrued payroll and employee benefits	1,010	982
Contract liabilities	916	809
Other accrued expenses	1,675	1,470
Total current liabilities	6,197	6,147
Deferred Income Taxes	2,192	2,265
Other Long-term Liabilities	3,241	2,515
Long-term Obligations	17,076	17,719
Commitments and Contingencies (Note 12)		
Shareholders' Equity:		
Preferred stock, $100 par value, 50,000 shares authorized; none issued		
Common stock, $1 par value, 1,200,000,000 shares authorized; 434,416,804 and 431,566,561 shares issued	434	432
Capital in excess of par value	15,064	14,621
Retained earnings	22,092	18,696
Treasury stock at cost, 35,676,421 and 29,444,882 shares	(5,236)	(3,665)
Accumulated other comprehensive items	(2,679)	(2,498)
Total shareholders' equity	29,675	27,586
Total Liabilities and Shareholders' Equity	$ 58,381	$ 56,232

The accompanying notes are an integral part of these consolidated financial statements.

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED STATEMENT OF INCOME

(In millions except per share amounts)	Year Ended December 31, 2019	December 31, 2018	December 31, 2017
Revenues			
Product revenues	$ 19,496	$ 18,868	$ 17,374
Service revenues	6,046	5,490	3,544
Total revenues	25,542	24,358	20,918
Costs and Operating Expenses:			
Cost of product revenues	10,037	9,682	8,975
Cost of service revenues	4,177	3,819	2,495
Selling, general and administrative expenses	6,144	6,057	5,504
Research and development expenses	1,003	967	887
Restructuring and other (income) costs, net	(413)	50	97
Total costs and operating expenses	20,948	20,575	17,958
Operating Income	4,594	3,783	2,960
Interest Income	224	137	81
Interest Expense	(676)	(667)	(592)
Other (Expense) Income, Net	(72)	9	(20)
Income from Continuing Operations Before Income Taxes	4,070	3,262	2,429
Provision for Income Taxes	(374)	(324)	(201)
Income from Continuing Operations	3,696	2,938	2,228
Loss from Discontinued Operations (net of income tax benefit of $0, $0 and $2)	—	—	(3)
Net Income	$ 3,696	$ 2,938	$ 2,225
Earnings per Share from Continuing Operations			
Basic	$ 9.24	$ 7.31	$ 5.65
Diluted	$ 9.17	$ 7.24	$ 5.60
Earnings per Share			
Basic	$ 9.24	$ 7.31	$ 5.64
Diluted	$ 9.17	$ 7.24	$ 5.59
Weighted Average Shares			
Basic	400	402	395
Diluted	403	406	398

The accompanying notes are an integral part of these consolidated financial statements.

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED STATEMENT OF COMPREHENSIVE INCOME

(In millions)	Year Ended December 31, 2019	Year Ended December 31, 2018	Year Ended December 31, 2017
Comprehensive Income			
Net Income	$ 3,696	$ 2,938	$ 2,225
Other Comprehensive Items:			
Currency translation adjustment:			
Currency translation adjustment (net of tax provision (benefit) of $25, $84 and $(145))	(107)	(434)	588
Reclassification adjustment for losses included in net income	30	—	—
Unrealized gains and losses on available-for-sale investments:			
Unrealized holding losses arising during the period (net of tax benefit of $0, $0 and $0)	—	—	(1)
Reclassification adjustment for gains included in net income (net of tax provision of $0, $0 and $1)	—	—	(1)
Unrealized gains and losses on hedging instruments:			
Unrealized losses on hedging instruments (net of tax benefit of $12, $0 and $0)	(38)	—	—
Reclassification adjustment for losses included in net income (net of tax benefit of $6, $3 and $5)	19	9	7
Pension and other postretirement benefit liability adjustments:			
Pension and other postretirement benefit liability adjustments arising during the period (net of tax (benefit) provision of $(31), $2 and $7)	(93)	3	23
Amortization of net loss and prior service benefit included in net periodic pension cost (net of tax benefit of $2, $5 and $5)	8	15	17
Total other comprehensive items	(181)	(407)	633
Comprehensive Income	$ 3,515	$ 2,531	$ 2,858

The accompanying notes are an integral part of these consolidated financial statements.

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED STATEMENT OF CASH FLOWS

(In millions)	Year Ended December 31, 2019	Year Ended December 31, 2018	Year Ended December 31, 2017
Operating Activities			
Net income	$ 3,696	$ 2,938	$ 2,225
Loss from discontinued operations	—	—	3
Income from continuing operations	3,696	2,938	2,228
Adjustments to reconcile income from continuing operations to net cash provided by operating activities:			
Depreciation of property, plant and equipment	564	526	439
Amortization of acquisition-related intangible assets	1,713	1,741	1,594
Change in deferred income taxes	(302)	(379)	(1,098)
Gain on sales of businesses	(482)	—	—
Non-cash stock-based compensation	181	181	159
Loss on early extinguishment of debt	184	3	4
Other non-cash expenses, net	84	103	186
Changes in assets and liabilities, excluding the effects of acquisitions and disposition:			
Accounts receivable	(225)	(366)	(362)
Inventories	(458)	(324)	(81)
Other assets	(408)	54	(153)
Accounts payable	266	201	274
Other liabilities	210	(42)	1,016
Contributions to retirement plans	(50)	(93)	(200)
Net cash provided by continuing operations	4,973	4,543	4,006
Net cash used in discontinued operations	—	—	(1)
Net cash provided by operating activities	4,973	4,543	4,005
Investing Activities			
Acquisitions, net of cash acquired	(1,843)	(536)	(7,226)
Proceeds from sale of business, net of cash divested	1,128	—	—
Purchase of property, plant and equipment	(926)	(758)	(508)
Proceeds from sale of property, plant and equipment	36	50	7
Other investing activities, net	118	(9)	(2)
Net cash used in investing activities	(1,487)	(1,253)	(7,729)
Financing Activities			
Net proceeds from issuance of debt	5,638	690	6,459
Repayment of debt	(6,360)	(2,052)	(3,299)
Proceeds from issuance of commercial paper	2,781	5,060	8,380
Repayments of commercial paper	(3,464)	(5,254)	(8,514)
Purchases of company common stock	(1,500)	(500)	(750)
Dividends paid	(297)	(266)	(237)
Net proceeds from issuance of company common stock	—	—	1,690
Net proceeds from issuance of company common stock under employee stock plans	153	136	128
Other financing activities, net	(69)	(51)	(3)
Net cash (used in) provided by financing activities	(3,118)	(2,237)	3,854
Exchange Rate Effect on Cash	(63)	(297)	420
Increase in Cash, Cash Equivalents and Restricted Cash	305	756	550
Cash, Cash Equivalents and Restricted Cash at Beginning of Period	2,117	1,361	811
Cash, Cash Equivalents and Restricted Cash at End of Period	$ 2,422	$ 2,117	$ 1,361

The accompanying notes are an integral part of these consolidated financial statements.

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED STATEMENT OF SHAREHOLDERS' EQUITY

(In millions)	Common Stock		Capital in Excess of Par Value	Retained Earnings	Treasury Stock		Accumulated Other Comprehensive Items	Total Shareholders' Equity
	Shares	Amount			Shares	Amount		
Balance at December 31, 2016	415	$ 415	$ 12,140	$ 13,927	22	$ (2,306)	$ (2,636)	$ 21,540
Issuance of shares under employees' and directors' stock plans	3	3	196	—	—	(47)	—	152
Issuance of shares	10	10	1,680	—	—	—	—	1,690
Stock-based compensation	—	—	159	—	—	—	—	159
Purchases of company common stock	—	—	—	—	5	(750)	—	(750)
Dividends declared ($0.60 per share)	—	—	—	(238)	—	—	—	(238)
Net income	—	—	—	2,225	—	—	—	2,225
Other comprehensive items	—	—	—	—	—	—	633	633
Other	—	—	2	—	—	—	—	2
Balance at December 31, 2017	428	428	14,177	15,914	27	(3,103)	(2,003)	25,413
Cumulative effect of accounting changes	—	—	—	118	—	—	(88)	30
Issuance of shares under employees' and directors' stock plans	4	4	236	—	—	(62)	—	178
Stock-based compensation	—	—	181	—	—	—	—	181
Purchases of company common stock	—	—	—	—	2	(500)	—	(500)
Dividends declared ($0.68 per share)	—	—	—	(274)	—	—	—	(274)
Net income	—	—	—	2,938	—	—	—	2,938
Other comprehensive items	—	—	—	—	—	—	(407)	(407)
Other	—	—	27	—	—	—	—	27
Balance at December 31, 2018	432	432	14,621	18,696	29	(3,665)	(2,498)	27,586
Cumulative effect of accounting change	—	—	—	4	—	—	—	4
Issuance of shares under employees' and directors' stock plans	2	2	262	—	1	(71)	—	193
Stock-based compensation	—	—	181	—	—	—	—	181
Purchases of company common stock	—	—	—	—	6	(1,500)	—	(1,500)
Dividends declared ($0.76 per share)	—	—	—	(304)	—	—	—	(304)
Net income	—	—	—	3,696	—	—	—	3,696
Other comprehensive items	—	—	—	—	—	—	(181)	(181)
Balance at December 31, 2019	434	$ 434	$ 15,064	$ 22,092	36	$ (5,236)	$ (2,679)	$ 29,675

The accompanying notes are an integral part of these consolidated financial statements.

Note 1. Nature of Operations and Summary of Significant Accounting Policies

Nature of Operations

Thermo Fisher Scientific Inc. (the company or Thermo Fisher) enables customers to make the world healthier, cleaner and safer by helping them accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics, deliver medicines to market and increase laboratory productivity. Markets served include pharmaceutical and biotech, academic and government, industrial and applied, as well as healthcare and diagnostics.

Principles of Consolidation

The accompanying financial statements include the accounts of the company and its wholly and majority-owned subsidiaries. All material intercompany accounts and transactions have been eliminated. The company accounts for investments in businesses using the equity method when it has the ability to exercise significant influence but not control (generally between 20% and 50% ownership) and is not the primary beneficiary.

Presentation

Certain reclassifications of prior year amounts have been made to conform to the current year presentation.

Revenue Recognition

Prior to 2018, the company recognized revenue after all significant obligations had been met, collectability was probable and title had passed, which typically occurred upon shipment, delivery, completion of services, or ratably over the contract period. Beginning in 2018, the company recognizes revenue as performance obligations are satisfied by transferring control of promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. See *Recent Accounting Pronouncements* below for a discussion of the change in revenue recognition accounting that became effective in 2018.

Consumables revenues consist of single-use products and are recognized at a point in time following the transfer of control of such products to the customer, which generally occurs upon shipment. Instruments revenues typically consist of longer-lived assets that, for the substantial majority of sales, are recognized at a point in time in a manner similar to consumables. Service revenues (clinical trial logistics, pharmaceutical development and manufacturing services, asset management, diagnostic testing, training, service contracts, and field services including related time and materials) are recognized over time as customers receive and consume the benefits of such services. For revenues recognized over time, the company generally uses costs accumulated relative to total estimated costs to measure progress as this method approximates satisfaction of the performance obligation. For contracts that contain multiple performance obligations, the company allocates the consideration to which it expects to be entitled to each performance obligation based on relative standalone selling prices and recognizes the related revenue when or as control of each individual performance obligation is transferred to customers. The company exercises judgment in determining the timing of revenue by analyzing the point in time or the period over which the customer has the ability to direct the use of and obtain substantially all of the remaining benefits of the asset. The company immediately expenses contract costs that would otherwise be capitalized and amortized over a period of less than one year.

Payments from customers for most instruments, consumables and services are typically due in a fixed number of days after shipment or delivery of the product. Service arrangements commonly call for payments in advance of performing the work (e.g. extended service contracts), upon completion of the service (e.g. pharmaceutical development and manufacturing) or a mix of both.

See Note 3 for revenue disaggregated by type and by geographic region as well as further information about remaining performance obligations.

Contract-related Balances

Accounts receivable include amounts that have been billed and are currently due from customers. They are recorded at the invoiced amount and do not bear interest. The company maintains allowances for doubtful accounts for estimated losses resulting from the inability of its customers to pay amounts due. The allowance for doubtful accounts is the company's best estimate of the amount of probable credit losses in existing accounts receivable. The company determines the allowance based on the age of the receivable, the creditworthiness of the customer and any other information that is relevant to the judgment. Account balances are charged off against the allowance when the company believes it is probable the receivable will not be recovered. The company does not have any off-balance-sheet credit exposure related to customers.

The changes in the allowance for doubtful accounts are as follows:

(In millions)	Year Ended December 31, 2019	2018	2017
Beginning Balance	$ 117	$ 109	$ 77
Provision charged to expense	20	18	32
Accounts written off	(32)	(12)	(10)
Acquisitions, currency translation and other	(3)	2	10
Ending Balance	$ 102	$ 117	$ 109

Contract assets include revenues recognized in advance of billings and are recorded net of estimated losses resulting from the inability to invoice customers. Contract assets are classified as current or noncurrent based on the amount of time expected to lapse until the company's right to consideration becomes unconditional. Noncurrent contract assets are included within other assets in the accompanying balance sheet.

Contract liabilities include billings in excess of revenues recognized, such as those resulting from customer advances and deposits and unearned revenue on service contracts. Contract liabilities are classified as current or noncurrent based on the periods over which remaining performance obligations are expected to be transferred to customers. Noncurrent contract liabilities are included within other long-term liabilities in the accompanying balance sheet. Contract assets and liabilities are presented on a net basis in the consolidated balance sheet if they arise from different performance obligations in the same contract. Contract asset and liability balances are as follows:

(In millions)	December 31, 2019	December 31, 2018
Current Contract Assets, Net	$ 603	$ 459
Noncurrent Contract Assets, Net	17	15
Current Contract Liabilities	916	809
Noncurrent Contract Liabilities	594	355

Substantially all of the current contract liabilities balance at December 31, 2018 and January 1 2018, was recognized in revenue during 2019 and 2018, respectively. Contract assets increased in 2019 primarily due to growth in pharmaceutical development and manufacturing services. Contract liabilities increased during 2019 primarily due to an advance payment from a customer and an acquisition.

Warranty Obligations

The company provides for the estimated cost of standard product warranties, primarily from historical information, in cost of product revenues at the time product revenue is recognized. While the company engages in extensive product quality programs and processes, including actively monitoring and evaluating the quality of its component supplies, the company’s warranty obligation is affected by product failure rates, utilization levels, material usage, service delivery costs incurred in correcting a product failure and supplier warranties on parts delivered to the company. Should actual product failure rates, utilization levels, material usage, service delivery costs or supplier warranties on parts differ from the company’s estimates, revisions to the estimated warranty liability would be required. The liability for warranties is included in other accrued expenses in the accompanying balance sheet. Extended warranty agreements are considered service contracts, which are discussed above. Costs of service contracts are recognized as incurred. The changes in the carrying amount of standard product warranty obligations are as follows:

(In millions)	Year Ended December 31, 2019	Year Ended December 31, 2018
Beginning Balance	$ 92	$ 87
Provision charged to income	115	121
Usage	(112)	(109)
Adjustments to previously provided warranties, net	(2)	(4)
Currency translation	—	(3)
Ending Balance	$ 93	$ 92

Leases

The company determines whether an arrangement is, or contains, a lease at inception. Prior to 2019, the company did not account for operating leases on the balance sheet. Beginning in 2019, as discussed below under Recent Accounting Pronouncements, operating leases that have commenced are included in other assets, other accrued expenses and other long-term liabilities in the consolidated balance sheet. Classification of operating lease liabilities as either current or noncurrent is based on the expected timing of payments due under the company's obligations.

Right-of-use (ROU) assets represent the company's right to use an underlying asset for the lease term and lease liabilities represent the company's obligation to make lease payments arising from the lease. Operating lease ROU assets and liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. Leases with an initial term of 12 months or less are not recorded on the consolidated balance sheet. The company recognizes lease expense for these leases on a straight-line basis over the lease term.

Because most of the company's leases do not provide an implicit rate, the company estimates incremental borrowing rates based on the information available at the commencement date in determining the present value of lease payments. The company uses the implicit rate when readily determinable. Lease terms may include the effect of options to extend or terminate the lease when it is reasonably certain that the company will exercise that option. Operating lease expense is recognized on a straight-line basis over the lease term.

