2018

Annual Report

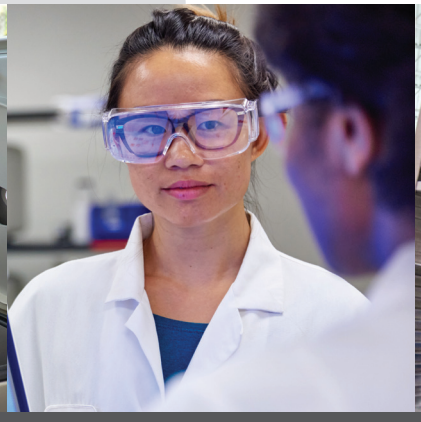
ThermoFisher SCIENTIFIC

The world leader in serving science

ThermoFisher
SCIENTIFIC

Our Mission is to enable our customers to make the world healthier, cleaner and safer.






thermo scientific | applied biosystems | invitrogen | fisher scientific | unity lab services

Marc N. Casper
President and CEO

Thermo Fisher Scientific is the world leader in serving science. Customers worldwide trust the solutions available through our technologies, products and services to help them accelerate innovation and enhance productivity.

Dear Shareholder,

I am pleased to report that, once again, Thermo Fisher Scientific achieved an excellent year. Our more than 70,000 colleagues around the world exemplified our 4i Values in every way, delivering on their commitments through Intensity, Integrity, Innovation and Involvement. I couldn't be prouder of all that they accomplished in 2018.

Together, we successfully executed our growth strategy to become a stronger partner for our customers. For our colleagues, we continued to enhance our culture to be an even better place to work. And for our shareholders, we delivered excellent performance across the board, positioning our company for a strong and vibrant future.

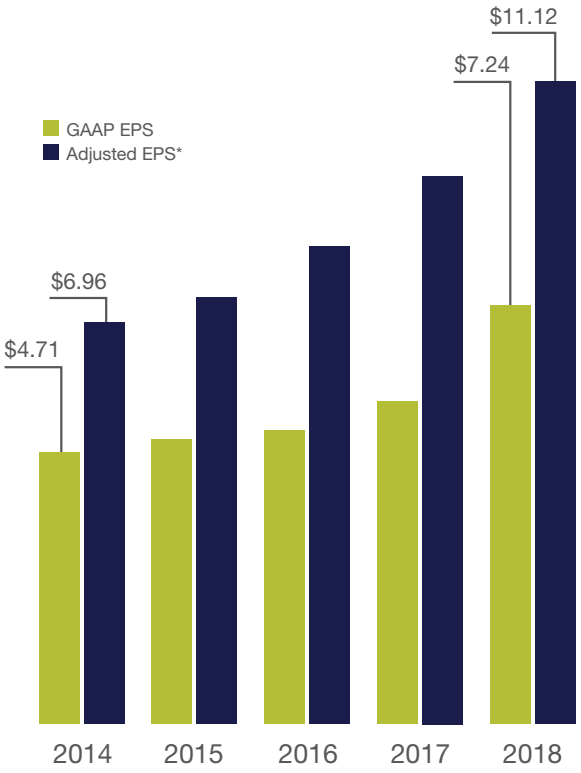
Conditions were good in all of our key end markets in 2018, and our team captured the many opportunities we had in this environment to meet the needs of our customers and gain share. We grew revenue by 16 percent over the previous year, to $24.36 billion. On the bottom line, we extended our long track record of strong earnings growth. GAAP diluted earnings per share (EPS) increased 30 percent to $7.24, and we grew adjusted EPS by 17 percent to $11.12.*

In terms of our cash flow and balance sheet, we generated $3.83 billion of free cash flow in 2018. A key priority for use of our cash flow during the year was to pay down debt following our acquisition of the Patheon pharma services business in 2017, and we were able to reduce our debt by $2 billion. At the same time, we actively deployed our capital to create value for our customers and our shareholders. We invested $540 million on acquisitions that strengthened our customer offering and returned capital to shareholders by repurchasing $500 million of our shares and increasing our dividend by 13 percent.

* The increase in 2018 GAAP diluted earnings per share (EPS) includes a one-time tax provision in 2017 associated with U.S. tax reform. Adjusted EPS 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 10 and 11 of this annual report.

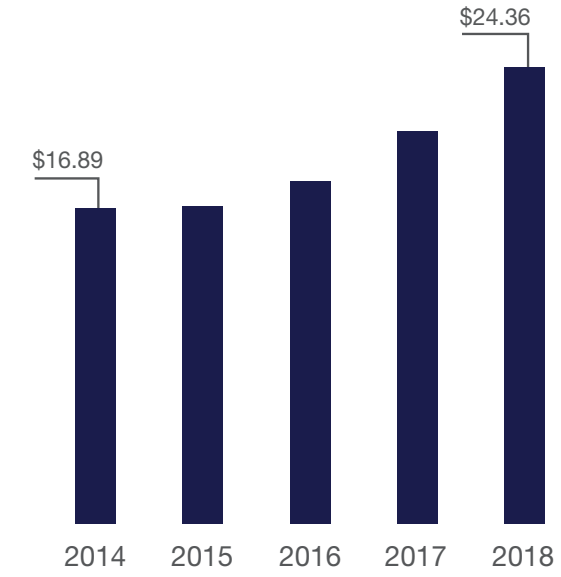
Strong Track Record of **Performance**

Earnings per share
(In dollars)



* Adjusted EPS is defined on page 1.

Revenue
(In billions)



We are committed to consistently delivering strong financial performance. Our results in 2018 were a continuation of our long-term track record and put us in an excellent position for the year ahead. Thermo Fisher Scientific is a much stronger company today than it was a decade ago. Every year, we've continued to build on our leadership position to be the best partner for our customers so we can help them achieve their goals.

Our customer-centric culture

Our Mission, which is to enable our customers to make the world healthier, cleaner and safer, gives our work a higher purpose. It's why we exist as a company, and it's why our colleagues are proud of their contributions to both our customers' success and ours. We fulfill our Mission by consistently executing our proven growth strategy and earning our customers' business every single day. Our strategy is simple and consists of three pillars:

- Innovating to develop high-impact products and services
- Leveraging scale in high-growth and emerging markets
- Continuing to enhance our customer value proposition.

Using our growth strategy as a framework, I'll highlight some of the many accomplishments from 2018 that created significant value for our customers and strengthened our competitive advantage in the end markets that we serve.

Innovation at our core

Those who have followed our company since its inception know that we have always been committed to innovation. We invested $1 billion in 2018 to develop high-impact new products. We focus that significant investment by leveraging the expertise of our more than 5,000 scientists and engineers, by gaining insights from our world-class Scientific Advisory Board and by closely collaborating with our customers. This is how we create the most impact and generate the highest returns. I'll cover a few examples here in addition to those featured on the pages of this annual report.

First, our customers across research and applied markets know that our Thermo Scientific brand stands for exceptional analytical performance, and we continued to raise the bar. In fact, of the top

Everyone deserves a full life

Cystic fibrosis (CF) is a life-threatening genetic disorder that affects the lungs, pancreas and other organs of patients suffering from the disease. In the past, a child with CF might not live long enough to attend elementary school. But thanks to advancements in care over the past few decades and innovative new treatments, many CF patients can look forward to attending college, pursuing careers and living much longer and fuller lives.

Our Pharma Services business manufactures one of those novel therapies – a drug that treats the underlying cause of the disease and not just the symptoms. In fact, life expectancy for patients who respond to this therapy is now into the 60s and beyond.

* According to the Cystic Fibrosis Foundation, more than 70,000 people worldwide are living with cystic fibrosis.

3 in 10
lack safe water*

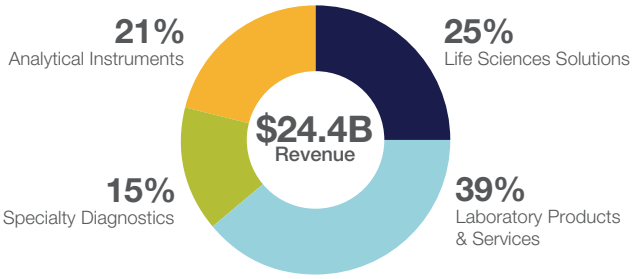
* The World Health Organization and UNICEF report that 3 out of every 10 people worldwide lack access to safe, readily available water at home.

Not a drop to waste

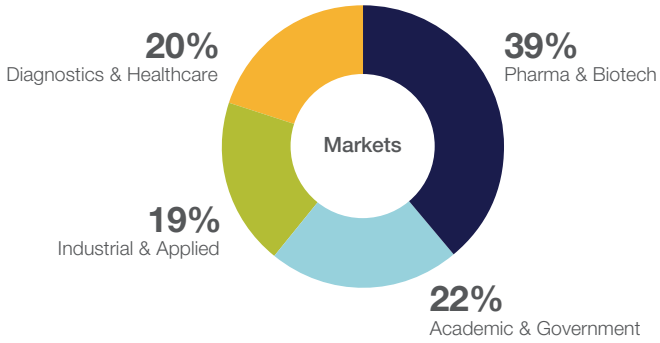
Water is vital to life, but billions of people around the world still do not have access to clean, safe drinking water. Thermo Fisher is committed to enhancing the quality of our global water resources by providing solutions for environmental water testing.

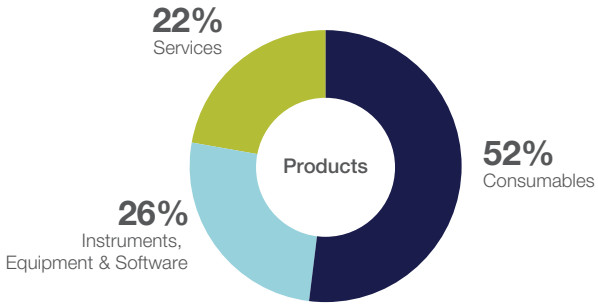
For more than 40 years, our Thermo Scientific Dionex ion chromatography instruments have been used by government and industrial laboratories to analyze water samples. We're helping to ensure compliance with regulatory standards and confirm that drinking water is safe – so we can all live healthier lives.

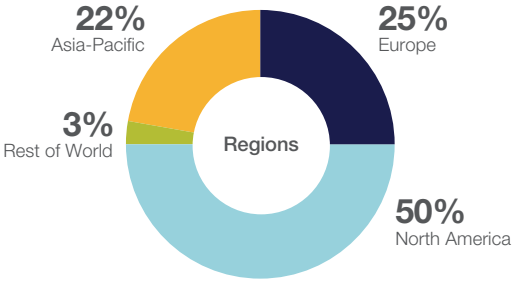
Complementary **Segments**



Revenue **Profile**







15 innovations in 2018 recognized by our customers who read *Analytical Scientist* magazine, five came from Thermo Fisher.

Among the highlights, we launched a new line of our Vanquish Duo liquid chromatography systems to help scientists in biopharma labs be more productive. We also continued to expand our flagship Orbitrap mass spectrometry franchise, introducing the ID-X Tribrid and Q Exactive UHMR systems for applications ranging from drug discovery to food safety. And in electron microscopy, we launched the Verios G4 system for materials analysis and were pleased that our Krios G3i system used in structural biology received a 2018 Gold Edison Award as one of the world's best innovations.

We also made good progress in developing technologies that will ultimately help clinicians make better decisions for their patients. We continued to strengthen our Ion Torrent line of next-generation sequencing systems with the new Ion GeneStudio S5 Series of benchtop instruments. When combined with our growing menu of Oncomine assays, this new platform offers a complete solution to help researchers bring new cancer diagnostics to the clinic. And in specialty diagnostics, we launched two important instruments in Europe in 2018 – the B.R.A.H.M.S. Kryptor Gold automated immunoassay system and the Phadia 200 benchtop analyzer for the diagnosis of allergy and autoimmune conditions.

You might say that our customers' innovations are closely linked to ours. We take pride in the difference we make by helping our customers to get the answers they need more efficiently, whether they're a researcher in an academic lab, a technician in a hospital or a quality engineer in a factory.

Scale as a differentiator

The second pillar of our growth strategy is that we leverage our industry-leading scale in high-growth and emerging markets to create a differentiated experience for our customers. No matter where in the world they're working, our customers have one thing in common – they want a partner with global capabilities, but local presence. This is where Thermo Fisher has a key advantage, and it's reflected in our strong performance in these markets, which represented 21 percent of our total revenue in 2018.

During the year, not only did we deliver excellent results again in China, our largest market outside of the U.S., but we also had broad-based growth across these geographies, from India to South Korea. Our ongoing success is a result of our efforts to build our industry-leading commercial infrastructure, localize manufacturing and R&D, and of course hire the right talent.

Using China as an example, it's certainly a fast-growing market, but we have been growing even faster there for quite some time. I'm pleased to say that 2018 was no exception, with 20 percent growth for the year. This is because we continue to increase our local presence to align our capabilities with the priorities in China's five-year plan, which supports better healthcare, a cleaner environment and a safer food supply.

21%
of total revenue from high-growth and emerging markets

For instance, early in the year we held the first China-U.S. Precision Medicine Summit in Beijing shortly after we opened our Precision Medicine Science Center in Guangzhou. With collaborators from both countries, we brought together thought leaders from government, academia and industry. We're now providing a broad range of our technologies to help build an infrastructure in China to advance research in this important field, so customers can accelerate progress and increase the impact on patient care.

We also opened our first Bioprocess Design Center in 2018. This new center, located in Shanghai, will facilitate collaboration between our biologics customers and our own applications scientists to meet China's growing demand for biologic drugs.

The challenges our customers are solving around the world have no boundaries, and we're the company they increasingly turn to for solutions.

Unique customer value

The third pillar of our growth strategy is our unique value proposition that helps our customers accelerate innovation and enhance productivity. Through our broad and innovative product offering, our leading Fisher Scientific channel and our extensive value-added services, we have scale and depth of capabilities that are unmatched in our industry. This gives us unique customer access and insights that create a significant advantage for us in understanding and satisfying their objectives.

And we continually strengthen our value proposition by adding new capabilities. Some we develop ourselves, such as our expanding digital solutions, and some we acquire, such as the Advanced Bioprocessing business we bought in 2018 to strengthen our cell culture offering.

Our customer value proposition resonates across the end markets that we serve, and continues to be a differentiator that allows us to gain share. Nowhere is this more evident than in pharma and biotech – our largest end market and one that is quite robust. That said, we've been growing significantly faster than the market as we continue to strengthen our position by successfully executing our growth strategy.

A great example is the comprehensive services offering we've created by combining our clinical trials logistics business with the drug formulation, development and manufacturing services we acquired with Patheon. In 2018, we continued to enhance our capabilities, expanding our clinical trials supply-chain operations in Germany and our biologics production center in Missouri.

Pharma and biotech companies, both large and small, turn to Thermo Fisher for support, from research through drug development and clinical trials – all the way to commercial manufacturing. Our customer value proposition is a key competitive advantage that we continue to strengthen year after year.

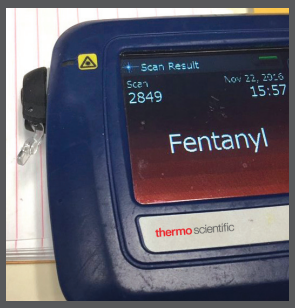
These are just a few examples that illustrate how we put our growth strategy to work to create value for our customers and position Thermo Fisher Scientific for long-term success.

Living with a food allergy

Getting an answer quickly can make all the difference in a diagnosis. One of the most common food allergies is peanut allergy, and reactions can be potentially life-threatening – even from exposure to small amounts. That's why it's so important to get an accurate diagnosis – fast.

With a simple blood test, our ImmunoCAP assays can help doctors understand their patients' overall sensitivity, their risk of serious reaction and how to manage their allergy long term. And our Phadia Laboratory Systems automate the testing process to aid in the diagnosis of allergies and a range of autoimmune conditions.

* According to the World Allergy Organization's 2013 *White Book on Allergy*, an estimated 240-660 million people globally may suffer from food allergies.



* The latest United Nations world drug report noted that opioids are the most harmful global drug trend, accounting for 76% of drug-related deaths.

Battling the opioid epidemic

The misuse of opioid drugs – from prescription pain relievers to heroin – is a global challenge and has risen to a national crisis in the U.S., according to the federal Drug Enforcement Administration. Highly potent synthetic opioids, such as fentanyl, not only threaten users but can also endanger law enforcement officers through accidental exposure.

Thermo Fisher is aiding the fight with our TruNarc handheld drug analyzers. Police departments in 45 states and more than 75 countries are using this technology to detect fentanyl and other opioids without the risk of direct contact, keeping officers and the public safe.

Incredibly talented global team

We had an amazing year, but none of it would be possible without the dedication and passion of our colleagues around the world. As I stated at the beginning of this letter, their commitment to delivering results and doing so according to our 4i Values is what makes Thermo Fisher an exceptional place to work. But here, too, we're focused on making our company even better, and I'll give you a few examples of the great progress we continue to make.

First, a key element of our success is our PPI Business System. It's our operational discipline and how we engage our colleagues to make our company more effective and efficient. PPI stands for Practical Process Improvement, and our teams use the methodology behind it to continuously improve productivity, the quality of our products and services, and ultimately, to build customer allegiance. PPI is in the fabric of our culture and essential to delivering profitable growth, strong cash flow and a great experience for our customers.

Second, in today's world, aside from delivering strong results, we have to do so responsibly and by making a positive impact on the communities in which we live and work. We know that our environmental, social and governance (ESG) performance matters increasingly to our key stakeholders: customers, colleagues and investors. In 2018, we made good progress in expanding our ESG-related programs and reporting.

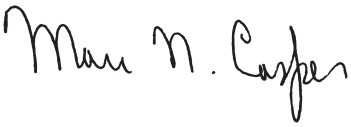
I'm very proud of our ongoing focus on STEM education as a key element of our community outreach. We're seeing a significant increase in the involvement of our colleagues through our volunteerism programs that are designed to inspire the next generation of scientists. We also continue to invest in our signature STEM scholarships to make a science-based college degree a possibility for more students. I encourage you to read about the positive impact we're having in our Corporate Social Responsibility report. Aside from raising awareness of the great work we're doing across the company, our ESG metrics reinforce the importance of sustainable business practices as another key driver of our growth.

Last, but most important in my mind, are the steps we've been taking to enhance our culture and strengthen our reputation as one of the world's most admired companies. We can only serve our customers well if our colleagues are fully involved in what we do and feel that their contributions make a difference. We measure this every year through our Employee Involvement Survey. We share the feedback across the company and with our Board, and we take specific actions from the valuable input we receive.

