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, 2021 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)	*(I.R.S. Employer Identification No.)*

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

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

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

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $1.00 par value	TMO	New York Stock Exchange
0.750% Notes due 2024	TMO 24A	New York Stock Exchange
0.125% Notes due 2025	TMO 25B	New York Stock Exchange
2.000% Notes due 2025	TMO 25	New York Stock Exchange
1.400% Notes due 2026	TMO 26A	New York Stock Exchange
1.450% Notes due 2027	TMO 27	New York Stock Exchange
1.750% Notes due 2027	TMO 27B	New York Stock Exchange
0.500% Notes due 2028	TMO 28A	New York Stock Exchange
1.375% Notes due 2028	TMO 28	New York Stock Exchange
1.950% Notes due 2029	TMO 29	New York Stock Exchange
0.875% Notes due 2031	TMO 31	New York Stock Exchange
2.375% Notes due 2032	TMO 32	New York Stock Exchange
2.875% Notes due 2037	TMO 37	New York Stock Exchange
1.500% Notes due 2039	TMO 39	New York Stock Exchange
1.875% Notes due 2049	TMO 49	New York Stock Exchange

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

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

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes ☐ No ☒

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

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

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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 July 2, 2021, the aggregate market value of the voting stock held by nonaffiliates of the Registrant was approximately $201,672,052,000 (based on the last reported sale of common stock on the New York Stock Exchange Composite Tape reporting system on July 2, 2021).

As of February 5, 2022, the Registrant had 391,191,770 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Sections of Thermo Fisher's definitive Proxy Statement for the 2022 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, 2021
TABLE OF CONTENTS

		Page
	PART I	
Item 1.	Business	3
Item 1A.	Risk Factors	17
Item 1B.	Unresolved Staff Comments	25
Item 2.	Properties	25
Item 3.	Legal Proceedings	25
Item 4.	Mine Safety Disclosures	25
	PART II	
Item 5.	Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	25
Item 6.	Reserved	25
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	26
Item 7A.	Quantitative and Qualitative Disclosures About Market Risk	35
Item 8.	Financial Statements and Supplementary Data	36
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	36
Item 9A.	Controls and Procedures	36
Item 9B.	Other Information	37
Item 9C.	Disclosure Regarding Foreign Jurisdictions that Prevent Inspections	37
	PART III	
Item 10.	Directors, Executive Officers and Corporate Governance	38
Item 11.	Executive Compensation	38
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	38
Item 13.	Certain Relationships and Related Transactions, and Director Independence	38
Item 14.	Principal Accountant Fees and Services	38
	PART IV	
Item 15.	Exhibits and Financial Statement Schedules	39
Item 16.	Form 10-K Summary	39

PART I

Item 1. Business

General Development of Business

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

We continuously increase our depth of capabilities in technologies, software and services, and leverage our extensive global channels to address our customers' emerging needs. We do this through organic investments in research and development and through acquisitions. Our goal is to make our customers more productive in an increasingly competitive business environment, and enable them to solve their challenges, from complex research to improved patient care, environmental, industrial quality and process monitoring, and consumer safety.

On December 8, 2021, the company acquired PPD, Inc., a leading global provider of clinical research services to the pharma and biotech industry. The addition of PPD's clinical research services enhances our offering to biotech and pharma customers by enabling them to accelerate innovation and increase their productivity within the drug development process. PPD is now part of our Laboratory Products and Biopharma Services segment.

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 revenues, expenses, earnings, margins, tax rates, tax provisions, cash flows, pension and benefit obligations and funding requirements, and 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; the expected impact of the COVID-19 pandemic on the company's business; 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 Biopharma Services.

During 2021, the Life Sciences Solutions and Specialty Diagnostics segments as well as the laboratory products business continued to support COVID-19 diagnostic testing, scaling and evolving their molecular diagnostics solutions and plastic consumables businesses to respond to the on-going COVID-19 pandemic. The biosciences and bioproduction businesses also expanded their capacity to meet the needs of pharma and biotech customers as they rapidly expanded their own production volumes to meet global vaccine manufacturing requirements. Additionally, through our pharma services business, we provided our pharma and biotech customers with the services they needed to develop and produce vaccines and therapies globally.

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 infection

and disease. These products and services are used by customers in pharmaceutical, biotechnology, agricultural, clinical, healthcare, 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 diagnose infection and disease, such as COVID-19.

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, toxicology research and diagnostic testing.
- 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 precast 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, healthcare and applied markets.

Our offerings include real-time polymerase chain reaction (PCR) technology used to identify changes in gene expression, genotyping or proteins on an individual gene-by-gene basis and for diagnostic testing to identify infection and disease such as COVID-19; capillary electrophoresis (CE) sequencing, a core technology used in DNA sequencing and fragment analysis and forensic analysis applications; and microarray technology, used in gene expression, genotyping and reproductive health.

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

Clinical Next-Generation Sequencing

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

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, including the COVID-19 vaccine. We also provide our customers with the associated services to optimize the productivity of these production platforms.

- Chromatography products, which deliver superior capacity and resolution for process-scale bioseparations, and offer a broad set of scalable options for the purification of antibodies, antibody fragments and proteins.
- Rapid molecular products that deliver accurate results in less than four hours for contaminant detection, identification and quantitation.
- Scalable solutions for the manufacture of cell therapy-based drugs.

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

Analytical Instruments Segment

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

Chromatography and Mass Spectrometry

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

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

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

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

- *Life Sciences Mass Spectrometers* include triple quadrupole and Orbitrap technologies. Our triple quadrupole systems provide high-performance quantitative analysis of chemicals in biological fluids, environmental samples and food

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

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

Chemical Analysis

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

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

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

Electron Microscopy

Our electron microscopy business (formerly known as materials and structural analysis business) includes electron microscopy, molecular spectroscopy and bulk elemental analysis instruments that are used by customers in life sciences, materials sciences, semiconductor and industrial markets to accelerate breakthrough discoveries.

Business (continued)

- *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 a range of surface analysis instruments commonly used in the semiconductor, metals, coatings, and polymer industries as a product development and failure analysis tool. We also provide 3D visualization software that turns the data and images generated by a broad range of instruments into 3D visualizations of the microscopic sample, allowing for 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.
- *Bulk Elemental Analysis Instruments* and analyzers use XRF, X-ray diffraction (XRD), and arc spark optical emission (OES) techniques for accurate and precise analysis of bulk materials in the metals, cement, minerals, and petrochemicals industries.

Specialty Diagnostics Segment

Our Specialty Diagnostics segment offers a wide range of diagnostic test kits, reagents, culture media, instruments and associated products in order to serve customers in healthcare, clinical, pharmaceutical, industrial, and food safety laboratories. Our healthcare products are used to increase the speed and accuracy of diagnoses, which improves patient care in a more cost-efficient manner. This segment has five primary businesses – Clinical Diagnostics, ImmunoDiagnostics, Microbiology, Transplant Diagnostics and our Healthcare Market Channel.

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 COVID-19 testing; 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. 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.

Business (continued)

Microbiology

Our microbiology offerings include dehydrated and prepared culture media, collection and transport systems, instrumentation and consumables to detect pathogens in blood, diagnostic and rapid direct specimen tests, quality-control products and associated products for the microbiology laboratory. Our products help customers worldwide to diagnose infectious disease; determine appropriate antimicrobial therapy; implement effective infection control programs; and detect microbial contamination of their products or manufacturing facilities.

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

Transplant Diagnostics

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

Healthcare Market Channel

Our healthcare market channel offerings include a broad array of consumables, diagnostic kits and reagents, equipment, instruments, solutions and services for hospitals, clinical laboratories, reference laboratories, physicians' offices and other clinical testing facilities. These products are manufactured by Thermo Fisher and third parties and are primarily used in clinical diagnosis. We go to market through our expert sales force, segment-relevant printed collateral and digital content, and a state-of-the-art website, www.fishersci.com/healthcare, containing full product content for more than 1.5 million products.

Laboratory Products and Biopharma Services Segment

Our Laboratory Products and Biopharma Services segment (formerly known as Laboratory Products and Services) 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 research, clinical trials services and commercial drug manufacturing. We serve the pharmaceutical, biotechnology, academic, medical device, government and other research and industrial markets, as well as the clinical laboratory market through five key businesses: Laboratory Products, Laboratory Chemicals, Research and Safety Market Channel, Pharma Services and Clinical Research.

Laboratory Products

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

- *Laboratory Equipment Technologies* includes our leading laboratory refrigerators and freezers, ultralow-temperature freezers and cryopreservation storage tanks for maintaining samples in a cold environment to protect them from degradation. We also offer temperature control products such as heated bath circulators, immersion coolers, recirculating chillers, water baths, and dry baths in a range of sizes, temperatures and configurations for life science, analytical chemistry, manufacturing and quality-control applications. In addition, we offer sample preparation and preservation equipment, which protects our customers' chemical and biological samples and supports the growth of cells and organisms in optimal conditions such as temperature, carbon dioxide and humidity, as well as incubators and related products. We also offer centrifugation products, which are used to separate biological matrices and inorganic materials, including microcentrifuges, general use bench-top centrifuges and floor models. Additionally, we offer biological safety cabinets, which enable technicians to handle samples without risk to themselves or their environment and without risk of cross-contamination of samples.
- *Water and Laboratory Products* include water analysis instruments such as meters, electrodes and solutions for the measurement of pH, ions, conductivity, dissolved oxygen, turbidity and other key parameters in the lab and production

line. We also offer other laboratory equipment such as water purification systems, shakers, vacuum concentrators, microbiological incubators, ovens, furnaces, hotplates, stirrers, stirring hotplates, and other related products.

- *Laboratory Plastics Essentials* include a leading offering of laboratory pipette tips and a complementary range of handheld and automated pipetting systems, supporting low- through high-throughput activity. These products optimize productivity and ergonomics and ensure accurate results. We also offer sample preparation and storage products such as centrifugation consumables as well as vials and organization systems for ultralow temperature and cryogenic storage, with specific products designed for low protein binding and low DNA binding and containers for packaging life science and diagnostic reagents as well for the storage and transport of bulk intermediates and active pharmaceutical ingredients. Additionally, our offerings include a complete selection of clinical specimen collection products, drug-of-abuse collection kits and environmental and food-safety glass and plastic vials, bottles and containers, plastic transfer pipettes, general purpose clinical laboratory consumables and containers for breast milk collection, storage and feeding primarily used in neo-natal units and by lactation specialists. We also provide OEM and custom kit assembly services for clinical and drugs-of-abuse test kits.

Laboratory Chemicals

Our laboratory chemicals offering comprises a broad range of chemicals, solvents and reagents supporting virtually every laboratory application – from research and drug discovery to 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 four 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 markets.

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.

Business (continued)

- *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. We also provide a full range of viral vector development and manufacturing services for customers developing and commercializing gene and cell therapies, including process development, optimization, scale-up, analytical development and qualification of viral vectors for commercial manufacturing. Our breadth of vector platform includes the five most widely used virus types, providing extensive coverage across the gene and cell therapy landscape.
- *Drug Product Services* - We manufacture both small-molecule and large-molecule products for customers in conventional and specialized dosage forms. We differentiate ourselves by our breadth of dosage forms and specialized capabilities in both oral solid and sterile dosage forms. We provide a wide spectrum of advanced formulation, production and technical services and scientific expertise and solutions, from the early stages of a product's development to regulatory approval and commercial scale production.
- *Clinical Trials Services* - We provide a comprehensive global supply chain offering 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; clinical supply-chain planning and management; and a global distribution logistics network.
- *Advanced Therapy Services* - We provide a global network of cell and gene therapy development, manufacturing and supply chain services for Plasmid, mRNA drug substance and cell therapy manufacturing.

Clinical Research

We offer comprehensive, integrated clinical development and analytical services to our biopharmaceutical, biotechnology, government and academic customers. Our clinical development services include all phases of development (i.e., Phases I-IV), peri- and post-approval and site and patient access services. Our analytical services include a range of high-value, advanced testing services, including bioanalytical, biomarker, vaccine, cGMP and central laboratory services.

- *Clinical Development Services* - Within our clinical development services business, we provide early development and clinical research management services, site and patient access services, and peri- and post-approval services.

  Through our early development and clinical research management services offering, we provide comprehensive support to early clinical development programs, including Phase I trials. We conduct early-phase studies at our dedicated in-patient clinical facilities and complement these Phase I clinical research units with a global network of affiliated clinical trial sites. We also provide full-service protocol management for Phases II-IV clinical research studies for investigational new drugs, biologics and medical devices. Our suite of services for Phases II-IV clinical trials includes protocol design; clinical trial strategic feasibility and investigator site selection; project management; site study startup activities; patient recruitment; clinical monitoring and data capture; data management; biostatistics; safety medical monitoring/pharmacovigilance; regulatory affairs; medical writing; global clinical supplies; eClinical services; quality assurance; and virtual and digitally enabled trial solutions.

  Through our site and patient access services offering we combine our unique-in-industry patient recruitment capability with a large independent network of dedicated clinical research investigator sites to offer services to complement the traditional site selection model, speeding study enrollment through efficient and predictive centralized recruitment while leveraging our network sites exclusively or in conjunction with independent investigators.

  Through our peri- and post-approval services offering, we provide real-world research and evidence-based solutions to demonstrate the real-world effectiveness, safety, and value of biopharmaceutical and biotechnology products. We also provide industry inbound and outbound peri- and post-approval contact center solutions focused on medical and clinical support to the biopharmaceutical industry.
- *Analytical Services* - We own and operate an integrated and scaled suite of laboratory services. Our bioanalytical laboratories analyze drug and metabolite concentrations from biological fluid and tissue samples within preclinical and human clinical studies. Our biomarker laboratory is closely aligned with both the central laboratories and bioanalytical laboratories to provide customized solutions for biomarker projects, including ligand binding, flow cytometry and molecular genomics. We also perform testing for vaccines, such as immunogenicity testing to evaluate the efficacy of vaccines in inducing cellular and humoral immune responses, and employ molecular detection methods, such as

Business (continued)

polymerase chain reaction testing to detect the absence of pathogens or to characterize attenuated vaccine strains following administration of a vaccine. We provide early preclinical development through post-approval testing services and product analysis laboratory services that are designed to be compliant with cGMPs, and our central laboratories provide highly standardized safety and biomarker testing services with customized results databases for our customers.