As a lessee, the company accounts for the lease and non-lease components as a single lease component.

See Note 11 additional information about the company's leases.

Research and Development

The company conducts research and development activities to increase its depth of capabilities in technologies, software and services. Research and development costs include employee compensation and benefits, consultants, facilities related costs, material costs, depreciation and travel. Research and development costs are expensed as incurred.

Restructuring Costs

Accounting for the timing and amount of termination benefits provided by the company to employees is determined based on whether: (a) the company has a substantive plan to provide such benefits, (b) the company has a written employment contract with the affected employees that includes a provision for such benefits, (c) the termination benefits are due to the occurrence of an event specified in an existing plan or agreement, or (d) the termination benefits are a one-time benefit. In certain circumstances, employee termination benefits may meet more than one of the characteristics listed above and therefore, may have individual elements that are subject to different accounting models.

From time to time when executing a restructuring or exit plan, the company also incurs costs other than termination benefits, such as lease termination costs, that are not associated with or will not be incurred to generate revenues. These include costs that represent amounts under contractual obligations that exist prior to the restructuring plan communication date and will either continue after the restructuring plan is completed with no economic benefit or result in a penalty to cancel a contractual obligation. Such costs are recognized when incurred, which generally occurs at the contract termination or over the period from when a plan to abandon a leased facility is approved through the cease-use date but charges may continue over the remainder of the original contractual period.

Income Taxes

The company recognizes deferred income taxes based on the expected future tax consequences of differences between the financial statement basis and the tax basis of assets and liabilities, calculated using enacted tax rates in effect for the year in which the differences are expected to be reflected in the tax return.

The financial statements reflect expected future tax consequences of uncertain tax positions that the company has taken or expects to take on a tax return presuming the taxing authorities' full knowledge of the positions and all relevant facts, but without discounting for the time value of money (Note 8).

Earnings per Share

Basic earnings per share has been computed by dividing net income by the weighted average number of shares outstanding during the year. Except where the result would be antidilutive to income from continuing operations, diluted earnings per share has been computed using the treasury stock method for outstanding stock options and restricted units (Note 9).

Cash and Cash Equivalents

Cash equivalents consists principally of money market funds, commercial paper and other marketable securities purchased with an original maturity of three months or less. These investments are carried at cost, which approximates market value.

Inventories

Inventories are valued at the lower of cost or net realizable value, cost being determined principally by the first-in, first-out (FIFO) method with certain of the company's businesses utilizing the last-in, first-out (LIFO) method. The company periodically reviews quantities of inventories on hand and compares these amounts to the expected use of each product or product line. In addition, the company has certain inventory that is subject to fluctuating market pricing. The company assesses the carrying value of this inventory based on a lower of cost or net realizable value analysis. The company records a charge to cost of sales for the amount required to reduce the carrying value of inventory to net realizable value. Costs associated with the procurement of inventories, such as inbound freight charges, purchasing and receiving costs, and internal transfer costs, are included in cost of revenues in the accompanying statement of income. The components of inventories are as follows:

(In millions)	December 31, 2019	December 31, 2018
Raw Materials	$ 971	$ 812
Work in Process	517	430
Finished Goods	1,882	1,763
Inventories	$ 3,370	$ 3,005

The value of inventories maintained using the LIFO method was $268 million and $244 million at December 31, 2019 and 2018, respectively, which was below estimated replacement cost by $39 million and $34 million, respectively. Reductions to cost of revenues as a result of the liquidation of LIFO inventories were nominal during the three years ended December 31, 2019.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost. The costs of additions and improvements are capitalized, while maintenance and repairs are charged to expense as incurred. The company provides for depreciation and amortization using the straight-line method over the estimated useful lives of the property as follows: buildings and improvements, 25 to 40 years; machinery and equipment (including software), 3 to 10 years; and leasehold improvements, the shorter of the term of the lease or the life of the asset. When assets are retired or otherwise disposed of, the assets and related accumulated depreciation are eliminated from the accounts and the resulting gain or loss is reflected in the accompanying statement of income. Property, plant and equipment consists of the following:

(In millions)	December 31, 2019	December 31, 2018
Land	$ 396	$ 397
Buildings and Improvements	1,873	1,729
Machinery, Equipment and Leasehold Improvements	5,495	4,694
Property, Plant and Equipment, at Cost	7,764	6,820
Less: Accumulated Depreciation and Amortization	3,015	2,655
Property, Plant and Equipment, Net	$ 4,749	$ 4,165

Depreciation and amortization expense of property, plant and equipment was $564 million, $526 million and $439 million in 2019, 2018 and 2017, respectively.

Acquisition-related Intangible Assets

Acquisition-related intangible assets include the costs of acquired customer relationships, product technology, tradenames and other specifically identifiable intangible assets, and are being amortized using the straight-line method over their estimated useful lives, which range from 2 to 20 years. In addition, the company has tradenames and in-process research and development that have indefinite lives and which are not amortized. The company reviews intangible assets for impairment when indication of potential impairment exists, such as a significant reduction in cash flows associated with the assets. Intangible assets with indefinite lives are reviewed for impairment annually or whenever events or changes in circumstances indicate they may be impaired. Acquisition-related intangible assets are as follows:

	Balance at December 31, 2019			Balance at December 31, 2018		
(In millions)	Gross	Accumulated Amortization	Net	Gross	Accumulated Amortization	Net
Definite Lived:						
Customer relationships	$ 16,906	$ (6,997)	$ 9,909	$ 17,120	$ (6,833)	$ 10,287
Product technology	5,544	(3,121)	2,423	6,036	(3,178)	2,858
Tradenames	1,300	(869)	431	1,495	(929)	566
Other	9	(9)	—	33	(33)	—
	23,759	(10,996)	12,763	24,684	(10,973)	13,711
Indefinite Lived:						
Tradenames	1,235	N/A	1,235	1,235	N/A	1,235
In-process research and development	16	N/A	16	32	N/A	32
	1,251	N/A	1,251	1,267	N/A	1,267
Acquisition-related Intangible Assets	$ 25,010	$ (10,996)	$ 14,014	$ 25,951	$ (10,973)	$ 14,978

The estimated future amortization expense of acquisition-related intangible assets with definite lives is as follows:

(In millions)	
2020	$ 1,660
2021	1,552
2022	1,406
2023	1,329
2024	1,168
2025 and Thereafter	5,648
Estimated Future Amortization Expense of Definite-lived Intangible Assets	$ 12,763

Amortization of acquisition-related intangible assets was $1.71 billion, $1.74 billion and $1.59 billion in 2019, 2018 and 2017, respectively.

Other Assets

Other assets in the accompanying balance sheet include operating lease right-of-use assets, deferred tax assets, pension assets, cash surrender value of life insurance, insurance recovery receivables related to product liability matters, investments and other assets.

Prior to January 1, 2018, investments for which there are not readily determinable market values were accounted for under the cost method of accounting. The company periodically evaluated the carrying value of its investments accounted for under the cost method of accounting, which provided that they are recorded at the lower of cost or estimated net realizable value. Effective January 1, 2018, equity investments that do not have readily determinable fair values are measured at cost minus impairment, if any, plus or minus changes resulting from observable price changes in orderly transactions for the identical or similar investments of the same issuer. The company performs qualitative assessments to identify impairments of these investments. At December 31, 2019 and 2018, the company had such investments with carrying amounts of $34 million and $36 million, respectively, which are included in other assets.

Goodwill

The company assesses goodwill for impairment at the reporting unit level annually and whenever events occur or circumstances change that would more-likely-than-not reduce the fair value of a reporting unit below its carrying amount. Such events or circumstances generally include the occurrence of operating losses or a significant decline in earnings associated with one or more of the company's reporting units. The company is permitted to first assess qualitative factors to determine whether the goodwill impairment test is necessary. If the qualitative assessment results in a determination that the fair value of a reporting unit is more-likely-than-not less than its carrying amount, the company performs a quantitative goodwill impairment test. The company may bypass the qualitative assessment for the reporting unit in any period and proceed directly to the goodwill impairment test. The company estimates the fair value of its reporting units by using forecasts of discounted future cash flows and peer market multiples. The company would record an impairment charge based on the excess of a reporting unit's carrying amount over its fair value (limited to the amount of goodwill). The company determined that no impairments existed in 2019, 2018 or 2017.

The changes in the carrying amount of goodwill by segment are as follows:

(In millions)	Life Sciences Solutions	Analytical Instruments	Specialty Diagnostics	Laboratory Products and Services	Total
Balance at December 31, 2017	$ 8,391	$ 5,027	$ 3,856	$ 8,016	$ 25,290
Acquisitions	161	—	—	—	161
Finalization of purchase price allocations for 2017 acquisitions	—	1	—	20	21
Currency translation	(5)	(77)	(121)	79	(124)
Other	1	(1)	—	(1)	(1)
Balance at December 31, 2018	8,548	4,950	3,735	8,114	25,347
Acquisitions	—	9	—	938	947
Finalization of purchase price allocations for 2018 acquisitions	(2)	—	—	—	(2)
Sale of business	—	—	(478)	—	(478)
Currency translation	(3)	(38)	(72)	11	(102)
Other	1	7	(1)	(5)	2
Balance at December 31, 2019	$ 8,544	$ 4,928	$ 3,184	$ 9,058	$ 25,714

Loss Contingencies

Accruals are recorded for various contingencies, including legal proceedings, environmental, workers' compensation, product, general and auto liabilities, self-insurance and other claims that arise in the normal course of business. The accruals are based on management's judgment, historical claims experience, the probability of losses and, where applicable, the consideration of opinions of internal and/or external legal counsel and actuarial estimates. Additionally, the company records

receivables from third-party insurers up to the amount of the loss when recovery has been determined to be probable. Liabilities acquired in acquisitions have been recorded at fair value and, as such, were discounted to present value at the dates of acquisition.

Currency Translation

All assets and liabilities of the company's non-U.S. subsidiaries are translated at period-end exchange rates. Resulting translation adjustments are reflected in the "accumulated other comprehensive items" component of shareholders' equity. Revenues and expenses are translated at average exchange rates for the period. Currency transaction gains (losses) are included in the accompanying statement of income and in aggregate were $52 million, $19 million and $(31) million in 2019, 2018 and 2017, respectively.

Derivative Contracts

The company is exposed to certain risks relating to its ongoing business operations including changes to interest rates and currency exchange rates. The company uses derivative instruments primarily to manage currency exchange and interest rate risks. The company recognizes derivative instruments as either assets or liabilities and measures those instruments at fair value. If a derivative is a hedge, depending on the nature of the hedge, changes in the fair value of the derivative are either offset against the change in fair value of the hedged item through earnings or recognized in other comprehensive items until the hedged item is recognized in earnings. Derivatives that are not designated as hedges are recorded at fair value through earnings.

The company uses short-term forward and option currency exchange contracts primarily to hedge certain balance sheet and operational exposures resulting from changes in currency exchange rates, predominantly intercompany loans and cash balances that are denominated in currencies other than the functional currencies of the respective operations. The currency-exchange contracts principally hedge transactions denominated in Swiss franc, euro, Canadian dollars, Swedish kronor, British pounds sterling, Japanese yen and Czech koruna. The company does not hold or engage in transactions involving derivative instruments for purposes other than risk management.

Cash flow hedges. For derivative instruments that are designated and qualify as a cash flow hedge, the gain or loss on the derivative is reported as a component of other comprehensive items and reclassified into earnings in the same period or periods during which the hedged transaction affects earnings and is presented in the same income statement line item as the earnings effect of the hedged item.

Fair value hedges. For derivative instruments that are designated and qualify as a fair value hedge, the gain or loss on the derivative, as well as the offsetting loss or gain on the hedged item attributable to the hedged risk, are recognized in earnings.

Net investment hedges. The company also uses foreign currency-denominated debt and cross-currency interest rate swaps to partially hedge its net investments in foreign operations against adverse movements in exchange rates. The majority of the company's euro-denominated senior notes and cross-currency interest rate swaps have been designated as, and are effective as, economic hedges of part of the net investment in a foreign operation. Accordingly, foreign currency transaction gains or losses due to spot rate fluctuations on the euro-denominated debt instruments and contract fair value changes on the cross-currency interest rate swaps, excluding interest accruals, are included in currency translation adjustment within other comprehensive items and shareholders' equity.

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Recent Accounting Pronouncements

In January 2020, the FASB issued new guidance to clarify the interaction of the accounting for certain equity securities, equity method investments, and certain forward contracts and purchased options. Among other things, the new guidance clarifies that an entity should consider observable transactions that require it to either apply or discontinue the equity method of accounting for the purposes of applying measurement principles for certain equity securities immediately before applying or discontinuing the equity method. The company expects to adopt this guidance in 2020 using a prospective method. The adoption of this guidance is not expected to have a material impact on the company's consolidated financial statements.

In December 2019, the FASB issued new guidance to simplify the accounting for income taxes. Among other things, the new guidance requires the effects of enacted changes in tax laws or rates to be reflected in the annual effective tax rate

computation in the interim period that includes the enactment date. The company expects to adopt this guidance when it is effective in 2021 using a prospective method. The adoption of this guidance is not expected to have a material impact on the company's consolidated financial statements; however, the impact in future periods will be dependent on the extent of future events or conditions that would be affected such as enacted changes in tax laws or rates.

In August 2018, the FASB issued new guidance to modify the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The company will adopt the guidance in 2020 using a retrospective method. The adoption of this guidance is not expected to have a material impact on the company's disclosures.

In August 2018, the FASB issued new guidance to modify the disclosure requirements on fair value measurements. The company will adopt the guidance in 2020 with some items requiring a prospective method and others requiring a retrospective method. The adoption of this guidance is not expected to have a material impact on the company's disclosures.

In February 2018, the FASB issued new guidance to allow reclassifications from accumulated other comprehensive items (AOCI) to retained earnings for certain tax effects on items within AOCI resulting from the Tax Cuts and Jobs Act of 2017 (the Tax Act). The company adopted this guidance in January 2018 and recorded the reclassifications in the period of adoption. The balance sheet impact of adopting this guidance is included in the table below. This guidance only relates to the effects of the Tax Act. For all other tax law changes that have occurred or may occur in the future, the company reclassifies the tax effects to the consolidated statement of income on an item-by-item basis when the pre-tax item in AOCI is reclassified to income.

In December 2017, the SEC staff issued guidance to address the application of accounting guidance in situations when a registrant does not have the necessary information available, prepared, or analyzed (including computations) in reasonable detail to complete the accounting for certain income tax effects of the Tax Act enacted on December 22, 2017. The company reported provisional amounts in its 2017 financial statements for certain income tax effects of the Tax Act for which a reasonable estimate could be determined. Adjustments to provisional amounts identified during the measurement period, which ended December 22, 2018, are included as adjustments to Provision for Income Taxes in 2018 (Note 8).

In August 2017, the FASB issued new guidance to simplify the application of hedge accounting guidance. Among other things, the new guidance will permit more hedging strategies to qualify for hedge accounting, allow for additional time to perform an initial assessment of a hedge's effectiveness, and permit a qualitative effectiveness test for certain hedges after initial qualification. The company adopted this guidance in January 2018. The balance sheet impact of adopting this guidance is included in the table below.

In October 2016, the FASB issued new guidance eliminating the deferral of the tax effects of intra-entity asset transfers. The impact of this guidance in future periods will be dependent on the extent of future asset transfers which usually occur in connection with planning around acquisitions and other business structuring activities. The balance sheet impact of adopting this guidance as of January 1, 2018 is included in the table below.

In June 2016, the FASB issued new guidance to require a financial asset measured at amortized cost basis, such as accounts receivable, to be presented at the net amount expected to be collected based on relevant information about past events, including historical experience, current conditions, and reasonable and supportable forecasts that affect the collectability of the reported amount. During 2018 and 2019, the FASB issued additional guidance and clarification. The company will adopt the guidance in 2020 using a modified retrospective method. The adoption of this guidance is not expected to have a material impact on the company's consolidated financial statements.