In looking at our survey results from 2018, what stood out to me was that our colleagues believe that workplace diversity is one of our greatest strengths. We strive to be a company where our colleagues feel comfortable in bringing their true selves to work. Our seven Employee Resource Groups, with more than 100 local chapters around the world, provide a mechanism for sharing different experiences and perspectives. They not only foster employee development, but also help to create a competitive advantage for our company. Embracing a diverse and inclusive culture is a differentiator in today's war for talent and in our ability to build the strongest team possible to execute our strategy.

In closing, beyond the financial performance, our growth strategy and great work by our colleagues every day, our Mission is what defines us and inspires us. It's not an overstatement to say that what we do for our customers makes the world a better place. As long as scientific discoveries are being made, Thermo Fisher Scientific will be there to support them, and this gives me great pride and confidence in our future.

Sincerely,



Marc N. Casper
President and Chief Executive Officer

February 25, 2019

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)	2018	2017	2016	2015	2014
Consolidated Statement of Income (a) (b)					
Revenue	$24,358	$20,918	$18,274	$16,965	$16,890
Costs and Operating Expenses:					
Cost of revenue (c)	12,994	10,958	9,456	8,782	8,971
Selling, general and administrative expenses (d)	4,823	4,422	4,039	3,724	3,991
Amortization of acquisition-related intangible assets	1,741	1,594	1,378	1,315	1,332
Research and development expenses	967	887	754	692	691
Restructuring and other costs (income), net (e)	50	97	189	116	(598)
	20,575	17,958	15,816	14,629	14,387
Operating Income	3,783	2,960	2,458	2,336	2,503
Other Expense, Net (f)	(521)	(531)	(434)	(400)	(416)
Income from Continuing Operations Before Income Taxes	3,262	2,429	2,024	1,936	2,087
Income Tax (Provision) Benefit (g)	(324)	(201)	1	44	(192)
Income from Continuing Operations	2,938	2,228	2,025	1,980	1,895
Loss from Discontinued Operations (net of income tax benefit of $0, $2, $2, $3 and $1)	—	(3)	(3)	(5)	(1)
Net Income	$ 2,938	$ 2,225	$ 2,022	$ 1,975	$ 1,894
Earnings per Share from Continuing Operations:					
Basic	$ 7.31	$ 5.65	$ 5.13	$ 4.97	$ 4.76
Diluted	$ 7.24	$ 5.60	$ 5.10	$ 4.93	$ 4.71
Earnings per Share:					
Basic	$ 7.31	$ 5.64	$ 5.12	$ 4.96	$ 4.76
Diluted	$ 7.24	$ 5.59	$ 5.09	$ 4.92	$ 4.71
Weighted Average Shares:					
Basic	402	395	395	399	398
Diluted	406	398	397	402	402
Reconciliation of Adjusted Earnings per Share					
GAAP Diluted EPS (a)	$ 7.24	$ 5.59	$ 5.09	$ 4.92	$ 4.71
Cost of Revenue Charges, Net of Tax (c)	0.02	0.21	0.16	0.01	0.55
Selling, General and Administrative Charges, Net of Tax (d)	0.06	0.17	0.18	0.05	0.24
Restructuring and Other Costs (Income), Net of Tax (e)	0.09	0.18	0.30	0.19	(0.79)
Amortization of Acquisition-related Intangible Assets, Net of Tax	3.34	2.86	2.41	2.27	2.27
Other Expense (Income), Net of Tax (f)	0.05	0.03	0.09	0.03	(0.01)
Income Tax Benefit (Provision) (g)	0.32	0.44	0.03	(0.09)	(0.01)
Discontinued Operations, Net of Tax	0.00	0.01	0.01	0.01	0.00
Adjusted EPS (b)	$11.12	$ 9.49	$ 8.27	$ 7.39	$ 6.96

(Dollars in millions)	2018		2017		2016		2015		2014	
Reconciliation of Adjusted Operating Income and Adjusted Operating Margin										
GAAP Operating Income (a)	$3,783	15.5%	$2,960	14.2%	$2,458	13.5%	$2,336	13.8%	$2,503	14.8%
Cost of Revenue Charges (c)	12	0.1%	123	0.6%	102	0.6%	9	0.0%	328	1.9%
Selling, General and Administrative Charges, Net (d)	29	0.1%	78	0.4%	104	0.6%	46	0.3%	130	0.8%
Restructuring and Other Costs (Income), Net (e)	50	0.2%	97	0.4%	189	1.0%	116	0.7%	(598)	(3.5)%
Amortization of Acquisition-related Intangible Assets	1,741	7.2%	1,594	7.6%	1,378	7.5%	1,315	7.7%	1,332	7.9%
Adjusted Operating Income (b)	$5,615	23.1%	$4,852	23.2%	$4,231	23.2%	$3,822	22.5%	$3,695	21.9%
Reconciliation of Free Cash Flow										
GAAP Net Cash Provided by Operating Activities (a)	$4,543		$4,005		$3,258		$2,942		$2,729	
Net Cash Used in Discontinued Operations	—		1		2		9		4	
Purchases of Property, Plant and Equipment	(758)		(508)		(444)		(423)		(427)	
Proceeds from Sale of Property, Plant and Equipment	50		7		26		18		49	
Free Cash Flow	$3,835		$3,505		$2,842		$2,546		$2,355	

(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 revenue (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 $14, $87, $75, $7 and $304 in 2018, 2017, 2016, 2015 and 2014, respectively, of charges for the sale of inventories revalued at the date of acquisition; $1, $3, $2, $2 and $3 in 2018, 2017, 2016, 2015 and 2014, respectively, of accelerated depreciation on manufacturing assets to be abandoned due to facility consolidations; and ($3), $33, $25 and $21 in 2018, 2017, 2016 and 2014, respectively, of (credits) charges to conform the accounting policies of recently acquired businesses to the company's accounting policies.

(d) Reported results include $40, $63, $72, $12 and $100 in 2018, 2017, 2016, 2015 and 2014, respectively, of third-party transaction/integration costs related to acquisitions; ($11), ($8), $17, $19 and $5 in 2018, 2017, 2016, 2015 and 2014, respectively, of (income) charges, net, associated with product liability litigation; $15, ($2), ($3) and $8 in 2017, 2016, 2015 and 2014, respectively, of charges (credits), net, for changes in estimates of contingent acquisition consideration; $2, $9, $18 and $1 in 2017, 2016, 2015 and 2014, respectively, of accelerated depreciation on fixed assets to be abandoned due to integration synergies and facility consolidations; and $6, $8 and $16 in 2017, 2016 and 2014, 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 costs (income), net, consisting principally of severance, abandoned facility and other expenses of headcount reductions within several businesses and real estate consolidations; ($46), ($27), $24 and $20 in 2018, 2017, 2016 and 2015, respectively, of net (credits) charges for litigation-related matters; $17, $6, $11 and $15 in 2018, 2016, 2015 and 2014, 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, $5 and $92 in 2017, 2015 and 2014, respectively, of compensation contractually due to employees of acquired businesses; $6 and $29 in 2017 and 2014, respectively, of net charges for the settlement/curtailment of retirement plans; $15 in 2015 of impairment of intangible assets; and $895 in 2014 of gains on the sale of businesses, principally the sera and media, gene modulation, magnetic beads and Cole-Parmer businesses.

(f) Reported results include ($15), $17, $13 and $6 in 2018, 2017, 2016 and 2014, respectively, of net (losses) gains on investments; $7 in 2018 of net charges for the settlement/curtailment of retirement plans; $32, $22 and $1 in 2017, 2016 and 2014, respectively, of charges related to fees paid to obtain bridge financing commitments for acquisitions; $3, $4, $9 and $12 in 2018, 2017, 2016 and 2015, respectively, of losses on the early extinguishment of debt; $2, $2 and $2 in 2016, 2015 and 2014, 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 $411, $538, $543, $478 and $278 in 2018, 2017, 2016, 2015 and 2014, respectively, of incremental tax benefit for the pre-tax reconciling items between GAAP and adjusted net income; $68 and $204 in 2018 and 2017, respectively, of net provision from the effects of U.S. tax reform legislation; $71 in 2018 of incremental tax provision due to net operating losses that will not be utilized as a result of the planned sale of the Anatomical Pathology business; $12, $61, ($1), $38 and $6 in 2018, 2017, 2016, 2015 and 2014, respectively, of incremental tax benefit (provision) from adjusting the company's non-U.S. deferred tax balances as a result of tax rate changes; 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 on Wednesday, May 22, 2019, at 1:00 p.m. at the Park Hyatt New York, 153 West 57th Street, New York, NY 10019.

Annual Report on Form 10-K

The accompanying Annual Report on Form 10-K for the fiscal year ended December 31, 2018, 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, 2018.

Management Team

Marc N. Casper
President and Chief Executive Officer

Mark P. Stevenson
Executive Vice President and Chief Operating Officer

Stephen Williamson
Senior Vice President and Chief Financial Officer

Patrick M. Durbin
Senior Vice President and President, Specialty Diagnostics

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

Syed A. Jafry
Senior Vice President and President, Regions

Michel Lagarde
Senior Vice President and President, Pharma Services

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

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

Peter Silvester
Senior Vice President and President, Life Sciences Solutions

Andrew J. Thomson
Senior Vice President and President, Europe, Middle East and Africa

Joseph C. Beery
Senior Vice President and Retiring Chief Information Officer

Michael A. Boxer
Senior Vice President and General Counsel

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

Shiraz Ladiwala
Senior Vice President, Strategy and Corporate Development

Richard L. Spoor
Senior Vice President, Global Business Services

Kenneth J. Apicerno
Vice President, Investor Relations

Sharon S. Briansky
Vice President and Secretary

Thomas Grover
Vice President, Financial Operations

Peter E. Hornstra
Vice President and Chief Accounting Officer

Karen A. Kirkwood
Vice President, Corporate Communications

Anthony H. Smith
Vice President, Tax and Treasury, and Treasurer

Ryan J. Snyder
Vice President and Chief Information Officer

Board of Directors

Jim P. Manzi
Chairman of the Board; Chairman, Stonegate Capital (private equity investments); Former Chairman, President and Chief Executive Officer, Lotus Development Corporation (computer software)

Marc N. Casper
President and Chief Executive Officer

Nelson J. Chai
Chief Financial Officer, Uber Technologies Inc. (global ride-hailing technology)

C. Martin Harris
Associate Vice President of the Health Enterprise and Chief Business Officer of the Dell Medical School at The University of Texas at Austin (healthcare)

Tyler Jacks
David H. Koch Professor of Biology, Massachusetts Institute of Technology; Director, David H. Koch Institute for Integrative Cancer Research (research)

Judy C. Lewent
Former Executive Vice President and Chief Financial Officer, Merck & Co., Inc. (pharmaceuticals)

Thomas J. Lynch
Chairman of the Board of Directors, TE Connectivity Ltd. (electronics)

James C. Mullen
Former Chief Executive Officer, Patheon N.V. (pharmaceutical services); Former President and Chief Executive Officer, Biogen Idec, Inc. (pharmaceuticals)

Lars R. Sørensen
Former President and Chief Executive Officer, Novo Nordisk A/S (healthcare)

Scott M. Sperling
Co-President, Thomas H. Lee Partners, L.P. (leveraged buyouts)

Elaine S. Ullian
Former President and Chief Executive Officer, Boston Medical Center (healthcare)

Dion J. Weisler
President and Chief Executive Officer, HP Inc. (information technology)

Form 10-K

2018 Annual Report

Consolidated Financial Statements

ThermoFisher SCIENTIFIC

The world leader in serving science

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, 2018 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	04-2209186
(State of incorporation or organization)	*(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	Name of each exchange on which registered	Title of each class	Name of each exchange on which registered
Common Stock, $1.00 par value	New York Stock Exchange	2.000% Notes due 2025	New York Stock Exchange
Floating Rate Notes due 2019	New York Stock Exchange	1.400% Notes due 2026	New York Stock Exchange
Floating Rate Notes due 2020	New York Stock Exchange	1.450% Notes due 2027	New York Stock Exchange
1.500% Notes due 2020	New York Stock Exchange	1.375% Notes due 2028	New York Stock Exchange
2.150% Notes due 2022	New York Stock Exchange	1.950% Notes due 2029	New York Stock Exchange
0.750% Notes due 2024	New York Stock Exchange	2.875% Notes due 2037	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 (or for such shorter period that the Registrant was required to submit such files). Yes ☒ No ☐

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

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

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

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

As of June 29, 2018, the aggregate market value of the voting stock held by nonaffiliates of the Registrant was approximately $83,322,432,000 (based on the last reported sale of common stock on the New York Stock Exchange Composite Tape reporting system on June 29, 2018).

As of February 2, 2019, the Registrant had 399,003,681 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Sections of Thermo Fisher's definitive Proxy Statement for the 2019 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, 2018

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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 help our customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics, deliver medicines to market and increase laboratory productivity.

Thermo Fisher has approximately 70,000 employees and serves more than 400,000 customers within 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.

We serve our customers through our premier brands, Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific and Unity Lab Services:

- 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, anatomical pathology, 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. We also offer a range of biopharma services for clinical trials management and biospecimen storage.
- 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.

We continuously increase our depth of capabilities in technologies, software and services, and leverage our extensive global channels to address our customers' emerging needs. For example, in October 2018, we acquired, within the Life Sciences Solutions segment, Becton Dickinson and Company's Advanced Bioprocessing business, expanding our bioproduction offerings. 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

Business (continued)

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.

Biosciences

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.

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.

Business (continued)

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; the application of NGS in oncology; and is an enabling technology for other businesses within Thermo Fisher.

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 material.

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

Business (continued)

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 four main categories: materials and minerals; portable analytical instruments; radiation measurement and security 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.
- *Portable Analytical Instruments* are rugged handheld products that provide rapid, precise, real-time analysis at the point of need. Our two main product categories are elemental and optical analyzers. 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

Business (continued)

chemicals and explosives in critical safety and security situations. Other applications include QA/QC in pharmaceutical production and identification of counterfeit drugs.

- *Radiation Measurement and Security 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.

The company has entered into an agreement to acquire Gatan, Inc., a wholly owned subsidiary of Roper Technologies, Inc., for approximately $925 million in cash. Gatan is a leading manufacturer of instrumentation and software used to enhance and extend the operation and performance of electron microscopes. The transaction is subject to customary closing conditions, including regulatory approvals.

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

Business (continued)

efficient manner. This segment has six primary businesses – Clinical Diagnostics, ImmunoDiagnostics, Microbiology, Anatomical Pathology, Transplant Diagnostics and our Healthcare Market Channel.

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.

Anatomical Pathology

Our anatomical pathology offerings include a broad portfolio of products primarily for cancer diagnosis and medical research in histology, cytology and hematology applications. These products include a wide range of instruments, consumables and reagents for specimen collection and transport, tissue preparation, staining and immunohistochemistry assays and controls. Reagent and consumable products include sample collection and preservation products used to ensure specimen integrity; tissue cassettes and reagents necessary for same-day, high-quality specimen processing; blades and paraffin used to section tissue; and a wide range of leading stains. Also included are a full line of immunohistochemistry antibodies, detection systems, ancillaries and controls.

We also provide a complete range of anatomical pathology instruments including cassette and slide labeling systems, which enable on-demand slide and cassette printing; tissue processors for same-day tissue-processing; embedding stations, microtomes and cryostats used to section tissue; and automated staining and cover slip systems used for primary and immunohistochemistry staining. In cytology, we offer low-speed centrifugation technology coupled with patented EZ cytofunnels to deposit a thin layer of cells onto a microscope slide to ensure better cell capture and better preservation of cell morphology. We manufacture high-quality flat-sheet glass to produce medical disposable products such as microscope slides, plates, cover glass, and microarray substrates serving the medical, diagnostics, and scientific communities. We also offer specialized hydrophobic, adhesive, and fluorescent slides through proprietary coating techniques.

Business (continued)

On January 28, 2019, the company entered into an agreement to sell its Anatomical Pathology business to PHC Holdings Corporation for approximately $1.14 billion. The sale is subject to customary closing conditions and applicable regulatory approvals.

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

Business (continued)

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.

Business (continued)

- *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.

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 have approximately 12,000 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.

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.

Business (continued)

Backlog

Our backlog of firm orders at year-end 2018 and 2017 was as follows:

(In millions)	2018	2017
Life Sciences Solutions	$ 647	$ 581
Analytical Instruments	2,243	2,050
Specialty Diagnostics	187	158
Laboratory Products and Services	2,055	1,679
Eliminations	(45)	(20)
	$ 5,087	$ 4,448

We believe that approximately 90% of our backlog at the end of 2018 will be filled during 2019.

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.

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 (EPA), 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.

Business (continued)

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 U.S. Environmental Protection Agency (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. The company has indicated its willingness to finance and perform the required remediation work together with the other responsible parties. 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 $69 million at December 31, 2018.

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 approximately 70,000 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)

Executive Officers of the Registrant

Name	Age	Present Title (Fiscal Year First Became Executive Officer)	Other Positions Held
Marc N. Casper	50	President and Chief Executive Officer (2001)	Chief Operating Officer (2008-2009) Executive Vice President (2006-2009) Senior Vice President (2003-2006)
Mark P. Stevenson	56	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)
Michael A. Boxer	57	Senior Vice President and General Counsel (2018)	Executive Vice President and Group General Counsel, Luxottica Group S.p.A. (2011-2017)
Patrick M. Durbin	52	Senior Vice President and President, Specialty Diagnostics (2015)	President, BioPharma Services (2010-2015)
Gregory J. Herrema	53	Senior Vice President and President, Customer Channels (2017)	President, Biosciences (2012-2014)
Michel Lagarde	45	Senior Vice President and President, Pharma Services (2017)	President and Chief Operating Officer, Patheon N.V. (2016-2017) Managing Director, JLL Partners* (2008-2016)
Stephen Williamson	52	Senior Vice President and Chief Financial Officer (2015)	Vice President, Financial Operations (2008-2015)
Peter E. Hornstra	59	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;

Risk Factors (continued)

- 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.

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 2018, currency translation had a favorable effect of $173 million on revenues due to the weakening 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;

Risk Factors (continued)

- 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;
- 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.