Sales and Marketing

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

We offer our products and services through leading brands including:

- The Thermo Scientific brand offers customers in research, diagnostics, industrial, and applied markets a complete range of high-end analytical instruments as well as laboratory equipment, software, services, consumables and reagents. Our portfolio of products includes innovative technologies for mass spectrometry, chromatography, elemental analysis, electron microscopy, molecular spectroscopy, sample preparation, informatics, chemical research and analysis, cell culture, bioprocess production, cellular, protein and molecular biology research, allergy testing, drugs-of-abuse testing, therapeutic drug monitoring testing, microbiology, as well as environmental monitoring and process control.
- The Applied Biosystems brand offers customers in research, clinical and applied markets integrated instrument systems, reagents, and software for genetic analysis. Our portfolio includes innovative technologies for genetic sequencing and real-time, digital and end point PCR, that are used to determine meaningful genetic information in applications such as COVID-19 testing, cancer diagnostics, human identification testing, and animal health, as well as inherited and infectious disease.
- The Invitrogen brand offers life science customers a broad range of consumables and instruments that accelerate research and ensure consistency of results. Our portfolio of products includes innovative solutions for cellular analysis and biology, flow cytometry, cell culture, protein expression, synthetic biology, molecular biology and protein biology.
- Fisher Scientific is our channels brand, offering customers a complete portfolio of laboratory equipment and consumables, chemicals, supplies and services used in scientific research, healthcare, safety, and education markets. These products are offered through an extensive network of direct sales professionals, segment-relevant printed collateral and digital content, a state-of-the-art website, and supply-chain management services.
- Unity Lab Services is our instrument and equipment services brand, offering a complete portfolio of services from enterprise-level engagements to individual instruments and laboratory equipment, regardless of the original manufacturer. Through our network of world-class service and support personnel, we provide services that are designed to help our customers improve productivity, reduce costs, and drive decisions with better data.
- Patheon is our contract development and manufacturing brand, representing the comprehensive offering of services that we provide to customers ranging from small biotech to large pharmaceutical companies. We support our customers' development of innovative medicines, including biologics, gene therapies and vaccines. By leveraging our expanding global network of facilities, we deliver high-quality services at all stages of the drug lifecycle, from discovery to development through clinical trials services and commercial manufacturing.
- PPD is our clinical research services brand, helping customers in the biopharmaceutical industry bring their medicines and other treatments to patients around the world. Our clinical development services include all phases of development (i.e., Phases I-IV), peri- and post-approval and site and patient access services. Our analytical services offer a range of high-value, advanced testing services, including bioanalytical, biomarker, vaccine, cGMP and central laboratory services.

We have approximately 15,000 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.

Business (continued)

Resources

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. No single supplier is material, although for reasons of quality assurance, regulatory requirements, cost effectiveness, availability or uniqueness of design, certain materials components may be sourced from a single supplier or a limited number of suppliers that can readily provide such materials or components.

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.

For a discussion of risks related to our supply chain and raw material and fuel prices, refer to "Risk Factors" in Part I, Item 1A.

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 intellectual property rights.

All trademarks, trade names, product names, graphics and logos of Thermo Fisher contained herein are trademarks or registered trademarks of Thermo Fisher or its subsidiaries, as applicable, in the United States and/or other countries. Solely for convenience, we may refer to trademarks in this Annual Report on Form 10-K without the ™ and ® symbols. Such references are not intended to indicate, in any way, that we will not assert, to the fullest extent permitted by law, our rights to our trademarks. To the extent other trademarks appear in this Annual Report on Form 10-K, they are the property of their respective owners.

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.

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, third-party distributors and service providers. 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.

Business (continued)

Government Regulation

Environmental Regulations

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

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

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

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

Our Fair Lawn and Somerville, New Jersey facilities entered into administrative consent orders with the New Jersey Department of Environmental Protection in 1984 to maintain groundwater-remediation activities at these sites, and are currently under the State's Licensed Site Remediation Professional Program. As the owner of the Fair Lawn facility, we are listed as a potentially responsible party for remediation within an area called the Fair Lawn Wellfields Superfund Site, and, in 2008, the company and certain other parties entered into a consent order with the USEPA to complete a Remedial Investigation/Feasibility Study. In 2018, the USEPA issued a Record of Decision, setting forth the scope of required remediation work at the site, which includes upgrading a water treatment plant to address constituents such as chlorinated organic compounds, 1,4-dioxane, and perfluorooctanoic acid/perfluorooctane sulfonate (PFOA/PFOS). In 2020, the court approved a consent decree that requires the company and another responsible party to finance and perform the required remediation work with USEPA oversight.

In 2011, our Life Technologies subsidiary entered into a consent decree with the USEPA and other responsible parties to implement a groundwater remedy at the former Davis Landfill Superfund site in Smithfield, Rhode Island. After years of additional study, in September, 2020, USEPA revised its cleanup plan by selecting an interim remedial approach that includes groundwater treatment followed by additional monitoring of site conditions. Depending on the results of these treatment and monitoring activities over the next several years, USEPA anticipates selecting a final groundwater remedy for the site. In November 2021, the 2011 consent decree was amended to reflect the parties' obligations to implement USEPA's interim remedy.

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 $65 million at December 31, 2021.

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. For a discussion of the environmental laws and regulations that the Company's operations, products and services are subject to and other environmental contingencies, refer to Note 12 to our Consolidated Financial Statements – Commitments and Contingencies.

Business (continued)

Other Laws and Regulations

Our operations, and some of the products and services we offer, are subject to a number of complex and stringent laws and regulations governing the development, testing, approval, 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, no such laws or regulations have 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 revenues 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 also result in suspension of these contracts, criminal, civil and administrative penalties or debarment.

For a discussion of risks related to changes in governmental regulations, refer to "Risk Factors" in Part I, Item 1A.

Human Capital

The success of Thermo Fisher is fueled by colleagues who are highly engaged and feel empowered to achieve their goals. Everything we do starts with our Mission – to enable our customers to make the world healthier, cleaner and safer. Our colleagues understand the role they play in fulfilling that Mission and that inspires them to bring their best to work each day. Our Mission is not only a differentiator for us externally, but a motivator for us internally.

Our culture is rooted in our 4i Values of Integrity, Intensity, Innovation and Involvement. Within this framework, we strive to create a safe, fair and positive working environment for our colleagues around the world. We want our teams to feel they have a stake in our success, a voice in our direction and to be empowered to make a difference for the key stakeholders we serve.

Every year, we conduct an Employee Involvement Survey to solicit direct feedback from our colleagues on what we're doing well and where we need to improve. We then compile the feedback to measure our progress using three key indices: Leadership, Involvement and Inclusion. In 2021, 86 percent of our workforce completed the survey, and we saw marked improvement in each index and across nearly every survey question, despite the challenges of a sustained pandemic environment. Our continued focus on enhancing our culture helps position our company to be an even better place to work.

We are committed to maintaining the strongest team in our industry, focusing on developing and retaining our colleagues, while leveraging our leadership to attract new colleagues to our company. As of December 31, 2021, we employed approximately 130,000 colleagues globally, with an approximate regional distribution as follows: 67,000 based in the Americas, 20,000 in the Asia Pacific region, and nearly 42,000 in Europe, the Middle East and Africa (EMEA).

Diversity and Inclusion

We recognize that the future aspirations outlined in our Vision for 2030, which serves as our long-term roadmap, will only be achievable if we have a culture that values diversity and inclusion. While diversity of gender and ethnicity are important – and we're focused on continuously improving– for us, diversity of backgrounds, experiences and viewpoints is equally vital to our long-term success. When those differences are welcomed and supported, we create an inclusive workplace that unlocks the true benefits of diversity.

Diversity and Inclusion (D&I) is not an initiative at Thermo Fisher. It's woven into the fabric of our culture, and our colleagues are encouraged to openly share the wide range of perspectives they represent. We work together to create an inclusive culture where our colleagues feel they belong and are empowered to contribute, collaborate and innovate. Embracing individual differences is critical to our success. For example, Thermo Fisher was named as a Top 100 Female Friendly Employer by Forbes in 2021 as well as a Best Place to Work for LGBTQ Equality for the seventh consecutive year. Establishing this kind of environment is critical in empowering our colleagues so they can contribute their best ideas and bring their true selves to work each day.

Our D&I focus is embedded in every stage of our colleague lifecycle – from recruiting to onboarding, training, development and longer-term career planning. We track our progress on our D&I strategic objectives through a core set of metrics that are reviewed during routine business operating mechanisms, including Quarterly Business Reviews, Human Resource Reviews, Board Reviews and through team dashboards that are shared each month with leaders across the company. This enables frequent, meaningful, data-driven discussions across our businesses and functions on a range of D&I factors, including gender and ethnic representation. This approach also ensures we consistently prioritize our opportunities to improve. We understand the critical role diversity plays in sustained business success, and our teams are empowered to ensure our workforce represents the customers we serve. Further, to provide additional transparency to our U.S. workforce demographics, in 2021, following our report submission to the U.S. Equal Employment Opportunity Commission, we disclosed our EEO-1 report on our website and we plan to continue to do so on an annual basis.

We are committed to ensuring our colleagues have access to resources, awareness training and internal networks that offer support and guidance. Our D&I strategy is greatly enabled by our Employee Resource Groups (ERGs), which bring together individuals with similar interests to share experiences, learn from each other and collaborate to identify solutions to business challenges. Our ERGs reinforce that all colleagues can make a difference for our customers, for each other and for our company. As of December 31, 2021, we had 10 ERGs globally, with more than 220 local ERG chapters.

Talent Development

Our overarching goal from a talent perspective is to create opportunities for our colleagues to achieve their full potential and career aspirations here at Thermo Fisher. We are committed to creating an exceptional colleague experience from their first day throughout their career with us. We focus on the entire lifecycle of a colleague's career, from their initial recruitment, to onboarding, through ongoing development and training to enhance their skills so they are in the best position to deliver on their goals and achieve their career aspirations.

In today's environment, we know talent is a key competitive advantage, and that building the strongest team in the industry is critical to our future. From our colleague referral program, summer internships, university relations, to our Graduate Leadership Development Program, we continue to build strong internal and external sourcing channels.

Once on board, talent development at Thermo Fisher is a key organizational capability. We continue to make significant investments to support our colleagues along every step of their career journey to help support their success. Our talent development framework incorporates a multi-faceted approach, including formal and self-paced training, networking opportunities, on-the-job stretch learning, coaching, mentoring and manager training utilizing contemporary technology solutions to support the broad needs of our workforce.

We provide multiple programs at all career levels, from online learning for all colleagues through Thermo Fisher University, to focused trainings for managers at various experience levels, to our Global Leadership Program for executives. We also support our colleagues' career advancement through our tuition reimbursement program.

In a company our size, we can also actively manage our talent through rotational opportunities across our businesses, functions and geographies that help our colleagues gain new experiences, share knowledge and broaden their skills. Our executives and leaders participate in frequent talent discussions as well as formal reviews, leveraging workforce data and predictive analytics to better anticipate the talent requirements of our business based on our growth opportunities and market demand.

Thermo Fisher is dedicated to talent development to meet our evolving business needs and to provide our colleagues with opportunities for long and fulfilling careers. Our colleagues are passionate about our company, and their role in our success, and it's our responsibility to help them reach their full potential.

Total Rewards

We offer a comprehensive total rewards package that we regularly evaluate and measure against established benchmarks to ensure its effectiveness in recruiting and retention, and to position Thermo Fisher as an employer of choice. In 2021, we reinvested an incremental $1 billion back into our global workforce in the form of pay, benefits, and workplace enhancements.

Our health and wellness programs provide competitive, flexible programs that our global colleagues and their families can count on. For example, for U.S. colleagues, we offer a choice of comprehensive national medical, dental and vision plans; a wellness program, including valuable health incentive opportunities and tax-advantaged savings and spending accounts; as well as commuter benefits, employee assistance programs, optional group legal coverage, and company-paid disability, accident and life insurance. We also offer a company-paid proprietary program for cancer care called the Impact Program, which gives our colleagues and their families access to personalized support and direct lines of communication to experts in cancer genetics and genomics. Similar benefits are available in all countries around the world where we operate.

Business (continued)

We also invest in our colleagues' financial health, helping them to grow and protect their savings, plan for the future and share in the success of the company they are helping to build. We deliver comprehensive rewards, including competitive base pay, and also provide a variety of incentive and equity programs that, by design, directly link the impact of colleague contributions to the company's overall success.

Disclosure Pursuant to Section 13(r) of the Exchange Act

In March 2021, the Russian Federal Security Service (the FSB) was designated as a blocked party under Executive Order 13382. During the quarter ended December 31, 2021, one of our Russian affiliates responded to an official inquiry from FSB in connection with the validity of certain product warranties on certain instruments sold by a reseller of the Russian affiliate to a health center based in Russia. This interaction did not result in any revenue or otherwise contribute to our net income for the quarter and all such dealings were legal and authorized by General License 1B issued by the U.S. Department of the Treasury's Office of Foreign Assets Control. We expect our Russian affiliate to respond to similar regulatory inquiries in the future, as necessary and to the extent permitted by applicable U.S. sanctions laws and regulations.

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.

Information about Our Executive Officers

As of February 24, 2022, our executive officers were:

Name	Age	Present Title (Fiscal Year First Became Executive Officer)	Other Positions Held
Marc N. Casper	53	Chairman, President and Chief Executive Officer (2001)	President and Chief Executive Officer (2009-2020) Chief Operating Officer (2008-2009) Executive Vice President (2006-2009)
Mark P. Stevenson	59	Retiring Executive Vice President and Chief Operating Officer (2014)	Executive Vice President and Chief Operating Officer (2017-2021) Executive Vice President and President, Life Sciences Solutions (2014-2017) President and Chief Operating Officer, Life Technologies Corporation (2008-2014)
Michel Lagarde	48	Executive Vice President and Chief Operating Officer (2017)	Executive Vice President (2019-2021) Senior Vice President and President, Pharma Services (2017-2019) President and Chief Operating Officer, Patheon N.V. (2016-2017) Managing Director, JLL Partners* (2008-2016)
Gianluca Pettiti	43	Executive Vice President (2021)	Senior Vice President and President, Specialty Diagnostics (2019-2021) President, Biosciences (2018-2019) President, China (2015-2017)
Michael A. Boxer	60	Senior Vice President, General Counsel and Secretary** (2018)	Executive Vice President and Group General Counsel, Luxottica Group S.p.A. (2011-2017)
Stephen Williamson	55	Senior Vice President and Chief Financial Officer (2015)	Vice President, Financial Operations (2008-2015)
Joseph R. Holmes	43	Vice President and Chief Accounting Officer (2021)	Senior Director, Technical Accounting (2017-2021)

*JLL Partners is a private equity firm focused on healthcare.
**Assumed additional role of Secretary effective November 5, 2021.

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".

Industry and Economic Risks

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

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, continue to be unstable (including as a result of the COVID-19 pandemic), 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.

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 2021, currency translation had a favorable effect of $619 million on revenues due to the weakening of the U.S. dollar relative to other currencies in which the company sells products and services.

Some emerging market countries may be particularly vulnerable to periods of global and local political, legal, regulatory and financial instability, including issues of geopolitical relations, the imposition of international sanctions in response to certain state actions and/or sovereign debt issues, and may have a higher incidence of corruption and fraudulent business practices. As a result of these and other factors, our strategy to grow in emerging markets may not be successful, and growth rates in these markets may not be sustainable.