In February 2016, the FASB issued new guidance which requires lessees to record most leases on their balance sheets as lease liabilities, initially measured at the present value of the future lease payments, with corresponding right-of-use assets. The new guidance also sets forth new disclosure requirements related to leases. During 2017 - 2019, the FASB issued additional guidance and clarification. The company adopted this guidance in January 2019. The company elected to adopt the guidance using a modified retrospective method, by applying the transition approach as of the beginning of the period of adoption. Comparative periods have not been restated. As permitted upon transition, the company did not reassess whether any expired or existing contracts were or contained embedded leases, the lease classification for any expired or existing leases, initial direct costs for any leases, or whether land easements met the definition of a lease if they were not accounted for as leases under the prior guidance. Adoption of the new guidance impacted the company's Consolidated Balance Sheet as follows:

(In millions)	December 31, 2018 as Reported	Impact of Adopting New Lease Guidance	January 1, 2019 As Adopted
Other Assets	$ 1,117	$ 641	$ 1,758
Other Accrued Expenses	1,470	132	1,602
Other Long-term Liabilities	2,515	505	3,020
Retained Earnings	18,696	4	18,700

In January 2016, the FASB issued new guidance which affects the accounting for equity investments, financial liabilities under the fair value option, and the presentation and disclosure requirements for financial instruments. This guidance requires equity investments to be measured at fair value with subsequent changes recognized in net income, except for those accounted for under the equity method or requiring consolidation. The guidance also changes the accounting for investments without a readily determinable fair value and that do not qualify for the practical expedient permitted by the guidance to estimate fair value. The balance sheet impact of adopting this guidance as of January 1, 2018 is included in the table below.

In May 2014, the FASB issued new revenue recognition guidance which provides a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most previous revenue recognition guidance. The new standard also requires significantly expanded disclosures regarding the qualitative and quantitative information of an entity's nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers. During 2016 and 2017, the FASB issued additional guidance and clarification, including the elimination of certain SEC Staff Guidance. The guidance is effective for the company in 2018. The company elected to adopt this guidance through application of the modified retrospective method by applying it to contracts that were not completed as of December 31, 2017 (in addition to new contracts in 2018).

Adoption of new guidance that became effective on January 1, 2018, impacted the company's Consolidated Balance Sheet as follows:

(In millions)	December 31, 2017 as Reported	Impact of Adopting New Revenue Guidance	Impact of Adopting New Equity Investment Guidance	Impact of Adopting New Intra-entity Tax Guidance	Impact of Adopting New Hedge Accounting Guidance	Impact of Adopting New Tax Effects on Items in AOCI Guidance	January 1, 2018 as Adopted
Accounts Receivable, Less Allowances	$ 3,879	$ (8)	$ —	$ —	$ —	$ —	$ 3,871
Inventories	2,971	(252)	—	—	—	—	2,719
Other Current Assets	1,236	229	—	—	—	—	1,465
Other Assets	1,227	18	—	(77)	—	—	1,168
Deferred Revenue	719	(719)	—	—	—	—	—
Contract Liabilities	—	736	—	—	—	—	736
Other Accrued Expenses	1,848	(153)	—	—	—	—	1,695
Deferred Income Taxes	2,766	—	—	(57)	—	2	2,711
Other Long-term Liabilities	2,569	74	—	—	—	—	2,643
Long-term Obligations	18,873	—	—	—	(3)	—	18,870
Retained Earnings	15,914	49	(1)	(20)	3	87	16,032
Accumulated Other Comprehensive Items	(2,003)	—	1	—	—	(89)	(2,091)

Had the company continued to use the revenue recognition guidance in effect prior to 2018, no material changes would have resulted to the consolidated statements of income, comprehensive income, or cash flows for the year ended December 31, 2018 from amounts reported therein. However, inventories would have been $357 million higher and other current assets would have been $359 million lower as of December 31, 2018, primarily as a result of differences in the accounting for pharmaceutical development and manufacturing services under the new revenue guidance. Under the prior guidance, costs of these services were recorded in inventory and revenues were recognized generally when the products were delivered to customers. Under the new guidance, costs are expensed and revenues are recognized as the manufacturing service is performed and the company's rights to consideration are recorded as contract assets.

Note 2. Acquisitions and Dispositions

The company's acquisitions have historically been made at prices above the determined fair value of the acquired identifiable net assets, resulting in goodwill, due to expectations of the synergies that will be realized by combining the businesses. These synergies include the elimination of redundant facilities, functions and staffing; use of the company's existing commercial infrastructure to expand sales of the acquired businesses' products; and use of the commercial infrastructure of the acquired businesses to cost-effectively expand sales of company products.

Acquisitions have been accounted for using the acquisition method of accounting, and the acquired companies' results have been included in the accompanying financial statements from their respective dates of acquisition. Acquisition transaction costs are recorded in selling, general and administrative expenses as incurred.

2019

On April 30, 2019, the company acquired, within the Laboratory Products and Services segment, Brammer Bio for approximately $1.67 billion in cash. Brammer Bio is a leading viral vector contract development and manufacturing organization for gene and cell therapies. The acquisition expands the segment's contract manufacturing capabilities. Brammer Bio reported revenues of approximately $140 million in 2018. The purchase price exceeded the fair value of the identifiable net assets and, accordingly, $938 million was allocated to goodwill, $405 million of which is tax deductible.

In addition, in 2019 the company acquired, within the Analytical Instruments segment, a Slovakia-based provider of mass spectrometry software used for identification of compounds, and, within the Laboratory Products and Services segment, an active pharmaceutical ingredient (API) manufacturing facility in Cork, Ireland, for an aggregate purchase price of $169 million.

The components of the purchase price and net assets acquired for 2019 acquisitions are as follows:

(In millions)	Brammer Bio	Other	Total
Purchase Price			
Cash paid	$ 1,710	$ 169	$ 1,879
Cash acquired	(36)	—	(36)
	$ 1,674	$ 169	$ 1,843
Net Assets Acquired			
Current assets	$ 52	$ 58	$ 110
Property, plant and equipment	147	102	249
Definite-lived intangible assets:			
Customer relationships	744	—	744
Product technology	65	7	72
Tradenames	7	—	7
Goodwill	938	9	947
Other assets	49	—	49
Contract liabilities	(110)	—	(110)
Deferred tax liabilities	(110)	(6)	(116)
Other liabilities assumed	(108)	(1)	(109)
	$ 1,674	$ 169	$ 1,843

The weighted-average amortization periods for definite-lived intangible assets acquired in 2019 are 14 years for customer relationships, 13 years for product technology and 2 years for tradenames. The weighted average amortization period for all definite-lived intangible assets acquired in 2019 is 14 years.

2018

On October 25, 2018, the company acquired, within the Life Sciences Solutions segment, Becton Dickinson and Company's Advanced Bioprocessing business for $477 million in cash. This North America-based business adds complementary cell culture products that expand the segment's bioproduction offerings to help customers increase yield during production of biologic drugs. The Advanced Bioprocessing business reported revenues of $100 million in 2017. The purchase price exceeded the fair value of the identifiable net assets and, accordingly, $146 million was allocated to goodwill, all of which is tax deductible.

In 2018, the company acquired, within the Life Sciences Solutions segment, a North America-based provider of a rapid DNA platform for use in forensics and law enforcement applications, for an aggregate purchase price of $65 million.

The components of the purchase price and net assets acquired for 2018 acquisitions are as follows:

(In millions)	Advanced Bioprocessing business	Other	Total
Purchase Price			
Cash paid	$ 477	$ 55	$ 532
Fair value of contingent consideration	—	11	11
Cash acquired	—	(1)	(1)
	$ 477	$ 65	$ 542
Net Assets Acquired			
Current assets	$ 53	$ 4	$ 57
Property, plant and equipment	42	—	42
Definite-lived intangible assets:			
Customer relationships	108	—	108
Product technology	132	31	163
Tradenames	8	—	8
Indefinite-lived intangible assets:			
In-process research and development	—	10	10
Goodwill	146	15	161
Other assets	—	14	14
Deferred tax liabilities	(7)	—	(7)
Other liabilities assumed	(5)	(9)	(14)
	$ 477	$ 65	$ 542

The weighted-average amortization periods for definite-lived intangible assets acquired in 2018 are 14 years for customer relationships, 13 years for product technology and 6 years for tradenames. The weighted average amortization period for all definite-lived intangible assets acquired in 2018 is 13 years.

2017

On August 29, 2017, the company acquired, within the Laboratory Products and Services segment, Patheon N.V., a leading global provider of high-quality drug development and delivery solutions to the pharmaceutical and biopharma sectors, for $35.00 per share in cash, or $7.36 billion, including the assumption of net debt. The company financed the purchase price, including the repayment of indebtedness of Patheon, with issuances of debt and equity.

Patheon provides comprehensive, integrated and highly customizable solutions as well as the expertise to help biopharmaceutical companies of all sizes satisfy complex development and manufacturing needs. The acquisition provided entry into the pharmaceutical contract development and manufacturing organization market and added a complementary service to the company's existing pharmaceutical services portfolio. Patheon reported revenues of $1.87 billion for the year ended October 31, 2016. The purchase price exceeded the fair market value of the identifiable net assets and, accordingly, $3.28 billion was allocated to goodwill, $125 million of which is tax deductible.

In addition, in 2017 the company acquired, within the Analytical Instruments segment, a North America-based provider of cloud-based platforms supporting scientific data management; within the Life Sciences Solutions segment, a North America-based developer of scalable control automation systems and software for bioproduction; within the Specialty Diagnostics segment, a North America-based molecular diagnostics company offering qPCR tests to the transplant community; and within the Analytical Instruments segment, a provider of desktop scanning electron microscopy solutions and a manufacturer of volatile organic compound monitoring instruments and integrated systems, for an aggregate purchase price of $425 million.

The components of the purchase price and net assets acquired for 2017 acquisitions are as follows:

(In millions)	Patheon	Other	Total
Purchase Price			
Cash paid	$ 6,911	$ 422	$ 7,333
Debt assumed	488	—	488
Fair value of contingent consideration	—	17	17
Fair value of equity awards exchanged	6	—	6
Fair value of previously held interest	—	11	11
Cash acquired	(47)	(25)	(72)
	$ 7,358	$ 425	$ 7,783
Net Assets Acquired			
Current assets	$ 1,062	$ 39	$ 1,101
Property, plant and equipment	1,242	4	1,246
Definite-lived intangible assets:			
Customer relationships	3,641	90	3,731
Product technology	—	96	96
Tradenames	112	5	117
Indefinite-lived intangible assets:			
In-process research and development	—	2	2
Goodwill	3,276	263	3,539
Other assets	54	—	54
Deferred tax liabilities	(1,093)	(40)	(1,133)
Other liabilities assumed	(936)	(34)	(970)
	$ 7,358	$ 425	$ 7,783

The weighted-average amortization periods for definite-lived intangible assets acquired in 2017 are 17 years for customer relationships, 9 years for product technology and 4 years for tradenames. The weighted average amortization period for all definite-lived intangible assets acquired in 2017 is 16 years.

Unaudited Pro Forma Information

The following unaudited pro forma information provides the effect of the company's 2017 acquisition of Patheon as if the acquisition had occurred on January 1, 2016:

(In millions)	2017
Revenues	$ 22,144
Net Income	$ 2,258

To reflect the acquisition of Patheon as if it had occurred on January 1, 2016, the unaudited pro forma results include adjustments to reflect, among other things, the incremental intangible asset amortization to be incurred based on the preliminary values of each identifiable intangible asset and the interest expense from debt financings obtained to partially fund the cash consideration transferred. Pro forma adjustments were tax effected at the company's historical statutory rates in effect for the respective periods. The unaudited pro forma amounts are not necessarily indicative of the combined results of operations that would have been realized had the acquisition and related financings occurred on the aforementioned date, nor are they meant to be indicative of any anticipated combined results of operations that the company will experience after the transaction. In addition, the amounts do not include any adjustments for actions that may be taken following the completion of the transaction, such as expected cost savings, operating synergies, or revenue enhancements that may be realized subsequent to the transaction.

Pro forma net income for the year ended December 31, 2017, excludes certain items associated with the Patheon acquisition that were included in the determination of net income for that period. These items have been included in the determination of pro forma net income for the year ended December 31, 2016 (not presented), and are as follows: $54 million

of direct transaction costs, $39 million of accounting policy conformity adjustments, $21 million of initial restructuring costs, $40 million reduction of revenues for revaluing the deferred revenue obligations to fair value, and $55 million of expense related to the fair value adjustment to acquisition-date inventories.

The company's results would not have been materially different from its pro forma results had the company's other 2019, 2018 or 2017 acquisitions occurred at the beginning of 2018, 2017 or 2016, respectively.

Disposition

On June 28, 2019, the company sold its Anatomical Pathology business to PHC Holdings Corporation for $1.13 billion, net of cash divested. The business was part of the Specialty Diagnostics segment. The sale of this business resulted in a pre-tax gain of approximately $478 million, included in restructuring and other (income) costs, net. Revenues in 2019, through the date of sale, and the full year 2018 of the business sold were approximately $115 million and $238 million, respectively, net of retained sales through the company's healthcare market and research and safety market channel businesses. The assets and liabilities of the Anatomical Pathology business were as follows on December 31, 2018:

(In millions)	December 31, 2018
Current Assets	$ 81
Long-term Assets	528
Current Liabilities	34
Long-term Liabilities	24

Note 3. Revenue

Disaggregated Revenue

Revenue by type is as follows:

(In millions)	2019	2018
Revenues		
Consumables	$ 13,109	12,576
Instruments	6,387	6,292
Services	6,046	5,490
Consolidated revenues	$ 25,542	$ 24,358

Revenue by geographic region is as follows:

(In millions)	2019	2018
Revenues (a)		
North America	$ 12,896	$ 12,143
Europe	6,358	6,215
Asia-Pacific	5,524	5,250
Other regions	764	750
Consolidated revenues	$ 25,542	$ 24,358

(a) Revenues are attributed to regions based on customer location.

Each reportable segment earns revenues from consumables, instruments and services in North America, Europe, Asia-Pacific and other regions. See note 4 for revenue by reportable segment and other geographic data.

Remaining Performance Obligations

The aggregate amount of the transaction price allocated to the remaining performance obligations for all open customer contracts as of December 31, 2019 was $7.77 billion. The company will recognize revenue for these performance obligations as they are satisfied, approximately 63% of which is expected to occur within the next twelve months.

Note 4. Business Segment and Geographical Information

The company's financial performance is reported in four segments. A description of each segment follows.

Life Sciences Solutions: provides an extensive portfolio of reagents, instruments and consumables used in biological and medical research, discovery and production of new drugs and vaccines as well as diagnosis of disease. These products and services are used by customers in pharmaceutical, biotechnology, agricultural, clinical, academic, and government markets.

Analytical Instruments: provides a broad offering of instruments, consumables, software and services that are used for a range of applications in the laboratory, on the production line and in the field. These products and services are used by customers in pharmaceutical, biotechnology, academic, government, environmental and other research and industrial markets, as well as the clinical laboratory.

Specialty Diagnostics: provides a wide range of diagnostic test kits, reagents, culture media, instruments and associated products used to increase the speed and accuracy of diagnoses. These products are used by customers in healthcare, clinical, pharmaceutical, industrial and food safety laboratories.

Laboratory Products and Services: provides virtually everything needed for the laboratory, including a combination of self-manufactured and sourced products for customers in research, academic, government, industrial and healthcare settings. The segment also includes a comprehensive offering of outsourced services used by the pharmaceutical and biotech industries for drug development, clinical trials logistics and commercial drug manufacturing.

The company's management evaluates segment operating performance based on operating income before certain charges/credits to cost of revenues and selling, general and administrative expenses, principally associated with acquisition accounting; restructuring and other costs/income including costs arising from facility consolidations such as severance and abandoned lease expense and gains and losses from the sale of real estate and product lines as well as from significant litigation-related matters; and amortization of acquisition-related intangible assets. The company uses this measure because it helps management understand and evaluate the segments' core operating results and facilitates comparison of performance for determining compensation.