Significant developments stemming from the U.S. administration or the U.K.'s referendum on membership in the EU could have an adverse effect on us. The U.S. administration has called for substantial changes to trade agreements and is imposing significant increases on tariffs on goods imported into the United States. The administration has also indicated an intention to request Congress to make significant changes, replacement or elimination of the Patient Protection and Affordable Care Act, and government negotiation/regulation of drug prices paid by government programs. Changes in U.S. social, political, regulatory and economic conditions or laws and policies governing the health care system and drug prices, foreign trade, manufacturing, and development and investment in the territories and countries where we or our customers operate could adversely affect our operating results and our business.

Additionally, on June 23, 2016, the United Kingdom held a referendum and voted in favor of leaving the European Union, or EU. This referendum 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 referendum. 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 actual or threatened 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.

Risk Factors (continued)

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, 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 $25.35 billion and $1.27 billion, respectively, as of December 31, 2018. In addition, we have definite-lived intangible assets totaling $13.71 billion as of December 31, 2018. 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

Risk Factors (continued)

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

Risk Factors (continued)

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 importation and exportation of products, the handling, transportation and manufacture of substances that could be classified as hazardous, and our business practices in the U.S. and abroad such as anti-corruption, anti-competition and privacy and data protection laws. 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 business could be adversely affected by disruptions at our sites. We rely upon our manufacturing operations to produce many of the products we sell and our warehouse facilities to store products, pending sale. Any significant disruption of those operations for any reason, such as strikes or other labor unrest, power interruptions, fire, hurricanes or other events beyond our control could adversely affect our sales and customer relationships and therefore adversely affect our business. We have significant operations in California, near major earthquake faults, which make us susceptible to earthquake risk. Although most of our raw materials are available from a number of potential suppliers, our operations also depend upon our ability to obtain raw materials at reasonable prices. If we are unable to obtain the materials we need at a reasonable price, we may not be able to produce certain of our products or we may not be able to produce certain of these products at a marketable price, which could have an adverse effect on our results of operations.

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.

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

Risk Factors (continued)

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 recently-enacted EU General Data Protection Regulation, which took effect in May 2018, 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, 2018, we had approximately $18.99 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

Not applicable.

Item 2. Properties

The location and general character of our principal properties by segment are as follows:

Life Sciences Solutions

We own approximately 2.9 million square feet of office, engineering, laboratory and production space, principally in California, New York, Florida, Michigan, Maryland, Illinois, Oregon, Wisconsin and Pennsylvania, within the U.S., and in Lithuania, the U.K. and New Zealand. We lease approximately 3.1 million square feet of office, engineering, laboratory and production space, principally in California, Maryland, Utah, Massachusetts and Texas, within the U.S., and in Singapore, China, Netherlands, Germany, India, South Korea, Norway, Japan and Brazil under various leases that expire between 2019 and 2033.

Analytical Instruments

We own approximately 2.2 million square feet of office, engineering, laboratory and production space, principally in California, Massachusetts, Wisconsin, Oregon and Minnesota, within the U.S., and in Germany, Netherlands and Italy. We lease approximately 2.5 million square feet of office, engineering, laboratory and production space, principally in California, Texas, Tennessee, Illinois, Oregon, Pennsylvania, Colorado and Florida, within the U.S., and in Czech Republic, China, Germany, Switzerland, Netherlands, the U.K., Japan, Australia and India, under various leases that expire between 2019 and 2034.

Specialty Diagnostics

We own approximately 2.0 million square feet of office, engineering, laboratory and production space, principally in Virginia, Kansas, New Hampshire and California, within the U.S., and in Sweden, Germany, the U.K. and Switzerland. We lease approximately 1.6 million square feet of office, engineering, laboratory and production space, principally in California, Kansas and Michigan, within the U.S., and in Finland, China, the U.K., France, Canada and Japan under various leases that expire between 2019 and 2034.

Laboratory Products and Services

We own approximately 12.8 million square feet of office, engineering, laboratory, warehouse and production space, principally in North Carolina, Pennsylvania, Ohio, Puerto Rico, New York, New Jersey, South Carolina, Illinois and California, within the U.S., and in the U.K., Austria, Italy, Canada, France, Germany and China. We lease approximately 4.7 million square feet of office, engineering, laboratory, warehouse and production space, principally in California, Pennsylvania, New York, Maryland, Ohio, North Carolina, Massachusetts, Tennessee and Texas, within the U.S., and in Australia, Germany, China, the U.K., Mexico, India, Singapore, New Zealand and Sweden under various leases that expire between 2019 and 2038.

Corporate Headquarters

We own approximately 127,000 square feet of office space in Massachusetts.

We believe that all of the facilities that we are currently using are in good condition and are suitable and adequate to meet our current needs. If we are unable to renew any of the leases that are due to expire in 2019 or 2020, we believe that suitable replacement properties are available on commercially reasonable terms.

Item 3. Legal Proceedings

There are various lawsuits and claims against the company involving product liability, intellectual property, employment and commercial issues. See "Note 11 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 2, 2019, the company had 3,344 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 2018 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. 30 - Nov. 3)	1,008,466	$ 247.90	1,008,466	$ 2,000.0
Fiscal November (Nov. 4 - Dec. 1)	—		—	2,000.0
Fiscal December (Dec. 2 - Dec. 31)	—		—	2,000.0
Total Fourth Quarter	1,008,466	$ 247.90	1,008,466	$ 2,000.0

(1) On July 7, 2016, the Board of Directors authorized the repurchase of up to $1.50 billion of the company’s common stock. All of the shares of common stock repurchased by the company during the fourth quarter of 2018 were purchased under this program. On September 7, 2018, the Board of Directors authorized the repurchase of up to $2.00 billion of the company’s common stock. In January 2019, the company repurchased $750 million of the company's common stock under the 2018 authorization.

Item 6. Selected Financial Data

(In millions except per share amounts)	2018 (a)	2017 (b)	2016 (c)	2015 (d)	2014 (e)
Statement of Income Data					
Revenues	$ 24,358	$ 20,918	$ 18,274	$ 16,965	$ 16,890
Income from Continuing Operations	2,938	2,228	2,025	1,980	1,895
Net Income	2,938	2,225	2,022	1,975	1,894
Earnings per Share from Continuing Operations:					
Basic	7.31	5.65	5.13	4.97	4.76
Diluted	7.24	5.60	5.10	4.93	4.71
Earnings per Share:					
Basic	7.31	5.64	5.12	4.96	4.76
Diluted	7.24	5.59	5.09	4.92	4.71
Balance Sheet Data					
Total Assets	56,232	56,669	45,908	40,834	42,852
Long-term Obligations	17,719	18,873	15,372	11,420	12,352

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 $91 million of pre-tax charges for restructuring and other costs.

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

(c) 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.

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

(e) Reflects $140 million of pre-tax income from gains on sale of businesses, net of restructuring and other costs. Also reflects the acquisition of Life Technologies Corporation in February 2014.

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 Consolidated Financial Statements, which begin on page F-1 of this report.

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 continuing operations fall into four business segments (see Note 4): Life Sciences Solutions, Analytical Instruments, Specialty Diagnostics and Laboratory Products and Services.

Recent Acquisitions

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

On March 31, 2016, the company acquired, primarily within the Life Sciences Solutions segment, Affymetrix, Inc., a North America-based provider of cellular and genetic analysis products, for a total purchase price of $1.34 billion, net of cash acquired, including the assumption of $254 million of debt. The acquisition expanded the company's existing portfolio of antibodies and assays for flow cytometry and single-cell biology applications. Additionally, the acquisition expanded the company's genetic analysis portfolio through the addition of microarrays. Revenues of Affymetrix were $360 million in 2015.

On September 19, 2016, the company acquired, within the Analytical Instruments segment, FEI Company, a North America-based provider of high-performance electron microscopy, for a total purchase price of $4.08 billion, net of cash acquired. The acquisition strengthened the company's analytical instrument portfolio with the addition of high-end electron microscopes. Revenues of FEI were $930 million in 2015.

On February 14, 2017, the company acquired, within the Life Sciences Solutions segment, Finesse Solutions, Inc., a North America-based developer of scalable control automation systems and software for bioproduction, for a total purchase price of $221 million, net of cash acquired. The acquisition expanded the company's bioproduction offerings. Revenues of Finesse Solutions were approximately $50 million in 2016.

On March 2, 2017, the company acquired, within the Analytical Instruments segment, Core Informatics, a North America-based provider of cloud-based platforms supporting scientific data management, for a total purchase price of $94 million, net of cash acquired. The acquisition enhanced the company's existing informatics solutions. Revenues of Core Informatics were approximately $10 million in 2016.

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's revenues totaled $1.87 billion for the year ended October 31, 2016.

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. Revenues of the Advanced Bioprocessing business were $100 million in 2017.

Overview of Results of Operations and Liquidity

(Dollars in millions)	2018		2017	
Revenues				
Life Sciences Solutions	$ 6,269	25.7 %	$ 5,728	27.4 %
Analytical Instruments	5,469	22.5 %	4,821	23.0 %
Specialty Diagnostics	3,724	15.3 %	3,486	16.7 %
Laboratory Products and Services	10,035	41.2 %	7,825	37.4 %
Eliminations	(1,139)	(4.7)%	(942)	(4.5)%
	$ 24,358	100 %	$ 20,918	100 %

Sales in 2018 were $24.36 billion, an increase of $3.44 billion from 2017. Sales increased $1.53 billion due to acquisitions. The favorable effects of currency translation resulted in an increase in revenues of $173 million in 2018. Aside from the effects of acquisitions and currency translation, revenues increased $1.74 billion (8%) primarily due to increased demand. Sales to customers in each of the company's primary end markets grew. Sales growth was strong in each of the company's primary geographic areas, particularly Asia.

In 2018, total company operating income and operating income margin were $3.78 billion and 15.5%, respectively, compared with $2.96 billion and 14.2%, respectively, in 2017. The increase in operating income was primarily due to profit on higher sales and, to a lesser extent, the effects of acquisitions and productivity improvements, net of inflationary cost increases, offset in part by an increase in strategic growth investments, unfavorable sales mix and amortization of acquisition-related intangible assets, due to recent acquisitions. 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 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 planned sale of the Anatomical Pathology business (Note 2).

The company recorded a provision for income taxes in 2017 principally due to a net provision of $204 million from the effects of the Tax Act consisting primarily of a one-time transition tax on deemed repatriated earnings and profits of foreign subsidiaries, net of a benefit from adjusting the deferred tax balances for the U.S. statutory tax rate reduction. 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. In addition, in 2017 the company recorded a $65 million favorable adjustment to deferred tax balances due to extension of a tax holiday agreement in Singapore. The company continued to implement tax planning initiatives related to non-U.S. subsidiaries in 2017. 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 benefitted 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) for a net benefit of $33 million. The foreign tax credits 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. 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.,

The effective tax rate in both 2018 and 2017 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

Overview of Results of Operations and Liquidity (continued)

income taxes were higher than its income tax expense for financial reporting purposes and totaled $591 million and $479 million in 2018 and 2017, respectively.

The company expects its effective tax rate in 2019 will be between 7% 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 $2.94 billion in 2018, from $2.23 billion in 2017 principally due to increase in operating income in 2018 (discussed above).

During 2018, the company's cash flow from operations totaled $4.54 billion compared with $4.01 billion for 2017. The increase primarily resulted from higher income before amortization and depreciation in the 2018 period, offset in part by higher investment in working capital to support sales growth.

As of December 31, 2018, the company's short-term debt totaled $1.27 billion, including $693 million of commercial paper obligations and $573 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, 2018, no borrowings were outstanding under the company's revolving credit facility, although available capacity was reduced by approximately $82 million as a result of outstanding letters of credit.

The company expects to fund the acquisition of Gatan Inc. with a combination of existing cash balances and short-term borrowings. The company believes that its existing cash and cash equivalents of $2.10 billion as of December 31, 2018 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, contingencies and litigation, and pension costs. 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 $13.71 billion at December 31, 2018. 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.

Critical Accounting Policies and Estimates (continued)

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 $25.35 billion and $1.27 billion, respectively, at December 31, 2018. Estimates of discounted future cash flows require assumptions related to revenue and operating income growth, discount rates and other factors. For the goodwill impairment tests, the company considers peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the respective reporting units and 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 for 2019 and thereafter 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 2018, the date of the company's 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.

With the completion of the Patheon acquisition in August 2017, the company established a new reporting unit, called Pharma Services, which solely consists of the legacy Patheon business, the book carrying value of which equaled its fair value as of the acquisition date. During its annual 2018 goodwill impairment assessment, the company determined that the Pharma Services reporting unit's cushion of fair value over book value had increased to 5%. Despite this favorable increase, given that the fair value of the reporting unit was not substantially in excess of its carrying value, relatively small decreases in future cash flows from anticipated results could result in impairment of goodwill. The key variables that drive the valuation of the reporting unit are revenue and operating income growth rate assumptions, peer revenue and earnings trading multiples, as well as the weighted average cost of capital rate applied. The estimates used for these assumptions represent management's best estimates, which the company believes are reasonable. These assumptions, however are subject to variability and uncertainty, including the degree to which the reporting unit will grow revenue and profitability levels. The Pharma Services reporting unit had $3.37 billion of goodwill, and an overall carrying value of $7.70 billion as of December 31, 2018.

(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 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 $1.44 billion at December 31, 2018.

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 interpretation of 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.

Critical Accounting Policies and Estimates (continued)

The company estimates the degree to which tax assets and loss carryforwards will result in a benefit, after consideration of all positive and negative evidence, and provides a valuation allowance for tax assets and loss carryforwards that it believes will more likely than not go unused. In situations in which the company has been able to conclude that its deferred tax assets will be realized, it has generally relied on future reversals of taxable temporary differences, expected future taxable income where such estimates have historically been reliable, and other factors. If it becomes more likely than not that a tax asset or loss carryforward 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 $471 million at December 31, 2018. 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 state income or foreign withholding 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 state and foreign withholding 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, were 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.

(d) Pension and Other Retiree Benefits

Several of the company's U.S. and non-U.S. subsidiaries sponsor defined benefit pension and other retiree benefit plans. The cost and obligations of these arrangements are calculated using many assumptions to estimate the benefits that the employee earns while working, the amount of which cannot be completely determined until the benefit payments cease. Major assumptions used in the accounting for these employee benefit plans include the discount rate, expected return on plan assets and rate of increase in employee compensation levels. Assumptions are determined based on company data and appropriate market indicators in consultation with third-party actuaries, and are evaluated each year as of the plans' measurement date. Net periodic pension costs for the company's pension and other postretirement benefit plans totaled $22 million in 2018. The company's unfunded benefit obligation totaled $391 million at year-end 2018 compared with $486 million at year-end 2017. Should any of these assumptions change, they would have an effect on net periodic pension costs and the unfunded benefit obligation. For example, a 10% decrease in the discount rate would result in an annual increase in pension and other postretirement benefit expense of approximately $2 million and an increase in the benefit obligation of approximately $93 million.

Results of Operations

2018 Compared With 2017

(In millions)	2018	2017	Total Change	Currency Translation	Acquisitions	Operations
Revenues						
Life Sciences Solutions	$ 6,269	$ 5,728	$ 541	$ 49	$ 28	$ 464
Analytical Instruments	5,469	4,821	648	41	45	562
Specialty Diagnostics	3,724	3,486	238	41	8	189
Laboratory Products and Services	10,035	7,825	2,210	50	1,466	694
Eliminations	(1,139)	(942)	(197)	(8)	(18)	(171)
Consolidated Revenues	$ 24,358	$ 20,918	$ 3,440	$ 173	$ 1,529	$ 1,738

Sales in 2018 were $24.36 billion, an increase of $3.44 billion from 2017. Sales increased $1.53 billion due to acquisitions. The favorable effects of currency translation resulted in an increase in revenues of $173 million in 2018. Aside from the effects of acquisitions and currency translation, revenues increased $1.74 billion (8%) primarily due to increased demand. Sales to customers in each of the company's primary end markets grew. Sales growth was strong in each of the company's primary geographic areas, particularly Asia.

In 2018, total company operating income and operating income margin were $3.78 billion and 15.5%, respectively, compared with $2.96 billion and 14.2%, respectively, in 2017. The increase in operating income was primarily due to profit on higher sales and, to a lesser extent, the effects of acquisitions and productivity improvements, net of inflationary cost increases, offset in part by an increase in strategic growth investments, unfavorable sales mix and amortization of acquisition-related intangible assets, due to recent acquisitions.

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, principally third-party transaction and integration costs associated with recent and pending acquisitions, offset in part by income from the favorable results of product liability litigation. In addition, the company recorded $88 million of cash restructuring costs in its continuing 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 (see Note 15).

In 2017, the company recorded restructuring and other costs, net, of $298 million, including $123 million of charges to cost of revenues primarily for the sale of inventories revalued at the date of acquisition and, to a lesser extent, to conform the accounting policies of Patheon to the company's accounting policies; $78 million of charges to selling, general and administrative expenses primarily for third-party transaction and integration costs associated with recent acquisitions and changes in estimates of acquisition contingent consideration. In addition, the company recorded $97 million of cash restructuring costs, primarily to achieve acquisition synergies, including severance and abandoned facilities costs associated with the closure and consolidation of facilities in the U.S. and Europe. The company’s other businesses incurred costs for continued headcount reductions and facility consolidations in an 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., Europe and Asia. The company also recorded $27 million of net credits for litigation-related matters, which were mostly offset by compensation due at Patheon on the date of acquisition, hurricane response/impairment costs, and net charges for the settlement/curtailment of retirement plans.