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

- interruption to transportation flows for delivery of parts to us and finished goods to our customers;
- changes in a specific country's or region's political, economic or other conditions;
- changes in diplomatic and trade relationships, including new tariffs, trade protection measures, import or export licensing requirements, trade embargoes and sanctions and other trade barriers;
- tariffs imposed by the U.S. on goods from other countries and tariffs imposed by other countries on U.S. goods, including the tariffs adopted by the U.S. government on various imports from China and by the Chinese government on certain U.S. goods;

Risk Factors (continued)

- the impact of public health epidemics/pandemics on the global economy, such as the COVID-19 pandemic;
- uncertainties regarding the collectability of accounts receivable;
- the imposition of governmental controls;
- diverse data privacy and protection requirements;
- supply interruptions, which could disrupt our ability to produce our products;
- 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;
- the effects of the U.K.'s departure from the E.U., known as Brexit; and
- geopolitical uncertainty or turmoil, including terrorism and war.

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.

We are subject to risks associated with public health crises and epidemics/pandemics, such as the COVID-19 pandemic. Our global operations expose us to risks associated with public health crises and epidemics/pandemics, such as COVID-19. The global spread of COVID-19 has created significant volatility, uncertainty and worldwide economic disruption, resulting in an economic slowdown of potentially extended duration.

COVID-19 has had an adverse impact on certain of our operations, supply chains and distribution systems, including as a result of impacts associated with preventive and precautionary measures that we, other businesses and governments are taking. National, state and local governments have implemented and may continue to implement safety precautions, including quarantines, border closures, increased border controls, travel restrictions, shelter in place orders and shutdowns and other measures. These measures may disrupt normal business operations and may have significant negative impacts on businesses and financial markets worldwide.

The company has mobilized to support the COVID-19 response with products and services that help diagnose the virus as well as assisting customers to develop therapeutics and vaccines used to protect from the virus. Our ability to continue to manufacture products is highly dependent on our ability to maintain the safety and health of our factory employees. The ability of our employees to work may be significantly impacted by individuals contracting or being exposed to COVID-19. While we are following the requirements of governmental authorities and taking preventative and protective measures to prioritize the safety of our employees, these measures may not be successful, and we may be required to temporarily close facilities or take other measures. While we are staying in close communication with our sites, employees, customers and suppliers and acting to mitigate the impact of this dynamic and evolving situation, the duration and extent of the effect of COVID-19 on the company is not determinable.

In addition, several of the company’s businesses have had an increase in revenues due to sales of products addressing diagnosis and treatment of COVID-19. While these positive impacts are expected to continue into 2022, the duration and extent of future revenues from such sales are uncertain and dependent primarily on customer testing demand.

Business Risks

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 revenues 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 revenues.

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

- strengthening our presence in selected geographic markets;
- allocating research and development funding to products with higher growth prospects;
- developing new applications for our technologies;
- expanding our service offerings;
- continuing key customer initiatives;
- combining sales and marketing operations in appropriate markets to compete more effectively;
- finding new markets for our products; and
- continuing the development of commercial tools and infrastructure to increase and support cross-selling opportunities of products and services to take advantage of our depth in product offerings.

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

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.

Integrating PPD into our business may be more difficult, costly or time consuming than expected and the anticipated benefits and cost savings of the transaction may not be fully realized. The success of the PPD acquisition, including the realization of anticipated benefits and cost savings, depends, in part, on our ability to successfully integrate PPD into our business. The integration is a difficult, costly and time-consuming process. It is possible that the integration process could result in the loss of key employees or the disruption of our ongoing business or that the alignment of standards, controls, procedures and policies may adversely affect our ability to maintain relationships with clients, customers, suppliers and employees or to fully achieve the anticipated benefits and cost savings of the transaction. The loss of key employees could adversely affect our ability to successfully conduct our business in the markets in which PPD now operates, which could have an adverse effect on our financial results.

If we experience difficulties with the integration process, the anticipated benefits and cost savings of the PPD acquisition may not be realized fully or at all, or may take longer to realize than expected, and our business may be unable to grow as planned, which could materially impact our business, cash flow, financial condition or results of operations as well as adversely impact our share price. The integration process may also result in significant expenses and charges, both cash and noncash.

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, as well as disputes or litigation. 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 $41.92 billion and $1.24 billion, respectively, as of December 31, 2021. In addition, we have definite-lived intangible assets totaling $18.88 billion as of December 31, 2021. We assess the realizability of goodwill and indefinite-lived intangible assets annually as well as whenever events or changes in circumstances indicate that these assets may be impaired. We assess the realizability of definite-lived intangible assets whenever events or changes in circumstances indicate that these assets may be impaired. These events or circumstances would generally include operating losses or a significant decline in earnings associated with the acquired business or asset. Our ability to realize the value of the goodwill and intangible assets will depend on the future cash flows of these businesses. These cash flows in turn depend in part on how well we have integrated these businesses. If we are not able to realize the value of the goodwill and intangible assets, we may be required to incur material charges relating to the impairment of those assets.

Operational Risks

Our reliance upon sole or limited sources of supply for certain materials or components could cause production interruptions, delays and inefficiencies. Some of our businesses purchase certain materials from sole or limited source suppliers for reasons of quality assurance, regulatory requirements, cost effectiveness, availability or uniqueness of design. If these or other suppliers encounter financial, operating or other difficulties or if our relationship with them changes, we might not be able to quickly establish or qualify replacement sources of supply. The supply chains for our businesses could also be disrupted by supplier capacity constraints, bankruptcy or exiting of the business for other reasons, decreased availability of key raw materials or commodities and external events such as natural disasters, pandemic health issues such as COVID-19, war, terrorist actions, governmental actions and legislative or regulatory changes. Any of these factors could result in production interruptions, delays, extended lead times and inefficiencies.

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

We also rely on our information technology systems to process, transmit and store electronic information (including sensitive data such as confidential business information and personally identifiable data relating to employees, customers and other business partners) and to manage or support a variety of critical business processes and activities (such as interacting with suppliers, selling our products and services, fulfilling orders and billing, collecting and making payments, shipping products, providing services and support to customers, tracking customer activity, fulfilling contractual obligations and otherwise conducting business). Our systems may be vulnerable to damage or interruption from natural disasters, power loss, telecommunication failures, terrorist attacks, computer hackers, computer viruses, ransomware, phishing, computer denial-of-service attacks, unauthorized access to customer or employee data or company trade secrets, and other attempts to harm our systems. Certain of our systems are not redundant, and our disaster recovery planning is not sufficient for every eventuality. Despite any precautions we may take, such problems could result in, among other consequences, interruptions in our services, which could harm our reputation and financial results. Our key business partners face similar risks and any security breach of their systems could adversely affect our security posture. 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. Our liability insurance may not be sufficient in type or amount to cover us against claims related to security breaches, cyber-attacks and other related breaches.

If we are unable to maintain reliable information technology systems and appropriate controls with respect to global data privacy and security requirements and prevent data breaches, we may suffer regulatory consequences in addition to business consequences. As a global organization, we are subject to data privacy and security laws, regulations, and customer-imposed

controls in numerous jurisdictions as a result of having access to and processing confidential, personal and/or sensitive data in the course of our business. For example, in the U.S., individual states regulate data breach and security requirements and multiple governmental bodies assert authority over aspects of the protection of personal privacy. European laws require us to have an approved legal mechanism to transfer personal data out of Europe, and the EU General Data Protection Regulation imposes significantly stricter requirements in how we collect and process personal data. Several countries, such as China and Russia, have passed laws that require personal data relating to their citizens to be maintained on local servers and impose additional data transfer restrictions. Government enforcement actions can be costly and interrupt the regular operation of our business, and data breaches or violations of data privacy laws can result in fines, reputational damage and civil lawsuits, any of which may adversely affect our business, reputation and financial statements.

We may have difficulty attracting and retaining a highly qualified workforce. Our success is largely dependent upon our ability to attract and retain highly qualified scientific, technical, clinical and management workforce in a highly competitive environment. Qualified individuals are in high demand, and we may incur significant costs to attract them. We may face difficulty in attracting and retaining key talent for a number of reasons, including management changes or recruitment by competitors. Our ability to attract and retain key talent also depends in part on how well we maintain a strong workplace culture that is attractive to employees. We cannot ensure that we will be able to hire or retain the personnel necessary for our operations or that the loss of any personnel will not have a material impact on our financial condition and results of operations.

We may incur unexpected costs from increases in fuel and raw material prices, which could reduce our earnings and cash flows. 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.

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.

Natural disasters, public health crises, political crises, and other catastrophic events or other events outside of our control may disrupt our facilities or the facilities of third parties on which we depend, and could impact customer spending. We have significant operations in California, near major earthquake faults, which make us susceptible to earthquake risk. An earthquake or other natural disaster such as a fire or hurricane or power shortages or outages could disrupt our operations or impair our critical systems. Any of these disruptions or other events outside of our control, such as strikes or other labor unrest, could have an adverse effect on our results of operations. In addition, if any of our facilities, including our manufacturing or warehouse facilities, or the facilities of our suppliers, third-party service providers, or customers, is affected by natural disasters, such as earthquakes, tsunamis, power shortages or outages, floods or monsoons, public health crises, such as pandemics and epidemics, political crises, such as terrorism, war, political instability or other conflict, or other events outside of our control, such as trade protectionism, strikes or other labor unrest, our results of operations could be adversely affected. Moreover, these types of events could negatively impact customer spending in the impacted regions or depending upon the severity, globally, which could also adversely impact our operating results.

Increasing attention to environmental, social and governance matters may impact our business, financial results or stock price. Companies across all industries are facing increasing scrutiny from stakeholders related to their environmental, social and governance (ESG) practices and disclosures, including practices and disclosures related to climate change, diversity and inclusion and governance standards. Investor advocacy groups, certain institutional investors, lenders, investment funds and other influential investors are also increasingly focused on ESG practices and disclosures and in recent years have placed increasing importance on the implications and social cost of their investments. In addition, government organizations are enhancing or advancing legal and regulatory requirements specific to ESG matters. The heightened stakeholder focus on ESG issues related to our business requires the continuous monitoring of various and evolving laws, regulations, standards and expectations and the associated reporting requirements. A failure to adequately meet stakeholder expectations may result in noncompliance, the loss of business, reputational impacts, diluted market valuation, an inability to attract customers and an

inability to attract and retain top talent. In addition, our adoption of certain standards or mandated compliance to certain requirements could necessitate additional investments that could impact our profitability.

Legal, Quality and Regulatory Risks

Changes in governmental regulations may reduce demand for our products or increase our expenses. We compete in many markets in which we and our customers must comply with federal, state, local and international regulations, such as environmental, health and safety and food and drug regulations. We develop, configure and market our products to meet customer needs created by those regulations. Any significant change in regulations could reduce demand for our products or increase our expenses. For example, we manufacture pharmaceuticals and many of our instruments are marketed to the pharmaceutical industry for use in discovering and developing drugs. Changes in the U.S. Food and Drug Administration's (the FDA) regulation of the drug discovery and development process could have an adverse effect on the demand for these products.

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 revenues 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.

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 revenues, 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. In addition, patients involved in our clinical services trials conducted by our clinical development services business or taking drugs approved on the basis of those trials may also bring personal injury claims against us. 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.

Risk Factors (continued)

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 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), 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 our pharma and clinical development 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 or personal injury, as well as ongoing remediation and increased compliance costs, any or all of which could be significant. We are the sole manufacturer of a number of pharmaceuticals for many of our customers and a negative regulatory event could impact our customers' ability to provide products to their customers.

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

Our reputation, ability to do business and financial statements may be impaired by improper conduct by any of our employees, agents or business partners. We have internal controls and compliance systems to protect the company against acts committed by employees, agents or businesses that we acquire that would violate U.S. and/or non-U.S. laws, including the laws governing payments to government officials, bribery, fraud, kickbacks and false claims, pricing, sales and marketing practices, conflicts of interest, competition, employment practices and workplace behavior, export and import compliance, money laundering and data privacy, but these controls and systems may not be sufficient to prevent every such wrongful act. In particular, the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act 2010 and similar anti-bribery laws in other jurisdictions generally prohibit companies and their intermediaries from making improper payments to government officials for the purpose of obtaining or retaining business, and we operate in many parts of the world that have experienced governmental corruption to some degree. Any such improper actions or allegations of such acts could damage our reputation and subject us to civil or criminal investigations in the U.S. and in other jurisdictions and related shareholder lawsuits, could lead to substantial civil and criminal, monetary and nonmonetary penalties and could cause us to incur significant legal and investigatory fees. In addition, the government may seek to hold us liable for violations committed by companies which we acquire. We also rely on our suppliers to adhere to our supplier standards of conduct, and material violations of such standards of conduct could occur that could have a material effect on our business, reputation and financial statements.

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 U.S. 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 not adequately protect our trade secrets and other proprietary rights. 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.

Risks Relating to Financial Profile

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, the results of examinations and audits of our tax filings 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.

Our existing and future indebtedness may restrict our investment opportunities or limit our activities and negatively impact our credit ratings. As of December 31, 2021, we had approximately $34.87 billion in outstanding indebtedness. In addition, we have availability to borrow under a revolving credit facility that provides for up to $5.00 billion (as of January 7. 2022) of unsecured multi-currency revolving credit (the Facility). 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 a financial ratio, 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 and create liens. The covenants in the Facility include a Consolidated Net Interest Coverage Ratio (Consolidated EBITDA to Consolidated Net 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 minimum Consolidated Interest Coverage Ratio of 3.5:1.0 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 the impact of foreign exchange rates and interest rates. Our failure to comply with any of these restrictions or covenants may result in an event of default under the applicable debt instrument, which could permit acceleration of the debt under that instrument and

require us to prepay that debt before its scheduled due date. Also, an acceleration of the debt under certain of our debt instruments would trigger an event of default under other of our debt instruments.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

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

Item 3. Legal Proceedings

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

Item 4. Mine Safety Disclosures

Not applicable.

PART II

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

Market Price of Common Stock

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

Holders of Common Stock

As of February 5, 2022, the company had 2,619 holders of record of its common stock. This does not include holdings in street or nominee names.

Issuer Purchases of Equity Securities

There was no share repurchase activity for the company's fourth quarter of 2021. On September 23, 2021, the Board of Directors authorized the repurchase of up to $3.00 billion of the company's common stock. Early in the first quarter of 2022, the company repurchased $2.00 billion of the company's common stock. At February 24, 2022, $1.00 billion was available for future repurchases of the company's common stock under this authorization.

Item 6. Reserved

Not applicable.

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

Reference is made throughout this Management's Discussion and Analysis of Financial Condition and Results of Operations to Notes to the Consolidated Financial Statements, which begin on page F-1 of this report. Management's discussion and analysis of financial condition and results of operations for 2019 is included in Item 7 of the company's 2020 Annual Report on Form 10-K filed with the Securities and Exchange Commission.