Business Segment Information

(In millions)	2019	2018	2017
Revenues			
Life Sciences Solutions	$ 6,856	$ 6,269	$ 5,728
Analytical Instruments	5,522	5,469	4,821
Specialty Diagnostics	3,718	3,724	3,486
Laboratory Products and Services	10,599	10,035	7,825
Eliminations	(1,153)	(1,139)	(942)
Consolidated revenues	25,542	24,358	20,918
Segment Income (a)			
Life Sciences Solutions	2,446	2,158	1,894
Analytical Instruments	1,273	1,247	1,027
Specialty Diagnostics	930	952	927
Laboratory Products and Services	1,324	1,258	1,004
Subtotal reportable segments (a)	5,973	5,615	4,852
Cost of revenues charges, net	(17)	(12)	(123)
Selling, general and administrative charges, net	(62)	(29)	(78)
Restructuring and other income (costs), net	413	(50)	(97)
Amortization of acquisition-related intangible assets	(1,713)	(1,741)	(1,594)
Consolidated operating income	4,594	3,783	2,960
Interest income (b)	224	137	81
Interest expense (b)	(676)	(667)	(592)
Other (expense) income, net (b)	(72)	9	(20)
Income from Continuing Operations Before Income Taxes	$ 4,070	$ 3,262	$ 2,429
Depreciation			
Life Sciences Solutions	$ 130	$ 119	$ 129
Analytical Instruments	75	73	71
Specialty Diagnostics	67	76	72
Laboratory Products and Services	292	258	167
Consolidated depreciation	$ 564	$ 526	$ 439

(a) Represents operating income before certain charges to cost of revenues and selling, general and administrative expenses; restructuring and other costs/income, net; and amortization of acquisition-related intangibles.

(b) The company does not allocate interest or other expense/income, net to its segments.

(In millions)	2019	2018	2017
Total Assets			
Life Sciences Solutions	$ 18,306	$ 18,774	$ 19,063
Analytical Instruments	9,896	9,907	9,960
Specialty Diagnostics	5,867	6,663	7,095
Laboratory Products and Services	21,761	19,051	19,181
Corporate/Other (c)	2,551	1,837	1,370
Consolidated total assets	$ 58,381	$ 56,232	$ 56,669
Capital Expenditures			
Life Sciences Solutions	$ 151	$ 107	$ 118
Analytical Instruments	64	85	56
Specialty Diagnostics	83	103	87
Laboratory Products and Services	554	374	178
Corporate/Other	74	89	69
Consolidated capital expenditures	$ 926	$ 758	$ 508

(c) Corporate assets consist primarily of cash and cash equivalents and property and equipment at the company's corporate offices.

Geographical Information

(In millions)	2019	2018	2017
Revenues (d)			
United States	$ 12,366	$ 11,629	$ 10,129
China	2,752	2,504	2,060
Other	10,424	10,225	8,729
Consolidated revenues	$ 25,542	$ 24,358	$ 20,918
Long-lived Assets (e)			
United States	$ 3,099	$ 2,444	$ 2,349
Other	2,349	1,721	1,698
Consolidated long-lived assets	$ 5,448	$ 4,165	$ 4,047

(d) Revenues are attributed to countries based on customer location.

(e) Includes property, plant and equipment, net, and beginning in 2019, operating lease right-of-use assets.

Note 5. Other Expense/Income, Net

In all periods, other expense, net includes currency transaction gains and losses on monetary assets and liabilities and net periodic pension benefit cost/income, excluding the service cost component which is included in operating expenses on the accompanying statement of income. In 2019, other expense, net includes $184 million of losses on the early extinguishment of debt (see Note 10), offset in part by $44 million of net gains on investments. The investment gains include a $28 million gain on the sale of a joint venture for net proceeds of $42 million.

In 2018, other expense, net also includes $15 million of net losses on investments.

In 2017, other expense, net includes $32 million of charges related to amortization of fees paid to obtain bridge financing commitments related to the Patheon acquisition (Note 2) and $4 million of losses on the early extinguishment of debt, offset in part by $17 million of net gains on investments.

Note 6. Stock-based Compensation Expense

The company has stock-based compensation plans for its key employees, directors and others. These plans permit the grant of a variety of stock and stock-based awards, including restricted stock units, stock options or performance-based shares, as determined by the compensation committee of the company's Board of Directors or, for certain non-officer grants, by the company's employee equity committee, which consists of its chief executive officer. The company generally issues new shares of its common stock to satisfy option exercises and restricted unit vestings. Grants of stock options and restricted units generally provide that in the event of both a change in control of the company and a qualifying termination of an option or unit holder's employment, all options and service-based restricted unit awards held by the recipient become immediately vested (unless an employment or other agreement with the employee provides for different treatment).

Compensation cost is based on the grant-date fair value and is recognized ratably over the requisite vesting period or to the date based on qualifying retirement eligibility, if earlier.

Stock-based compensation expense is primarily included in selling, general and administrative expenses.

(In millions)	2019	2018	2017
Stock-based Compensation Expense	$ 181	$ 181	$ 159

Stock Options

The company's practice is to grant stock options at fair market value. Options vest over 3-5 years with terms of 7-10 years, assuming continued employment with certain exceptions. Vesting of the option awards is contingent upon meeting certain service conditions. The fair value of most option grants is estimated using the Black-Scholes option pricing model. For option grants that require the achievement of both service and market conditions, a lattice model is used to estimate fair value. The fair value is then amortized on a straight-line basis over the requisite service periods of the awards, which is generally the vesting period. Use of a valuation model requires management to make certain assumptions with respect to selected model inputs. Expected volatility was calculated based on the historical volatility of the company's stock. Historical data on exercise patterns is the basis for estimating the expected life of an option. The risk-free interest rate is based on U.S. Treasury zero-coupon issues with a remaining term which approximates the expected life assumed at the date of grant. The expected annual dividend rate was calculated by dividing the company's annual dividend, based on the most recent quarterly dividend rate, by the closing stock price on the grant date. The compensation expense recognized for all stock-based awards is net of estimated forfeitures. Forfeitures are estimated based on an analysis of actual option forfeitures.

The weighted average assumptions used in the Black-Scholes option pricing model are as follows:

	2019	2018	2017
Expected Stock Price Volatility	21 %	20 %	20 %
Risk Free Interest Rate	2.4 %	2.6 %	1.9 %
Expected Life of Options (years)	4.3	4.3	4.3
Expected Annual Dividend	0.3 %	0.3 %	0.4 %

The weighted average per share grant-date fair values of options granted during 2019, 2018 and 2017 were $53.37, $43.45 and $30.73, respectively. The total intrinsic value of options exercised during the same periods was $320 million, $312 million and $199 million, respectively. The intrinsic value is the difference between the market value of the shares on the exercise date and the exercise price of the option.

A summary of the company's option activity for the year ended December 31, 2019 is presented below:

	Shares (in millions)	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value (a) (in millions)
Outstanding at December 31, 2018	8.0	$ 148.09		
Granted	1.3	256.61		
Exercised	(2.0)	111.13		
Canceled/Expired	(0.4)	193.78		
Outstanding at December 31, 2019	6.9	$ 176.26	4.1	
Vested and Unvested Expected to Vest at December 31, 2019	6.6	$ 174.33	4.1	$ 992
Exercisable at December 31, 2019	3.1	$ 141.20	2.9	$ 561

As of December 31, 2019, there was $95 million of total unrecognized compensation cost related to unvested stock options granted. The cost is expected to be recognized through 2023 with a weighted average amortization period of 2.2 years.

Restricted Share/Unit Awards

Awards of restricted units convert into an equivalent number of shares of common stock. The awards generally vest over 3-4 years, assuming continued employment, with some exceptions. Vesting of the awards is contingent upon meeting certain service conditions and may also be contingent upon meeting certain performance and/or market conditions. The fair market value of the award at the time of the grant is amortized to expense over the requisite service period of the award, which is generally the vesting period. Recipients of restricted units have no voting rights but are entitled to accrue dividend equivalents. The fair value of service- and performance-based restricted unit awards is determined based on the number of units granted and the market value of the company's shares on the grant date. For awards with market-based vesting conditions, the company uses a lattice model to estimate the grant-date fair value of the award.

A summary of the company's restricted unit activity for the year ended December 31, 2019 is presented below:

	Units (in millions)	Weighted Average Grant-Date Fair Value
Unvested at December 31, 2018	1.2	$ 177.04
Granted	0.6	248.10
Vested	(0.7)	173.61
Forfeited	(0.1)	198.73
Unvested at December 31, 2019	1.0	$ 218.34

The total fair value of shares vested during 2019, 2018 and 2017 was $118 million, $114 million and $97 million, respectively.

As of December 31, 2019, there was $141 million of total unrecognized compensation cost related to unvested restricted stock unit awards. The cost is expected to be recognized through 2023 with a weighted average amortization period of 1.9 years.

Employee Stock Purchase Plans

Qualifying employees are eligible to participate in an employee stock purchase plan sponsored by the company. Shares may be purchased under the program at 95% of the fair market value at the end of the purchase period and the shares purchased are not subject to a holding period. Shares are purchased through payroll deductions of up to 10% of each participating

employee's qualifying gross wages. The company issued 0.2 million, 0.1 million and 0.1 million shares, respectively, of its common stock in 2019, 2018 and 2017 under the employee stock purchase plan.

Note 7. Pension and Other Postretirement Benefit Plans

401(k) Savings Plan and Other Defined Contribution Plans

The company's 401(k) savings and other defined contribution plans cover the majority of the company's eligible U.S. and certain non-U.S. employees. Contributions to the plans are made by both the employee and the company. Company contributions are based on the level of employee contributions. Company contributions to these plans are based on formulas determined by the company. In 2019, 2018 and 2017, the company charged to expense $232 million, $204 million and $161 million, respectively, related to its defined contribution plans.

Defined Benefit Pension Plans

Employees of a number of the company's non-U.S. and certain U.S. subsidiaries participate in defined benefit pension plans covering substantially all full-time employees at those subsidiaries. Some of the plans are unfunded, as permitted under the plans and applicable laws. The company also maintains postretirement healthcare programs at several acquired businesses where certain employees are eligible to participate. The costs of the postretirement healthcare programs are generally funded on a self-insured and insured-premium basis.

The company recognizes the funded status of defined benefit pension and other postretirement benefit plans as an asset or liability. This amount is defined as the difference between the fair value of plan assets and the benefit obligation. The company is required to recognize as a component of other comprehensive items, net of tax, the actuarial gains/losses and prior service costs/credits that arise but were not previously required to be recognized as components of net periodic benefit cost. Other comprehensive items is adjusted as these amounts are later recognized in income as components of net periodic benefit cost.

When a company with a pension plan is acquired, any excess of projected benefit obligation over the plan assets is recognized as a liability and any excess of plan assets over the projected benefit obligation is recognized as an asset. The recognition of a new liability or a new asset results in the elimination of (a) previously existing unrecognized net gain or loss and (b) unrecognized prior service cost or credits.

The company funds annually, at a minimum, the statutorily required minimum amount as actuarially determined. During 2019, 2018 and 2017, the company made cash contributions of approximately $50 million, $93 million and $200 million, respectively. Contributions to the plans included in the following table are estimated at between $40 and $60 million for 2020.

The following table provides a reconciliation of benefit obligations and plan assets of the company's domestic and non-U.S. pension plans and postretirement benefit plans:

	Domestic Pension Benefits		Non-U.S. Pension Benefits		Postretirement Benefits	
(In millions)	2019	2018	2019	2018	2019	2018
Change in Projected Benefit Obligations						
Benefit Obligation at Beginning of Year	$ 1,179	$ 1,300	$ 1,193	$ 1,324	$ 50	$ 63
Business combinations/divestiture	—	8	(23)	—	—	1
Service costs	—	—	23	26	1	1
Interest costs	45	41	24	23	2	2
Settlements	—	—	(34)	(33)	—	—
Plan participants' contributions	—	—	5	5	—	—
Actuarial (gains) losses	156	(87)	136	(48)	3	(8)
Benefits paid	(78)	(83)	(27)	(34)	(2)	(2)
Currency translation and other	—	—	6	(70)	1	(7)
Benefit Obligation at End of Year	$ 1,302	$ 1,179	$ 1,303	$ 1,193	$ 55	$ 50
Change in Fair Value of Plan Assets						
Fair Value of Plan Assets at Beginning of Year	$ 1,091	$ 1,181	$ 932	$ 1,011	$ 8	$ 9
Business combinations/divestiture	—	7	(15)	—	—	—
Actual return on plan assets	183	(49)	60	(21)	2	(1)
Employer contribution	5	35	43	56	2	2
Settlements	—	—	(34)	(33)	—	—
Plan participants' contributions	—	—	5	5	—	—
Benefits paid	(78)	(83)	(27)	(34)	(2)	(2)
Currency translation and other	—	—	22	(52)	—	—
Fair Value of Plan Assets at End of Year	$ 1,201	$ 1,091	$ 986	$ 932	$ 10	$ 8
Funded Status	$ (101)	$ (88)	$ (317)	$ (261)	$ (45)	$ (42)
Accumulated Benefit Obligation	$ 1,302	$ 1,179	$ 1,238	$ 1,136		
Amounts Recognized in Balance Sheet						
Noncurrent assets	$ —	$ —	$ 97	$ 106	$ 9	$ 8
Current liability	(6)	(6)	(8)	(8)	(3)	(3)
Noncurrent liabilities	(95)	(82)	(406)	(359)	(51)	(47)
Net amount recognized	$ (101)	$ (88)	$ (317)	$ (261)	$ (45)	$ (42)
Amounts Recognized in Accumulated Other Comprehensive Items						
Net actuarial loss	$ 195	$ 168	$ 200	$ 106	$ 5	$ 4
Prior service credits	—	—	(3)	5	(5)	(5)
Net amount recognized	$ 195	$ 168	$ 197	$ 111	$ —	$ (1)

The actuarial assumptions used to compute the funded status for the plans are based upon information available as of December 31, 2019 and 2018 and are as follows:

	Domestic Pension Benefits		Non-U.S. Pension Benefits		Postretirement Benefits	
	2019	2018	2019	2018	2019	2018
Weighted Average Assumptions Used to Determine Projected Benefit Obligations						
Discount rate	3.12 %	4.21 %	1.60 %	2.34 %	2.86 %	3.81 %
Average rate of increase in employee compensation	N/A	N/A	2.27 %	2.47 %	N/A	N/A
Initial healthcare cost trend rate					5.98 %	6.35 %
Ultimate healthcare cost trend rate					4.48 %	4.89 %

The actuarial assumptions used to compute the net periodic pension benefit cost (income) are based upon information available as of the beginning of the year, as presented in the following table:

	Domestic Pension Benefits			Non-U.S. Pension Benefits		
	2019	2018	2017	2019	2018	2017
Weighted Average Assumptions Used to Determine Net Benefit Cost (Income)						
Discount rate	4.22 %	3.54 %	4.06 %	2.34 %	2.10 %	1.95 %
Average rate of increase in employee compensation	N/A	N/A	N/A	2.47 %	2.59 %	3.10 %
Expected long-term rate of return on assets	5.76 %	5.75 %	6.50 %	3.25 %	3.31 %	3.11 %

The ultimate healthcare cost trend rates for the postretirement benefit plans are expected to be reached between 2020 and 2040.

The discount rate reflects the rate the company would have to pay to purchase high-quality investments that would provide cash sufficient to settle its current pension obligations. The discount rate is determined based on a range of factors, including the rates of return on high-quality, fixed-income corporate bonds and the related expected duration of the obligations or, in certain instances, the company has used a hypothetical portfolio of high quality instruments with maturities that mirror the benefit obligation in order to accurately estimate the discount rate relevant to a particular plan.

The company utilizes a full yield curve approach in the estimation of these components by applying the specific spot-rates along the yield curve used in the determination of the benefit obligation to the relevant projected cash flows.

The expected long-term rate of return on plan assets reflects the average rate of earnings expected on the funds invested, or to be invested, to provide for the benefits included in the projected benefit obligations. In determining the expected long-term rate of return on plan assets, the company considers the relative weighting of plan assets, the historical performance of total plan assets and individual asset classes and economic and other indicators of future performance. In addition, the company may consult with and consider the opinions of financial and other professionals in developing appropriate return benchmarks.

Asset management objectives include maintaining an adequate level of diversification to reduce interest rate and market risk and providing adequate liquidity to meet immediate and future benefit payment requirements.