As of February 27, 2019, the company has identified restructuring actions that will result in additional charges of approximately $65 million, primarily in 2019, and expects to identify additional actions during 2019 which will be recorded when specified criteria are met, such as communication of benefit arrangements and abandonment of leased facilities. Approximately 40% of the additional charges will be incurred in the Life Sciences Solutions segment, 25% in the Analytical Instruments segment, 30% in the Laboratory Products and Services segment, and 5% in the Specialty Diagnostics segment. The restructuring projects for which charges were incurred in 2018 are expected to result in annual cost savings of approximately

Results of Operations (continued)

$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. The restructuring actions for which charges were incurred in 2017 resulted in annual cost savings of approximately $90 million beginning in part in 2017 and to a greater extent in 2018, including $50 million in the Life Sciences Solutions segment, $20 million in the Analytical Instruments segment, $10 million in the Specialty Diagnostics segment and $10 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)	2018	2017	Change
Revenues			
Life Sciences Solutions	$ 6,269	$ 5,728	9%
Analytical Instruments	5,469	4,821	13%
Specialty Diagnostics	3,724	3,486	7%
Laboratory Products and Services	10,035	7,825	28%
Eliminations	(1,139)	(942)	21%
Consolidated Revenues	$ 24,358	$ 20,918	16%
Segment Income			
Life Sciences Solutions	$ 2,158	$ 1,894	14%
Analytical Instruments	1,247	1,027	21%
Specialty Diagnostics	952	927	3%
Laboratory Products and Services	1,258	1,004	25%
Subtotal Reportable Segments	5,615	4,852	16%
Cost of Revenues Charges	(12)	(123)	
Selling, General and Administrative Charges, Net	(29)	(78)	
Restructuring and Other (Costs) Income, Net	(50)	(97)	
Amortization of Acquisition-related Intangible Assets	(1,741)	(1,594)	
Consolidated Operating Income	$ 3,783	$ 2,960	28%
Reportable Segments Operating Income Margin	23.1%	23.2%	
Consolidated Operating Income Margin	15.5%	14.2%	

Income from the company's reportable segments increased 16% to $5.62 billion in 2018 due primarily to profit on higher sales and, to a lesser extent, the effects of acquisitions, and productivity improvements, net of inflationary cost increases, offset in part by strategic growth investments and unfavorable sales mix.

Results of Operations (continued)

Life Sciences Solutions

(Dollars in millions)	2018	2017	Change
Revenues	$ 6,269	$ 5,728	9%
Operating Income Margin	34.4%	33.1%	1.3 pt

Sales in the Life Sciences Solutions segment increased $541 million to $6.27 billion in 2018. Sales increased $464 million (8%) due to higher revenues at existing businesses, $49 million due to the favorable effects of currency translation and $28 million due to acquisitions. The increase in revenue at existing businesses was primarily due to increased demand at each of the segment's primary businesses, with particular strength from sales of biosciences products and bioprocess production products.

Operating income margin was 34.4% in 2018 compared to 33.1% in 2017. The increase in operating margin resulted primarily from profit on higher sales and productivity improvements, net of inflationary cost increases. These increases were offset in part by unfavorable sales mix, and strategic growth investments.

Analytical Instruments

(Dollars in millions)	2018	2017	Change
Revenues	$ 5,469	$ 4,821	13%
Operating Income Margin	22.8%	21.3%	1.5 pt

Sales in the Analytical Instruments segment increased $648 million to $5.47 billion in 2018. Sales increased $562 million (12%) due to higher revenues at existing businesses, $45 million due to acquisitions and $41 million due to the favorable effects of currency translation. The increase in revenue at existing businesses was primarily due to increased demand at each of the segment's primary businesses.

Operating income margin was 22.8% in 2018 compared to 21.3% in 2017. The increase resulted primarily from profit on higher sales and, to a lesser extent, productivity improvements, net of inflationary cost increases, offset in part by strategic growth investments.

Specialty Diagnostics

(Dollars in millions)	2018	2017	Change
Revenues	$ 3,724	$ 3,486	7%
Operating Income Margin	25.6%	26.6%	-1.0 pt

Sales in the Specialty Diagnostics segment increased $238 million to $3.72 billion in 2018. Sales increased $189 million (5%) due to higher revenues at existing businesses, $41 million due to the favorable effects of currency translation and $8 million due to an acquisition. The increase in revenue at existing businesses was due to broad based higher demand in each of the segment's primary businesses with particular strength in sales of products sold through the segment’s healthcare market channel.

Operating income margin was 25.6% in 2018 and 26.6% in 2017. The decrease resulted primarily from strategic growth investments and, to a lesser extent, unfavorable sales mix, offset in part by profit on higher sales and, to a lesser extent, favorable foreign currency exchange.

Results of Operations (continued)

Laboratory Products and Services

(Dollars in millions)	2018	2017	Change
Revenues	$ 10,035	$ 7,825	28%
Operating Income Margin	12.5%	12.8%	-0.3 pt

Sales in the Laboratory Products and Services segment increased $2.21 billion to $10.04 billion in 2018. Sales increased $1.47 billion due to an acquisition, $694 million (9%) due to higher revenues at existing businesses and $50 million due to the favorable effects of currency translation. 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 its research and safety market channel business and its clinical trials business.

Operating income margin was 12.5% in 2018 compared to 12.8% in 2017. The decrease was primarily due to unfavorable sales mix and, to a lesser extent, strategic growth investments, offset in part by profit on higher sales.

Other Expense, Net

The company reported other expense, net, of $521 million and $531 million in 2018 and 2017, respectively (Note 5). An increase in interest expense of $75 million was offset in part by an increase in interest income of $56 million in 2018. In 2017, other expense, net included $32 million of charges related to the amortization of fees paid to obtain bridge financing commitments related to the acquisition of Patheon.

Provision for Income Taxes

The company recorded a 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 planned sale of the Anatomical Pathology business (Note 2).

The company recorded a provision for income taxes in 2017 principally due to a net provision of $204 million from the effects of the Tax Act consisting primarily of a one-time transition tax on deemed repatriated earnings and profits of foreign subsidiaries, net of a benefit from adjusting the deferred tax balances for the U.S. statutory tax rate reduction. 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. In addition, in 2017 the company recorded a $65 million favorable adjustment to deferred tax balances due to extension of a tax holiday agreement in Singapore. The company continued to implement tax planning initiatives related to non-U.S. subsidiaries in 2017. 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 benefitted 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) for a net benefit of $33 million. The foreign tax credits 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. 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.

The effective tax rate in both 2018 and 2017 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 $591 million and $479 million in 2018 and 2017, respectively.

The company expects its effective tax rate in 2019 will be between 7% 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.

Results of Operations (continued)

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 11 could have a material adverse effect on the company's financial position as well as its results of operations and cash flows.

2017 Compared With 2016

(In millions)	2017	2016	Total Change	Currency Translation	Acquisitions	Operations
Revenues						
Life Sciences Solutions	$ 5,728	$ 5,317	$ 411	$ 12	$ 99	$ 300
Analytical Instruments	4,821	3,668	1,153	29	794	330
Specialty Diagnostics	3,486	3,339	147	12	9	126
Laboratory Products and Services	7,825	6,724	1,101	13	727	361
Eliminations	(942)	(774)	(168)	4	(4)	(168)
Consolidated Revenues	$ 20,918	$ 18,274	$ 2,644	$ 70	$ 1,625	$ 949

Sales in 2017 were $20.92 billion, an increase of $2.64 billion from 2016. Sales increased $1.63 billion due to acquisitions. The favorable effects of currency translation resulted in an increase in revenues of $70 million in 2017. Aside from the effects of acquisitions and currency translation, revenues increased $949 million (5%) primarily due to increased demand. Sales to customers in each of the company's primary end markets grew. Sales growth was moderate in North America and Europe and particularly strong in Asia.

In 2017, total company operating income and operating income margin were $2.96 billion and 14.2%, respectively, compared with $2.46 billion and 13.5%, respectively, in 2016. The increase in operating income was primarily due to profit on higher sales in local currencies, the effects of acquisitions and productivity improvements, net of inflationary cost increases, offset in part by an increase in amortization of acquisition-related intangible assets, due to recent acquisitions, and strategic growth investments.

In 2017, the company recorded restructuring and other costs, net, of $298 million, including $123 million of charges to cost of revenues primarily for the sale of inventories revalued at the date of acquisition, and, to a lesser extent, to conform the accounting policies of Patheon to the company's accounting policies. The company recorded $78 million of charges to selling, general and administrative expenses, primarily for third-party transaction and integration costs associated with recent acquisitions and changes in estimates of acquisition contingent consideration. In addition, the company recorded $97 million of cash restructuring costs, primarily to achieve acquisition synergies, including severance and abandoned facilities costs associated with the closure and consolidation of facilities in the U.S and Europe. The company's other businesses incurred costs for continued headcount reductions and facility consolidations in an 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., Europe and Asia. The company also recorded $27 million of net credits for litigation-related matters, which were mostly offset by compensation due at Patheon on the date of the acquisition, hurricane response/impairment costs, and net charges for the settlement/curtailment of retirement plans (see Note 15).

Results of Operations (continued)

In 2016, the company recorded restructuring and other costs, net, of $395 million, including $102 million of charges to cost of revenues for the sale of inventories revalued at the date of acquisition and to conform the accounting policies of FEI and Affymetrix to the company's accounting policies; $104 million of charges to selling, general and administrative expenses primarily for third-party transaction and integration costs related to the acquisitions of FEI and Affymetrix. In addition, the company recorded $164 million of cash restructuring costs, primarily to achieve acquisition synergies, including severance and abandoned facilities costs associated with the closure and consolidation of facilities in the U.S. The company's other businesses incurred costs for continued headcount reductions and facility consolidations in an 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., Europe and Asia. The company also recorded charges for litigation and environmental remediation matters. These costs were partially offset by gains on the sales of real estate.

The restructuring actions for which charges were incurred in 2016 resulted in annual cost savings of approximately $100 million beginning in part in 2016 and to a greater extent in 2017, including $60 million in the Life Sciences Solutions segment, $25 million in the Analytical Instruments segment, $5 million in the Specialty Diagnostics segment and $10 million in the Laboratory Products and Services segment.

Segment Results

(Dollars in millions)	2017	2016	Change
Revenues			
Life Sciences Solutions	$ 5,728	$ 5,317	8%
Analytical Instruments	4,821	3,668	31%
Specialty Diagnostics	3,486	3,339	4%
Laboratory Products and Services	7,825	6,724	16%
Eliminations	(942)	(774)	22%
Consolidated Revenues	$ 20,918	$ 18,274	14%
Segment Income			
Life Sciences Solutions	$ 1,894	$ 1,598	19%
Analytical Instruments	1,027	749	37%
Specialty Diagnostics	927	910	2%
Laboratory Products and Services	1,004	974	3%
Subtotal Reportable Segments	4,852	4,231	15%
Cost of Revenues Charges	(123)	(102)	
Selling, General and Administrative Costs, Net	(78)	(104)	
Restructuring and Other Income (Costs), Net	(97)	(189)	
Amortization of Acquisition-related Intangible Assets	(1,594)	(1,378)	
Consolidated Operating Income	$ 2,960	$ 2,458	20%
Reportable Segments Operating Income Margin	23.2%	23.2%	
Consolidated Operating Income Margin	14.2%	13.5%	

Income from the company's reportable segments increased 15% to $4.85 billion in 2017 due primarily to profit on higher sales in local currencies, the effects of acquisitions and productivity improvements, net of inflationary cost increases, offset in part by strategic growth investments.

Results of Operations (continued)

Life Sciences Solutions

(Dollars in millions)	2017	2016	Change
Revenues	$ 5,728	$ 5,317	8%
Operating Income Margin	33.1%	30.1%	3.0 pt

Sales in the Life Sciences Solutions segment increased $411 million to $5.73 billion in 2017. Sales increased $300 million (6%) due to higher revenues at existing businesses, $99 million due to acquisitions and $12 million due to the favorable effects of currency translation. The increase in revenue at existing businesses was primarily due to increased demand for biosciences products and, to a lesser extent, bioprocess production products as well as genetic sciences products.

Operating income margin was 33.1% in 2017 compared to 30.1% in 2016. The increase in operating margin resulted primarily from productivity improvements, net of inflationary cost increases, and, to a lesser extent, profit on higher sales in local currencies and price increases. These increases were offset in part by strategic growth investments and acquisition dilution.

Analytical Instruments

(Dollars in millions)	2017	2016	Change
Revenues	$ 4,821	$ 3,668	31%
Operating Income Margin	21.3%	20.4%	0.9 pt

Sales in the Analytical Instruments segment increased $1.15 billion to $4.82 billion in 2017. Sales increased $794 million due to acquisitions, $330 million (9%) due to higher revenues at existing businesses and $29 million due to the favorable effects of currency translation. The increase in revenue at existing businesses was primarily due to increased demand in each of the segment's primary businesses particularly products sold by the segment's chromatography and mass spectrometry business and materials and structural analysis business.

Operating income margin was 21.3% in 2017 compared to 20.4% in 2016. The increase resulted primarily from profit on higher sales in local currencies, productivity improvements, net of inflationary cost increases and, to a lesser extent, the effect of acquisitions, offset in part by strategic growth investments and, to a lesser extent, unfavorable foreign currency exchange and unfavorable sales mix.

Specialty Diagnostics

(Dollars in millions)	2017	2016	Change
Revenues	$ 3,486	$ 3,339	4%
Operating Income Margin	26.6%	27.3%	-0.7 pt

Sales in the Specialty Diagnostics segment increased $147 million to $3.49 billion in 2017. Sales increased $126 million (4%) due to higher revenues at existing businesses, $12 million due to the favorable effects of currency translation and $9 million due to acquisitions. The increase in revenue at existing businesses was primarily due to higher demand for products sold through the segment's healthcare market channel as well as clinical diagnostics products and immunodiagnostics products.

Operating income margin was 26.6% in 2017 and 27.3% in 2016. The decrease resulted primarily from strategic growth investments and, to a lesser extent, unfavorable sales mix, offset in part by profit on higher sales in local currencies and productivity improvements, net of inflationary cost increases.

Results of Operations (continued)

Laboratory Products and Services

(Dollars in millions)	2017	2016	Change
Revenues	$ 7,825	$ 6,724	16%
Operating Income Margin	12.8%	14.5%	-1.7 pt

Sales in the Laboratory Products and Services segment increased $1.10 billion to $7.83 billion in 2017. Sales increased $727 million due to acquisitions, $361 million (5%) due to higher revenues at existing businesses and $13 million due to the favorable effects of currency translation. The increase in revenue at existing businesses was primarily due to increased demand for products sold through the segment's channel business and, to a lesser extent, laboratory equipment and consumables.

Operating income margin was 12.8% in 2017 compared to 14.5% in 2016. The decrease was primarily due to unfavorable sales mix and strategic growth investments offset in part by profit on higher sales in local currencies and, to a lesser extent, the effect of acquisitions.

Other Expense, Net

The company reported other expense, net, of $531 million and $434 million in 2017 and 2016, respectively (Note 5). Interest expense increased $123 million, primarily due to an increase in outstanding debt.

Provision for Income Taxes

The company recorded a provision for income taxes in 2017 principally due to a net provision of $204 million from the effects of the Tax Act consisting primarily of a one-time transition tax on deemed repatriated earnings and profits of foreign subsidiaries, net of a benefit from adjusting the deferred tax balances for the U.S. statutory tax rate reduction. 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. In addition, in 2017 the company recorded a $65 million favorable adjustment to deferred tax balances due to extension of a tax holiday agreement in Singapore. The company continued to implement tax planning initiatives related to non-U.S. subsidiaries in 2017. 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 benefitted 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) for a net benefit of $33 million. The foreign tax credits 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. 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.

The company recorded a benefit from income taxes in 2016. In 2016, 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 benefitted from U.S. foreign tax credits of $91 million, offset in part by additional U.S. taxes of $37 million on the related foreign income (which reduced the benefit from the foreign rate differential in 2016) for a net benefit of $54 million. The company also implemented foreign tax credit planning in Sweden which resulted in $100 million of foreign tax credits, with no related incremental U.S. income tax expense. In addition, the company recorded discrete benefits in 2016 totaling $39 million related to prior year tax filings and net charges of $12 million related to tax audits.

The effective tax rate in both 2017 and 2016 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 $479 million and $663 million in 2017 and 2016, respectively.

Liquidity and Capital Resources

Consolidated working capital was $4.48 billion at December 31, 2018, compared with $2.37 billion at December 31, 2017, primarily due to higher cash and lower short-term debt. Included in working capital were cash and cash equivalents of $2.10 billion at December 31, 2018 and $1.34 billion at December 31, 2017.

Liquidity and Capital Resources (continued)

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. On January 28, 2019, the company entered into an agreement to sell its Anatomical Pathology business to PHC Holdings Corporation for approximately $1.14 billion. The sale is subject to customary closing conditions and applicable regulatory approvals.

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. On July 7, 2016, the Board of Directors authorized the repurchase of up to $1.50 billion of the company's common stock. In 2018, the company repurchased $500 million of the company's common stock, depleting the 2016 authorization. On September 7, 2018, the Board of Directors authorized the repurchase of up to $2.00 billion of the company's common stock. In January 2019, the company repurchased $750 million of the company's common stock. At February 27, 2019, authorization remained for $1.25 billion of future repurchases of the company's common stock.

As of December 31, 2018, the company's short-term debt totaled $1.27 billion, including $693 million of commercial paper obligations and $573 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, 2018, no borrowings were outstanding under the company's revolving credit facility, although available capacity was reduced by approximately $82 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 expects to fund the acquisition of Gatan Inc. with a combination of existing cash balances and short-term borrowings. The company believes that its existing cash and cash equivalents of $2.10 billion as of December 31, 2018 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.

2017

Cash provided by operating activities was $4.01 billion during 2017. An increase in other liabilities provided cash of $1.02 billion primarily due to the Tax Act's one-time transition tax on deemed repatriated earnings and profits of foreign subsidiaries. Given the availability of foreign tax credits, the company does not expect the transition tax to result in significant cash requirements. An increase in accounts payable provided cash of $274 million due to the timing of payments. Increases in accounts receivable and inventories used cash of $362 million and $81 million, respectively, primarily to support growth in sales in local currencies. An increase in other assets used cash of $153 million primarily due to the timing of income tax refunds. Cash payments for income taxes decreased to $479 million during 2017, compared with $663 million in 2016. The company made cash contributions to its pension and postretirement benefit plans totaling $200 million during 2017. Payments for restructuring actions, principally severance costs and lease and other expenses of real estate consolidation, used cash of $93 million during 2017.

Liquidity and Capital Resources (continued)

During 2017, the company's investing activities used $7.73 billion of cash. Acquisitions used cash of $7.23 billion. The company's investing activities also included the purchase of $508 million of property, plant and equipment.

The company's financing activities provided $3.85 billion of cash during 2017. Issuance of senior notes and borrowings under a term loan provided cash of $6.46 billion. The company also issued 10 million shares of its common stock for net proceeds of $1.69 billion. Repayment of senior notes and term loans used cash of $3.30 billion and a net decrease in commercial paper obligations used cash of $134 million. The company's financing activities also included the repurchase of $750 million of the company's common stock and the payment of $237 million in cash dividends, offset in part by $128 million of net proceeds from employee stock option exercises.