The company refers to various amounts or measures not prepared in accordance with generally accepted accounting principles (non-GAAP measures). These non-GAAP measures are further described and reconciled to their most directly comparable amount or measure under the section "Non-GAAP Measures" later in this "Management's Discussion and Analysis of Financial Condition and Results of Operations"

Overview

Thermo Fisher Scientific Inc. enables customers to make the world healthier, cleaner and safer by helping them accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics and therapies, and increase laboratory productivity. Markets served include pharmaceutical and biotech, academic and government, industrial and applied, as well as healthcare and diagnostics. The company's operations fall into four segments (Note 4): Life Sciences Solutions, Analytical Instruments, Specialty Diagnostics and Laboratory Products and Biopharma Services.

Financial Highlights - 2021 Compared With 2020

Dollars in millions except per share amounts)	2021	2020	Change
Revenues	$ 39,211	$ 32,218	22%
GAAP operating income	$ 10,028	$ 7,794	29%
GAAP operating income margin	25.6%	24.2%	1.4pt
Adjusted operating income *(non-GAAP measure)*	$ 12,138	$ 9,556	27%
Adjusted operating income margin *(non-GAAP measure)*	31.0%	29.7%	1.3pt
GAAP diluted earnings per share attributable to Thermo Fisher Scientific Inc.	$ 19.46	$ 15.96	22%
Adjusted earnings per share *(non-GAAP measure)*	$ 25.13	$ 19.56	28%

Organic Revenue Growth

Revenue growth	22 %
Impact of acquisitions	3 %
Impact of currency translation	2 %
Organic revenue growth* *(non-GAAP measure)*	17 %

* Results may not sum due to rounding.

The company mobilized in early 2020 to support the COVID-19 pandemic response with products and services that help analyze, diagnose and protect from the virus. However, as a result of the pandemic's impact on various markets, the company saw a significant reduction in customer activity in several businesses by late March 2020 that materially adversely affected primarily the 2020 results of the Analytical Instruments segment and, to a lesser extent, some businesses within the company's other three segments. The negative impact significantly lessened in 2021, but could worsen in 2022 dependent on the success of global efforts to control and unwind from the pandemic and economic activity ramping up. During 2021, the Life Sciences Solutions and Specialty Diagnostics segments as well as the laboratory products business continued to support COVID-19 diagnostic testing, scaling and evolving their molecular diagnostics solutions and plastic consumables businesses to respond to the on-going COVID-19 pandemic. The biosciences and bioproduction businesses also expanded their capacity to meet the needs of pharma and biotech customers as they rapidly expanded their own production volumes to meet global vaccine manufacturing requirements. Additionally, through our pharma services business, we provided our pharma and biotech customers with the services they needed to develop and produce vaccines and therapies globally. While these positive impacts are expected to continue through 2022, the duration and extent of future revenues from such sales are uncertain and dependent primarily on customer testing as well as therapy and vaccine demand. Sales of products related to COVID-19 response were $9.23 billion and $6.63 billion in 2021 and 2020, respectively.

Conditions were strong in each of the company's end markets during 2021. Revenues were particularly strong in pharma and biotech driven by strong market dynamics and the company's role in supporting customers across a wide range of therapeutic areas, including our role in supporting COVID-19 vaccines and therapies. Customers in the academic and

Overview (continued)

government market increased demand as a result of positive funding trends around the globe and a return to pre-pandemic levels of activity. Customer activity in the industrial and applied market returned to pre-pandemic levels in 2021. Revenues from customers in the diagnostics and healthcare market were driven by growth in COVID-19 testing-related products as the company continued to support the societal response to the pandemic. Sales growth was strong across all geographic regions during 2021. The company continues to execute its proven growth strategy which consists of three pillars:

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

GAAP operating income margin and adjusted operating income margin increased in 2021 due primarily to profit on higher sales and sales mix, offset in part by strategic growth investments to support the company's near and long-term growth.

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, research and development projects and other expenditures to enhance the customer experience, as well as incentive compensation and recognition for employees. The company's references throughout this discussion to productivity improvements generally refer to improved cost efficiencies from its Practical Process Improvement (PPI) business system including reduced costs resulting from implementing continuous improvement methodologies, global sourcing initiatives, a lower cost structure following restructuring actions, including headcount reductions and consolidation of facilities, and low cost region manufacturing. Productivity improvements are calculated net of inflationary cost increases.

Notable Recent Acquisitions

On January 15, 2021, the company acquired, within the Laboratory Products and Biopharma Services segment, the Belgium-based European viral vector manufacturing business of Groupe Novasep SAS for $830 million in net cash consideration. The European viral vector manufacturing business provides manufacturing services for vaccines and therapies to biotechnology companies and large biopharma customers. The acquisition expands the segment's capabilities for cell and gene vaccines and therapies.

On February 25, 2021, the company acquired, within the Life Sciences Solutions segment, Mesa Biotech, Inc., a U.S.-based molecular diagnostic company, for $407 million in net cash consideration and contingent consideration with an initial fair value of $65 million due upon the completion of certain milestones. Mesa Biotech has developed and commercialized a PCR based rapid point-of-care testing platform available for detecting infectious diseases including COVID-19. The acquisition enables the company to accelerate the availability of reliable and accurate advanced molecular diagnostics at the point of care.

On September 30, 2021, the company assumed operating responsibility, within the Laboratory Products and Biopharma Services segment, of a new state-of-the-art biologics manufacturing facility in Lengnau, Switzerland from CSL Limited to perform pharma services for CSL with capacity to serve other customers as well. The company expects to make fixed lease payments aggregating to $555 million (excluding renewals) from 2021 to 2041, with additional amounts dependent on the extent of revenues from customers of the facility other than CSL.

On December 8, 2021, the company acquired, within the Laboratory Products and Biopharma Services segment, PPD, Inc., a U.S.-based global provider of clinical research services to the pharma and biotech industry, for $15.99 billion in net cash consideration and $43 million of equity awards exchanged. The addition of PPD's clinical research services enhances our offering to biotech and pharma customers by enabling them to accelerate innovation and increase their productivity within the drug development process. In 2020, PPD generated revenues of $4.68 billion.

On December 30, 2021, the company acquired, within the Life Sciences Solutions segment, PeproTech, Inc., a U.S. based developer and manufacturer of recombinant proteins, for $1.86 billion in net cash consideration. PeproTech provides bioscience reagents known as recombinant proteins, including cytokines and growth factors. The acquisition expands the segment's bioscience offerings.

Results of Operations

The company's management evaluates segment operating performance using operating income before certain charges/credits as defined in Note 4. Accordingly, the following segment data are reported on this basis.

Results of Operations (continued)

(Dollars in millions)	2021	2020
Revenues		
Life Sciences Solutions	$ 15,631	$ 12,168
Analytical Instruments	6,069	5,124
Specialty Diagnostics	5,659	5,343
Laboratory Products and Biopharma Services	14,862	12,245
Eliminations	(3,010)	(2,662)
Consolidated revenues	$ 39,211	$ 32,218

Life Sciences Solutions

(Dollars in millions)	2021	2020	Total Change	Currency Translation	Acquisitions/ Divestitures	Organic* *(non-GAAP measure)*
Revenues	$ 15,631	$ 12,168	28 %	2 %	3 %	23 %
Segment income	$ 7,817	$ 6,109	28 %			
Segment income margin	50.0 %	50.2 %	-0.2 pt			

* Results may not sum due to rounding

The increase in segment revenues at existing businesses in 2021 was driven by a combination of increased demand for testing to diagnose COVID-19 with higher sales of biosciences products and strong demand in each of the segment's businesses. The decrease in segment income margin resulted primarily from strategic growth investments, offset in part by profit on higher sales.

Analytical Instruments

(Dollars in millions)	2021	2020	Total Change	Currency Translation	Acquisitions/ Divestitures	Organic* *(non-GAAP measure)*
Revenues	$ 6,069	$ 5,124	18 %	2 %	— %	17 %
Segment income	1,197	808	48 %			
Segment income margin	19.7 %	15.8 %	3.9 pt			

* Results may not sum due to rounding

The increase in segment revenues at existing businesses in 2021 was due to increased demand for products sold by each of the segment's primary businesses with particular strength in electron microscopy instruments as well as chromatography and mass spectrometry instruments. The increase in segment income margin was primarily due to profit on higher sales and, to a lesser extent, a $108 million charge in 2020 related to a long-term supply contract (discussed in Note 12), offset in part by strategic growth investments.

Specialty Diagnostics

(Dollars in millions)	2021	2020	Total Change	Currency Translation	Acquisitions/ Divestitures	Organic* *(non-GAAP measure)*
Revenues	$ 5,659	$ 5,343	6 %	1 %	— %	5 %
Segment income	1,280	1,368	(6) %			
Segment income margin	22.6 %	25.6 %	-3.0 pt			

* Results may not sum due to rounding

The increase in segment revenues at existing businesses in 2021 was due to higher demand primarily driven by products addressing treatment of COVID-19, with particular strength in sales of products sold through the segment's healthcare market channel, immunodiagnostics and clinical diagnostics products. The decrease in segment income margin was primarily due to sales mix and strategic investments, offset in part by profit on higher sales and, to a lesser extent, a $13 million credit to cost of product revenue as a result of changing the method of accounting for inventories (discussed in Note 1).

Results of Operations (continued)

Laboratory Products and Biopharma Services

(Dollars in millions)	2021	2020	Total Change	Currency Translation	Acquisitions/ Divestitures	Organic* *(non-GAAP measure)*
Revenues	$ 14,862	$ 12,245	21 %	2 %	5 %	15 %
Segment income	1,844	1,271	45 %			
Segment income margin	12.4 %	10.4 %	2.0 pt			

* Results may not sum due to rounding

The increase in segment revenues at existing businesses in 2021 was primarily due to increased demand in each of the segment's principal businesses with particular strength in products sold through its pharma services business and research and safety market channel and, to a lesser extent, laboratory products businesses. The increase in segment income margin was primarily due to profit on higher sales and sales mix, and, to a lesser extent, acquisitions and a $20 million credit to cost of product revenue as a result of changing the method of accounting for inventories (discussed in Note 1), offset in part by strategic growth investments.

Non-operating Items

(Dollars in millions)	2021	2020
Net interest expense	$ 493	$ 488
GAAP other income/(expense)	(694)	(76)
Adjusted other income/(expense) *(non-GAAP measure)*	38	45
GAAP tax rate	12.5 %	11.8 %
Adjusted tax rate *(non-GAAP measure)*	14.6 %	14.3 %

Net interest expense (interest expense less interest income) increased due primarily to the increase in debt to finance the acquisition of PPD and for general corporate purposes, offset in part by lower average interest rates. See additional discussion under the caption "Liquidity and Capital Resources" below.

GAAP other income/(expense) and adjusted other income/(expense) includes currency transaction gains and losses on non-operating monetary assets and liabilities and net periodic pension benefit cost/income, excluding the service cost component. GAAP other income/(expense) in 2021 also includes $767 million of losses on the early extinguishment of debt (Note 10) and $36 million of financing costs associated with obtaining bridge financing commitments in connection with the agreement to acquire PPD (Note 2), offset in part by $66 million of net gains on investments. GAAP other income/(expense) in 2020 includes $81 million of financing costs for a terminated acquisition, primarily for loan commitment fees and entering into hedging contracts and $42 million of expense reclassified from accumulated other comprehensive items related to a hedge arrangement (Note 14), offset in part by $10 million of net gains on investments.

The company's GAAP and adjusted tax rates increased in 2021 compared to 2020, primarily due to higher profits at different marginal rates, offset in part by the benefits of our tax planning initiatives. The company's 2021 GAAP and adjusted tax rates were also impacted by income tax benefits on intra-entity transactions totaling $284 million. In 2020, the company's GAAP and adjusted tax rates were impacted by foreign tax credit planning in Sweden which resulted in $96 million of foreign tax credits, with no related incremental U.S. income tax expense; a net income tax benefit of $51 million from a domestication transaction involving the transfer of non-U.S. subsidiaries to the U.S.; and a $47 million income tax benefit related to a foreign exchange loss for tax purposes on certain intercompany financing arrangements. Additionally, the 2020 GAAP tax rate included a $27 million tax benefit from tax audit settlements.

The effective tax rate in both 2021 and 2020 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 $2.18 billion and $1.32 billion in 2021 and 2020, respectively.

The company expects its GAAP effective tax rate in 2022 will be between 9% and 11% based on currently forecasted rates of profitability in the countries in which the company conducts business and expected generation of foreign tax credits. The effective tax rate can vary significantly from period to period as a result of discrete income tax factors and events. The company expects its adjusted tax rate will be approximately 13% in 2022.

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.

Liquidity and Capital Resources

The company's proven growth strategy has enabled it to generate free cash flow as well as access the capital markets. The company deploys its capital primarily via mergers and acquisitions and secondarily via share buybacks and dividends.

(In millions)	December 31, 2021	December 31, 2020
Cash and cash equivalents	$ 4,477	$ 10,325
Total debt	34,870	21,735

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, capacity expansion, and repayment of third-party foreign debt by foreign subsidiaries. In addition, the company also transfers cash to the U.S. using non-taxable returns of capital as well as dividends where the related U.S. dividend received deduction or foreign tax credit equals any tax cost arising from the dividends. As a result of using such means of transferring cash to the U.S., the company does not expect any material adverse liquidity effects from its significant non-U.S. cash balances for the foreseeable future.

The company believes that its existing cash and cash equivalents 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.

As of December 31, 2021, the company's short-term debt totaled $2.54 billion. On January 7, 2022, the company replaced its prior credit facility with a new revolving credit facility with a bank group that provides up to $5.00 billion of unsecured multi-currency revolving credit (Note 10). 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, 2021, no borrowings were outstanding under the company's revolving credit facility, although available capacity was reduced by approximately $4 million as a result of outstanding letters of credit.

(In millions)	2021	2020
Net cash provided by operating activities	$ 9,312	$ 8,289
Net cash used in investing activities	(21,932)	(1,510)
Net cash provided by financing activities	6,581	959
Free cash flow *(non-GAAP measure)*	6,809	6,823

During 2021, cash provided by income was offset in part by investments in working capital. Increases in accounts receivable and inventories used cash of $204 million and $1.07 billion, respectively, primarily to support growth in sales. An increase in accounts payable provided cash of $479 million. Changes in other assets and other liabilities used cash of $724 million primarily due to the timing of tax and incentive compensation payments. Cash payments for income taxes were $2.18 billion during 2021.

During 2020, cash provided by income was offset in part by investments in working capital. Increases in accounts receivable and inventories used cash of $1.30 billion and $508 million, respectively, primarily to support growth in sales. Changes in other assets and other liabilities provided cash of $1.45 billion primarily due to the timing of incentive compensation payments and, to a lesser extent, customer billings. Cash payments for income taxes were $1.32 billion during 2020.

During 2021, acquisitions used cash of $19.40 billion. The company's investing activities also included the purchase of $2.52 billion of property, plant and equipment for capacity and capability investments. During 2020, the company's investing activities were principally for the purchase of property, plant and equipment.