The expected rate of compensation increase reflects the long-term average rate of salary increases and is based on historic salary increase experience and management's expectations of future salary increases.

The amounts in accumulated other comprehensive items expected to be recognized as components of net periodic benefit cost in 2020 are not material.

The projected benefit obligation and fair value of plan assets for the company's qualified and non-qualified pension plans with projected benefit obligations in excess of plan assets are as follows:

(In millions)	Pension Plans 2019	Pension Plans 2018
Pension Plans with Projected Benefit Obligations in Excess of Plan Assets		
Projected benefit obligation	$ 2,072	$ 1,876
Fair value of plan assets	1,557	1,421

The accumulated benefit obligation and fair value of plan assets for the company's qualified and non-qualified pension plans with accumulated benefit obligations in excess of plan assets are as follows:

(In millions)	Pension Plans 2019	Pension Plans 2018
Pension Plans with Accumulated Benefit Obligations in Excess of Plan Assets		
Accumulated benefit obligation	$ 1,976	$ 1,792
Fair value of plan assets	1,525	1,393

The measurement date used to determine benefit information is December 31 for all plan assets and benefit obligations.

The net periodic pension benefit cost (income) includes the following components:

	Domestic Pension Benefits			Non-U.S. Pension Benefits		
(In millions)	2019	2018	2017	2019	2018	2017
Components of Net Benefit Cost (Income)						
Service cost-benefits earned	$ —	$ —	$ —	$ 23	$ 26	$ 26
Interest cost on benefit obligation	45	41	43	24	23	21
Expected return on plan assets	(55)	(55)	(56)	(30)	(32)	(29)
Amortization of actuarial net loss	2	3	2	6	7	9
Amortization of prior service benefit	—	—	—	(1)	—	—
Settlement/curtailment loss	—	—	1	4	7	5
Net periodic benefit cost (income)	$ (8)	$ (11)	$ (10)	$ 26	$ 31	$ 32

The net periodic postretirement benefit cost was not material in 2019, 2018 and 2017.

Expected benefit payments are estimated using the same assumptions used in determining the company's benefit obligation at December 31, 2019. Benefit payments will depend on future employment and compensation levels, average years employed and average life spans, among other factors, and changes in any of these factors could significantly affect these estimated future benefit payments. Estimated future benefit payments during the next five years and in the aggregate for the five fiscal years thereafter, are as follows:

(In millions)	Domestic Pension Benefits	Non-U.S. Pension Benefits	Post-retirement Benefits
Expected Benefit Payments			
2020	$ 90	$ 34	$ 2
2021	90	37	2
2022	87	38	2
2023	86	41	2
2024	85	45	2
2025-2029	390	250	8

A change in the assumed healthcare cost trend rate by one percentage point effective January 2019 would not have caused a material change in the accumulated postretirement benefit obligation as of December 31, 2019 and the 2019 aggregate of service and interest costs.

Domestic Pension Plan Assets

The company's overall objective is to manage the assets in a liability framework where investments are selected that are expected to have similar changes in fair value as the related liabilities will have upon changes in interest rates. The company invests in a portfolio of both return-seeking and liability-hedging assets, primarily through the use of institutional collective funds, to achieve long-term growth and to insulate the funded position from interest rate volatility. The strategic asset allocation uses a combination of risk controlled and index strategies in fixed income and global equities. The target allocations for the investments are approximately 10% to funds investing in U.S. equities, approximately 10% to funds investing in international equities and approximately 80% to funds investing in fixed income securities. The portfolio maintains enough liquidity at all times to meet the near-term benefit payments.

Non-U.S. Pension Plan Assets

The company maintains specific plan assets for many of the individual pension plans outside the U.S. The investment strategy of each plan has been uniquely established based on the country specific standards and characteristics of the plans. Several of the plans have contracts with insurance companies whereby the market risks of the benefit obligations are borne by the insurance companies. When assets are held directly in investments, generally the objective is to invest in a portfolio of diversified assets with a variety of fund managers. The investments may include equity funds, fixed income funds, hedge funds, multi-asset funds, alternative investments and derivative funds with the target asset allocations ranging from approximately 0% - 25% for equity funds, 0% - 70% for fixed income funds, 0% - 20% for hedge funds, 0% - 100% for multi-asset funds, 0% to 5% for alternative investments and 0% - 30% for funds holding derivatives. The derivatives held by the funds are primarily interest rate swaps intended to match the movements in the plan liabilities as well as equity futures in a synthetic equity fund which provide targeted exposure to equity markets without the fund holding individual equity positions. Each plan maintains enough liquidity at all times to meet the near-term benefit payments.

The fair values of the company's plan assets at December 31, 2019 and 2018, by asset category are as follows:

(In millions)	December 31, 2019	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Not Subject to Leveling (1)
Domestic Pension Plan Assets					
U.S. equity funds	$ 122	$ —	$ —	$ —	$ 122
International equity funds	116	—	—	—	116
Fixed income funds	951	—	—	—	951
Money market funds	12	—	—	—	12
Total Domestic Pension Plans	$ 1,201	$ —	$ —	$ —	$ 1,201
Non-U.S. Pension Plan Assets					
Equity funds	$ 37	$ —	$ —	$ —	$ 37
Fixed income funds	430	—	—	—	430
Hedge funds	61	—	—	—	61
Multi-asset funds	76	—	—	—	76
Derivative funds	129	—	—	—	129
Alternative investments	4	—	—	—	4
Insurance contracts	237	—	237	—	—
Cash / money market funds	12	9	—	—	3
Total Non-U.S. Pension Plans	$ 986	$ 9	$ 237	$ —	$ 740

(1) Investments measured at the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy.

(In millions)	December 31, 2018	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)	Not Subject to Leveling (1)
Domestic Pension Plan Assets					
U.S. equity funds	$ 104	$ —	$ —	$ —	$ 104
International equity funds	103	—	—	—	103
Fixed income funds	868	—	—	—	868
Money market funds	16	—	—	—	16
Total Domestic Pension Plans	$ 1,091	$ —	$ —	$ —	$ 1,091
Non-U.S. Pension Plan Assets					
Equity funds	$ 43	$ —	$ —	$ —	$ 43
Fixed income funds	299	—	—	—	299
Hedge funds	61	—	—	—	61
Multi-asset funds	97	—	—	—	97
Derivative funds	169	—	—	—	169
Alternative investments	20	—	—	—	20
Insurance contracts	237	—	237	—	—
Cash / money market funds	6	5	—	—	1
Total Non-U.S. Pension Plans	$ 932	$ 5	$ 237	$ —	$ 690

(1) Investments measured at the net asset value per share (or its equivalent) practical expedient have not been classified in the fair value hierarchy.

The tables above present the fair value of the company's plan assets in accordance with the fair value hierarchy (Note 14). Certain investments that are measured at fair value using the net asset value per share practical expedient have not been classified in the fair value hierarchy. The fair value amounts of these investments presented in the above tables are intended to permit reconciliation of the fair value hierarchy to the amounts presented for the total pension plan assets. These investments were also redeemable at the balance sheet date or within limited time restrictions.

Note 8. Income Taxes

The components of income from continuing operations before provision for income taxes are as follows:

(In millions)	2019	2018	2017
U.S.	$ 2,278	$ 1,329	$ 655
Non-U.S.	1,792	1,933	1,774
Income from Continuing Operations	$ 4,070	$ 3,262	$ 2,429

The components of the provision for income taxes of continuing operations are as follows:

(In millions)	2019	2018	2017
Current Income Tax Provision			
Federal	$ 267	$ 165	$ 1,259
Non-U.S.	544	574	576
State	62	59	62
	873	798	1,897
Deferred Income Tax Provision (Benefit)			
Federal	$ (222)	$ (258)	$ (1,437)
Non-U.S.	(252)	(187)	(271)
State	(25)	(29)	12
	(499)	(474)	(1,696)
Provision for Income Taxes	$ 374	$ 324	$ 201

The provision for income taxes in the accompanying statement of income differs from the provision calculated by applying the statutory federal income tax rate to income from continuing operations before provision for income taxes due to the following:

(In millions)	2019	2018	2017
Statutory Federal Income Tax Rate	21 %	21 %	35 %
Provision for Income Taxes at Statutory Rate	$ 855	$ 685	$ 850
Increases (Decreases) Resulting From:			
Foreign rate differential	(204)	(375)	(380)
Foreign exchange loss on inter-company debt refinancing	(62)	—	(237)
Income tax credits	(379)	(349)	(273)
Withholding taxes	38	31	55
Global intangible low-taxed income	258	167	—
Foreign-derived intangible income	(111)	(47)	—
Impact of change in tax laws and apportionment on deferred taxes	6	(12)	(1,121)
Transition tax and other impacts of U.S. tax reform	8	117	1,250
Provision for (reversal of) tax reserves, net	62	(49)	99
Excess tax benefits from stock options and restricted stock units	(80)	(77)	(65)
Basis difference on disposal of business	73	—	—
Valuation allowance	(4)	260	7
Intra-entity transfers	(79)	—	—
Other, net	(7)	(27)	16
Provision for Income Taxes	$ 374	$ 324	$ 201

The company has operations and a taxable presence in approximately 50 countries outside the U.S. The company's effective income tax rate differs from the U.S. federal statutory rate each year due to certain operations that are subject to tax incentives, state and local taxes, and foreign taxes that are different than the U.S. federal statutory rate.

U.S. Tax Reform Impacts

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 was enacted. The Tax Act includes significant changes to existing U.S. tax laws that affect the company, including a reduction of the U.S. corporate income tax rate from 35% to 21% beginning in 2018 and creation of a territorial tax system with a one-time transition tax on deemed repatriated earnings and profits of foreign subsidiaries (transition tax). As detailed below, the company recognized a net charge of $204 million for certain aspects of the Tax Act in its 2017 financial statements for which the accounting was provisional, but a reasonable

estimate could be determined. During 2018, the company completed its accounting for the income tax effects of the Tax Act and recognized net adjustments (detailed below) to the provisional amounts, totaling a net charge of $68 million, as a component of income tax expense.

The transition tax is based on the company's total post-1986 earnings and profits, the tax on which was previously deferred from U.S. income taxes under U.S. law. The company recorded a provisional amount for the transition tax liability for each of the foreign subsidiaries, resulting in a total transition liability of $1.25 billion at December 31, 2017. After further analysis of new U.S. Treasury guidance, available tax accounting methods and elections, legislative updates, regulations, earnings and profits computations and foreign taxes, the company finalized the calculations of the transition tax liability during 2018. The increase in the liability for the transition tax in 2018 consisted of an incremental provision of $117 million offset in part by a $49 million reduction of related unrecognized tax benefits established in 2017.

In 2017, as a result of the Tax Act, the company remeasured certain deferred tax assets and liabilities based on the rates at which they were expected to reverse in the future (which was generally 21%), by recording a provisional tax benefit of $1.06 billion. During 2018, no material changes to this provisional amount were made.

The Tax Act included a provision for global intangible low-taxed income. The company has adopted a policy to account for this provision as a period cost.

During 2019, the company recorded a net tax provision of $1 million to adjust the impacts of U.S. tax reform based on final regulations issued by the U.S. Treasury in 2019. The income tax provision consists of an incremental charge of $8 million offset by a $7 million reduction of related unrecognized tax benefits.

Other Tax Impacts

In 2019, the company recorded a $62 million income tax benefit, including both U.S. federal and state taxes, related to a foreign exchange loss for tax purposes on certain intercompany financing arrangements as well as a tax provision of $191 million related to the gain on the sale of the Anatomical Pathology business. Also in 2019, the company recorded a $79 million benefit related to the deferred tax implications of intra-entity transactions which included a tax benefit to release a valuation allowance against net operating losses previously determined to be unrealizable.

In 2018, the provision for income taxes also included a $71 million charge to establish a valuation allowance against net operating losses that will not be utilized as a result of the 2019 sale of the Anatomical Pathology business (Note 2).

The foreign tax credits discussed below are the result of foreign earnings and profits remitted or deemed remitted to the U.S. during the reporting year and the U.S. treatment of taxes paid in the foreign jurisdictions in the years those profits were originally earned.

In 2019, the company implemented foreign tax credit planning in Sweden which resulted in $75 million of foreign tax credits, with no related incremental U.S. income tax expense.

In 2017, the company continued to implement tax planning initiatives related to non U.S. subsidiaries. These non-U.S. subsidiaries incurred foreign tax obligations, and made cash and deemed distributions to the company’s U.S. operations which resulted in no net tax cost. As a result of these distributions, the company benefited from U.S. foreign tax credits of $86 million, offset in part by additional U.S. income taxes of $53 million on the related foreign income (which reduced the benefit from the foreign rate differential in 2017). The company also implemented foreign tax credit planning in Sweden which resulted in $20 million of foreign tax credits, with no related incremental U.S. income tax expense. In 2017, the company refinanced certain long term inter-company debt which resulted in an income tax benefit of $237 million related to a foreign exchange loss recognized for income tax purposes.

The company generally receives a tax deduction upon the exercise of non-qualified stock options by employees, or the vesting of restricted stock units held by employees, for the difference between the exercise price and the market price of the underlying common stock on the date of exercise. The company uses the incremental tax benefit approach for utilization of tax attributes. These excess tax benefits reduce the tax provision. In 2019, 2018 and 2017, the company's tax provision was reduced by $80 million, $77 million and $65 million, respectively, of such benefits.

Net deferred tax asset (liability) in the accompanying balance sheet consists of the following:

(In millions)	2019	2018
Deferred Tax Asset (Liability)		
Depreciation and amortization	$ (3,084)	$ (3,444)
Net operating loss and credit carryforwards	1,231	1,311
Reserves and accruals	144	148
Accrued compensation	261	250
Inventory basis difference	99	105
Other capitalized costs	71	103
Unrealized losses on hedging instruments	10	23
Other, net	57	143
Deferred tax assets (liabilities), net before valuation allowance	(1,211)	(1,361)
Less: Valuation allowance	408	471
Deferred tax assets (liabilities), net	$ (1,619)	$ (1,832)

The company estimates the degree to which tax assets and loss and credit carryforwards will result in a benefit based on expected profitability by tax jurisdiction and provides a valuation allowance for tax assets and loss and credit carryforwards that it believes will more likely than not expire unutilized. At December 31, 2019, all of the company's valuation allowance relates to deferred tax assets, primarily net operating losses, for which any subsequently recognized tax benefits will reduce income tax expense.

The changes in the valuation allowance are as follows:

	Year Ended December 31,		
(In millions)	2019	2018	2017
Beginning Balance	$ 471	$ 256	$ 113
(Reductions) additions charged to income tax provision, net	(27)	223	28
Additions due to acquisitions	—	17	108
Reduction due to a divestiture	(33)	—	—
Deductions	—	(15)	—
Currency translation and other	(3)	(10)	7
Ending Balance	$ 408	$ 471	$ 256

At December 31, 2019, the company had federal, state and non-U.S. net operating loss carryforwards of $282 million, $1.73 billion and $4.82 billion, respectively. Use of the carryforwards is limited based on the future income of certain subsidiaries. The federal and state net operating loss carryforwards expire in the years 2020 through 2039. Of the non-U.S. net operating loss carryforwards, $1.98 billion expire in the years 2024 through 2039, and the remainder do not expire.

As a result of the Tax Act, U.S. federal taxes have been recorded on $15 billion of undistributed foreign earnings as of December 31, 2019. A provision has not been made for certain U.S. state income taxes or additional non-U.S. taxes that would be due when cash is repatriated to the U.S. as the company's undistributed foreign earnings are intended to be reinvested outside of the U.S. indefinitely. The determination of the amount of the unrecognized deferred tax liability related to the undistributed foreign earnings is not practicable due to the uncertainty in the manner in which these earnings will be distributed. The company's intent is to only make distributions from non-U.S. subsidiaries in the future when they can be made at no net tax cost.

Unrecognized Tax Benefits

As of December 31, 2019, the company had $1.55 billion of unrecognized tax benefits which, if recognized, would reduce the effective tax rate.