2016

Cash provided by operating activities was $3.26 billion during 2016. An increase in accounts receivable used cash of $352 million primarily to support growth in sales in local currencies and due to the mid-month timing of the acquisition of FEI when receivables are commonly lower than at quarter-end. Inventories provided cash of $98 million due to a reduction associated with fourth quarter 2016 sales. An increase in other assets used cash of $153 million primarily due to the timing of payments. An increase in other liabilities provided cash of $216 million primarily due to the timing of payments for income taxes and incentive compensation. Cash payments for income taxes increased to $663 million during 2016, compared with $477 million in 2015. The company made cash contributions to its pension and postretirement benefit plans totaling $43 million during 2016. Payments for restructuring actions, principally severance costs and lease and other expenses of real estate consolidation, used cash of $122 million during 2016.

During 2016, the company's investing activities used $5.52 billion of cash. Acquisitions used cash of $5.18 billion. The company's investing activities also included the purchase of $444 million of property, plant and equipment.

The company's financing activities provided $2.76 billion of cash during 2016. Issuance of senior notes and borrowings under term loans provided cash of $7.60 billion and an increase in commercial paper obligations provided cash of $904 million. Repayment of senior notes, the 364-day term loan and acquired debt used cash of $4.33 billion. The company's financing activities also included the repurchase of $1.25 billion of the company's common stock and the payment of $238 million in cash dividends, offset in part by $87 million of 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 2016, 2017 or 2018, 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.

Liquidity and Capital Resources (continued)

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, 2018.

	Payments due by Period or Expiration of Commitment				
(In millions)	2019	2020 and 2021	2022 and 2023	2024 and Thereafter	Total
Contractual Obligations and Other Commercial Commitments					
Debt principal, including short-term debt (a)	$ 1,268	$ 4,727	$ 3,175	$ 10,004	$ 19,174
Interest	522	915	621	1,990	4,048
Capital lease obligations	3	6	3	—	12
Operating lease obligations	192	276	144	177	789
Unconditional purchase obligations (b)	673	46	21	5	745
Letters of credit and bank guarantees	183	19	13	3	218
Surety bonds and other guarantees	27	1	—	—	28
Pension obligations on balance sheet	43	91	97	274	505
Asset retirement obligations accrued on balance sheet	6	15	11	13	45
Acquisition-related contingent consideration accrued on balance sheet	3	13	5	16	37
	$ 2,920	$ 6,109	$ 4,090	$ 12,482	$ 25,601

(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.

The contractual obligation at December 31, 2018 to acquire Gatan Inc. for approximately $925 million has been omitted from the above table. The transaction is subject to customary closing conditions, including regulatory approvals.

Reserves for unrecognized tax benefits of $1.44 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 2019, such expenditures will be between $800 and $850 million.

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 initial terms of these leases end in 2019, 2020 and 2023, although renewal options exist for each.

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, 2018 was $38 million.

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.

Liquidity and Capital Resources (continued)

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 euro, British pounds sterling, Swiss franc, Norwegian kroner, Canadian dollars, Japanese yen and Swedish kronor. 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, 2018, 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, 2018 was $19.04 billion (see Note 13). 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, 2018 would increase by approximately $1.06 billion. If interest rates were to increase by 100 basis points, the fair value of the company's debt at December 31, 2018 would decrease by approximately $0.98 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 2018, 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 $43 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 2018 functional currencies, relative to the U.S. dollar, would result in a reduction of shareholders' equity of $0.84 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 2018 non-functional currency exchange rates related to the company's contracts would result in an additional unrealized loss on forward currency-exchange contracts of $145 million. A 10% appreciation in year-end 2018 non-functional currency exchange rates related to the company's contracts would result in an unrealized gain on forward currency-exchange contracts of $138 million. The 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 2018 non-functional currency exchange rates applied to such cash balances would result in a negative impact of $25 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, 2018, 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, 2018 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, 2018, 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, 2018, 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 (2019 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 2019 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 2019 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 2019 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 2019 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 2019 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 44.

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 27, 2019

THERMO FISHER SCIENTIFIC INC.

By: /s/ Marc N. Casper
Marc N. Casper
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 27, 2019.

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

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

By: /s/ Jim P. Manzi
Jim P. Manzi
Chairman of the Board and Director

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

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

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

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

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

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

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

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

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

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

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

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
2.1	Purchase Agreement, dated as of May 15, 2017, by and between Thermo Fisher Scientific Inc., Thermo Fisher (CN) Luxembourg S.à r.l. and Patheon N.V. (filed as Exhibit 99.(D)(1) to the Registrant's Tender Offer Statement on Schedule TO-T filed May 31, 2017 and incorporated in this document by reference).
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	Second Supplemental Indenture dated as of April 27, 2010 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 April 27, 2010 [File No. 1-8002] and incorporated in this document by reference).
4.3	Third Supplemental Indenture dated as of February 22, 2011 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 February 22, 2011 [File No. 1-8002] and incorporated in this document by reference).
4.4	Fourth Supplemental Indenture dated as of August 16, 2011 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 August 16, 2011 [File No. 1-8002] and incorporated in this document by reference).
4.5	Fifth Supplemental Indenture dated as of August 22, 2012 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 August 22, 2012 [File No. 1-8002] and incorporated in this document by reference).
4.6	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).
4.7	Seventh Supplemental Indenture, dated as of November 14, 2014, 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 November 14, 2014 [File No. 1-8002] and incorporated in this document by reference).
4.8	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).
4.9	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).
4.10	Tenth Supplemental Indenture, dated as of November 24, 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 November 24, 2015 [File No. 1-8002] and incorporated in this document by reference).
4.11	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).
4.12	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).
4.13	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).
4.14	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).

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
4.15	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).
4.16	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).
4.17	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).
4.18	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).
4.19	First Supplemental 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 4.2 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).
4.20	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).
4.21	Indenture between Life Technologies and U.S. Bank National Association., as trustee, dated as of February 19, 2010 (filed as Exhibit 4.1 to Life Technologies Corporation's Current Report on Form 8-K, filed on February 19, 2010 [File No. 000-25317] and incorporated in this document by reference).
4.22	First Supplemental Indenture between Life Technologies and U.S. Bank National Association., as trustee, dated as of February 19, 2010, including the forms of the Life Technologies 3.375% Senior Notes due 2013, 4.400% Senior Notes due 2015 and 6.000% Senior Notes due 2020 (filed as Exhibit 4.2 to Life Technologies Corporation's Current Report on Form 8-K filed February 19, 2010 [File No. 000-25317] and incorporated in this document by reference).
4.23	Second Supplemental Indenture between Life Technologies and U.S. Bank National Association., as trustee, dated as of December 14, 2010, including the forms of the Life Technologies 3.50% Senior Notes due 2016 and 5.00% Senior Notes due 2021 (filed as Exhibit 4.2 to Life Technologies Corporation's Current Report on Form 8-K filed December 14, 2010 [File No. 000-25317] and incorporated in this document by reference).
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	Executive Registry Program at the Massachusetts General Hospital (filed as Exhibit 10.74 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 28, 2002 [File No. 1-8002] and incorporated in this document by reference).*
10.5	Thermo Fisher Scientific Inc. Executive Severance Policy (filed as Exhibit 10.2 to the Registrant's Current Report on Form 8-K filed May 19, 2008 [File No. 1-8002] and incorporated in this document by reference).*
10.6	Summary of Thermo Fisher Scientific Inc. Annual Director Compensation (filed as Exhibit 10.7 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).*
10.7	Summary of 2018 Annual Cash Incentive Plan Matters (set forth in Item 5.02 to the Registrant's Current Report on Form 8-K filed March 1, 2018 [File No.1-8002] under the heading "Compensatory Arrangements of Certain Officers" and incorporated in this document by reference).*
10.8	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).*
10.9	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).*
10.10	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).*

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.11	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).*
10.12	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).*
10.13	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).*
10.14	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).*
10.15	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).*
10.16	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).*
10.17	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).*
10.18	Amendment No. 1 to Executive Severance Policy, dated February 25, 2010 (filed as Exhibit 10.1 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).*
10.19	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).*
10.20	Amendment No. 2 to Executive Severance Policy, dated November 10, 2010 (filed as Exhibit 10.54 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).*
10.21	Amendment No. 2 to 2009 Restatement of Executive Severance Agreement, dated November 10, 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).*
10.22	Amendment No. 1 to Executive Change In Control Retention Agreement, dated November 10, 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).*
10.23	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).*
10.24	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).*
10.25	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).*
10.26	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).*
10.27	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).*
10.28	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).*
10.29	Form of Thermo Fisher Scientific Inc.'s Stock Option Agreement (filed as Exhibit 10.6 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).*
10.30	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).*
10.31	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).*
10.32	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).*

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.33	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).*
10.34	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).*
10.35	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).*
10.36	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).*
10.37	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).*
10.38	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).*
10.39	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).*
10.40	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).*
10.41	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).
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.
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.

*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.

Attached as Exhibit 101 to this report are the following formatted in XBRL (Extensible Business Reporting Language): (i) Consolidated Balance Sheet at December 31, 2018, and 2017, (ii) Consolidated Statement of Income for the years ended December 31, 2018, 2017 and 2016, (iii) Consolidated Statement of Comprehensive Income for the years ended December 31, 2018, 2017 and 2016 (iv) Consolidated Statement of Cash Flows for the years ended December 31, 2018, 2017 and 2016, (v) Consolidated Statement of Shareholders' Equity for the years ended December 31, 2018, 2017 and 2016 and (vi) Notes to Consolidated Financial Statements.

INDEX OF CONSOLIDATED FINANCIAL STATEMENTS AND SCHEDULE

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

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 sheets of Thermo Fisher Scientific Inc. and its subsidiaries (the "Company") as of December 31, 2018 and December 31, 2017, and the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended December 31, 2018, 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, 2018, 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, 2018 and December 31, 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018 in conformity with 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, 2018, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

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 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.

Boston, Massachusetts
February 27, 2019

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, 2018	December 31, 2017
Assets		
Current Assets:		
Cash and cash equivalents	$ 2,103	$ 1,335
Accounts receivable, less allowances of $117 and $109	4,136	3,879
Inventories	3,005	2,971
Other current assets	1,381	1,236
Total current assets	10,625	9,421
Property, Plant and Equipment, Net	4,165	4,047
Acquisition-related Intangible Assets, Net	14,978	16,684
Other Assets	1,117	1,227
Goodwill	25,347	25,290
Total Assets	$ 56,232	$ 56,669
Liabilities and Shareholders' Equity		
Current Liabilities:		
Short-term obligations and current maturities of long-term obligations	$ 1,271	$ 2,135
Accounts payable	1,615	1,428
Accrued payroll and employee benefits	982	918
Contract liabilities	809	—
Deferred revenue	—	719
Other accrued expenses	1,470	1,848
Total current liabilities	6,147	7,048
Deferred Income Taxes	2,265	2,766
Other Long-term Liabilities	2,515	2,569
Long-term Obligations	17,719	18,873
Commitments and Contingencies (Note 11)		
Shareholders' Equity:		
Preferred stock, $100 par value, 50,000 shares authorized; none issued		
Common stock, $1 par value, 1,200,000,000 shares authorized; 431,566,561 and 428,327,873 shares issued	432	428
Capital in excess of par value	14,621	14,177
Retained earnings	18,696	15,914
Treasury stock at cost, 29,444,882 and 27,013,311 shares	(3,665)	(3,103)
Accumulated other comprehensive items	(2,498)	(2,003)
Total shareholders' equity	27,586	25,413
Total Liabilities and Shareholders' Equity	$ 56,232	$ 56,669

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, 2018	December 31, 2017	December 31, 2016
Revenues			
Product revenues	$ 18,868	$ 17,374	$ 15,712
Service revenues	5,490	3,544	2,562
Total revenues	24,358	20,918	18,274
Costs and Operating Expenses:			
Cost of product revenues	9,682	8,975	8,212
Cost of service revenues	3,819	2,495	1,690
Selling, general and administrative expenses	6,057	5,504	4,971
Research and development expenses	967	887	754
Restructuring and other costs, net	50	97	189
Total costs and operating expenses	20,575	17,958	15,816
Operating Income	3,783	2,960	2,458
Other Expense, Net	(521)	(531)	(434)
Income from Continuing Operations Before Income Taxes	3,262	2,429	2,024
(Provision for) Benefit from Income Taxes	(324)	(201)	1
Income from Continuing Operations	2,938	2,228	2,025
Loss from Discontinued Operations (net of income tax benefit of $0, $2 and $2)	—	(3)	(3)
Net Income	$ 2,938	$ 2,225	$ 2,022
Earnings per Share from Continuing Operations			
Basic	$ 7.31	$ 5.65	$ 5.13
Diluted	$ 7.24	$ 5.60	$ 5.10
Earnings per Share			
Basic	$ 7.31	$ 5.64	$ 5.12
Diluted	$ 7.24	$ 5.59	$ 5.09
Weighted Average Shares			
Basic	402	395	395
Diluted	406	398	397

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, 2018	December 31, 2017	December 31, 2016
Comprehensive Income			
Net Income	$ 2,938	$ 2,225	$ 2,022
Other Comprehensive Items:			
Currency translation adjustment (net of tax provision (benefit) of $84, ($145) and $0)	(434)	588	(566)
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)	(2)
Reclassification adjustment for (gains) losses included in net income (net of tax (provision) benefit of $0, ($1) and $0)	—	(1)	1
Unrealized gains and losses on hedging instruments:			
Unrealized losses on hedging instruments (net of tax benefit of $0, $0 and $22)	—	—	(37)
Reclassification adjustment for losses included in net income (net of tax benefit of $3, $5 and $4)	9	7	6
Pension and other postretirement benefit liability adjustments:			
Pension and other postretirement benefit liability adjustments arising during the period (net of tax provision (benefit) of $2, $7 and ($17))	3	23	(47)
Amortization of net loss and prior service benefit included in net periodic pension cost (net of tax benefit of $5, $5 and $2)	15	17	6
Total other comprehensive items	(407)	633	(639)
Comprehensive Income	$ 2,531	$ 2,858	$ 1,383

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, 2018	December 31, 2017	December 31, 2016
Operating Activities			
Net income	$ 2,938	$ 2,225	$ 2,022
Loss from discontinued operations	—	3	3
Income from continuing operations	2,938	2,228	2,025
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	2,267	2,033	1,758
Change in deferred income taxes	(379)	(1,098)	(620)
Non-cash stock-based compensation	181	159	133
Other non-cash expenses, net	106	190	142
Changes in assets and liabilities, excluding the effects of acquisitions:			
Accounts receivable	(366)	(362)	(352)
Inventories	(324)	(81)	98
Other assets	54	(153)	(153)
Accounts payable	201	274	56
Other liabilities	(42)	1,016	216
Contributions to retirement plans	(93)	(200)	(43)
Net cash provided by continuing operations	4,543	4,006	3,260
Net cash used in discontinued operations	—	(1)	(2)
Net cash provided by operating activities	4,543	4,005	3,258
Investing Activities			
Acquisitions, net of cash acquired	(536)	(7,226)	(5,178)
Purchase of property, plant and equipment	(758)	(508)	(444)
Proceeds from sale of property, plant and equipment	50	7	26
Other investing activities, net	(9)	(2)	76
Net cash used in investing activities	(1,253)	(7,729)	(5,520)
Financing Activities			
Net proceeds from issuance of debt	690	6,459	7,604
Repayment of debt	(2,052)	(3,299)	(4,334)
Proceeds from issuance of commercial paper	5,060	8,380	9,182
Repayments of commercial paper	(5,254)	(8,514)	(8,278)
Purchases of company common stock	(500)	(750)	(1,250)
Dividends paid	(266)	(237)	(238)
Net proceeds from issuance of company common stock	—	1,690	—
Net proceeds from issuance of company common stock under employee stock plans	136	128	87
Other financing activities	(51)	(3)	(14)
Net cash (used in) provided by financing activities	(2,237)	3,854	2,759
Exchange Rate Effect on Cash	(297)	420	(152)
Increase in Cash, Cash Equivalents and Restricted Cash	756	550	345
Cash, Cash Equivalents and Restricted Cash at Beginning of Period	1,361	811	466
Cash, Cash Equivalents and Restricted Cash at End of Period	$ 2,117	$ 1,361	$ 811

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 Shares	Common Stock Amount	Capital in Excess of Par Value	Retained Earnings	Treasury Stock Shares	Treasury Stock Amount	Accumulated Other Comprehensive Items	Total Shareholders' Equity
Balance at December 31, 2015	412	$ 412	$ 11,801	$ 12,142	12	$ (1,008)	$ (1,997)	$ 21,350
Issuance of shares under employees' and directors' stock plans	3	3	153	—	1	(48)	—	108
Stock-based compensation	—	—	133	—	—	—	—	133
Tax benefit related to employees' and directors' stock plans	—	—	53	—	—	—	—	53
Purchases of company common stock	—	—	—	—	9	(1,250)	—	(1,250)
Dividends declared ($0.60 per share)	—	—	—	(237)	—	—	—	(237)
Net income	—	—	—	2,022	—	—	—	2,022
Other comprehensive items	—	—	—	—	—	—	(639)	(639)
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

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 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 for the transfer 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 as inputs to measure progress. 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, 2018	2017	2016
Beginning Balance	$ 109	$ 77	$ 70
Provision charged to expense	18	32	16
Accounts written off	(12)	(10)	(9)
Acquisitions, currency translation and other	2	10	—
Ending Balance	$ 117	$ 109	$ 77

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. Current contract assets and noncurrent contract assets are included within other current assets and other assets, respectively, 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 asset and liability balances are as follows:

(In millions)	December 31, 2018	January 1, 2018
Current Contract Assets, Net	$ 459	$ 329
Noncurrent Contract Assets, Net	15	18
Current Contract Liabilities	809	736
Noncurrent Contract Liabilities	355	322

Substantially all of the current contract liabilities balance at January 1, 2018 was recognized in revenue during 2018.

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, 2018	December 31, 2017
Beginning Balance	$ 87	$ 78
Provision charged to income	121	110
Usage	(109)	(101)
Adjustments to previously provided warranties, net	(4)	(4)
Currency translation	(3)	4
Ending Balance	$ 92	$ 87

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 cease-use date but 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, 2018	December 31, 2017
Raw Materials	$ 812	$ 708
Work in Process	430	505
Finished Goods	1,763	1,758
Inventories	$ 3,005	$ 2,971

The value of inventories maintained using the LIFO method was $244 million and $219 million at December 31, 2018 and 2017, respectively, which was below estimated replacement cost by $34 million and $31 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, 2018.