Liquidity and Capital Resources (continued)

During 2021, issuance of senior notes provided $18.14 billion of cash. A net increase in commercial paper obligations provided cash of $2.51 billion. Repayment of debt used cash of $11.74 billion, including $4.30 billion to repay the debt assumed in the acquisition of PPD. The company's financing activities also included the repurchase of $2.00 billion of the company's common stock (4.1 million shares) and the payment of $395 million in cash dividends. On September 23, 2021, the Board of Directors authorized the repurchase of up to $3.00 billion of the company's common stock. Early in the first quarter of 2022, the company repurchased $2.00 billion of the company's common stock (3.3 million shares). At February 24, 2022, authorization remained for $1.00 billion of future repurchases of the company's common stock. As discussed in Note 10, in the first quarter of 2022 the company redeemed its 3.650% Senior Notes due 2025 for a total cash outlay of $375 million.

During 2020, issuance of senior notes provided cash of $3.46 billion. Repayment of senior notes used cash of $710 million. The company's financing activities also included the repurchase of $1.50 billion of the company's common stock (4.5 million shares) and the payment of $337 million in cash dividends.

The company expects that for all of 2022, expenditures for property, plant and equipment, net of disposals, will be between $2.5 and $2.7 billion.

In addition to the obligations on the balance sheet at December 31, 2021, which include, but are not limited to, debt (Note 10), unrecognized tax benefits (Note 8), operating leases (Note 11) pension obligations (Note 7) and contingent consideration (Note 14), 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 (Note 12).

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 heading "*Product Liability, Workers Compensation and Other Personal Injury Matters,*" in Note 12 could have a material adverse effect on the company's financial position as well as its results of operations and cash flows.

Non-GAAP Measures

In addition to the financial measures prepared in accordance with generally accepted accounting principles (GAAP), we use certain non-GAAP financial measures such as organic revenue growth, which is reported revenue growth, excluding the impacts of revenues from acquired/divested businesses and the effects of currency translation. We report organic revenue growth because Thermo Fisher management believes that in order to understand the company's short-term and long-term financial trends, investors may wish to consider the impact of acquisitions and foreign currency translation on revenues. Thermo Fisher management uses organic revenue growth to forecast and evaluate the operational performance of the company as well as to compare revenues of current periods to prior periods.

We report adjusted operating income, adjusted operating income margin, adjusted other income/(expense), adjusted tax rate, and adjusted EPS. We believe that the use of these non-GAAP financial measures, in addition to GAAP financial 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 core operating performance, especially when comparing such results to previous periods, forecasts, and to the performance of our competitors. Such measures are also used by management in their financial and operating decision-making and for compensation purposes. To calculate these measures we exclude, as applicable:

- Certain acquisition-related costs, including charges for the sale of inventories revalued at the date of acquisition, significant transaction/acquisition-related costs, including changes in estimates of contingent acquisition-related consideration, and other costs associated with obtaining short-term financing commitments for pending/recent acquisitions. We exclude these costs because we do not believe they are indicative of our normal operating costs.
- Costs/income associated with restructuring activities, such as reducing overhead and consolidating facilities. We exclude these costs because we believe that the costs related to restructuring activities are not indicative of our normal operating costs.
- Equity in earnings of unconsolidated entities; impairments of long-lived assets; and certain other gains and losses that are either isolated or cannot be expected to occur again with any predictability, including gains/losses on investments, the sale of businesses, product lines, and real estate, significant litigation-related matters, curtailments/settlements of pension plans, and the early retirement of debt. We exclude these items because they are outside of our normal operations and/or, in certain cases, are difficult to forecast accurately for future periods.
- The expense associated with the amortization of acquisition-related intangible assets because a significant portion of the purchase price for acquisitions may be allocated to intangible assets that have lives of up to 20 years. Exclusion of

Non-GAAP Measures (continued)

the amortization expense allows comparisons of operating results that are consistent over time for both our newly acquired and long-held businesses and with both acquisitive and non-acquisitive peer companies.

- The tax impacts of the above items and the impact of significant tax audits or events (such as changes in deferred taxes from enacted tax rate changes), the latter of which we exclude because they are outside of our normal operations and difficult to forecast accurately for future periods.

We report free cash flow, which is operating cash flow, excluding net capital expenditures to provide a view of the continuing operations' ability to generate cash for use in acquisitions and other investing and financing activities. The company uses this measure as an indication of the strength of the company and its ability to generate cash for use in acquisitions and other investing and financing activities. Free cash flow is not a measure of cash available for discretionary expenditures since we have certain non-discretionary obligations such as debt service that are not deducted from the measure.

The non-GAAP financial measures of Thermo Fisher Scientific's results of operations and cash flows included in this Form 10-K are not meant to be considered superior to or a substitute for Thermo Fisher Scientific's results of operations prepared in accordance with GAAP. Reconciliations of such non-GAAP financial measures to the most directly comparable GAAP financial measures are set forth within the "Overview" and "Results of Operations" sections and below.

Dollars in millions except per share amounts)	2021		2020	
Reconciliation of adjusted operating income and adjusted operating income margin				
GAAP operating income	$ 10,028	25.6%	$ 7,794	24.2%
Cost of revenues charges (a)	8	0.0%	6	0.0%
Selling, general and administrative charges (credits) (b)	144	0.4%	(10)	0.0%
Restructuring and other costs (c)	197	0.5%	99	0.3%
Amortization of acquisition-related intangible assets	1,761	4.5%	1,667	5.2%
Adjusted operating income *(non-GAAP measure)*	$ 12,138	31.0%	$ 9,556	29.7%
Reconciliation of adjusted other income/(expense)				
GAAP other income/(expense)	$ (694)		$ (76)	
Adjustments (d)	732		121	
Adjusted other income/(expense) *(non-GAAP measure)*	$ 38		$ 45	
Reconciliation of adjusted tax rate				
GAAP tax rate	12.5%		11.8%	
Adjustments (e)	2.1%		2.5%	
Adjusted tax rate *(non-GAAP measure)*	14.6%		14.3%	
Reconciliation of adjusted earnings per share				
GAAP diluted earnings per share (EPS) attributable to Thermo Fisher Scientific Inc.	$ 19.46		$ 15.96	
Cost of revenues charges (a)	0.02		0.01	
Selling, general and administrative charges (credits) (b)	0.36		(0.02)	
Restructuring and other costs (c)	0.50		0.25	
Amortization of acquisition-related intangible assets	4.43		4.17	
Other income/expense adjustments (d)	1.84		0.30	
Benefit from income taxes (e)	(1.49)		(1.12)	
Equity in losses of unconsolidated entities	0.01		0.01	
Adjusted EPS *(non-GAAP measure)*	$ 25.13		$ 19.56	

Non-GAAP Measures (continued)

(Dollars in millions except per share amounts)	2021	2020
Reconciliation of free cash flow		
GAAP net cash provided by operating activities	$ 9,312	$ 8,289
Purchases of property, plant and equipment	(2,523)	(1,474)
Proceeds from sale of property, plant and equipment	20	8
Free cash flow *(non-GAAP measure)*	$ 6,809	$ 6,823

(a) Adjusted results in 2021 exclude charges for the sale of inventories revalued at the date of acquisition. Adjusted results in 2020 exclude $4 million of accelerated depreciation on manufacturing assets to be abandoned due to facility consolidations and $2 million of charges to conform the accounting policies of recently acquired businesses with the company's accounting policies.

(b) Adjusted results in 2021 and 2020 exclude certain third-party expenses (credits), principally transaction/integration costs (including reimbursement thereof) related to recent/terminated acquisitions; credits from changes in estimates of contingent acquisition consideration; and charges associated with product liability litigation.

(c) Adjusted results in 2021 and 2020 exclude restructuring and other costs consisting principally of severance, abandoned facility and other expenses of headcount reductions within several businesses and real estate consolidations, and charges for impairment of acquired technology. Adjusted results in 2021 exclude $35 million of charges for compensation due to employees of recently acquired businesses at the date of acquisition.

(d) Adjusted results in 2021 and 2020 exclude net gains on investments and charges for amortization of bridge loan commitment fees and entering hedging contracts for recent/terminated acquisitions. Adjusted results in 2021 exclude $767 million of losses on the early extinguishment of debt. Adjusted results in 2020 exclude $42 million of charges related to terminated interest rate swaps and $8 million of net charges for the settlement/curtailment of pension plans.

(e) Adjusted provision for income taxes in 2021 and 2020 excludes the incremental tax benefit for the pre-tax reconciling items between GAAP and adjusted net income, incremental tax impacts from audit settlements and incremental tax impacts from adjusting the company's non-U.S. deferred tax balances as a result of tax rate changes.

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, revenues and expenses and related disclosure of contingent liabilities. On an on-going basis, management evaluates its estimates, including those related to acquisition-related measurements and income taxes. 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:

Acquisition-related Measurements

Business Combinations

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, which include estimates of customer attrition and technology obsolesce rates. The projected cash flows are discounted to determine the present value of the assets at the dates of acquisition. See Note 2 for additional information about our recent business combinations.

Critical Accounting Policies and Estimates (continued)

Goodwill and Indefinite-lived Intangible Assets

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 $41.92 billion and $1.24 billion, respectively, at December 31, 2021 (see Note 1 for additional information). Estimates of discounted future cash flows require assumptions related to revenue and operating income growth rates, discount rates and other factors. For the goodwill impairment tests, the company considers (i) peer revenues and earnings trading multiples from companies that have operational and financial characteristics that are similar to the respective reporting units and (ii) estimated weighted average costs of capital. Different assumptions from those made in the company's analysis could materially affect projected cash flows and the company's evaluation of goodwill and indefinite-lived intangible assets for impairment.

The company performed the quantitative goodwill impairment test for all of its reporting units and indefinite-lived intangible assets. Indications of fair value based on projections of cash flows, which increased over the prior year projections at higher rates than the increases in carrying values, and on peer revenues, earnings trading multiples and discount rates, which were relatively consistent with the prior year, were sufficient to conclude that no impairment of goodwill or indefinite-lived intangible assets existed at the end of the tenth fiscal month of 2021, the date of the company's annual impairment testing. There were no interim impairments of goodwill or indefinite-lived intangible assets in 2021. 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.

Definite-lived Intangible Assets

Definite-lived intangible assets totaled $18.88 billion at December 31, 2021 (see Note 1 for additional information). The company reviews definite-lived intangible assets for impairment when indication of potential impairment exists, such as a significant reduction in cash flows associated with the assets. Actual cash flows arising from a particular intangible asset could vary from projected cash flows which could imply different carrying values from those established at the dates of acquisition and which could result in impairment of such asset. The company recorded impairments of $0.12 billion in 2021 (see Note 16 for additional information).

Contingent Consideration

The fair value of contingent consideration liabilities, which were initially exchanged for control of businesses or assumed from acquired businesses, was $0.32 billion at December 31, 2021. At each reporting period, the fair value of contingent consideration is determined using either discounted cash flow analyses, Monte Carlo simulations, or fair values of an underlying recapitalization investment portfolio. Changes in the fair value of contingent consideration liabilities can result from changes in estimates of revenue or operating results or in the timing or likelihood of achieving milestones, as well as changes in the fair values of the investments underlying the recapitalization investment portfolio. These changes resulted in (benefits)/charges of $(0.05) billion during 2021 (see Note 14 for additional information).

Income Taxes

Unrecognized Tax Benefits

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 $1.12 billion at December 31, 2021 (see Note 8 for additional information).

Critical Accounting Policies and Estimates (continued)

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

Valuation Allowances

The company estimates the degree to which tax assets will result in a benefit, after consideration of all positive and negative evidence, and provides a valuation allowance for tax assets that it believes will more likely than not go unused. In situations in which the company has been able to determine that its deferred tax assets will be realized, that determination generally relies on future reversals of taxable temporary differences and expected future taxable income. If it becomes more likely than not that a tax asset will be used, the company reverses the related valuation allowance. Any such reversals are recorded as a reduction of the company's tax provision. The company's tax valuation allowance totaled $0.97 billion at December 31, 2021 (see Note 8 for additional information). Should the company's actual future taxable income by tax jurisdiction vary from estimates, additional allowances or reversals thereof may be necessary.

Undistributed Earnings

The company has not provided U.S. state income taxes or additional non-U.S. taxes on certain of its non-U.S. subsidiaries' undistributed earnings, as such amounts are intended to be reinvested outside the United States indefinitely in the respective jurisdictions based on specific business plans and tax strategies (see Note 8 for additional information). These business plans and tax strategies consider: short-term and long-term forecasts and budgets of the U.S. parent and non-U.S. subsidiaries; working capital and other needs in locations where earnings are generated; the company's past practices regarding non-U.S. subsidiary dividends; sources of financing by the U.S. parent, such as issuing debt or equity; and uses of cash by the U.S. parent that are more discretionary in nature, such as business combinations and share repurchase programs. However, should the company change its business plans and tax strategies in the future and decide to repatriate a portion of these earnings to one of its U.S. subsidiaries, including cash maintained by these non-U.S. subsidiaries, the company would recognize additional tax liabilities. It is not practicable to estimate the amount of additional U.S. state income tax and non-U.S. tax liabilities that the company would incur. The company's intent is to only make distributions from non-U.S. subsidiaries in the future when they can be made at no net tax costs.

Recent Accounting Pronouncements

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

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, Swiss franc, British pounds sterling, Canadian dollars, Czech koruna, Japanese yen and Hong Kong dollars. 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, 2021, the company's debt portfolio was comprised primarily of fixed rate borrowings. The fair market value of the company's

Quantitative and Qualitative Disclosures About Market Risk (continued)

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, 2021 was $36.05 billion (Note 14). Fair values were determined from available market prices using current interest rates and terms to maturity. If interest rates were to decrease by 100 basis points, the fair value of the company's debt at December 31, 2021 would increase by approximately $2.51 billion. If interest rates were to increase by 100 basis points, the fair value of the company's debt at December 31, 2021 would decrease by approximately $2.52 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 2021, 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 $6 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 euro, British pounds sterling, Swedish kronor, Canadian dollars, 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 2021 functional currencies, relative to the U.S. dollar, would result in a reduction of shareholders' equity of approximately $1.23 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 2021 non-functional currency exchange rates related to the company's contracts would result in an additional unrealized loss on forward currency-exchange contracts of $71 million. A 10% appreciation in year-end 2021 non-functional currency exchange rates related to the company's contracts would result in an unrealized gain on forward currency-exchange contracts of $71 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 2021 non-functional currency exchange rates applied to such cash balances would result in a negative impact of $27 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. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives, and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. 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, 2021, 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, 2021 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, 2021, the company's internal control over financial reporting was effective. Management's assessment of the effectiveness of the company's internal control over financial reporting as of December 31, 2021, excluded PPD, Inc., Mesa Biotech, Inc. and PeproTech, Inc., which were acquired by the company in 2021 in separate purchase business combinations. These entities, whose total assets and total revenues were excluded from the company's assessment, represented approximately 5% and 2%, respectively, of the related consolidated amounts as of and for the year ended December 31, 2021. Based upon Securities and Exchange Commission staff guidance, companies are allowed to exclude certain acquisitions from their assessments of internal control over financial reporting during the first year of an acquisition while integrating the acquired companies.