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

(In millions)	2019	2018	2017
Beginning Balance	$ 1,442	$ 1,409	$ 802
Additions due to acquisitions	—	—	31
Reductions due to acquisitions	—	(5)	—
Additions for tax positions of current year	53	48	565
Additions for tax positions of prior years	69	82	51
Reductions for tax positions of prior years	(7)	—	—
Closure of tax years	—	(5)	—
Settlements	(5)	(87)	(40)
Ending Balance	$ 1,552	$ 1,442	$ 1,409

Substantially all of the total $1.55 billion liability is classified as a long-term liability. The company does not expect its unrecognized tax benefits to change significantly over the next twelve months.

During 2019, the company's unrecognized tax benefits increased $70 million as a result of uncertain tax positions relating to foreign tax positions and $45 million relating to U.S. federal and state tax positions.

During 2018, the company's unrecognized tax benefits increased $85 million as a result of uncertain tax positions relating to foreign tax positions and $45 million relating to U.S. federal and state tax positions.

During 2017, the company's unrecognized tax benefits provisionally increased $511 million as a result of uncertain tax positions relating to the scope of the Tax Act's one-time transition tax, $54 million relating to foreign tax positions, $43 million as a result of a foreign exchange loss recognized on the refinancing of certain long term inter-company debt and $31 million due to an acquisition.

The company classified interest and penalties related to unrecognized tax benefits as income tax expense. The total amount of interest and penalties related to uncertain tax positions and recognized in the balance sheet as of December 31, 2019 and 2018 was $67 million and $59 million, respectively.

The company conducts business globally and, as a result, Thermo Fisher or one or more of its subsidiaries files income tax returns in the U.S. federal jurisdiction and various state and foreign jurisdictions. In the normal course of business, the company is subject to examination by taxing authorities throughout the world, including such major jurisdictions as Australia, Canada, China, Denmark, Finland, France, Germany, Japan, Singapore, Sweden, the United Kingdom and the United States. With few exceptions, the company is no longer subject to U.S. federal, state and local, or non-U.S., income tax examinations for years before 2011.

Note 9. Earnings per Share

(In millions except per share amounts)	2019	2018	2017
Income from Continuing Operations	$ 3,696	$ 2,938	$ 2,228
Loss from Discontinued Operations	—	—	(3)
Net Income	$ 3,696	$ 2,938	$ 2,225
Basic Weighted Average Shares	400	402	395
Plus Effect of:			
Stock options and restricted units	3	4	3
Diluted Weighted Average Shares	403	406	398
Basic Earnings per Share:			
Continuing operations	$ 9.24	$ 7.31	$ 5.65
Discontinued operations	—	—	(0.01)
Basic Earnings per Share	$ 9.24	$ 7.31	$ 5.64
Diluted Earnings per Share:			
Continuing operations	$ 9.17	$ 7.24	$ 5.60
Discontinued operations	—	—	(0.01)
Diluted Earnings per Share	$ 9.17	$ 7.24	$ 5.59
Antidilutive Stock Options Excluded from Diluted Weighted Average Shares	1	2	2

Note 10. Debt and Other Financing Arrangements

(Dollars in millions)	Effective Interest Rate at December 31, 2019	December 31, 2019	December 31, 2018
Commercial Paper		$ —	$ 693
Floating Rate 2-Year Senior Notes, Due 7/24/2019 (euro-denominated)		—	574
6.00% 10-Year Senior Notes, Due 3/1/2020		—	750
4.70% 10-Year Senior Notes, Due 5/1/2020		—	300
Floating Rate 2-Year Senior Notes, Due 8/7/2020 (euro-denominated)	0.17 %	673	688
1.50% 5-Year Senior Notes, Due 12/1/2020 (euro-denominated)		—	487
5.00% 10-Year Senior Notes, Due 1/15/2021		—	400
4.50% 10-Year Senior Notes, Due 3/1/2021		—	1,000
3.60% 10-Year Senior Notes, Due 8/15/2021		—	1,100
3.30% 7-Year Senior Notes, Due 2/15/2022		—	800
2.15% 7-Year Senior Notes, Due 7/21/2022 (euro-denominated)	2.28 %	561	574
3.15% 10-Year Senior Notes, Due 1/15/2023		—	800
3.00% 7-Year Senior Notes, Due 4/15/2023	5.02 %	1,000	1,000
4.15% 10-Year Senior Notes, Due 2/1/2024	4.16 %	1,000	1,000
0.75% 8-Year Senior Notes, Due 9/12/2024 (euro-denominated)	0.94 %	1,121	1,147
0.125% 5.5-Year Senior Notes, Due 3/1/2025 (euro-denominated)	0.41 %	897	—
2.00% 10-Year Senior Notes, Due 4/15/2025 (euro-denominated)	2.10 %	717	734
3.65% 10-Year Senior Notes, Due 12/15/2025	3.77 %	350	350
1.40% 8.5-Year Senior Notes, Due 1/23/2026 (euro-denominated)	1.53 %	785	802
2.95% 10-Year Senior Notes, Due 9/19/2026	3.19 %	1,200	1,200
1.45% 10-Year Senior Notes, Due 3/16/2027 (euro-denominated)	1.65 %	561	574
3.20% 10-Year Senior Notes, Due 8/15/2027	3.39 %	750	750
0.50% 8.5-Year Senior Notes, Due 3/1/2028 (euro-denominated)	0.77 %	897	—
1.375% 12-Year Senior Notes, Due 9/12/2028 (euro-denominated)	1.46 %	673	688
1.95% 12-Year Senior Notes, Due 7/24/2029 (euro-denominated)	2.08 %	785	802
2.60% 10-Year Senior Notes, Due 10/1/2029	2.74 %	900	—
0.875% 12-Year Senior Notes, Due 10/1/2031 (euro-denominated)	1.13 %	1,009	—
2.875% 20-Year Senior Notes, Due 7/24/2037 (euro-denominated)	2.94 %	785	802
1.50% 20-Year Senior Notes, Due 10/1/2039 (euro-denominated)	1.73 %	1,009	—
5.30% 30-Year Senior Notes, Due 2/1/2044	5.37 %	400	400
4.10% 30-Year Senior Notes, Due 8/15/2047	4.23 %	750	750
1.875% 30-Year Senior Notes, Due 10/1/2049 (euro-denominated)	1.98 %	1,121	—
Other		16	21
Total Borrowings at Par Value		17,960	19,186
Fair Value Hedge Accounting Adjustments		(13)	(93)
Unamortized Discount, Net		(94)	(21)
Unamortized Debt Issuance Costs		(101)	(82)
Total Borrowings at Carrying Value		17,752	18,990
Less: Short-term Obligations and Current Maturities		676	1,271
Long-term Obligations		$ 17,076	$ 17,719

The effective interest rates for the fixed-rate debt include the stated interest on the notes, the accretion of any discount or amortization of any premium, the amortization of any debt issuance costs and, if applicable, adjustments related to hedging.

See Note 14 for fair value information pertaining to the company's long-term obligations.

As of December 31, 2019, the annual repayment requirements for debt obligations are as follows:

(In millions)	
2020	$ 676
2021	4
2022	564
2023	1,001
2024	2,122
2025 and Thereafter	13,593
	$ 17,960

As of December 31, 2018, short-term obligations and current maturities of long-term obligations in the accompanying balance sheet included $693 million of commercial paper, short-term bank borrowings and borrowings under lines of credit of certain of the company's subsidiaries. The weighted average interest rate for short-term borrowings was 0.74% at December 31, 2018. No such borrowings were outstanding at December 31, 2019. In addition to available borrowings under the company's revolving credit agreements, discussed below, the company had unused lines of credit of $62 million as of December 31, 2019. These unused lines of credit generally provide for short-term unsecured borrowings at various interest rates.

Credit Facilities

The company has a revolving credit facility with a bank group that provides for up to $2.50 billion of unsecured multi-currency revolving credit. The facility expires in July 2021. The agreement calls for interest at either a LIBOR-based rate, a EURIBOR-based rate (for funds drawn in euro) or a rate based on the prime lending rate of the agent bank, at the company's option. The agreement contains affirmative, negative and financial covenants, and events of default customary for facilities of this type. The covenants in our revolving credit facility (the Facility) include a Consolidated Leverage Ratio (total debt-to-Consolidated EBITDA) and a Consolidated Interest Coverage Ratio (Consolidated EBITDA to Consolidated Interest Expense), as such terms are defined in the Facility. Specifically, the company has agreed that, so long as any lender has any commitment under the Facility, any letter of credit is outstanding under the Facility, or any loan or other obligation is outstanding under the Facility, it will maintain a maximum Consolidated Leverage Ratio of 3.5:1.0. The company has also agreed that so long as any lender has any commitment under the Facility or any letter of credit is outstanding under the Facility, or any loan or other obligation is outstanding under the Facility, it will maintain a minimum Consolidated Interest Coverage Ratio of 3.0:1.0 as of the last day of any fiscal quarter. As of December 31, 2019, no borrowings were outstanding under the Facility, although available capacity was reduced by approximately $72 million as a result of outstanding letters of credit.

Commercial Paper Programs

The company has commercial paper programs pursuant to which it may issue and sell unsecured, short-term promissory notes (CP Notes). Under the U.S. program, a) maturities may not exceed 397 days from the date of issue and b) the CP Notes are issued on a private placement basis under customary terms in the commercial paper market and are not redeemable prior to maturity nor subject to voluntary prepayment. Under the euro program, maturities may not exceed 183 days and may be denominated in euro, U.S. dollars, Japanese yen, British pounds sterling, Swiss franc, Canadian dollars or other currencies. Under both programs, the CP Notes are issued at a discount from par (or premium to par, in the case of negative interest rates), or, alternatively, are sold at par and bear varying interest rates on a fixed or floating basis. As of December 31, 2019, there were no outstanding borrowings under these programs.

Senior Notes

Interest on the floating rate senior notes is payable quarterly. Interest is payable annually on the other euro-denominated senior notes and semi-annually on all other senior notes. Each of the notes may be redeemed at a redemption price of 100% of the principal amount plus a specified make-whole premium and accrued interest. The company is subject to certain affirmative and negative covenants under the indentures governing the senior notes, the most restrictive of which limits the ability of the company to pledge principal properties as security under borrowing arrangements.

In 2019, the company refinanced certain of its debt by issuing new senior notes and using the proceeds to redeem some of its existing senior notes. In connection with these redemptions, the company incurred $184 million of losses on the early extinguishment of debt included in Other Expense, Net on the accompanying statement of income. Upon redemption of the senior notes, the company terminated the related fixed to floating rate interest rate swap arrangements and paid $17 million, included in other financing activities, net, in the accompanying statement of cash flows. The company also terminated related

cross-currency interest rate swap arrangements and received $44 million, included in other investing activities, net, in the accompanying statement of cash flows.

In 2018, Thermo Fisher Scientific (Finance I) B.V., a wholly-owned finance subsidiary of the company, issued the Floating Rate Senior Notes due 2020 included in the table above. This subsidiary has no independent function other than financing activities. The Floating Rate Senior Notes due 2020 are fully and unconditionally guaranteed by the company and no other subsidiaries of the company have guaranteed the obligations.

Interest Rate Swap Arrangements

The company has entered into LIBOR-based interest rate swap arrangements with various banks. The aggregate amounts of the swaps are equal to the principal amount of the notes and the payment dates of the swaps coincide with the interest payment dates of the note. The swap contracts provide for the company to pay a variable interest rate and receive a fixed rate. The variable interest rates reset monthly. The swaps have been accounted for as fair value hedges of the notes. See Note 14 for additional information on the interest rate swap arrangements and related cross-currency interest rate swap arrangements. The following table summarizes the outstanding interest rate swap arrangements on the company's senior notes at December 31, 2019:

(Dollars in millions)	Aggregate Notional Amount	Pay Rate	Pay Rate as of December 31, 2019	Receive Rate
3.00% Senior Notes due 2023 (a)	$ 1,000	1-month LIBOR + 1.7640%	3.5038 %	3.00 %

(a) The payments on $900 million notional value of these interest rate swaps are offset in part by cross-currency interest rate swaps which effectively reduced the pay rate as of December 31, 2019 from a weighted average of 3.50% to a weighted average of 1.14%.

The company entered into $900 million notional value of cross-currency interest rate swaps, which effectively convert a portion of the semi-annual payments related to the variable rate, U.S. dollar denominated, LIBOR-based interest rate swaps to payments on variable rate, euro denominated, EURIBOR-based cross-currency interest rate swaps.

Note 11. Leases

As a lessee, the company leases certain logistics, office, and manufacturing facilities, as well as vehicles, copiers, and other equipment. These operating leases generally have remaining lease terms between 1 month and 30 years, and some include options to extend (generally for 1 to 10 years) or have options to terminate the arrangement within 1 year. The company’s finance leases are not material.

The company has guaranteed the residual value of three leased operating facilities with lease terms ending in 2020, 2023 and 2024. The company has agreed with the lessor to comply with certain financial covenants consistent with its other debt arrangements (Note 10). The aggregate maximum guarantee under these three lease arrangements is $147 million. Operating lease ROU assets and lease liabilities for these lease arrangements are recorded on the consolidated balance sheet as of December 31, 2019, but exclude any amounts for residual value guarantees.

As a lessee, the consolidated statement of income includes pre-tax operating lease costs of $208 million and pre-tax variable lease costs of $41 million for the year ended December 31, 2019. Lease costs arising from finance leases, short-term leases, and sublease income are not material.

Cash used in operating activities for payments of amounts included in the measurement of operating lease liabilities was $208 million in the year ended December 31, 2019. Operating lease ROU assets of $205 million were obtained in exchange for new operating lease liabilities in the year ended December 31, 2019.

The weighted-average remaining operating lease term was 6.2 years and the weighted average discount rate was 4.0% as of December 31, 2019.

ROU assets of $699 million as of December 31, 2019, are classified in other assets in the consolidated balance sheet. Operating lease liabilities of $167 million and $571 million as of December 31, 2019, are classified in other accrued expenses and other long-term liabilities, respectively, in the consolidated balance sheet.

As of December 31, 2019, future payments of operating lease liabilities are as follows:

(In millions)		
2020	$	197
2021		158
2022		124
2023		92
2024		68
2025 and Thereafter		197
Total Lease Payments		836
Less: Imputed Interest		98
Total Operating Lease Liability	$	738

As a lessor, operating leases, sales-type leases and direct financing leases are not material.

As previously disclosed in the company's 2018 Annual Report on Form 10-K and under previous lease accounting guidance, income from continuing operations includes expense from operating leases of $211 million and $198 million in 2018 and 2017, respectively, and the following is a summary of annual future minimum lease and rental commitments under noncancelable operating leases as of December 31, 2018:

(In millions)		
2019	$	192
2020		158
2021		118
2022		86
2023		58
2024 and Thereafter		177
	$	789

Note 12. Commitments and Contingencies

Purchase Obligations

The company has entered into unconditional purchase obligations, in the ordinary course of business, that include agreements to purchase goods, services or fixed assets and to pay royalties that are enforceable and legally binding and that specify all significant terms including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable at any time without penalty. The aggregate amount of the company’s unconditional purchase obligations totaled $1.20 billion at December 31, 2019 and the majority of these obligations are expected to be settled during 2020.

Letters of Credit, Guarantees and Other Commitments

Outstanding letters of credit and bank guarantees totaled $272 million at December 31, 2019. Substantially all of these letters of credit and guarantees expire before 2026.

Outstanding surety bonds and other guarantees totaled $61 million at December 31, 2019. The expiration of these bonds and guarantees ranges through 2022.

The letters of credit, bank guarantees and surety bonds principally secure performance obligations, and allow the holder to draw funds up to the face amount of the letter of credit, bank guarantee or surety bond if the applicable business unit does not perform as contractually required.

The company is a guarantor of pension plan obligations of a divested business. The purchaser of the divested business has agreed to pay for the pension benefits, however the company was required to guarantee payment of these pension benefits should the purchaser fail to do so. The amount of the guarantee at December 31, 2019 was $41 million.

In connection with the sale of businesses of the company, the buyers have assumed certain contractual obligations of such businesses and have agreed to indemnify the company with respect to those assumed liabilities. In the event a third-party to a transferred contract does not recognize the transfer of obligations or a buyer defaults on its obligations under the transferred contract, the company could be liable to the third-party for such obligations. However, in such event, the company would be entitled to seek indemnification from the buyer.