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, 2018	December 31, 2017
Land	$ 397	$ 401
Buildings and Improvements	1,729	1,662
Machinery, Equipment and Leasehold Improvements	4,694	4,276
Property, Plant and Equipment, at Cost	6,820	6,339
Less: Accumulated Depreciation and Amortization	2,655	2,292
Property, Plant and Equipment, Net	$ 4,165	$ 4,047

Depreciation and amortization expense of property, plant and equipment was $526 million, $439 million and $380 million in 2018, 2017 and 2016, 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 3 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:

(In millions)	Balance at December 31, 2018 Gross	Accumulated Amortization	Net	Balance at December 31, 2017 Gross	Accumulated Amortization	Net
Definite Lived:						
Customer relationships	$ 17,120	$ (6,833)	$ 10,287	$ 17,356	$ (5,902)	$ 11,454
Product technology	6,036	(3,178)	2,858	6,046	(2,811)	3,235
Tradenames	1,495	(929)	566	1,538	(817)	721
Other	33	(33)	—	34	(34)	—
	24,684	(10,973)	13,711	24,974	(9,564)	15,410
Indefinite Lived:						
Tradenames	1,235	N/A	1,235	1,235	N/A	1,235
In-process research and development	32	N/A	32	39	N/A	39
	1,267	N/A	1,267	1,274	N/A	1,274
Acquisition-related Intangible Assets	$ 25,951	$ (10,973)	$ 14,978	$ 26,248	$ (9,564)	$ 16,684

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

(In millions)	
2019	$ 1,691
2020	1,610
2021	1,496
2022	1,348
2023	1,273
2024 and Thereafter	6,293
Estimated Future Amortization Expense of Definite-lived Intangible Assets	$ 13,711

Amortization of acquisition-related intangible assets was $1.74 billion, $1.59 billion and $1.38 billion in 2018, 2017 and 2016, respectively.

Other Assets

Other assets in the accompanying balance sheet include deferred tax assets, cash surrender value of life insurance, insurance recovery receivables related to product liability matters, pension assets, investments, notes receivable, restricted cash 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, 2018 and 2017, the company had such investments with carrying amounts of $36 million and $32 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 the 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. The company determined that no impairments existed in 2018, 2017 or 2016.

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, 2016	$ 8,246	$ 4,686	$ 3,659	$ 4,737	$ 21,328
Acquisitions	136	99	27	3,256	3,518
Finalization of purchase price allocations for 2016 acquisitions	(4)	68	—	(1)	63
Currency translation	14	174	171	25	384
Other	(1)	—	(1)	(1)	(3)
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

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 year-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 year. Currency transaction (losses) gains are included in the accompanying statement of income and in aggregate were $19 million, $(31) million and $19 million in 2018, 2017 and 2016, 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 euro, British pounds sterling, Swiss franc, Norwegian kroner, Canadian

dollars, Japanese yen and Swedish kronor. 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. During 2016, in connection with new debt issuances, the company entered into interest rate swap arrangements. The company includes the gain or loss on the hedged items (fixed-rate debt) in the same line item (interest expense) as the offsetting effective portion of the loss or gain on the related interest rate swaps.

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. In addition, significant estimates were made in estimating future cash flows to assess potential impairment of assets and in determining the fair value of acquired intangible assets (Note 2) and the ultimate loss from abandoning leases at facilities being exited (Note 15). Actual results could differ from those estimates.

Recent Accounting Pronouncements

In August 2018, the FASB issued new guidance to align the accounting for implementation costs incurred in a hosting arrangement that is a service contract with the accounting for implementation costs incurred to develop or obtain internal-use software and hosting arrangements that include an internal-use software license. Under the new guidance, certain implementation costs that previously were required to be expensed will be capitalized and amortized over the term of the hosting arrangement. The company adopted the guidance in the fourth quarter of 2018, prospectively to all implementation costs incurred after the date of adoption. The adoption of this guidance did not have a material impact on the company's consolidated financial statements.

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 expects to adopt the guidance when it is effective 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 expects to adopt the guidance when it is effective 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 March 2017, the FASB issued new guidance intended to improve the presentation of net periodic pension cost and net periodic postretirement benefit cost. The new guidance requires the service cost component of net periodic cost be reported in the same line item(s) as other employee compensation costs and all other components of the net periodic cost be reported in the income statement below operating income. The company adopted this guidance on January 1, 2018 and applied the changes to the statement of income retrospectively. As a result of adoption of this guidance, the accompanying 2017 and 2016 statements of income reflect the following changes from previously reported amounts:

(In millions)	2017	2016
Increase (Decrease) in Total Costs and Operating Expenses (principally Selling, General and Administrative Expenses)	$ 8	$ (9)
(Decrease) Increase in Operating Income	(8)	9
Increase (Decrease) in Other Income (Expense)	8	(9)

In January 2017, the FASB issued new guidance clarifying the definition of a business and providing criteria to determine when an integrated set of assets and activities is not defined as a business. The new guidance requires such integrated sets to be defined as an asset (and not a business) if substantially all of the fair value of the gross assets acquired or disposed is concentrated in a single identifiable asset or a group of similar identifiable assets. The adoption of this guidance as of January 1, 2018 did not have a material impact on the company's consolidated financial statements.

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, the FASB issued additional guidance and clarification. The company expects to adopt the guidance when it is effective 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 and 2018, the FASB issued additional guidance and clarification. The guidance is effective for the company in 2019. The company has 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 will not be restated. The company has substantially completed its analysis of the new guidance by considering which practical expedients and policies to elect, deploying a software tool to assist in the accounting calculations, surveying functional groups that oversee vendor relationships, and developing processes and controls to manage the new lease accounting guidance and gather information for the required disclosures. The company expects the impact to the balance sheet of recording right-of-use assets and lease liabilities will be less than 2% of total assets and less than 3% of total liabilities. The company also expects that the impact of adoption of the guidance to its results of operations and cash flows will be nominal. The company's future commitments under lease obligations are summarized in Note 11.

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 and included in other current 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 purchase 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.

2018

The company has entered into an agreement to acquire Gatan, Inc., a wholly owned subsidiary of Roper Technologies, Inc., for approximately $925 million in cash. Gatan is a leading manufacturer of instrumentation and software used to enhance and extend the operation and performance of electron microscopes. The transaction is subject to customary closing conditions, including regulatory approvals.

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. Revenues of the Advanced Bioprocessing business were $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, IntegenX Inc., 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	IntegenX	Total
Purchase Price			
Cash paid	$ 476	$ 55	$ 531
Fair value of contingent consideration	—	11	11
Purchase price payable	1	—	1
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 and other	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 and other. 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's revenues totaled $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.

On March 2, 2017, the company acquired, within the Analytical Instruments segment, Core Informatics, a North America-based provider of cloud-based platforms supporting scientific data management, for a total purchase price of $94 million, net of cash acquired. The acquisition enhanced the company's existing informatics solutions. Revenues of Core Informatics were approximately $10 million in 2016. The purchase price exceeded the fair market value of the identifiable net assets and, accordingly, $63 million was allocated to goodwill, $50 million of which is tax deductible.

On February 14, 2017, the company acquired, within the Life Sciences Solutions segment, Finesse Solutions, Inc., a North America-based developer of scalable control automation systems and software for bioproduction, for a total purchase price of $221 million, net of cash acquired. The acquisition expanded the company's bioproduction offerings. Revenues of Finesse Solutions were approximately $50 million in 2016. The purchase price exceeded the fair market value of the identifiable net assets and, accordingly, $136 million was allocated to goodwill, none of which is tax deductible.

In addition, in 2017 the company acquired, 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 $110 million.

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

(In millions)	Patheon	Core Informatics	Finesse Solutions	Other	Total
Purchase Price					
Cash paid	$ 6,911	$ 95	$ 223	$ 103	$ 7,332
Debt assumed	488	—	—	—	488
Fair value of contingent consideration	—	9	—	8	17
Fair value of equity awards exchanged	6	—	—	—	6
Fair value of previously held interest	—	—	—	11	11
Purchase price payable	—	—	—	1	1
Cash acquired	(47)	(10)	(2)	(13)	(72)
	$ 7,358	$ 94	$ 221	$ 110	$ 7,783
Net Assets Acquired					
Current assets	$ 1,062	$ 2	$ 17	$ 20	$ 1,101
Property, plant and equipment	1,242	—	1	3	1,246
Definite-lived intangible assets:					
Customer relationships	3,641	6	68	16	3,731
Product technology	—	29	32	35	96
Tradenames and other	112	3	2	—	117
Indefinite-lived intangible assets:					
In-process research and development	—	—	2	—	2
Goodwill	3,276	63	136	64	3,539
Other assets	54	—	—	—	54
Deferred tax liabilities	(1,093)	(4)	(22)	(14)	(1,133)
Other liabilities assumed	(936)	(5)	(15)	(14)	(970)
	$ 7,358	$ 94	$ 221	$ 110	$ 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 and other. The weighted average amortization period for all definite-lived intangible assets acquired in 2017 is 16 years.

2016

On September 19, 2016, the company acquired, within the Analytical Instruments segment, FEI Company, a North America-based provider of high-performance electron microscopy, for a total purchase price of $4.08 billion, net of cash acquired. The acquisition strengthened the company's analytical instrument portfolio with the addition of high-end electron microscopes. Revenues of FEI were $930 million in 2015. The purchase price exceeded the fair value of the identifiable net assets and, accordingly, $2.13 billion was allocated to goodwill, approximately $65 million of which is tax deductible.

On March 31, 2016, the company acquired, primarily within the Life Sciences Solutions segment, Affymetrix, Inc., a North America-based provider of cellular and genetic analysis products, for a total purchase price of $1.34 billion, net of cash acquired, including the assumption of $254 million of debt. The acquisition expanded the company's existing portfolio of antibodies and assays for flow cytometry and single-cell biology applications. Additionally, the acquisition expanded the company's genetic analysis portfolio through the addition of microarrays. Revenues of Affymetrix were $360 million in 2015. The purchase price exceeded the fair value of the identifiable net assets and, accordingly, $615 million was allocated to goodwill, none of which is tax deductible.

In addition, in 2016, the company acquired, within the Life Sciences Solutions segment, a manufacturer of transfection reagents and cell-related products and selected assets of an existing channel partner, within the Analytical Instruments segment, a provider of X-ray diffraction solutions for material science and industrial applications and, within the Specialty Diagnostics segment, an existing channel partner for its microbiology media products, for an aggregate purchase price of $33 million.

The components of the purchase price and net assets acquired for 2016 acquisitions are as follows:

(In millions)	FEI	Affymetrix	Other	Total
Purchase Price				
Cash paid	$ 4,451	$ 1,166	$ 32	$ 5,649
Debt assumed	—	254	1	255
Cash acquired	(369)	(78)	—	(447)
	$ 4,082	$ 1,342	$ 33	$ 5,457
Net Assets Acquired				
Current assets	$ 619	$ 161	$ 3	$ 783
Property, plant and equipment	153	19	—	172
Definite-lived intangible assets:				
Customer relationships	1,051	501	9	1,561
Product technology	740	253	7	1,000
Tradenames and other	42	46	—	88
Indefinite-lived intangible assets:				
In-process research and development	105	14	—	119
Goodwill	2,125	615	16	2,756
Other assets	72	8	—	80
Liabilities assumed	(825)	(275)	(2)	(1,102)
	$ 4,082	$ 1,342	$ 33	$ 5,457

The weighted-average amortization periods for definite-lived intangible assets acquired in 2016 are 16 years for customer relationships, 8 years for product technology and 8 years for tradenames and other. The weighted average amortization period for all definite-lived intangible assets acquired in 2016 is 13 years.

The company recorded a deferred tax liability of $156 million in the acquisition accounting related to the outside basis difference of the Affymetrix Singapore operations as the company does not intend to permanently reinvest the pre-acquisition Singapore earnings. This deferred tax liability was reversed in 2017 as a result of the enactment of the Tax Act.

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, and the effects of the company's 2016 acquisitions of FEI and Affymetrix as if the acquisitions had occurred on January 1, 2015:

(In millions)	2017	2016
Revenues	$ 22,144	$ 20,807
Net Income	$ 2,258	$ 1,791

The historical consolidated financial information of the company, Patheon, FEI, and Affymetrix has been adjusted in the pro forma information to give effect to pro forma events that are directly attributable to the acquisitions and related financing arrangements, are expected to have a continuing impact on the company, and are factually supportable.

To reflect the acquisition of Patheon as if it had occurred on January 1, 2016, and the acquisitions of FEI and Affymetrix as if they had occurred on January 1, 2015, 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 acquisitions and related financings occurred on the aforementioned dates, 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, 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.

Pro forma net income for the year ended December 31, 2016, excludes certain items associated with the FEI and Affymetrix acquisitions 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, 2015 (not presented), and are as follows: $102 million of direct transaction costs, $33 million of accounting policy conformity adjustments, $46 million of initial restructuring costs, $6 million reduction of revenues for revaluing the deferred revenue obligations to fair value, and $99 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 2018, 2017 or 2016 acquisitions occurred at the beginning of 2017, 2016 or 2015, respectively.

Disposition

On January 28, 2019, the company entered into an agreement to sell its Anatomical Pathology business to PHC Holdings Corporation for approximately $1.14 billion. The business is part of the Specialty Diagnostics segment. Revenues in 2018 of the business to be sold were approximately $344 million. The sale is subject to customary closing conditions and applicable regulatory approvals. 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)	2018
Revenues	
Consumables	$ 12,576
Instruments	6,292
Services	5,490
Consolidated revenues	$ 24,358

Revenue by geographic region is as follows:

(In millions)	2018
Revenues (a)	
North America	$ 12,143
Europe	6,215
Asia-Pacific	5,250
Other regions	750
Consolidated revenues	$ 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, 2018 was $5.09 billion. The company will recognize revenue for these performance obligations as they are satisfied, approximately 90% 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)	2018	2017	2016
Revenues			
Life Sciences Solutions	$ 6,269	$ 5,728	$ 5,317
Analytical Instruments	5,469	4,821	3,668
Specialty Diagnostics	3,724	3,486	3,339
Laboratory Products and Services	10,035	7,825	6,724
Eliminations	(1,139)	(942)	(774)
Consolidated revenues	24,358	20,918	18,274
Segment Income (a)			
Life Sciences Solutions	2,158	1,894	1,598
Analytical Instruments	1,247	1,027	749
Specialty Diagnostics	952	927	910
Laboratory Products and Services	1,258	1,004	974
Subtotal reportable segments (a)	5,615	4,852	4,231
Cost of revenues charges, net	(12)	(123)	(102)
Selling, general and administrative charges, net	(29)	(78)	(104)
Restructuring and other costs, net	(50)	(97)	(189)
Amortization of acquisition-related intangible assets	(1,741)	(1,594)	(1,378)
Consolidated operating income	3,783	2,960	2,458
Other expense, net (b)	(521)	(531)	(434)
Income from continuing operations before income taxes	$ 3,262	$ 2,429	$ 2,024
Depreciation			
Life Sciences Solutions	$ 119	$ 129	$ 142
Analytical Instruments	73	71	50
Specialty Diagnostics	76	72	70
Laboratory Products and Services	258	167	118
Consolidated depreciation	$ 526	$ 439	$ 380

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

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

(In millions)	2018	2017	2016
Total Assets			
Life Sciences Solutions	$ 18,774	$ 19,063	$ 19,065
Analytical Instruments	9,907	9,960	9,520
Specialty Diagnostics	6,663	7,095	6,802
Laboratory Products and Services	19,051	19,181	9,405
Corporate/Other (c)	1,837	1,370	1,116
Consolidated total assets	$ 56,232	$ 56,669	$ 45,908
Capital Expenditures			
Life Sciences Solutions	$ 107	$ 118	$ 122
Analytical Instruments	85	56	34
Specialty Diagnostics	103	87	72
Laboratory Products and Services	374	178	111
Corporate/Other	89	69	105
Consolidated capital expenditures	$ 758	$ 508	$ 444

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

Geographical Information

(In millions)	2018	2017	2016
Revenues (d)			
United States	$ 11,629	$ 10,129	$ 9,086
China	2,504	2,060	1,730
Other	10,225	8,729	7,458
Consolidated revenues	$ 24,358	$ 20,918	$ 18,274
Long-lived Assets (e)			
United States	$ 2,444	$ 2,349	$ 1,630
Other	1,721	1,698	948
Consolidated long-lived assets	$ 4,165	$ 4,047	$ 2,578

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

(e) Includes property, plant and equipment, net.

Note 5. Other Expense, Net

The components of other expense, net, in the accompanying statement of income are as follows:

(In millions)	2018	2017	2016
Interest Income	$ 137	$ 81	$ 48
Interest Expense	(667)	(592)	(469)
Other Items, Net	9	(20)	(13)
Other Expense, Net	$ (521)	$ (531)	$ (434)

Other Items, Net

In all periods, other items, 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 2018, other items, net also includes $15 million of net losses on investments.

In 2017, other items, 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 gains on investments.

In 2016, other items, net includes $22 million of charges related to amortization of fees paid to obtain bridge financing commitments for the acquisition of FEI (Note 2) and $9 million of losses on the early extinguishment of debt, offset in part by $13 million of gains on investments. The investment gains include an $8 million gain on the sale of a joint venture for net proceeds of $65 million.

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.

The components of stock-based compensation expense are primarily included in selling, general and administrative expenses and are as follows:

(In millions)	2018	2017	2016
Stock Option Awards	$ 57	$ 53	$ 41
Restricted Unit Awards	124	106	92
Total Stock-based Compensation Expense	$ 181	$ 159	$ 133

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:

	2018	2017	2016
Expected Stock Price Volatility	20%	20%	21%
Risk Free Interest Rate	2.6%	1.9%	1.2%
Expected Life of Options (years)	4.3	4.3	4.3
Expected Annual Dividend	0.3%	0.4%	0.5%

The weighted average per share grant-date fair values of options granted during 2018, 2017 and 2016 were $43.45, $30.73 and $24.54, respectively. The total intrinsic value of options exercised during the same periods was $312 million, $199 million and $176 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, 2018 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, 2017	9.0	$ 121.78		
Granted	1.6	211.38		
Exercised	(2.3)	86.88		
Canceled/Expired	(0.3)	164.58		
Outstanding at December 31, 2018	8.0	$ 148.09	4.2	
Vested and Unvested Expected to Vest at December 31, 2018	7.7	$ 146.24	4.2	$ 595
Exercisable at December 31, 2018	3.5	$ 114.93	2.8	$ 382

(a) Market price per share on December 31, 2018 was $223.79. The intrinsic value is zero for options with exercise prices above the market price.