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, 2021, as stated in their report that appears on page F-2 of this Annual Report on Form 10-K.

Item 9B. Other Information

On February 24, 2022, the company and Mark P. Stevenson entered into a consulting agreement relating to ongoing services that Mr. Stevenson will provide to the company following his last day as an employee on March 18, 2022. Under the consulting agreement, which has a term ending March 1, 2023, Mr. Stevenson will serve on the company's Scientific Advisory Board and will also provide ongoing advice and services relating to COVID-19 research and products. During the term of the consulting agreement, Mr. Stevenson's outstanding and unvested equity awards granted in fiscal year 2021 will continue to vest in accordance with their original terms based on his continued service to the company and, if he provides consulting services through March 1, 2023, his outstanding and unvested equity awards granted in fiscal year 2021 will vest to the same extent as if he had retired as an employee on March 1, 2023 and the post-termination exercise period of all of Mr. Stevenson's stock options, to the extent vested and exercisable on March 1, 2023, will be extended until the original maximum term of such stock options. The agreement also contains provisions that restrict Mr. Stevenson's ability during the term of the consulting agreement, and (i) for a period of twelve months thereafter, to work for or provide consulting services to, any competitor of the company, and (ii) for a period of eighteen months thereafter, to solicit for hire employees or consultants of the company or to solicit customers or clients of the company.

The foregoing summary of the consulting agreement is subject to, and qualified in its entirety by, the full text of such agreement, which is filed as an exhibit to this Annual Report on Form 10-K.

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

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 (2022 Definitive Proxy Statement) including under "Corporate governance—Board of directors—selection, skills and experience—Director nominee skills, experience, and background," and "Corporate governance—Board of directors—selection, skills and experience—Nominees and incumbent directors," 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 2022 Definitive Proxy Statement including under "Corporate governance—Board practices, policies and processes —Corporate Governance Guidelines" and "Corporate Governance—Board leadership structure—Board committees," and is incorporated in this report by reference.

Item 11. Executive Compensation

The information required by this Item will be contained in our 2022 Definitive Proxy Statement including under "Corporate governance—Compensation of directors," and "Executive compensation," 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 2022 Definitive Proxy Statement including under "Information about stock ownership—Equity compensation plan information" and "Information about stock ownership—Security ownership of certain beneficial owners and management," 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 2022 Definitive Proxy Statement including under "Corporate governance—Board practices, policies and processes—Related person transactions," and "Corporate governance—Board leadership structure—How we assess director independence," 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 2022 Definitive Proxy Statement including under "Audit matters—Independent auditor fees" and "Audit matters—Audit Committee's pre-approval policies and procedures," 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 Redeemable Noncontrolling Interest and 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 41.

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 24, 2022

THERMO FISHER SCIENTIFIC INC.

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

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities indicated, as of February 24, 2022.

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

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

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

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

By: /s/ Joseph R. Holmes
Joseph R. Holmes
Vice President and Chief Accounting Officer
(Principal Accounting Officer)

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

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

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

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

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

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

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

By: /s/ R. Alexandra Keith
R. Alexandra Keith
Director

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

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
2.1	Agreement and Plan of Merger, dated as of April 15, 2021, by and among Thermo Fisher Scientific Inc., Powder Acquisition Corp. and PPD, Inc. (filed as Exhibit 2.1 to the Registrant's Current Report on Form 8-K filed April 16, 2021 [File No. 1-8002] 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	Amended and Restated By-Laws of the Registrant, as amended and effective as of July 8, 2021 (filed as Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed July 9, 2021 [File No. 1-8002] and incorporated in this document by reference).
	The Registrant agrees, pursuant to Item 601(b)(4)(iii)(A) of Regulation S-K, to furnish to the Commission, upon request, a copy of each instrument with respect to long-term debt of the Registrant or its consolidated subsidiaries.
4.1	Indenture dated as of November 20, 2009 between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 99.1 to the Registrant's Current Report on Form 8-K filed November 20, 2009 [File No. 1-8002] and incorporated in this document by reference).
4.2	Sixth Supplemental Indenture, dated as of December 11, 2013, between the Company and The Bank of New York Mellon Trust Company, N.A. (filed as Exhibit 99.2 to the Registrant's Current Report on Form 8-K filed December 11, 2013 [File No. 1-8002] and incorporated in this document by reference).
4.3	Eighth Supplemental Indenture, dated as of November 24, 2014, among the Company, The Bank of New York Mellon Trust Company, N.A., as trustee, and The Bank of New York Mellon, London Branch, as paying agent (filed as Exhibit 4.2 to the Registrant's Current Report on Form 8-K filed November 24, 2014 [File No. 1-8002] and incorporated in this document by reference).
4.4	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).
4.5	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).
4.6	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).
4.7	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).
4.8	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).
4.9	Eighteenth Supplemental Indenture, dated as of September 30, 2019, 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 30, 2019 [File No. 1-8002] and incorporated in this document by reference).
4.10	Nineteenth Supplemental Indenture, dated as of October 8, 2019, 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 October 8, 2019 [File No. 1-8002] and incorporated in this document by reference).
4.11	Twenty-First Supplemental Indenture, dated as of April 2, 2020, 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 April 2, 2020 [File No. 1-8002] and incorporated in this document by reference).
4.12	Twenty-Second Supplemental Indenture, dated as of August 23, 2021, 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 23, 2021 [File No. 1-8002] and incorporated in this document by reference).
4.13	Third Supplemental Indenture, dated as of October 18, 2021, among Thermo Fisher Scientific (Finance I) B.V. (Thermo Fisher International), 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 October 18, 2021 [File No. 1-8002] and incorporated in this document by reference).
4.14	Twenty-Third Supplemental Indenture, dated as of October 22, 2021, 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 October 22, 2021 [File No. 1-8002] and incorporated in this document by reference).
4.15	Indenture, dated as of August 9, 2016, among Thermo Fisher International, 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).

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
4.16	Fourth Supplemental Indenture, dated as of November 18, 2021, among Thermo Fisher Scientific (Finance I) B.V. (Thermo Fisher International), 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).
4.17	Description of the Registrant's Securities
10.1	Thermo Fisher Scientific Inc. Deferred Compensation Plan for Directors of the Registrant, as amended and restated effective November 10, 2006 (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended September 29, 2007 [File No. 1-8002] and incorporated in this document by reference).*
10.2	Thermo Electron Corporation Deferred Compensation Plan, effective November 1, 2001 (filed as Exhibit 10.13 to the Registrant's Annual Report on Form 10-K for the fiscal year ended December 29, 2001 [File No. 1-8002] and incorporated in this document by reference).*
10.3	Form of Amended and Restated Indemnification Agreement between the Registrant and its directors and officers (filed as Exhibit 10.2 to the Registrant's Registration Statement on Form S-4 [Reg. No. 333-90661] and incorporated in this document by reference).*
10.4	Summary of Thermo Fisher Scientific Inc. Annual Non-Management Director Compensation (filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed February 24, 2022 [File No. 1-8002] and incorporated in this document by reference).*
10.5	Summary of 2021 Annual Cash Incentive Plan*
10.6	Form of Noncompetition Agreement between the Registrant and certain key employees and executive officers, effective as of January 1, 2009 (filed as Exhibit 10.25 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2009 [File No. 1-8002] and incorporated in this document by reference).*
10.7	Retirement Plan for Non-Employee Directors of Fisher Scientific International Inc. (filed as Exhibit 10.12 to Fisher Scientific International Inc.'s Annual Report on Form 10-K for the year ended December 31, 1992 [File No. 1-10920] and incorporated in this document by reference).*
10.8	First Amendment to the Fisher Scientific International Inc. Retirement Plan for Non-Employee Directors (filed as Exhibit 10.04 to Fisher Scientific International Inc.'s Quarterly Report on Form 10-Q for the quarter ended March 31, 2005 [File No. 1-10920] and incorporated in this document by reference).*
10.9	Amendment to Retirement Plan for Non-Employee Directors of Fisher Scientific International Inc. (filed as Exhibit 10.02 to Fisher Scientific International Inc.'s Current Report on Form 8-K filed March 7, 2006 [File No. 1-10920] and incorporated in this document by reference).*
10.10	Thermo Fisher Scientific Inc. Amended and Restated 2005 Deferred Compensation Plan, effective January 1, 2020 (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 27, 2020 [File No. 1-8002] and incorporated in this document by reference).*
10.11	2009 Restatement of Executive Severance Agreement, between Marc N. 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).*
10.12	Executive Change In Control Retention Agreement, between Marc N. 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).*
10.13	Noncompetition Agreement, between Marc N. 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).*
10.14	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).*
10.15	Amendment No. 2 to 2009 Restatement of Executive Severance Agreement, dated November 30, 2010, between the Registrant and Marc N. Casper (filed as Exhibit 10.55 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 [File No. 1-8002] and incorporated in this document by reference).*
10.16	Amendment No. 1 to Executive Change In Control Retention Agreement, dated November 30, 2010, between Marc N. Casper and the Registrant (filed as Exhibit 10.56 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2010 [File No. 1-8002] and incorporated in this document by reference).*
10.17	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).*
10.18	Form of Executive Change in Control Retention Agreement for Officers (other than Marc N. 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).*
10.19	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).*

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.20	Form of Thermo Fisher Scientific Inc.'s Performance Restricted Stock Unit Agreement effective February 26, 2013 (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).*
10.21	Form of Performance Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper effective February 26, 2013 (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).*
10.22	Form of Nonstatutory Stock Option Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper effective February 26, 2013 (filed as Exhibit 10.5 to the Registrant's Current Report on Form 8-K filed February 27, 2013 [File No. 1-8002] and incorporated in this document by reference).*
10.23	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).*
10.24	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).*
10.25	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).*
10.26	Noncompetition Agreement between the Registrant and Mark P. 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).*
10.27	Form of Thermo Fisher Scientific Inc.'s Nonstatutory 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).*
10.28	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).*
10.29	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).*
10.30	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).*
10.31	Credit Agreement, dated January 7, 2022, among Thermo Fisher Scientific Inc., certain Subsidiaries of Thermo Fisher Scientific Inc. from time to time party thereto, Bank of America, N.A., as Administrative Agent and each lender from time to time party thereto (filed as Exhibit 10.1 to the Registrant's Current Report on Form 8-K filed January 7, 2022 [File No. 1-8002] and incorporated in this document by reference).
10.32	Form of Performance Restricted Stock Unit Agreement effective February 26, 2019 (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 30, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.33	Form of Performance Restricted Stock Unit Agreement for Marc N. Casper effective February 26, 2019 (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended March 30, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.34	Letter Agreement between the Registrant and Michel Lagarde dated August 28, 2017 (filed as Exhibit 10.39 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.35	Option Agreement Under the Patheon N.V. 2016 Omnibus Incentive Plan between Patheon N.V. and Michel Lagarde dated July 20, 2016 (filed as Exhibit 10.40 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.36	Option Agreement Under the Patheon N.V. 2016 Omnibus Incentive Plan between Patheon N.V. and Michel Lagarde dated March 23, 2017 (filed as Exhibit 10.42 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.37	Thermo Fisher Scientific Inc. Executive Severance Policy (filed as Exhibit 10.1 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 29, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.38	Form of Noncompetition Agreement between the Registrant and certain key employees and executive officers (filed as Exhibit 10.2 to the Registrant's Quarterly Report on Form 10-Q for the quarter ended June 29, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.39	Form of Thermo Fisher Scientific Inc.'s Performance Restricted Stock Unit Agreement effective as of February 25, 2020 (filed as Exhibit 10.45 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.40	Form of Thermo Fisher Scientific Inc.'s Restricted Stock Unit Agreement effective as of February 25, 2020 (filed as Exhibit 10.46 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*

THERMO FISHER SCIENTIFIC INC.

EXHIBIT INDEX

Exhibit Number	Description of Exhibit
10.41	Form of Thermo Fisher Scientific Inc.'s Nonstatutory Stock Option Agreement for Officers effective as of February 25, 2020 (filed as Exhibit 10.47 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.42	Form of Performance Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper effective as of February 25, 2020 (filed as Exhibit 10.48 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.43	Form of Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper effective as of February 25, 2020 (filed as Exhibit 10.49 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.44	Form of Nonstatutory Stock Option Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper effective as of February 25, 2020 (filed as Exhibit 10.50 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2019 [File No. 1-8002] and incorporated in this document by reference).*
10.45	Form of Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper (filed as Exhibit 10.47 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2020 [File No. 1-8002] and incorporated in this document by reference).*
10.46	Form of Performance Restricted Stock Unit Agreement between Thermo Fisher Scientific Inc. and Marc N. Casper (filed as Exhibit 10.48 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2020 [File No. 1-8002] and incorporated in this document by reference).*
10.47	Form of Thermo Fisher Scientific Inc.'s Performance Restricted Stock Unit Agreement (filed as Exhibit 10.49 to the Registrant's Annual Report on Form 10-K for the year ended December 31, 2020 [File No. 1-8002] and incorporated in this document by reference).*
10.48	PPD, Inc. 2020 Omnibus Incentive Plan (filed as Exhibit 10.38 to PPD Inc.'s Form S-1/A filed January 27, 2020 [File No. 333-235860] and incorporated in this document by reference).*
10.49	Consulting Agreement between the Registrant and Mark P. Stevenson, dated February 24, 2022*
21	Subsidiaries of the Registrant.
22	Subsidiary Issuer of Guaranteed Securities.
23.1	Consent of PricewaterhouseCoopers LLP, an Independent Registered Public Accounting Firm.
31.1	Certification of Chief Executive Officer required by Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2	Certification of Chief Financial Officer required by Exchange Act Rules 13a-14(a) and 15d-14(a), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1	Certification of Chief Executive Officer required by Exchange Act Rules 13a-14(b) and 15d-14(b), as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.**
32.2	Certification of Chief Financial Officer required by Exchange Act Rules 13a-14(b) and 15d-14(b), as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.**
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema Document.
101.CAL	XBRL Taxonomy Calculation Linkbase Document.
101.DEF	XBRL Taxonomy Definition Linkbase Document.
101.LAB	XBRL Taxonomy Label Linkbase Document.
101.PRE	XBRL Taxonomy Presentation Linkbase Document.
104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101).

---

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

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

THERMO FISHER SCIENTIFIC INC.