Indemnifications

In conjunction with certain transactions, primarily divestitures, the company has agreed to indemnify the other parties with respect to certain liabilities related to the businesses that were sold or leased properties that were abandoned (e.g., retention of certain environmental, tax, employee and product liabilities). The scope and duration of such indemnity obligations vary from transaction to transaction. Where probable, an obligation for such indemnifications is recorded as a liability. Generally, a maximum obligation cannot be reasonably estimated. Other than obligations recorded as liabilities at the time of divestiture, historically the company has not made significant payments for these indemnifications.

In connection with the company's efforts to reduce the number of facilities that it occupies, the company has vacated some of its leased facilities or sublet them to third parties. When the company sublets a facility to a third-party, it remains the primary obligor under the master lease agreement with the owner of the facility. As a result, if a third-party vacates the sublet facility, the company would be obligated to make lease or other payments under the master lease agreement. The company believes that the financial risk of default by sublessors is individually and in the aggregate not material to the company's financial position or results of operations.

In connection with the sale of products in the ordinary course of business, the company often makes representations affirming, among other things, that its products do not infringe on the intellectual property rights of others and agrees to indemnify customers against third-party claims for such infringement. The company has not been required to make material payments under such provisions.

Environmental Matters

The company is currently involved in various stages of investigation and remediation related to environmental matters. The company cannot predict all potential costs related to environmental remediation matters and the possible impact on future operations given the uncertainties regarding the extent of the required cleanup, the complexity and interpretation of applicable laws and regulations, the varying costs of alternative cleanup methods and the extent of the company's responsibility. Expenses for environmental remediation matters related to the costs of installing, operating and maintaining groundwater-treatment systems and other remedial activities related to historical environmental contamination at the company's domestic and international facilities were not material in any period presented. The company records accruals for environmental remediation liabilities, based on current interpretations of environmental laws and regulations, when it is probable that a liability has been incurred and the amount of such liability can be reasonably estimated. The company calculates estimates based upon several factors, including input from environmental specialists and management's knowledge of and experience with these environmental matters. The company includes in these estimates potential costs for investigation, remediation and operation and maintenance of cleanup sites. At December 31, 2019, the company's total environmental liability was approximately $66 million. While management believes the accruals for environmental remediation are adequate based on current estimates of remediation costs, the company may be subject to additional remedial or compliance costs due to future events such as changes in existing laws and regulations, changes in agency direction or enforcement policies, developments in remediation technologies or changes in the conduct of the company's operations, which could have a material adverse effect on the company's financial position, results of operations or cash flows.

Litigation and Related Contingencies

There are various lawsuits and claims pending against the company including matters involving product liability, intellectual property, employment and commercial issues. The company determines the probability and range of possible loss based on the current status of each of these matters. A liability is recorded in the financial statements if it is believed to be probable that a loss has been incurred and the amount of the loss can be reasonably estimated. The company establishes a liability that is an estimate of amounts expected to be paid in the future for events that have already occurred. The company accrues the most likely amount or at least the minimum of the range of probable loss when a range of probable loss can be estimated. The accrued liabilities are based on management's judgment as to the probability of losses for asserted and unasserted claims and, where applicable, actuarially determined estimates. Accrual estimates are adjusted as additional information becomes known or payments are made. The amount of ultimate loss may differ from these estimates. Due to the inherent uncertainties associated with pending litigation or claims, the company cannot predict the outcome, nor, with respect to certain pending litigation or claims where no liability has been accrued, make a meaningful estimate of the reasonably possible

loss or range of loss that could result from an unfavorable outcome. The company has no material accruals for pending litigation or claims for which accrual amounts are not disclosed below, nor are material losses deemed probable for such matters. It is reasonably possible, however, that an unfavorable outcome that exceeds the company's current accrual estimate, if any, for one or more of the matters described below could have a material adverse effect on the company's results of operations, financial position and cash flows.

Product Liability, Workers Compensation and Other Personal Injury Matters

The range of probable loss for product liability, workers compensation and other personal injury matters of the company's continuing operations at December 31, 2019, was approximately $206 million to $342 million on an undiscounted basis. The portion of these liabilities assumed in the 2006 merger with Fisher was recorded at its fair (present) value at the date of merger. The company's accrual for all such matters in total, including the discounted liabilities, was $198 million at December 31, 2019 (or $215 million undiscounted). The accrual includes estimated defense costs and is gross of estimated amounts due from insurers of $84 million at December 31, 2019 (or $96 million undiscounted) that are included in other assets in the accompanying balance sheet. The portion of these insurance assets assumed in the merger with Fisher was also recorded at its fair value at the date of merger. In addition to the above accrual, as of December 31, 2019, the company had a product liability accrual of $9 million (undiscounted) relating to divested businesses.

The assets and liabilities assumed at the Fisher merger date were ascribed a fair value based on the present value of expected future cash flows, using a discount rate equivalent to the risk free rate of interest for monetary assets with comparable maturities (weighted average discount rate of 4.67%). The discount on the liabilities of approximately $17 million and the discount on the assets of approximately $12 million (net discount $5 million) are being accreted to interest expense over the expected settlement period.

Although the company believes that the amounts accrued and estimated recoveries are probable and appropriate based on available information, including actuarial studies of loss estimates, the process of estimating losses and insurance recoveries involves a considerable degree of judgment by management and the ultimate amounts could vary materially. Insurance contracts do not relieve the company of its primary obligation with respect to any losses incurred. The collectability of amounts due from its insurers is subject to the solvency and willingness of the insurer to pay, as well as the legal sufficiency of the insurance claims. Management monitors the payment history as well as the financial condition and ratings of its insurers on an ongoing basis.

Intellectual Property Matters

On June 3, 2013, Unisone Strategic IP filed a complaint against Life Technologies, a subsidiary of the company, in the United States District Court for the Southern District of California alleging patent infringement by Life Technologies' supply chain management system software, which operates with product "supply centers" installed at customer sites. Plaintiff seeks damages for alleged willful infringement, attorneys' fees, costs, and injunctive relief. On August 24, 2017, Unisone filed an appeal from a decision by the Patent Trial and Appeal Board (PTAB) that found the challenged patent claims invalid. The United States Court of Appeals for the Federal Circuit upheld the PTAB's ruling finding the challenged claims in the Unisone patent invalid. Unisone had until March 11, 2019 to file an appeal with the United States Supreme Court. Unisone did not appeal that decision, and consequently the case before the United States District Court, which had been stayed pending the outcome of the PTAB decision, resumed with Unisone filing an amended complaint on September 12, 2019 regarding similar patent claims that were not included in the PTAB proceeding. On November 1, 2019, Life Technologies filed two additional covered business method (CBM) challenges with the PTAB regarding Unisone's new patent claims. On December 16, 2019, the United States District Court granted Life Technologies' motion to stay the case pending the PTAB's decision whether to institute a CBM review of the new patent claims.

Note 13. Comprehensive Income and Shareholders' Equity

Comprehensive Income (Loss)

Comprehensive income combines net income and other comprehensive items. Other comprehensive items represent certain amounts that are reported as components of shareholders' equity in the accompanying balance sheet.

In the fourth quarter of 2017, the company recorded an out of period adjustment to correct an error in the accounting for income taxes associated with the partial hedge of its net investment in a foreign operation in 2014 through the third quarter of 2017. The adjustment affected deferred income taxes and other comprehensive income and, in the aggregate, increased comprehensive income by $101 million for the year ended December 31, 2017. The adjustment does not have any impact on the

company's statements of income or cash flows. The company determined that the adjustment was not material to the consolidated financial statements for any previously reported annual or interim periods.

Changes in each component of accumulated other comprehensive items, net of tax are as follows:

(In millions)	Currency Translation Adjustment	Unrealized Losses on Hedging Instruments	Pension and Other Postretirement Benefit Liability Adjustment	Total
Balance at December 31, 2018	$ (2,243)	$ (52)	$ (203)	$ (2,498)
Other comprehensive items before reclassifications	(107)	(38)	(93)	(238)
Amounts reclassified from accumulated other comprehensive items	30	19	8	57
Net other comprehensive items	(77)	(19)	(85)	(181)
Balance at December 31, 2019	$ (2,320)	$ (71)	$ (288)	$ (2,679)

Shareholders' Equity

At December 31, 2019, the company had reserved 25 million unissued shares of its common stock for possible issuance under stock-based compensation plans.

Note 14. Fair Value Measurements and Fair Value of Financial Instruments

Fair Value Measurements

The company uses the market approach technique to value its financial instruments and there were no changes in valuation techniques during 2019. The company's financial assets and liabilities carried at fair value are primarily comprised of insurance contracts, investments in derivative contracts, mutual funds holding publicly traded securities and other investments in unit trusts held as assets to satisfy outstanding deferred compensation and retirement liabilities; and acquisition-related contingent consideration.

The fair value accounting guidance requires that assets and liabilities carried at fair value be classified and disclosed in one of the following three categories:

Level 1: Quoted market prices in active markets for identical assets or liabilities that the company has the ability to access.

Level 2: Observable market based inputs or unobservable inputs that are corroborated by market data such as quoted prices, interest rates and yield curves.

Level 3: Inputs are unobservable data points that are not corroborated by market data.

The following tables present information about the company's financial assets and liabilities measured at fair value on a recurring basis as of December 31, 2019 and December 31, 2018:

(In millions)	December 31, 2019	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets				
Cash equivalents	$ 1,280	$ 1,280	$ —	$ —
Investments in common stock, mutual funds and other similar instruments	19	19	—	—
Warrants	6	—	6	—
Insurance contracts	131	—	131	—
Derivative contracts	37	—	37	—
Total Assets	$ 1,473	$ 1,299	$ 174	$ —
Liabilities				
Derivative contracts	$ 24	$ —	$ 24	$ —
Contingent consideration	55	—	—	55
Total Liabilities	$ 79	$ —	$ 24	$ 55

(In millions)	December 31, 2018	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets				
Cash equivalents	$ 769	$ 769	$ —	$ —
Bank time deposits	2	2	—	—
Investments in mutual funds and other similar instruments	10	10	—	—
Warrants	8	—	8	—
Insurance contracts	113	—	113	—
Derivative contracts	31	—	31	—
Total Assets	$ 933	$ 781	$ 152	$ —
Liabilities				
Derivative contracts	$ 145	$ —	$ 145	$ —
Contingent consideration	37	—	—	37
Total Liabilities	$ 182	$ —	$ 145	$ 37

The company uses the Black-Scholes model to value its warrants. The company determines the fair value of its insurance contracts by obtaining the cash surrender value of the contracts from the issuer. The fair value of derivative contracts is the estimated amount that the company would receive/pay upon liquidation of the contracts, taking into account the change in interest rates and currency exchange rates. The company determines the fair value of acquisition-related contingent consideration based on the probability-weighted discounted cash flows associated with such future payments. Changes to the fair value of contingent consideration are recorded in selling, general and administrative expense. The following table provides a rollforward of the fair value, as determined by level 3 inputs, of the contingent consideration.

(In millions)	2019	2018
Contingent Consideration		
Beginning Balance	$ 37	$ 35
Acquisitions (including assumed balances)	24	11
Payments	(3)	(8)
Change in fair value included in earnings	(3)	(1)
Ending Balance	$ 55	$ 37

Derivative Contracts

The following table provides the aggregate notional value of outstanding derivative contracts.

(In millions)	December 31, 2019	December 31, 2018
Notional Amount		
Interest rate swaps (described in Note 10)	$ 1,000	$ 3,100
Cross-currency interest rate swaps - designated as net investment hedges	900	1,500
Currency exchange contracts	2,846	3,424

While certain derivatives are subject to netting arrangements with counterparties, the company does not offset derivative assets and liabilities within the consolidated balance sheet. The following tables present the fair value of derivative instruments in the consolidated balance sheet and statement of income.

	Fair Value – Assets		Fair Value – Liabilities	
(In millions)	December 31, 2019	December 31, 2018	December 31, 2019	December 31, 2018
Derivatives Designated as Hedging Instruments				
Interest rate swaps (a)	$ —	$ —	$ 13	$ 129
Cross-currency interest rate swaps (b)	33	28	—	—
Derivatives Not Designated as Hedging Instruments				
Currency exchange contracts (c)	4	3	11	16
Total Derivatives	$ 37	$ 31	$ 24	$ 145

(a) The fair value of the interest rate swaps is included in the consolidated balance sheet under the caption other long-term liabilities.

(b) The fair value of the cross-currency interest rate swaps is included in the consolidated balance sheet under the caption other assets.

(c) The fair value of the currency exchange contracts is included in the consolidated balance sheet under the captions other current assets or other accrued expenses.

The following amounts related to cumulative basis adjustments for fair value hedges were included in the consolidated balance sheet under the caption long-term obligations:

	Carrying Amount of the Hedged Liability		Cumulative Amount of Fair Value Hedging Adjustment - Increase (Decrease) Included in Carrying Amount of Liability (d)	
(In millions)	December 31, 2019	December 31, 2018	December 31, 2019	December 31, 2018
Long-term Obligations	$ 980	$ 3,291	$ (13)	$ (93)

(d) Includes increase in the carrying amount of $30 million at December 31, 2018 on discontinued hedging relationships.

(In millions)	Gain (Loss) Recognized 2019	2018
Fair Value Hedging Relationships		
Interest rate swaps		
Hedged long-term obligations - included in other expense, net	$ (93)	$ 7
Derivatives designated as hedging instruments - included in other expense, net	97	(5)
Derivatives Designated as Cash Flow Hedges		
Interest rate swaps		
Included in unrealized losses on hedging instruments within other comprehensive items	(50)	—
Amount reclassified from accumulated other comprehensive items to other expense, net	(25)	(12)
Financial Instruments Designated as Net Investment Hedges		
Foreign currency-denominated debt		
Included in currency translation adjustment within other comprehensive items	60	336
Cross-currency interest rate swaps		
Included in currency translation adjustment within other comprehensive items	49	28
Included in other expense, net	48	21
Derivatives Not Designated as Hedging Instruments		
Currency exchange contracts		
Included in cost of product revenues	1	2
Included in other expense, net	52	37

Gains and losses recognized on currency exchange contracts and the interest rate swaps designated as fair value hedges are included in the consolidated statement of income together with the corresponding, offsetting losses and gains on the underlying hedged transactions.

The company also uses foreign currency-denominated debt and cross-currency interest rate swaps to partially hedge its net investments in foreign operations against adverse movements in exchange rates. The majority of the company's euro-denominated senior notes and cross-currency interest rate swaps have been designated as, and are effective as, economic hedges of part of the net investment in a foreign operation. Accordingly, foreign currency transaction gains or losses due to spot rate fluctuations on the euro-denominated debt instruments and contract fair value changes on the cross-currency interest rate swaps, excluding interest accruals, are included in currency translation adjustment within other comprehensive items and shareholders' equity.

See Note 1 and Note 10 for additional information on the company's risk management objectives and strategies.

Cash Flow Hedge Arrangements

In 2019, the company entered into interest rate swap arrangements to mitigate the risk of interest rates rising prior to the completion of debt offerings. Based on the company's conclusion that the debt offerings were probable, the swaps hedged the cash flow risk for each of the interest payments on €1.80 billion plus $900 million aggregate principal amounts of the planned fixed-rate debt issues. The hedges were terminated in 2019, in connection with the debt offerings. The aggregate fair value of the hedges at that time, $38 million, net of tax, has been classified as a reduction to accumulated other comprehensive items and will be amortized to interest expense over the terms of the related debt issuances. The company had a cash outlay of $50 million in 2019 associated with termination of the arrangements, included in other financing activities, net, in the accompanying statement of cash flows.

Fair Value of Other Financial Instruments

The carrying value and fair value of the company's notes receivable and debt obligations are as follows:

	December 31, 2019		December 31, 2018	
(In millions)	Carrying Value	Fair Value	Carrying Value	Fair Value
Debt Obligations:				
Senior notes	$ 17,736	$ 18,650	$ 18,276	$ 18,322
Commercial paper	—	—	693	693
Other	16	16	21	21
	$ 17,752	$ 18,666	$ 18,990	$ 19,036

The fair value of debt obligations was determined based on quoted market prices and on borrowing rates available to the company at the respective period ends which represent level 2 measurements.