As of December 31, 2018, there was $101 million of total unrecognized compensation cost related to unvested stock options granted. The cost is expected to be recognized through 2022 with a weighted average amortization period of 2.4 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, 2018 is presented below:

	Units (in millions)	Weighted Average Grant-Date Fair Value
Unvested at December 31, 2017	1.4	$ 150.23
Granted	0.6	204.72
Vested	(0.7)	150.28
Forfeited	(0.1)	166.95
Unvested at December 31, 2018	1.2	$ 177.04

The total fair value of shares vested during 2018, 2017 and 2016 was $114 million, $97 million and $91 million, respectively.

As of December 31, 2018, there was $144 million of total unrecognized compensation cost related to unvested restricted stock unit awards. The cost is expected to be recognized through 2022 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 0.1 million, 0.1 million and 0.2 million shares, respectively, of its common stock in 2018, 2017 and 2016 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 2018, 2017 and 2016, the company charged to expense $204 million, $161 million and $140 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 2018, 2017 and 2016, the company made cash contributions of approximately $93 million, $200 million and $43 million, respectively. Additionally, in 2016, the company contributed insurance contracts valued at $16 million to two of its German

defined benefit plans. Contributions to the plans included in the following table are estimated at between $35 and $65 million for 2019.

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)	2018	2017	2018	2017	2018	2017
Change in Projected Benefit Obligations						
Benefit Obligation at Beginning of Year	$ 1,300	$ 1,249	$ 1,324	$ 1,116	$ 63	$ 50
Business combinations	8	—	—	185	1	6
Service costs	—	—	26	26	1	1
Interest costs	41	43	23	21	2	2
Settlements	—	—	(33)	(60)	—	—
Plan participants' contributions	—	—	5	5	—	1
Actuarial (gains) losses	(87)	92	(48)	(34)	(8)	6
Benefits paid	(83)	(84)	(34)	(37)	(2)	(4)
Currency translation and other	—	—	(70)	102	(7)	1
Benefit Obligation at End of Year	$ 1,179	$ 1,300	$ 1,193	$ 1,324	$ 50	$ 63
Change in Fair Value of Plan Assets						
Fair Value of Plan Assets at Beginning of Year	$ 1,181	$ 944	$ 1,011	$ 853	$ 9	$ 8
Business combinations	7	—	—	101	—	—
Actual return on plan assets	(49)	161	(21)	32	(1)	1
Employer contribution	35	160	56	37	2	3
Settlements	—	—	(33)	(60)	—	—
Plan participants' contributions	—	—	5	5	—	1
Benefits paid	(83)	(84)	(34)	(37)	(2)	(4)
Currency translation and other	—	—	(52)	80	—	—
Fair Value of Plan Assets at End of Year	$ 1,091	$ 1,181	$ 932	$ 1,011	$ 8	$ 9
Funded Status	$ (88)	$ (119)	$ (261)	$ (313)	$ (42)	$ (54)
Accumulated Benefit Obligation	$ 1,179	$ 1,300	$ 1,136	$ 1,256		
Amounts Recognized in Balance Sheet						
Non-current asset	$ —	$ —	$ 106	$ 100	$ 8	$ 6
Current liability	(6)	(7)	(8)	(10)	(3)	(3)
Non-current liability	(82)	(112)	(359)	(403)	(47)	(57)
Net amount recognized	$ (88)	$ (119)	$ (261)	$ (313)	$ (42)	$ (54)
Amounts Recognized in Accumulated Other Comprehensive Items						
Net actuarial loss	$ 168	$ 156	$ 106	$ 126	$ 4	$ 11
Prior service credits	—	—	5	10	(5)	—
Net amount recognized	$ 168	$ 156	$ 111	$ 136	$ (1)	$ 11

The actuarial assumptions used to compute the funded status for the plans are based upon information available as of December 31, 2018 and 2017 and are as follows:

	Domestic Pension Benefits		Non-U.S. Pension Benefits		Postretirement Benefits	
	2018	2017	2018	2017	2018	2017
Weighted Average Assumptions Used to Determine Projected Benefit Obligations						
Discount rate	4.21%	3.55%	2.34%	2.10%	3.81%	3.43%
Average rate of increase in employee compensation	N/A	N/A	2.47%	2.59%	N/A	N/A
Initial healthcare cost trend rate					6.35%	6.73%
Ultimate healthcare cost trend rate					4.89%	5.04%

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		
	2018	2017	2016	2018	2017	2016
Weighted Average Assumptions Used to Determine Net Benefit Cost (Income)						
Discount rate	3.54%	4.06%	4.25%	2.10%	1.95%	2.83%
Average rate of increase in employee compensation	N/A	N/A	N/A	2.59%	3.10%	3.06%
Expected long-term rate of return on assets	5.75%	6.50%	7.00%	3.31%	3.11%	3.74%

The ultimate healthcare cost trend rates for the postretirement benefit plans are expected to be reached between 2019 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 2019 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 2018	2017
Pension Plans with Projected Benefit Obligations in Excess of Plan Assets		
Projected benefit obligation	$ 1,876	$ 2,059
Fair value of plan assets	1,421	1,527

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 2018	2017
Pension Plans with Accumulated Benefit Obligations in Excess of Plan Assets		
Accumulated benefit obligation	$ 1,792	$ 1,962
Fair value of plan assets	1,393	1,495

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:

(In millions)	Domestic Pension Benefits 2018	2017	2016	Non-U.S. Pension Benefits 2018	2017	2016
Components of Net Benefit Cost (Income)						
Service cost-benefits earned	$ —	$ —	$ —	$ 26	$ 26	$ 24
Interest cost on benefit obligation	41	43	51	23	21	27
Expected return on plan assets	(55)	(56)	(49)	(32)	(29)	(28)
Amortization of actuarial net loss	3	2	—	7	9	7
Settlement/curtailment loss	—	1	—	7	5	—
Net periodic benefit cost (income)	$ (11)	$ (10)	$ 2	$ 31	$ 32	$ 30

The net periodic postretirement benefit cost was not material in 2018, 2017 and 2016.

Expected benefit payments are estimated using the same assumptions used in determining the company's benefit obligation at December 31, 2018. 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			
2019	$ 92	$ 34	$ 3
2020	85	36	3
2021	86	37	3
2022	84	39	3
2023	83	42	3
2024-2028	393	244	12

A change in the assumed healthcare cost trend rate by one percentage point effective January 2018 would not have caused a material change in the accumulated postretirement benefit obligation as of December 31, 2018 and the 2018 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 company also has a small portfolio (comprising less than 1% of invested assets) of private equity investments. The target allocations for the remaining 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 hedge funds, multi-asset funds, alternative investments and derivative funds with the target asset allocations ranging from approximately 0% - 25% for equities, 0% - 55% for fixed income, 0% - 20% for hedge funds, 0% - 100% for multi-asset funds, 0% to 15% for alternative investments and 0% - 22% 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, 2018 and 2017, by asset category are as follows:

(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.

(In millions)	December 31, 2017	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	$ 163	$ —	$ —	$ —	$ 163
International equity funds	180	—	—	—	180
Fixed income funds	761	—	—	—	761
Private equity funds	2	—	—	—	2
Money market funds	75	—	—	—	75
Total Domestic Pension Plans	$ 1,181	$ —	$ —	$ —	$ 1,181
Non-U.S. Pension Plan Assets					
Equity funds	$ 75	$ —	$ —	$ —	$ 75
Fixed income funds	312	—	—	—	312
Hedge funds	77	—	—	—	77
Multi-asset funds	79	—	—	—	79
Derivative funds	194	—	—	—	194
Alternative investments	17	—	—	—	17
Insurance contracts	202	—	202	—	—
Cash / money market funds	55	40	—	—	15
Total Non-U.S. Pension Plans	$ 1,011	$ 40	$ 202	$ —	$ 769

(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 13). 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)	2018	2017	2016
U.S.	$ 1,329	$ 655	$ 493
Non-U.S.	1,933	1,774	1,531
Income from Continuing Operations	$ 3,262	$ 2,429	$ 2,024

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

(In millions)	2018	2017	2016
Current Income Tax Provision			
Federal	$ 165	$ 1,259	$ 280
Non-U.S.	574	576	349
State	59	62	9
	798	1,897	638
Deferred Income Tax Provision (Benefit)			
Federal	$ (258)	$ (1,437)	$ (510)
Non-U.S.	(187)	(271)	(104)
State	(29)	12	(25)
	(474)	(1,696)	(639)
Provision for (benefit from) income taxes	$ 324	$ 201	$ (1)

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)	2018	2017	2016
Statutory Federal Income Tax Rate	21%	35%	35%
Provision for Income Taxes at Statutory Rate	$ 685	$ 850	$ 708
Increases (Decreases) Resulting From:			
Foreign rate differential	(375)	(380)	(322)
Foreign exchange loss on inter-company debt refinancing	—	(237)	—
Income tax credits	(349)	(273)	(318)
Manufacturing deduction	—	(42)	(38)
Withholding taxes	31	55	—
Global intangible low-taxed income	167	—	—
Foreign-derived intangible income	(47)	—	—
Singapore tax holiday	(28)	(25)	(23)
Impact of change in tax laws and apportionment on deferred taxes	(12)	(1,121)	2
Transition tax and other initial impacts of U.S. tax reform	117	1,250	—
(Reversal of) provision for tax reserves, net	(49)	99	12
Excess tax benefits from stock options and restricted stock units	(77)	(65)	—
Tax return reassessments and settlements	(26)	8	(41)
Valuation allowance	260	7	—
Other, net	27	75	19
Provision for (benefit from) income taxes	$ 324	$ 201	$ (1)

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.

Other Tax Impacts

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 planned 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 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 benefitted 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.

In 2016, 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 benefitted from U.S. foreign tax credits of $91 million, offset in part by additional U.S. income taxes of $37 million on the related foreign income (which reduced the benefit from the foreign rate differential in 2016). The company also implemented foreign tax credit planning in Sweden which resulted in $100 million of foreign tax credits, with no related incremental U.S. income tax expense.

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. Prior to 2017, the amount of the tax deduction in excess of compensation cost recognized was allocated to capital in excess of par value. Beginning in 2017, these excess tax benefits reduce the tax provision. In 2018 and 2017, the company's tax provision was reduced by $77 million and $65 million, respectively, of such benefits. In 2016, $53 million of such benefits were allocated to capital in excess of par value.

The company has significant activities in Singapore and has received considerable tax incentives. The local taxing authority granted the company pioneer company status which provides an incentive encouraging companies to undertake activities that have the effect of promoting economic or technological development in Singapore. This incentive equates to a tax exemption on earnings associated with most of the company’s manufacturing activities in Singapore and continues through December 31, 2026. In 2018, 2017 and 2016, the impact of this tax holiday decreased the annual effective tax rates by 0.9 percentage points, 1.0 percentage points and 1.1 percentage points, respectively, and increased diluted earnings per share by approximately $0.07, $0.06 and $0.06, respectively. In connection with the March 2017 extension of this agreement until 2026,

the company recorded a benefit in the first quarter of 2017 of approximately $65 million ($0.16 per diluted share) for the effect on deferred tax balances of the extended tax holiday.

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

(In millions)	2018	2017
Deferred Tax Asset (Liability)		
Depreciation and amortization	$ (3,444)	$ (3,957)
Net operating loss and credit carryforwards	1,311	1,150
Reserves and accruals	148	139
Accrued compensation	250	265
Inventory basis difference	105	81
Other capitalized costs	103	61
Unrealized losses on hedging instruments	23	125
Other, net	143	126
Deferred tax assets (liabilities), net before valuation allowance	(1,361)	(2,010)
Less: Valuation allowance	471	256
Deferred tax assets (liabilities), net	$ (1,832)	$ (2,266)

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, 2018, 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)	2018	2017	2016
Beginning Balance	$ 256	$ 113	$ 109
Additions charged to income tax provision	223	28	—
Additions due to acquisitions	17	108	25
Deductions	(15)	—	—
Currency translation and other	(10)	7	(21)
Ending Balance	$ 471	$ 256	$ 113

At December 31, 2018, the company had federal, state and non-U.S. net operating loss carryforwards of $412 million, $1.69 billion and $4.41 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 2019 through 2038. Of the non-U.S. net operating loss carryforwards, $2.15 billion expire in the years 2019 through 2038, and the remainder do not expire.

The company operates in various jurisdictions around the world. A provision has not been made for certain U.S. state income taxes or additional non-U.S. taxes on $14.4 billion of undistributed earnings of international subsidiaries that could be subject to taxation if remitted to the U.S. because such amounts are intended to be reinvested outside the United States indefinitely. It is not practicable to estimate the unrecognized tax liability due to i) the extent of uncertainty as to which remittance structure would be used (among several possibilities) should a decision be made to repatriate; and ii) the implications of indirect taxes, including withholding taxes that could potentially be required depending on the repatriation structure. 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.

Unrecognized Tax Benefits

As of December 31, 2018, the company had $1.44 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)	2018	2017	2016
Balance at beginning of year	$ 1,409	$ 802	$ 350
Additions due to acquisitions	—	31	54
Reductions due to acquisitions	(5)	—	—
Additions for tax positions of current year	48	565	342
Additions for tax positions of prior years	82	51	94
Closure of tax years	(5)	—	(28)
Settlements	(87)	(40)	(10)
Balance at end of year	$ 1,442	$ 1,409	$ 802

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. All of the total $1.44 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 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.

During 2016, the company’s unrecognized tax benefits increased $342 million due to the uncertainty around the deductibility of a foreign exchange loss on intercompany investments, $54 million due to acquisitions, $43 million due to tax planning related to prior years that resulted in amended tax filings, $35 million relating to foreign tax positions and $14 million due to the utilization of deferred tax assets. In 2016, the company also settled the Life Technologies tax audit for the 2012 to 2014 tax years which reduced the reserve on unrecognized tax benefits by $10 million.

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, 2018 and 2017 was $59 million and $31 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)	2018	2017	2016
Income from Continuing Operations	$ 2,938	$ 2,228	$ 2,025
Loss from Discontinued Operations	—	(3)	(3)
Net Income	$ 2,938	$ 2,225	$ 2,022
Basic Weighted Average Shares	402	395	395
Plus Effect of:			
Stock options and restricted units	4	3	2
Diluted Weighted Average Shares	406	398	397
Basic Earnings per Share:			
Continuing operations	$ 7.31	$ 5.65	$ 5.13
Discontinued operations	—	(0.01)	(0.01)
Basic Earnings per Share	$ 7.31	$ 5.64	$ 5.12
Diluted Earnings per Share:			
Continuing operations	$ 7.24	$ 5.60	$ 5.10
Discontinued operations	—	(0.01)	(0.01)
Diluted Earnings per Share	$ 7.24	$ 5.59	$ 5.09
Antidilutive Stock Options Excluded from Diluted Weighted Average Shares	2	2	2

Note 10. Debt and Other Financing Arrangements

(Dollars in millions)	Effective Interest Rate at December 31, 2018	December 31, 2018	December 31, 2017
Commercial Paper	0.74%	$ 693	$ 960
Floating Rate 2-Year Senior Notes, Due 8/9/2018 (euro-denominated)		—	721
2.15% 3-Year Senior Notes, Due 12/14/2018		—	450
2.40% 5-Year Senior Notes, Due 2/1/2019		—	900
Floating Rate 2-Year Senior Notes, Due 7/24/2019 (euro-denominated)	0.10%	574	600
6.00% 10-Year Senior Notes, Due 3/1/2020	2.96%	750	750
4.70% 10-Year Senior Notes, Due 5/1/2020	4.23%	300	300
Floating Rate 2-Year Senior Notes, Due 8/7/2020 (euro-denominated)	0.17%	688	—
1.50% 5-Year Senior Notes, Due 12/1/2020 (euro-denominated)	1.62%	487	510
5.00% 10-Year Senior Notes, Due 1/15/2021	3.24%	400	400
4.50% 10-Year Senior Notes, Due 3/1/2021	6.89%	1,000	1,000
3.60% 10-Year Senior Notes, Due 8/15/2021	6.66%	1,100	1,100
3.30% 7-Year Senior Notes, Due 2/15/2022	3.42%	800	800
2.15% 7-Year Senior Notes, Due 7/21/2022 (euro-denominated)	2.28%	574	600
3.15% 10-Year Senior Notes, Due 1/15/2023	3.31%	800	800
3.00% 7-Year Senior Notes, Due 4/15/2023	6.84%	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%	1,147	1,201
2.00% 10-Year Senior Notes, Due 4/15/2025 (euro-denominated)	2.10%	734	768
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%	802	840
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)	1.66%	574	600
3.20% 10-Year Senior Notes, Due 8/15/2027	3.39%	750	750
1.375% 12-Year Senior Notes, Due 9/12/2028 (euro-denominated)	1.46%	688	721
1.95% 12-Year Senior Notes, Due 7/24/2029 (euro-denominated)	2.08%	802	840
2.875% 20-Year Senior Notes, Due 7/24/2037 (euro-denominated)	2.94%	802	840
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
Other		21	24
Total Borrowings at Par Value		19,186	21,175
Fair Value Hedge Accounting Adjustments		(93)	(70)
Unamortized Discount, Net		(21)	(2)
Unamortized Debt Issuance Costs		(82)	(95)
Total Borrowings at Carrying Value		18,990	21,008
Less: Short-term Obligations and Current Maturities		1,271	2,135
Long-term Obligations		$ 17,719	$ 18,873

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 13 for fair value information pertaining to the company's long-term obligations.

As of December 31, 2018, the annual repayment requirements for debt obligations are as follows:

(In millions)	
2019	$ 1,271
2020	2,229
2021	2,504
2022	1,377
2023	1,801
2024 and Thereafter	10,004
	$ 19,186

As of December 31, 2018 and 2017, short-term obligations and current maturities of long-term obligations in the accompanying balance sheet included $693 million and $960 million, respectively, 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% and slightly below 0% at December 31, 2018 and 2017, respectively. In addition to available borrowings under the company's revolving credit agreements, discussed below, the company had unused lines of credit of $68 million as of December 31, 2018. 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, 2018, no borrowings were outstanding under the Facility, although available capacity was reduced by approximately $82 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, 2018, outstanding borrowings under these programs were $693 million, with a weighted average remaining period to maturity of 51 days and are classified as short-term obligations in the accompanying balance sheet.