INDEX OF CONSOLIDATED FINANCIAL STATEMENTS

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

	Page
Report of Independent Registered Public Accounting Firm (PCAOB ID 238)	F-2
Consolidated Balance Sheet as of December 31, 2021 and 2020	F-6
Consolidated Statement of Income for the years ended December 31, 2021, 2020 and 2019	F-7
Consolidated Statement of Comprehensive Income for the years ended December 31, 2021, 2020 and 2019	F-8
Consolidated Statement of Cash Flows for the years ended December 31, 2021, 2020 and 2019	F-9
Consolidated Statement of Redeemable Noncontrolling Interest and Equity for the years ended December 31, 2021, 2020 and 2019	F-10
Notes to Consolidated Financial Statements	F-11

Report of Independent Registered Public Accounting Firm

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

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheet of Thermo Fisher Scientific Inc. and its subsidiaries (the "Company") as of December 31, 2021 and 2020, and the related consolidated statements of income, of comprehensive income, of redeemable noncontrolling interest and equity and of cash flows for each of the three years in the period ended December 31, 2021, 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, 2021, 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, 2021 and 2020, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2021 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, 2021, based on criteria established in *Internal Control - Integrated Framework* (2013) issued by the COSO.

Change in Accounting Principle

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

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and

significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included 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.

As described in Management's Annual Report on Internal Control Over Financial Reporting, management has excluded PPD, Inc., Mesa Biotech, Inc. and PeproTech, Inc. from its assessment of internal control over financial reporting as of December 31, 2021 because they were acquired by the Company in purchase business combinations during 2021. We have also excluded PPD, Inc., Mesa Biotech, Inc. and PeproTech, Inc. from our audit of internal control over financial reporting. PPD, Inc., Mesa Biotech, Inc. and PeproTech, Inc. are wholly-owned subsidiaries whose total assets and total revenues excluded from management's assessment and our audit of internal control over financial reporting collectively represent approximately 5% and 2%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2021.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Critical Audit Matters

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

Income taxes

As described in Note 8 to the consolidated financial statements, the Company's provision for income taxes for the year ended December 31, 2021 was $1,109 million. The Company has

deferred tax liabilities, net, of $2,829 million (including a valuation allowance of $968 million) and unrecognized tax benefits of $1,124 million as of December 31, 2021. As disclosed by management, the Company operates in numerous countries under many legal forms and, as a result, is subject to the jurisdiction of numerous domestic and non-U.S. tax authorities, as well as to tax agreements and treaties among these governments. Determination of taxable income in any jurisdiction requires management to interpret the related tax laws and regulations and to use estimates and assumptions regarding significant future events, such as the amount, timing and character of deductions, permissible revenue recognition methods under the tax law and the sources and character of income and tax credits. Management assesses income tax positions and records tax benefits for all years subject to examination based upon 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, management has recorded the largest amount of tax benefit with a greater than 50 percent likelihood of being realized upon ultimate settlement with a taxing authority that has full knowledge of all relevant information. For those income tax positions where it is not more likely than not that a tax benefit will be sustained, no tax benefit has been recognized in the financial statements. Management estimates the degree to which tax assets will result in a benefit, after consideration of all positive and negative evidence, and provides a valuation allowance for tax assets that it believes will more likely than not go unused. In situations in which management has been able to determine that the Company's deferred tax assets will be realized, that determination generally relies on future reversals of taxable temporary differences and expected future taxable income. If it becomes more likely than not that a tax asset will be used, management reverses the related valuation allowance.

The principal considerations for our determination that performing procedures relating to income taxes is a critical audit matter are (i) the significant judgment by management when interpreting the numerous and complex tax laws and regulations as it relates to determining the provision for income taxes, deferred tax assets and liabilities, including the valuation allowance, and liabilities for unrecognized tax benefits, (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating audit evidence related to the provision for income taxes, deferred tax assets and liabilities, including the valuation allowance, and liabilities for unrecognized tax benefits, and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

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

Acquisition of PPD, Inc. - Valuation of Customer Relationships Intangible Assets

As described in Note 2 to the consolidated financial statements, on December 8, 2021, the Company acquired PPD, Inc. for $15.99 billion in net cash consideration and $43 million of equity awards exchanged, which resulted in $6,264 million of customer relationships intangible assets being recorded. As disclosed by management, assumptions and estimates are used in determining the fair value of the customer relationships intangible assets acquired in a business combination. Management estimates the fair value of acquisition-related customer relationships intangible assets principally based on projections of cash flows that will arise from the customer relationships of PPD, Inc., which include estimates of customer attrition rates. The projected cash flows are discounted to determine the present value of the assets at the date of the acquisition.

The principal considerations for our determination that performing procedures relating to the valuation of the acquired customer relationships intangible assets from the acquisition of PPD, Inc. is a critical audit matter are (i) the significant judgment by management when determining the fair value of the acquired customer relationships intangible assets, (ii) a high degree of auditor judgment, subjectivity, and effort in performing procedures and evaluating management's significant assumptions related to projections of cash flows and discount rates, and (iii) the audit effort involved the use of professionals with specialized skill and knowledge.

Addressing the matter involved performing procedures and evaluating audit evidence in connection with forming our overall opinion on the consolidated financial statements. These procedures included testing the effectiveness of controls relating to the acquisition accounting, including controls over management's valuation of the customer relationships intangible assets. These procedures also included, among others (i) reading the purchase agreement, (ii) testing management's process for determining the fair values of the acquired customer relationships intangible assets, (iii) evaluating the appropriateness of the valuation methodology utilizing discounted projected cash flows, (iv) testing the completeness and accuracy of the underlying data used in the discounted projected cash flows, and (v) evaluating the reasonableness of the significant assumptions used by management related to projections of cash flows and discount rates. Evaluating management's significant assumption related to projections of cash flows involved evaluating whether the significant assumption used by management was reasonable considering (i) the current and past performance of PPD, Inc., (ii) the consistency with external market and industry data, and (iii) whether the significant assumption was consistent with evidence obtained in other areas of the audit. Professionals with specialized skill and knowledge were used to assist in evaluating (i) the appropriateness of the valuation methodology utilizing discounted projected cash flows and (ii) the reasonableness of the discount rate significant assumption.

/s/PricewaterhouseCoopers LLP
Boston, Massachusetts
February 24, 2022

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, 2021	December 31, 2020
Assets		
Current assets:		
Cash and cash equivalents	$ 4,477	$ 10,325
Accounts receivable, less allowances of $150 and $135	7,977	5,741
Inventories	5,051	4,029
Contract assets, net	968	731
Other current assets	1,640	1,131
Total current assets	20,113	21,957
Property, plant and equipment, net	8,333	5,912
Acquisition-related intangible assets, net	20,113	12,685
Other assets	4,640	2,457
Goodwill	41,924	26,041
Total assets	$ 95,123	$ 69,052
Liabilities, redeemable noncontrolling interest and equity		
Current liabilities:		
Short-term obligations and current maturities of long-term obligations	$ 2,537	$ 2,628
Accounts payable	2,867	2,175
Accrued payroll and employee benefits	2,427	1,916
Contract liabilities	2,655	1,271
Other accrued expenses	2,950	2,314
Total current liabilities	13,436	10,304
Deferred income taxes	3,837	1,794
Other long-term liabilities	4,540	3,330
Long-term obligations	32,333	19,107
Commitments and contingencies (Note 12)		
Redeemable noncontrolling interest	122	—
Equity:		
Thermo Fisher Scientific Inc. shareholders' equity:		
Preferred stock, $100 par value, 50,000 shares authorized; none issued		
Common stock, $1 par value, 1,200,000,000 shares authorized; 439,154,741 and 437,088,297 shares issued	439	437
Capital in excess of par value	16,174	15,579
Retained earnings	35,431	28,116
Treasury stock at cost, 44,720,112 and 40,417,789 shares	(8,922)	(6,818)
Accumulated other comprehensive items	(2,329)	(2,807)
Total Thermo Fisher Scientific Inc. shareholders' equity	40,793	34,507
Noncontrolling interests	62	10
Total equity	40,855	34,517
Total liabilities, redeemable noncontrolling interest and equity	$ 95,123	$ 69,052

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, 2021	December 31, 2020	December 31, 2019
Revenues			
Product revenues	$ 30,361	$ 25,306	$ 19,496
Service revenues	8,850	6,912	6,046
Total revenues	39,211	32,218	25,542
Costs and operating expenses:			
Cost of product revenues	13,594	11,407	10,037
Cost of service revenues	5,979	4,807	4,177
Selling, general and administrative expenses	8,007	6,930	6,144
Research and development expenses	1,406	1,181	1,003
Restructuring and other costs (income)	197	99	(413)
Total costs and operating expenses	29,183	24,424	20,948
Operating income	10,028	7,794	4,594
Interest income	43	65	224
Interest expense	(536)	(553)	(676)
Other income/(expense)	(694)	(76)	(70)
Income before income taxes	8,841	7,230	4,072
Provision for income taxes	(1,109)	(850)	(374)
Equity in (losses) earnings of unconsolidated entities	(4)	(3)	—
Net income	7,728	6,377	3,698
Less: net income attributable to noncontrolling interests and redeemable noncontrolling interest	3	2	2
Net income attributable to Thermo Fisher Scientific Inc.	$ 7,725	$ 6,375	$ 3,696
Earnings per share attributable to Thermo Fisher Scientific Inc.			
Basic	$ 19.62	$ 16.09	$ 9.24
Diluted	$ 19.46	$ 15.96	$ 9.17
Weighted average shares			
Basic	394	396	400
Diluted	397	399	403

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, 2021	December 31, 2020	December 31, 2019
Comprehensive income			
Net income	$ 7,728	$ 6,377	$ 3,698
Other comprehensive items:			
Currency translation adjustment:			
Currency translation adjustment (net of tax provision (benefit) of $231, $(221) and $25)	373	(118)	(106)
Reclassification adjustment for losses included in net income	—	—	30
Unrealized gains and losses on hedging instruments:			
Unrealized losses on hedging instruments (net of tax benefit of $0, $20 and $12)	—	(65)	(38)
Reclassification adjustment for losses included in net income (net of tax benefit of $17, $14 and $6)	56	45	19
Pension and other postretirement benefit liability adjustments:			
Pension and other postretirement benefit liability adjustments arising during the period (net of tax provision (benefit) of $11, $(1) and $(31))	36	(8)	(93)
Amortization of net loss and prior service benefit included in net periodic pension cost (net of tax benefit of $6, $4 and $2)	13	18	8
Total other comprehensive items	478	(128)	(180)
Comprehensive income	8,206	6,249	3,518
Less: comprehensive income attributable to noncontrolling interests and redeemable noncontrolling interest	2	2	3
Comprehensive income attributable to Thermo Fisher Scientific Inc.	$ 8,204	$ 6,247	$ 3,515

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, 2021	December 31, 2020	December 31, 2019
Operating activities			
Net income	$ 7,728	$ 6,377	$ 3,698
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation of property, plant and equipment	831	658	564
Amortization of acquisition-related intangible assets	1,761	1,667	1,713
Change in deferred income taxes	(647)	(552)	(302)
Gain on sales of businesses	—	—	(482)
Stock-based compensation	230	196	181
Loss on early extinguishment of debt	767	—	184
Other non-cash expenses	190	338	82
Changes in assets and liabilities, excluding the effects of acquisitions and disposition:			
Accounts receivable	(204)	(1,302)	(225)
Inventories	(1,065)	(508)	(458)
Accounts payable	479	59	266
Contributions to retirement plans	(34)	(96)	(50)
Other	(724)	1,452	(198)
Net cash provided by operating activities	9,312	8,289	4,973
Investing activities			
Acquisitions, net of cash acquired	(19,395)	(38)	(1,843)
Proceeds from sale of business, net of cash divested	—	—	1,128
Purchase of property, plant and equipment	(2,523)	(1,474)	(926)
Proceeds from sale of property, plant and equipment	20	8	36
Other investing activities, net	(34)	(6)	118
Net cash used in investing activities	(21,932)	(1,510)	(1,487)
Financing activities			
Net proceeds from issuance of debt	18,137	3,464	5,638
Repayment of debt	(11,738)	(710)	(6,355)
Proceeds from issuance of commercial paper	2,512	383	2,781
Repayments of commercial paper	—	(387)	(3,464)
Purchases of company common stock	(2,000)	(1,500)	(1,500)
Dividends paid	(395)	(337)	(297)
Net proceeds from issuance of company common stock under employee stock plans	156	196	153
Other financing activities, net	(91)	(150)	(74)
Net cash provided by (used in) financing activities	6,581	959	(3,118)
Exchange rate effect on cash	194	176	(63)
(Decrease) increase in cash, cash equivalents and restricted cash	(5,845)	7,914	305
Cash, cash equivalents and restricted cash at beginning of year	10,336	2,422	2,117
Cash, cash equivalents and restricted cash at end of year	$ 4,491	$ 10,336	$ 2,422

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

THERMO FISHER SCIENTIFIC INC.

CONSOLIDATED STATEMENT OF REDEEMABLE NONCONTROLLING INTEREST AND EQUITY

(In millions)	Redeemable Noncontrolling Interest	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 Thermo Fisher Scientific Inc. Shareholders' Equity	Noncontrolling Interests	Total Equity
Balance at December 31, 2018	$ —	432	$ 432	$ 14,621	$ 18,696	29	$ (3,665)	$ (2,498)	$ 27,586	$ 8	$ 27,594
Cumulative effect of accounting changes	—	—	—	—	4	—	—	—	4	—	4
Issuance of shares under employees' and directors' stock plans	—	2	2	262	—	1	(71)	—	193	—	193
Stock-based compensation	—	—	—	181	—	—	—	—	181	—	181
Purchases of company common stock	—	—	—	—	—	6	(1,500)	—	(1,500)	—	(1,500)
Dividends declared ($0.76 per share)	—	—	—	—	(304)	—	—	—	(304)	—	(304)
Net income	—	—	—	—	3,696	—	—	—	3,696	2	3,698
Other comprehensive items	—	—	—	—	—	—	—	(181)	(181)	1	(180)
Contributions from (distributions to) noncontrolling interests	—	—	—	—	—	—	—	—	—	(2)	(2)
Balance at December 31, 2019	—	434	434	15,064	22,092	36	(5,236)	(2,679)	29,675	9	29,684
Cumulative effect of accounting changes	—	—	—	—	(1)	—	—	—	(1)	—	(1)
Issuance of shares under employees' and directors' stock plans	—	3	3	319	—	—	(82)	—	240	—	240
Stock-based compensation	—	—	—	196	—	—	—	—	196	—	196
Purchases of company common stock	—	—	—	—	—	4	(1,500)	—	(1,500)	—	(1,500)
Dividends declared ($0.88 per share)	—	—	—	—	(350)	—	—	—	(350)	—	(350)
Net income	—	—	—	—	6,375	—	—	—	6,375	2	6,377
Other comprehensive items	—	—	—	—	—	—	—	(128)	(128)	—	(128)
Contributions from (distributions to) noncontrolling interests	—	—	—	—	—	—	—	—	—	(1)	(1)
Balance at December 31, 2020	—	437	437	15,579	28,116	40	(6,818)	(2,807)	34,507	10	34,517
Issuance of shares under employees' and directors' stock plans	—	2	2	324	—	1	(104)	—	222	—	222
Stock-based compensation	—	—	—	230	—	—	—	—	230	—	230
Purchases of company common stock	—	—	—	—	—	4	(2,000)	—	(2,000)	—	(2,000)
Dividends declared ($1.04 per share)	—	—	—	—	(410)	—	—	—	(410)	—	(410)
Recognition upon acquisition	122	—	—	—	—	—	—	—	—	—	—
Net income	1	—	—	—	7,725	—	—	—	7,725	2	7,727
Other comprehensive items	(1)	—	—	—	—	—	—	478	478	—	478
Contributions from (distributions to) noncontrolling interests	—	—	—	—	—	—	—	—	—	50	50
Other	—	—	—	41	—	—	—	—	41	—	41
Balance at December 31, 2021	$ 122	439	$ 439	$ 16,174	$ 35,431	45	$ (8,922)	$ (2,329)	$ 40,793	$ 62	$ 40,855

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 and therapies, and increase laboratory productivity. Markets served include pharmaceutical and biotech, academic and government, industrial and applied, as well as healthcare and diagnostics.