Note 15. Supplemental Cash Flow Information

(In millions)	2019	2018	2017
Cash Paid For:			
Interest	$ 790	$ 687	$ 533
Income Taxes	896	591	479
Non-cash Investing and Financing Activities			
Declared but unpaid dividends	77	69	61
Issuance of stock upon vesting of restricted stock units	182	170	125

Cash, cash equivalents and restricted cash is included in the consolidated balance sheet as follows:

(In millions)	December 31, 2019	December 31, 2018
Cash and Cash Equivalents	$ 2,399	$ 2,103
Restricted Cash Included in Other Current Assets	21	12
Restricted Cash Included in Other Assets	2	2
Cash, Cash Equivalents and Restricted Cash	$ 2,422	$ 2,117

Amounts included in restricted cash represent funds held as collateral for bank guarantees and incoming cash in China awaiting government administrative clearance.

Note 16. Restructuring and Other Costs (Income), Net

Restructuring and other costs (income), net, in 2019 primarily included the gain on the sale of the company's Anatomical Pathology business, and, to a lesser extent, transaction/integration costs related to acquisitions and a divestiture; sales of inventory revalued at the date of acquisition; and continuing charges for headcount reductions and facility consolidations in an effort to streamline operations, including the closure and consolidation of operations within several facilities in the U.S. and Europe. In 2019, severance actions associated with facility consolidations and cost reduction measures affected approximately 1% of the company's workforce.

Restructuring and other costs in 2018 included continuing charges for headcount reductions and facility consolidations in an effort to streamline operations, including the closure and consolidation of operations within several facilities in the U.S. and Europe; third-party transaction/integration costs primarily related to recent acquisitions; sales of inventories revalued at the date of acquisition; and environmental remediation charges. These charges were partially offset by gains on sales of real estate and favorable results of litigation. In 2018, severance actions associated with facility consolidations and cost reduction measures affected approximately 1% of the company's workforce.

Restructuring and other costs in 2017 included continuing charges for headcount reductions and facility consolidations in an effort to streamline operations, including the closure and consolidation of operations within several facilities in the U.S., Europe and Asia; costs to achieve synergies related to acquisitions, including severance and abandoned facility costs; third-party acquisition transaction and integration costs primarily associated with the acquisitions of FEI and Patheon; sales of inventories revalued at the date of acquisition; charges to conform the accounting policies of Patheon to the company's accounting policies; charges for changes in estimates of acquisition contingent consideration; hurricane response/impairment costs; net charges for the settlement/curtailment of retirement plans; and net credits for litigation matters. In 2017, severance actions associated with facility consolidations and cost reduction measures affected less than 2% of the company's workforce.

As of February 26, 2020, the company has identified restructuring actions that will result in additional charges of approximately $65 million, primarily in 2020, and expects to identify additional actions during 2020 which will be recorded when specified criteria are met, such as communication of benefit arrangements or when the costs have been incurred.

2019

During 2019, the company recorded net restructuring and other costs by segment as follows:

(In millions)	Cost of Revenues	Selling, General and Administrative Expenses	Restructuring and Other Costs (Income), Net	Total
Life Sciences Solutions	$ 16	$ —	$ 24	$ 40
Analytical Instruments	—	24	14	38
Specialty Diagnostics	—	4	(471)	(467)
Laboratory Products and Services	1	35	17	53
Corporate	—	(1)	3	2
	$ 17	$ 62	$ (413)	$ (334)

The principal components of net restructuring and other costs by segment are as follows:

Life Sciences Solutions

In 2019, the Life Sciences Solutions segment recorded $40 million of net restructuring and other charges, including $16 million of charges to cost of revenues for the sales of inventory revalued at the date of acquisition. The segment also recorded $24 million of net restructuring and other charges for severance and other costs associated with facility consolidations in the U.S and Europe, the impairment of acquired technology in development, and pre-acquisition litigation-related matters.

Analytical Instruments

In 2019, the Analytical Instruments segment recorded $38 million of net restructuring and other charges, including $24 million of charges to selling, general, and administrative expense, principally third-party transaction costs related to the acquisition of Gatan, subsequently terminated. The segment also recorded $14 million of restructuring and other costs, primarily for employee severance and other costs associated with facility consolidations in the U.S. and Europe.

Specialty Diagnostics

In 2019, the Specialty Diagnostics segment recorded $467 million of net restructuring and other income, primarily a gain on the divestiture of its Anatomical Pathology business (see Note 2). The segment also recorded $4 million of charges to selling, general, and administrative expense, principally third-party transaction costs in connection with the sale of the Anatomical Pathology business.

Laboratory Products and Services

In 2019, the Laboratory Products and Services segment recorded $53 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $1 million to conform the accounting policies of recently acquired businesses with the company's accounting policies and $35 million of charges to selling, general, and administrative expenses, principally third-party transaction/integration costs for recently completed acquisitions. The segment also recorded $17 million of restructuring and other costs, primarily charges for severance at businesses streamlining operations and employee compensation due at Brammer Bio on the date of acquisition.

Corporate

In 2019, the company recorded $2 million of net restructuring and other costs principally for severance at its corporate operations, partially offset by income from favorable results of product liability litigation.

2018

During 2018, the company recorded net restructuring and other costs by segment as follows:

(In millions)	Cost of Revenues	Selling, General and Administrative Expenses	Restructuring and Other Costs, Net	Total
Life Sciences Solutions	$ 4	$ 12	$ (17)	$ (1)
Analytical Instruments	3	8	28	39
Specialty Diagnostics	—	3	(1)	2
Laboratory Products and Services	5	16	31	52
Corporate	—	(10)	9	(1)
	$ 12	$ 29	$ 50	$ 91

The principal components of net restructuring and other costs by segment are as follows:

Life Sciences Solutions

In 2018, the Life Sciences Solutions segment recorded $1 million of net restructuring and other income. The segment recorded charges to cost of revenues of $4 million for the sales of inventory revalued at the date of acquisition, as well as $12 million of charges to selling, general, and administrative expenses, primarily third-party transaction/integration costs related to recent acquisitions. The segment also recorded $17 million of net restructuring and other income, principally for a $46 million net gain on the resolution of litigation, partially offset by charges for severance other costs associated with facility consolidations in the U.S.

Analytical Instruments

In 2018, the Analytical Instruments segment recorded $39 million of net restructuring and other charges. The segment recorded net charges to cost of revenues of $3 million for the sales of inventory revalued at the date of acquisition; $8 million of net charges to selling, general, and administrative expense, principally third-party transaction costs related to the acquisition of Gatan; and $28 million of restructuring and other costs, primarily for employee severance and other costs associated with facility consolidations in the U.S. and Europe, as well as abandoned facilities costs associated with the remediation and closure of a manufacturing facility in the U.S.

Specialty Diagnostics

In 2018, the Specialty Diagnostics segment recorded $2 million of net restructuring and other charges, including $3 million of net charges to selling, general, and administrative expense, principally third-party transaction costs in connection with the planned sale of the Anatomical Pathology business. The segment also recorded $1 million of net restructuring and other income, including a $6 million gain on the sale of real estate, mostly offset by cash charges for severance and other costs associated with facility consolidations in the U.S. and Europe.

Laboratory Products and Services

In 2018, the Laboratory Products and Services segment recorded $52 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $5 million, principally for the sales of inventory revalued at the date of acquisition, and $16 million of charges to selling, general, and administrative expenses for third-party transaction/integration costs related to the acquisition of Patheon. The segment also recorded $31 million of restructuring and other costs, primarily charges for environmental remediation associated with a Superfund site in the U.S., employee severance, and, to a lesser extent, hurricane response costs.

Corporate

In 2018, the company recorded $1 million of net restructuring and other income, principally income from favorable results of product liability litigation, mostly offset by charges for environmental remediation at an abandoned facility and, to a lesser extent, severance at its corporate operations.

2017

During 2017, the company recorded net restructuring and other costs by segment as follows:

(In millions)	Cost of Revenues	Selling, General and Administrative Expenses	Restructuring and Other Costs, Net	Total
Life Sciences Solutions	$ 1	$ 29	$ (16)	$ 14
Analytical Instruments	31	(2)	30	59
Specialty Diagnostics	1	(2)	39	38
Laboratory Products and Services	90	61	41	192
Corporate	—	(8)	3	(5)
	$ 123	$ 78	$ 97	$ 298

The principal components of net restructuring and other costs by segment are as follows:

Life Sciences Solutions

In 2017, the Life Sciences Solutions segment recorded $14 million of net restructuring and other charges. The segment recorded $29 million of charges to selling, general and administrative expenses, principally for changes in estimates of acquisition contingent consideration. The segment also recorded $16 million of restructuring and other income, net, including $64 million of net credits principally for pre-acquisition litigation-related matters, and, to a lesser extent, net gains on the settlement of retirement plans. These credits were largely offset by $48 million of cash restructuring costs, including $23 million of severance and related costs primarily to achieve acquisition synergies, and $25 million of abandoned facilities costs primarily for the consolidation of facilities in the U.S.

Analytical Instruments

In 2017, the Analytical Instruments segment recorded $59 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $31 million for the sales of inventory revalued at the date of acquisition, as well as $30 million of restructuring and other costs, primarily for severance and other costs to achieve acquisition synergies, as well as charges for the settlement of retirement plans.

Specialty Diagnostics

In 2017, the Specialty Diagnostics segment recorded $38 million of net restructuring and other charges, principally charges for litigation-related matters, and, to a lesser extent, cash costs for employee severance and other costs associated with headcount reductions in the U.S. and Europe.

Laboratory Products and Services

In 2017, the Laboratory Products and Services segment recorded $192 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $90 million, including $33 million to conform the accounting policies of Patheon to the company's accounting policies and $55 million for sales of inventory revalued at the date of acquisition. The segment also recorded $61 million of charges to selling, general, and administrative expenses, including $55 million for third-party acquisition transaction costs, as well as $6 million to conform the accounting policies of Patheon to the company's accounting policies. The segment also recorded $41 million of restructuring and other costs, primarily for employee severance and compensation due at Patheon on the date of acquisition, and, to a lesser extent, hurricane response/impairment charges.

Corporate

In 2017, the company recorded $5 million of net restructuring and other income, principally $8 million of income from favorable results of product liability litigation, partially offset by charges for the settlement of a retirement plan and severance at its corporate operations.

The following table summarizes the cash components of the company's restructuring plans. The non-cash components and other amounts reported as restructuring and other costs, net, in the accompanying statement of income have been summarized in the notes to the tables. Accrued restructuring costs are included in other accrued expenses in the accompanying balance sheet.

(In millions)	Severance	Abandonment of Excess Facilities	Other (a)	Total
Balance at December 31, 2016	$ 38	$ 32	$ 2	$ 72
Costs incurred in 2017 (c)	62	27	17	106
Reserves reversed (b)	(9)	—	—	(9)
Payments	(62)	(19)	(12)	(93)
Currency translation	1	—	(1)	—
Balance at December 31, 2017	30	40	6	76
Costs incurred in 2018 (d)	51	33	18	102
Reserves reversed (b)	(7)	(4)	(3)	(14)
Payments	(39)	(27)	(17)	(83)
Currency translation	(1)	—	—	(1)
Balance at December 31, 2018	34	42	4	80
Cumulative effect of accounting change (f)	—	(28)	—	(28)
Costs incurred in 2019 (e)	45	7	14	66
Reserves reversed (b)	(13)	(1)	—	(14)
Payments	(47)	(10)	(12)	(69)
Currency translation	(1)	—	—	(1)
Balance at December 31, 2019	$ 18	$ 10	$ 6	$ 34

(a) Other includes relocation and moving expenses associated with facility consolidations, as well as employee retention costs which are accrued ratably over the period through which employees must work to qualify for a payment.

(b) Represents reductions in cost of plans.

(c) Excludes $27 million of net credits associated with litigation-related matters, and $27 million of other restructuring charges, net, primarily for hurricane response/impairment, charges associated with the settlement/curtailment of retirement plans, and non-cash compensation due at an acquired business.

(d) Excludes $38 million of income, net, primarily associated with litigation-related matters, gains on sales of real estate, charges for environmental remediation, and hurricane response costs.

(e) Excludes $482 million of net gain on the sale of businesses, and $17 million of other restructuring charges, net, primarily for the impairment of acquired in-process research and development, pre-acquisition litigation-related matters, and compensation due to employees on the date of acquisition.

(f) Impact of adopting new lease accounting guidance on January 1, 2019.

The company expects to pay accrued restructuring costs primarily through 2020.

Note 17. Unaudited Quarterly Information

	2019			
(In millions except per share amounts)	First (a)	Second (b)	Third (c)	Fourth (d)
Revenues	$ 6,125	$ 6,316	$ 6,272	$ 6,829
Gross Profit	2,707	2,823	2,763	3,035
Net Income	815	1,119	760	1,002
Earnings per Share:				
Basic	2.04	2.80	1.89	2.51
Diluted	2.02	2.77	1.88	2.49

Amounts reflect aggregate restructuring and other items, net, as follows:

(a) Costs of $28 million.

(b) Income of $443 million.

(c) Costs of $43 million.

(d) Costs of $38 million.

	2018			
(In millions except per share amounts)	First (a)	Second (b)	Third (c)	Fourth (d)
Revenues	$ 5,853	$ 6,078	$ 5,920	$ 6,507
Gross Profit	2,580	2,738	2,615	2,924
Net Income	579	752	709	898
Earnings per Share:				
Basic	1.44	1.87	1.76	2.23
Diluted	1.43	1.85	1.75	2.22

Amounts reflect aggregate restructuring and other items, net, as follows:

(a) Costs of $56 million.

(b) Costs of $25 million.

(c) Income of $32 million.

(d) Costs of $42 million.

Stock performance graph

The following graph and table compare Thermo Fisher Scientific's total shareholder return for the five-year period ended December 31, 2019, with the total return for the Standard & Poor's 500 Index and a weighted blend (80/20, respectively) of the Standard & Poor's 500 Healthcare and Standard & Poor's 500 Industrial Indices.

In the past, we compared our performance with a weighted blend of the Standard & Poor's 500 Healthcare and Standard & Poor's 500 Industrial Indices (70/30, respectively). The performance of those combined indices with a weighted blend of 70/30 is also included in the table and graph below. While a weighted blend of those indices continues to be the appropriate comparison, the company's revenue split by end market has changed such that an 80/20 split of the indices is now the more current approximate representative split of our revenue by end market.

The comparison assumes that $100 was invested on December 31, 2014, and that dividends were reinvested. Our common stock is traded on the New York Stock Exchange under the ticker symbol "TMO."

Comparison of 5-year cumulative total return*

Among Thermo Fisher Scientific Inc., the S&P 500 Index,
the Weighted 70/30 S&P 500 Healthcare & Industrial Indices and
the Weighted 80/20 S&P 500 Healthcare & Industrial Indices

*$100 invested on 12/31/14 in stock or index, including reinvestment of dividends.

	12/14	12/15	12/16	12/17	12/18	12/19
Thermo Fisher Scientific Inc.	100.00	113.75	113.61	153.41	181.35	263.95
S&P 500	100.00	101.38	113.51	138.29	132.23	173.86
Weighted 70/30 S&P 500 Healthcare & Industrial Indices	100.00	104.06	107.06	130.95	131.11	161.53
Weighted 80/20 S&P 500 Healthcare & Industrial Indices	100.00	105.01	106.38	129.63	132.47	162.13

Management Team

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Executive Vice President and Chief Operating Officer

Michel Lagarde
Executive Vice President

Stephen Williamson
Senior Vice President and Chief Financial Officer

Gregory J. Herrema
Senior Vice President and President, Customer Channels

Syed A. Jafry
Senior Vice President and President, Regions

Frederick M. Lowery
Senior Vice President and President, Life Sciences Solutions and Laboratory Products

Gianluca Pettiti
Senior Vice President and President, Specialty Diagnostics

Michael D. Shafer
Senior Vice President and President, Pharma Services

Daniel P. Shine
Senior Vice President and President, Analytical Instruments

Peter Silvester
Senior Vice President and President, Life Sciences Solutions

Michael A. Boxer
Senior Vice President and General Counsel

Lisa P. Britt
Senior Vice President and Chief Human Resources Officer

Shiraz Ladiwala
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