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 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.

Prior to issuing the 3.00% Senior Notes due 2023, the company had entered into an agreement to hedge its exposure related to the interest rate on the anticipated borrowings (described under the heading *"Cash Flow Hedge Arrangements"* in Note 13) that was terminated in April 2016. The company had a cash outlay of $75 million in 2016 associated with termination of the arrangement, included in other financing activities, net, in the accompanying statement of cash flows.

Interest Rate Swap Arrangements

In 2016, the company terminated certain of its fixed to floating rate swap arrangements. The terminated swaps were accounted for as fair value hedges. As a result of terminating these arrangements, the company received $61 million (excluding accrued interest) in cash in 2016, included in other financing activities, net, in the accompanying statement of cash flows. The proceeds were recorded as part of the carrying value of the underlying debt and will be amortized as a reduction to interest expense over the remaining terms of the respective debt instruments. Subsequently, the company entered into new swap arrangements which are included in the table below.

The company has entered into LIBOR-based interest rate swap arrangements with various banks on several of its outstanding senior notes. The aggregate amounts of the swaps are equal to the principal amounts of the notes and the payment dates of the swaps coincide with the interest payment dates of the notes. 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 13 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, 2018:

(Dollars in millions)	Aggregate Notional Amount	Pay Rate	Pay Rate as of December 31, 2018	Receive Rate
4.50% Senior Notes due 2021 (a)	1,000	1-month LIBOR + 3.4420%	5.7913%	4.50%
3.60% Senior Notes due 2021	1,100	1-month LIBOR + 2.5150%	4.9701%	3.60%
3.00% Senior Notes due 2023 (a)	1,000	1-month LIBOR + 1.7640%	4.2191%	3.00%

(a) The payments on $1.5 billion 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, 2018 from a weighted average of 5.00% to a weighted average of 1.96%.

In 2018, the company entered into $1.5 billion 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. Commitments and Contingencies

Operating Leases

The company leases certain logistics, office, and manufacturing facilities. Income from continuing operations includes expense from operating leases of $211 million, $198 million and $182 million in 2018, 2017 and 2016, respectively. 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

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 $745 million at December 31, 2018 and the majority of these obligations are expected to be settled during 2019.

Letters of Credit, Guarantees and Other Commitments

Outstanding letters of credit and bank guarantees totaled $218 million at December 31, 2018. Substantially all of these letters of credit and guarantees expire before 2025.

Outstanding surety bonds and other guarantees totaled $28 million at December 31, 2018. The expiration of these bonds and guarantees ranges through 2020.

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, 2018 was $38 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.

The company has guaranteed the residual value of three leased operating facilities with initial lease terms ending in 2019, 2020 and 2023. 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.

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 reports prepared by 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, 2018, the company's total environmental liability was approximately $69 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, 2018, was approximately $215 million to $349 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 $204 million at December 31, 2018 (or $221 million undiscounted). The accrual includes estimated defense costs and is gross of estimated amounts due from insurers of $86 million at December 31, 2018 (or $97 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, 2018, the company had a product liability accrual of $10 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 $11 million (net discount $6 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 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 that found the challenged patent claims invalid. The United States Court of Appeals for the Federal Circuit upheld the Patent Trial and Appeal Board's ruling finding the challenged claims in the Unisone patent invalid. Unisone has until March 11, 2019 to file an appeal with the United States Supreme Court.

Note 12. Comprehensive Income and Shareholders' Equity

Comprehensive Income (Loss)

Comprehensive income (loss) 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 Available-for-Sale Investments	Unrealized Losses on Hedging Instruments	Pension and Other Postretirement Benefit Liability Adjustment	Total
Balance at December 31, 2017	(1,755)	(1)	(50)	(197)	(2,003)
Cumulative effect of accounting changes (Note 1)	(54)	1	(11)	(24)	(88)
Other comprehensive income (loss) before reclassifications	(434)	—	—	3	(431)
Amounts reclassified from accumulated other comprehensive items	—	—	9	15	24
Net other comprehensive items	(434)	—	9	18	(407)
Balance at December 31, 2018	(2,243)	—	(52)	(203)	(2,498)

Shareholders' Equity

At December 31, 2018, the company had reserved 30 million unissued shares of its common stock for possible issuance under stock-based compensation plans.

Note 13. 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 2018. The company's financial assets and liabilities carried at fair value are primarily comprised of insurance contracts, investments in money market funds, 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, 2018 and December 31, 2017:

(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

(In millions)	December 31, 2017	Quoted Prices in Active Markets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Assets				
Cash equivalents	$ 22	$ 22	$ —	$ —
Bank time deposits	2	2	—	—
Investments in mutual funds and other similar instruments	13	13	—	—
Warrants	2	—	2	—
Insurance contracts	116	—	116	—
Derivative contracts	10	—	10	—
Total Assets	$ 165	$ 37	$ 128	$ —
Liabilities				
Derivative contracts	$ 139	$ —	$ 139	$ —
Contingent consideration	35	—	—	35
Total Liabilities	$ 174	$ —	$ 139	$ 35

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)	2018	2017
Contingent Consideration		
Beginning Balance	$ 35	$ 6
Acquisitions	11	17
Payments	(8)	(3)
Change in fair value included in earnings	(1)	15
Ending Balance	$ 37	$ 35

Derivative Contracts

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

(In millions)	December 31, 2018	December 31, 2017
Notional Amount		
Interest rate swaps (described in Note 10)	$ 3,100	$ 3,100
Cross-currency interest rate swaps - designated as net investment hedges	1,500	—
Currency exchange contracts	3,424	2,921

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, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Derivatives Designated as Hedging Instruments				
Interest rate swaps (a)	$ —	$ —	$ 129	$ 124
Cross-currency interest rate swaps (b)	28	—	—	—
Derivatives Not Designated as Hedging Instruments				
Currency exchange contracts (c)	3	10	16	15
Total Derivatives	$ 31	$ 10	$ 145	$ 139

(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, 2018	December 31, 2017	December 31, 2018	December 31, 2017
Long-term Obligations	$ 3,291	$ 3,309	$ (93)	$ (70)

(d) Includes increases in the carrying amount of $30 million and $43 million at December 31, 2018 and December 31, 2017, respectively, on discontinued hedging relationships.

	Gain (Loss) Recognized	
(In millions)	2018	2017
Fair Value Hedging Relationships		
Interest rate swaps		
Hedged long-term obligations - included in other expense, net	$ (5)	$ (14)
Derivatives designated as hedging instruments - included in other expense, net	7	19
Derivatives Designated as Cash Flow Hedges		
Interest rate swaps		
Amount reclassified from accumulated other comprehensive items to other expense, net	(12)	(12)
Derivatives Designated as Net Investment Hedges		
Foreign currency-denominated debt		
Included in currency translation adjustment within other comprehensive items	336	(664)
Cross-currency interest rate swaps		
Included in currency translation adjustment within other comprehensive items	28	—
Included in other expense, net	21	—
Derivatives Not Designated as Hedging Instruments		
Currency exchange contracts		
Included in cost of revenues	2	(1)
Included in other expense, net	37	92

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 2015, the company entered into interest rate swap arrangements to mitigate the risk of interest rates rising prior to completion of a debt offering in 2016. Based on the company's conclusion that a debt offering was probable as a result of debt maturing in 2016 and that such debt would carry semi-annual interest payments over a 10-year term, the swaps hedged the cash flow risk for each of the semi-annual fixed-rate interest payments on $1.00 billion of principal amount of the planned fixed-rate debt issue. The hedge was terminated in advance of completing a debt offering in April 2016 (Note 10). The fair value of the hedge at that time, $46 million, net of tax, was classified as a reduction to accumulated other comprehensive items and is being amortized to interest expense over the term of the debt.

Fair Value of Other Financial Instruments

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

(In millions)	December 31, 2018 Carrying Value	December 31, 2018 Fair Value	December 31, 2017 Carrying Value	December 31, 2017 Fair Value
Notes Receivable	$ 92	$ 92	$ 89	$ 93
Debt Obligations:				
Senior notes	$ 18,276	$ 18,322	$ 20,024	$ 20,639
Commercial paper	693	693	960	960
Other	21	21	24	24
	$ 18,990	$ 19,036	$ 21,008	$ 21,623

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 14. Supplemental Cash Flow Information

(In millions)	2018	2017	2016
Cash Paid For:			
Interest	$ 687	$ 533	$ 458
Income Taxes	591	479	663
Non-cash Investing and Financing Activities			
Declared but unpaid dividends	69	61	60
Issuance of stock upon vesting of restricted stock units	170	125	127
Fair value of investments contributed to defined benefit plans	—	—	16

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

(In millions)	December 31, 2018	December 31, 2017
Cash and Cash Equivalents	$ 2,103	$ 1,335
Restricted Cash Included in Other Current Assets	12	24
Restricted Cash Included in Other Assets	2	2
Cash, Cash Equivalents and Restricted Cash	$ 2,117	$ 1,361

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

Note 15. Restructuring and Other Costs, Net

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.

Restructuring and other costs in 2016 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; third-party acquisition transaction and integration costs primarily associated with the acquisitions of FEI and Affymetrix; sales of inventories revalued at the date of acquisition; costs to conform the accounting policies of FEI and Affymetrix to the company's accounting policies; costs to achieve synergies related to acquisitions, including severance and abandoned facility costs; and net charges for environmental and litigation-related matters. These charges were partially offset by gains on sales of assets. In 2016, severance actions associated with facility consolidations and cost reduction measures affected less than 3% of the company's workforce.

As of February 27, 2019, the company has identified restructuring actions that will result in additional charges of approximately $65 million, primarily in 2019, which will be recorded when specified criteria are met, such as communication of benefit arrangements and abandonment of leased facilities.

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.

2016

During 2016, 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	$ 31	$ 36	$ 88	$ 155
Analytical Instruments	63	46	68	177
Specialty Diagnostics	—	—	15	15
Laboratory Products and Services	8	1	17	26
Corporate	—	21	1	22
	$ 102	$ 104	$ 189	$ 395

Life Sciences Solutions

In 2016, the Life Sciences Solutions segment recorded $155 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $31 million, including $27 million for sales of inventories revalued at the date of acquisition and $4 million to conform the accounting policies of Affymetrix to the company's accounting policies. The segment recorded $36 million of charges to selling, general and administrative expenses, including $34 million of third-party transaction and integration costs primarily related to the acquisition of Affymetrix, $4 million for accelerated depreciation at facilities closing due to real estate consolidation, offset in part by credits of $2 million from changes in estimates of contingent acquisition consideration. In addition, the segment recorded $78 million of cash restructuring costs, including $60 million of severance and related costs primarily to achieve acquisition synergies, and $18 million of abandoned facilities costs principally for the consolidation of facilities in the U.S. The segment also recorded $10 million of other costs, net, primarily for charges associated with litigation-related matters at acquired businesses.

Analytical Instruments

In 2016, the Analytical Instruments segment recorded $177 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $63 million, including $21 million to conform the accounting policies of FEI to the

company's accounting policies and $42 million for the sales of inventory revalued at the date of acquisition. The segment recorded $46 million of charges to selling, general, and administrative expense, including $38 million of third-party transaction costs related to the acquisition of FEI, as well as $9 million of charges to conform the accounting policies of FEI to the company's accounting policies. The segment also recorded $68 million of cash restructuring costs primarily for severance obligations payable to former FEI executives and charges associated with abandoned facilities, including remediation and other closure costs of a manufacturing facility in the U.S.

Specialty Diagnostics

In 2016, the Specialty Diagnostics segment recorded $15 million of net restructuring and other charges. These costs were principally comprised of $10 million for charges associated with litigation-related matters and $6 million of cash restructuring costs for severance and other costs associated with headcount reductions and facility consolidations. The segment also recorded $1 million of other income, net, primarily gains on the sale of real estate, offset in part by charges for the settlement of retirement plans.

Laboratory Products and Services

In 2016, the Laboratory Products and Services segment recorded $26 million of net restructuring and other charges. The segment recorded charges to cost of revenues of $8 million, including $6 million for sales of inventories revalued at the date of acquisition, and $2 million for accelerated depreciation at facilities closing due to real estate consolidation. The segment recorded $11 million of cash restructuring costs, primarily for employee severance and other costs associated with headcount reductions and facility consolidations. In addition, the segment recorded $8 million of charges for an increase in environmental remediation cost estimates associated with a Superfund site in the U.S., offset in part by $1 million of gains on the settlement of litigation.

Corporate

In 2016, the company recorded $22 million of restructuring and other costs, principally within selling, general, and administrative expenses, including $17 million of charges for product liability litigation and $4 million of accelerated depreciation on information systems to be abandoned due to integration synergies. The segment also recorded $1 million of restructuring charges for severance and other costs associated with facility consolidation 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, 2015	$ 15	$ 13	$ 3	$ 31
Costs incurred in 2016 (c)	109	46	12	167
Reserves reversed (b)	(2)	—	(1)	(3)
Payments	(83)	(27)	(12)	(122)
Currency translation	(1)	—	—	(1)
Balance at December 31, 2016	38	32	2	72
Costs incurred in 2017 (d)	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 (e)	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

(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 $24 million of provision for losses on litigation-related matters; $8 million of provision for environmental remediation; $5 million of net gains on the sale of real estate; and an aggregate of $3 million of non-cash income, net.

(d) 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.

(e) 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.

The company expects to pay accrued restructuring costs as follows: severance, employee-retention obligations and other costs, primarily through 2019; and abandoned-facility payments, over lease terms expiring through 2027.

Note 16. Unaudited Quarterly Information

	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
Cash Dividend Declared per Common Share	0.17	0.17	0.17	0.17

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.

	2017			
(In millions except per share amounts)	First (a)	Second (b)	Third (c)	Fourth (d)
Revenues	$ 4,765	$ 4,990	$ 5,116	$ 6,047
Gross Profit	2,193	2,284	2,300	2,671
Net Income	551	612	534	528
Earnings per Share:				
Basic	1.41	1.57	1.35	1.32
Diluted	1.40	1.56	1.34	1.30
Cash Dividend Declared per Common Share	0.15	0.15	0.15	0.15

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

(a) Costs of $86 million.

(b) Costs of $30 million.

(c) Costs of $131 million.

(d) Costs of $51 million.

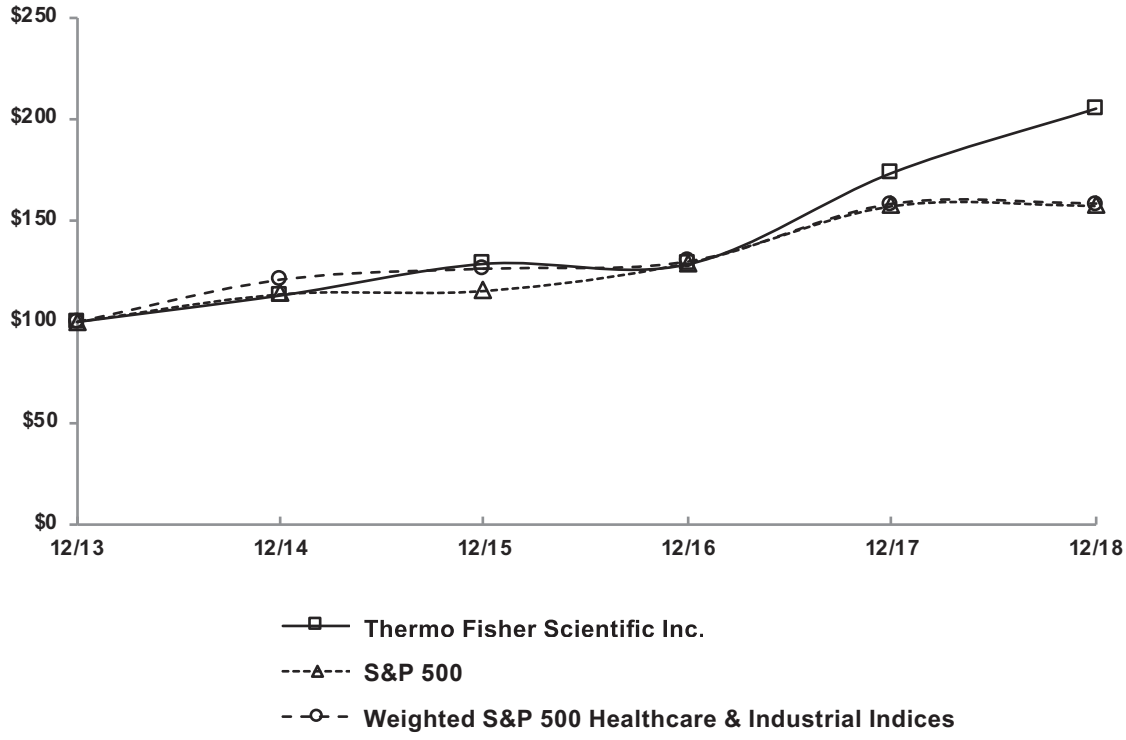
STOCK PERFORMANCE GRAPH

The following graph and table compare Thermo Fisher Scientific's total shareholder return for the five-year period ended December 31, 2018, with the total return for the Standard & Poor's 500 Index and a weighted blend (70/30) of the Standard & Poor's 500 Healthcare and Standard & Poor's 500 Industrial Indices.

The comparison assumes that $100 was invested on December 31, 2013, and that dividends were reinvested. Our common stock is traded on the New York Stock Exchange under the ticker symbol "TMO."

COMPARISON OF FIVE-YEAR CUMULATIVE TOTAL RETURN*

Among Thermo Fisher Scientific Inc., the S&P 500 Index,
and the Weighted S&P 500 Healthcare & Industrial Indices



*$100 invested on 12/31/13 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

	12/13	12/14	12/15	12/16	12/17	12/18
Thermo Fisher Scientific Inc.	100.00	113.07	128.61	128.46	173.45	205.05
S&P 500	100.00	113.69	115.26	129.05	157.22	157.22
Weighted S&P 500 Healthcare & Industrial Indices	100.00	120.68	125.89	129.43	157.60	157.60

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