Principles of Consolidation

The accompanying financial statements include the accounts of the company and its wholly and majority-owned subsidiaries. All material intercompany accounts and transactions have been eliminated. The company accounts for investments in businesses using the equity method when it has the ability to exercise significant influence but not control (generally between 20% and 50% ownership), is not the primary beneficiary and has not elected the fair value option. At December 31, 2021 and 2020, the company had such investments with carrying amounts of $576 million and $32 million, respectively. The company has elected the fair value option of accounting for certain of its investments with readily determinable fair values that would otherwise be accounted for under the equity method. At December 31, 2021, the fair value of such investments was $217 million.

Redeemable Noncontrolling Interest

The company owns 60% of its consolidated subsidiary PPD-SNBL K.K. The 40% ownership interest held by a third party is classified as a redeemable noncontrolling interest on the consolidated balance sheet due to certain put options under which the third party may require the company to purchase the remaining ownership interest at its pre-acquisition fair value.

Presentation

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

Revenue Recognition

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 (primarily clinical research, pharmaceutical, and instrument and enterprise services) are recognized over time as customers receive and consume the benefits of such services. For revenues recognized over time, the company generally uses costs accumulated relative to total estimated costs to measure progress as this method approximates satisfaction of the performance obligation. For contracts that contain multiple performance obligations, the company allocates the consideration to which it expects to be entitled (i.e., the transaction price) to each performance obligation based on relative standalone selling prices and recognizes the related revenues 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.

Changes to the scope of services contracts generally also include changes in the transaction price. Typically, these contract modifications are not distinct from existing services provided under the contract, and result in cumulative adjustments to revenue on the modification date.

Payments from customers for most instruments and consumables 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 services) or a mix of both. Some arrangements include variable amounts of consideration that arise from discounts, rebates, and other programs and practices. In such arrangements, the company estimates the amount by which to reduce the stated contract amount to reflect the transaction price. The company records reimbursement for third-party pass-through and out-of-pocket costs as revenues and the related expenses as costs of revenues.

Contract-related Balances

Accounts receivable include unconditional rights to consideration from customers, which generally represent billings that do not bear interest. The company maintains allowances for doubtful accounts for estimates of expected 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 history of similarly aged receivables, the creditworthiness of the customer, reasons for delinquency, current economic conditions, expectations associated with future events and circumstances where reasonable and supportable forecasts are available and any other information that is relevant to the judgment. Receivables from academic and government customers as well as large, well-capitalized commercial customers have historically experienced less collectability risk. 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.

Contract assets include revenues recognized in advance of billings where the company's right to bill includes something other than the passage of time. Such amounts are recorded net of estimated losses resulting from the inability to invoice customers, which is primarily due to risk associated with the company's performance. 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.

Contract liabilities include billings in excess of revenues recognized, such as those resulting from customer advances and deposits and unearned revenues 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. Contract assets and liabilities are presented on a net basis in the consolidated balance sheet if they arise from different performance obligations in the same contract.

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 revenues are recognized. 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.

Leases

Operating leases that have commenced are included in other assets, other accrued expenses and other long-term liabilities in the consolidated balance sheet. Finance leases that have commenced are included in property, plant and equipment, net, current maturities of long-term obligations and long-term obligations in the consolidated balance sheet. Classification of lease liabilities as either current or noncurrent is based on the expected timing of payments due under the company's obligations.

Right-of-use (ROU) assets represent the company's right to use an underlying asset for the lease term and lease liabilities represent the company's obligation to make lease payments arising from the lease. Lease ROU assets and liabilities are recognized at the lease commencement date based on the present value of lease payments over the lease term. Leases with an initial term of 12 months or less are not recorded on the consolidated balance sheet. The company recognizes operating lease expense on a straight-line basis over the lease term. Finance lease expense includes depreciation, which is recognized on a straight-line basis over the expected life of the leased asset, and an immaterial amount of interest expense.

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

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

Research and Development

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

Restructuring Costs

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

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

Income Taxes

The company recognizes deferred income taxes based on the expected future tax consequences of differences between the financial statement basis and the tax basis of assets and liabilities, calculated using enacted tax rates in effect for the year in which the differences are expected to be reflected in the tax return. A valuation allowance is provided for tax assets that will more likely than not go unused.

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.

Earnings per Share

Basic earnings per share has been computed by dividing net income attributable to Thermo Fisher Scientific Inc. by the weighted average number of shares outstanding during the year. Except where the result would be antidilutive to net income attributable to Thermo Fisher Scientific Inc., diluted earnings per share has been computed using the treasury stock method for outstanding stock options and restricted units.

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 by the first-in, first-out (FIFO) method. As discussed below, prior to the third quarter of 2021 certain of the company's businesses utilized 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 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, 2021	December 31, 2020
Raw materials	$ 1,922	$ 1,305
Work in process	676	540
Finished goods	2,453	2,184
Inventories	$ 5,051	$ 4,029

Prior to the third quarter of 2021, certain of the company's businesses utilized the LIFO method of accounting for inventories. During the third quarter of 2021, these businesses, which comprised approximately 5% of consolidated inventories, changed from the LIFO method to the FIFO method. The company believes this change is preferable as it will provide a consistent, uniform costing method for all inventories across the company, better reflect the current value of inventories, and improve comparability with peers. Prior financial statements have not been retrospectively adjusted due to immateriality. The cumulative pre-tax effect of this change in accounting principle of $33 million was recorded as an increase to inventories and a decrease to cost of product revenues in the third quarter of 2021. This change was recorded in the Laboratory Products and Biopharma Services ($20 million) and Specialty Diagnostics ($13 million) segments.

The value of inventories maintained using the LIFO method was $274 million at December 31, 2020, which was below estimated replacement cost by $49 million. Reductions to cost of revenues as a result of the liquidation of LIFO inventories were nominal during 2019, 2020 and the first half of 2021.

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 generally 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, 2021	December 31, 2020
Land	$ 431	$ 410
Buildings and improvements	2,575	2,192
Machinery, equipment and leasehold improvements	9,587	6,975
Property, plant and equipment, at cost	12,593	9,577
Less: Accumulated depreciation and amortization	4,260	3,665
Property, plant and equipment, net	$ 8,333	$ 5,912

Acquisition-related Intangible Assets

Acquisition-related intangible assets include the costs of acquired customer relationships, product technology, tradenames, backlog and other specifically identifiable intangible assets, and are being amortized using the straight-line method over their estimated useful lives, which range up to 20 years. The company reviews these intangible assets for impairment when indication of potential impairment exists, such as a significant reduction in cash flows associated with the assets. When impairment indicators exist, the company determines whether the carrying value of its intangible assets exceeds the related undiscounted cash flows. In these situations, the carrying value is written down to fair value.

In addition, the company has tradenames and in-process research and development that have indefinite lives and which are not amortized. Intangible assets with indefinite lives are reviewed for impairment annually or whenever events or changes in circumstances indicate they may be impaired. The company may perform an optional qualitative assessment. If the company determines that the fair value of the indefinite-lived intangible asset is more likely than not greater than its carrying amount, no additional testing is necessary. If not, or if the company bypasses the optional qualitative assessment, it writes the carrying value down to the fair value, if applicable.

Acquisition-related intangible assets are as follows:

	Balance at December 31, 2021			Balance at December 31, 2020		
(In millions)	Gross	Accumulated Amortization	Net	Gross	Accumulated Amortization	Net
Definite lived:						
Customer relationships	$ 22,802	$ (7,792)	$ 15,010	$ 16,593	$ (7,450)	$ 9,143
Product technology	6,041	(3,977)	2,064	5,523	(3,532)	1,991
Tradenames	1,722	(919)	803	1,213	(897)	316
Backlog	1,060	(59)	1,001	—	—	—
	31,625	(12,747)	18,878	23,329	(11,879)	11,450
Indefinite lived:						
Tradenames	1,235	N/A	1,235	1,235	N/A	1,235
Acquisition-related intangible assets	$ 32,860	$ (12,747)	$ 20,113	$ 24,564	$ (11,879)	$ 12,685

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

(In millions)		
2022	$	2,489
2023		2,358
2024		1,992
2025		1,669
2026		1,392
2027 and thereafter		8,978
Estimated future amortization expense of definite-lived intangible assets	$	18,878

Other Assets

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

At December 31, 2021 and 2020, the company had $33 million and $43 million, respectively, of intangible assets not derived from acquisitions, net of accumulated amortization, which are being amortized using the straight-line method over their estimated useful lives, which range up to 20 years.

Equity investments that do not have readily determinable fair values and are not eligible for the net asset value (NAV) practical expedient 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, 2021 and 2020, the company had such investments with carrying amounts of $22 million and $28 million, respectively, and investments measured at NAV of $16 million and $0 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 quantitative goodwill impairment test is necessary. If the qualitative assessment results in a determination that the fair value of a reporting unit is more likely than not less than its carrying amount, the company performs a quantitative goodwill impairment test. The company may bypass the qualitative assessment for the reporting unit in any period and proceed directly to the goodwill impairment test. The company estimates the fair value of its reporting units by using forecasts of discounted future cash flows and peer market multiples. The company would record an impairment charge based on the excess of a reporting unit's carrying amount over its fair value (limited to the amount of goodwill). The company determined that no impairments existed in 2021, 2020 or 2019.

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 Biopharma Services	Total
Balance at December 31, 2019	$ 8,544	$ 4,928	$ 3,184	$ 9,058	$ 25,714
Acquisition	35	—	—	—	35
Currency translation	11	151	186	(56)	292
Balance at December 31, 2020	8,590	5,079	3,370	9,002	26,041
Acquisitions	1,560	56	8	14,400	16,024
Currency translation	(7)	(92)	(101)	59	(141)
Balance at December 31, 2021	$ 10,143	$ 5,043	$ 3,277	$ 23,461	$ 41,924

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. Certain liabilities acquired in acquisitions have been recorded at readily determinable fair values and, as such, were discounted to present value at the dates of acquisition.

Currency Translation

All assets and liabilities of the company's subsidiaries operating in non-U.S. dollar currencies are translated at period-end exchange rates. Resulting translation adjustments are reflected in the "accumulated other comprehensive items" component of shareholders' equity. Revenues and expenses are translated at average exchange rates for the period. Currency transaction gains are included in the accompanying statement of income and in aggregate were $25 million, $24 million and $52 million in 2021, 2020 and 2019, 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, Swiss franc, British pounds sterling, Canadian dollars, Czech koruna, Japanese yen and Hong Kong dollars. The company does not hold or engage in transactions involving derivative instruments for purposes other than risk management.

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

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

Net investment hedges. The company 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. A portion of the company's euro-denominated senior notes and its 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.

The company's estimates include, among others, asset reserve requirements as well as the amounts of future cash flows associated with certain assets and businesses that are used in assessing the risk of impairment. Risks and uncertainties associated with the ongoing COVID-19 global pandemic materially adversely affected certain of the company's businesses in 2020, particularly in the Analytical Instruments segment and, to a lesser extent, some businesses within the other three segments. The negative impacts significantly lessened in 2021. The extent and duration of negative impacts in the future, which

may include inflationary pressures and supply chain disruptions, are uncertain and may require changes to estimates. Actual results could differ from those estimates.

Recent Accounting Pronouncements

In November 2021, the FASB issued new guidance to require entities to disclose information about certain types of government assistance they receive, including cash grants and tax credits. Among other things, the new guidance requires expanded disclosure regarding the qualitative and quantitative characteristics of the nature, amount, timing, and significant terms and conditions of transactions with a government arising from a grant or other forms of assistance accounted for under a contribution model. The company will adopt this guidance in 2022 using a prospective method. The adoption of this guidance is not expected to have a material impact on the company's disclosures; however, the impact will be dependent on the extent of transactions of this nature entered into by the company in periods subsequent to the date of adoption.

In October 2021, the FASB amended guidance to recognize and measure contract assets and contract liabilities acquired in a business combination. Generally, this new guidance will result in the company recognizing contract assets and contract liabilities at the same amounts recorded by the acquiree. The company adopted this guidance in the fourth quarter of 2021 retrospectively to all business combinations completed in the first three quarters of 2021 and prospectively to all future business combinations. The adoption of this guidance did not have a material impact on the company's consolidated financial statements for acquisitions that closed in 2021; however, the impact in future periods will be dependent on the contract assets and contract liabilities acquired in future business combinations.

In July 2021, the FASB amended guidance to require lessors to classify leases as operating leases if they have certain variable lease payment structures and would have selling losses if they were classified as sales-type or direct financing leases. The company adopted the guidance in the third quarter of 2021 using a prospective method. The adoption of this guidance did not have a material impact on the company's consolidated financial statements.

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

In December 2019, the FASB issued new guidance to simplify the accounting for income taxes. Among other things, the new guidance requires the effects of enacted changes in tax laws or rates to be reflected in the annual effective tax rate computation in the interim period that includes the enactment date. The company adopted this guidance in 2021 using a prospective method. The adoption of this guidance did not have a material impact on the company's consolidated financial statements; however, the impact in future periods will be dependent on the extent of future events or conditions that would be affected such as enacted changes in tax laws or rates.

In August 2018, the FASB issued new guidance to modify the disclosure requirements for employers that sponsor defined benefit pension or other postretirement plans. The company adopted the guidance in 2020 using a retrospective method. The adoption of this guidance did not 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 adopted the guidance in 2020 with some items requiring a prospective method and others requiring a retrospective method. The adoption of this guidance did not have a material impact on the company's disclosures.

In June 2016, the FASB issued new guidance to require a financial asset measured at amortized cost basis, such as accounts receivable, to be presented at the net amount expected to be collected based on relevant information about past events, including historical experience, current conditions, and reasonable and supportable forecasts that affect the collectability of the reported amount. During 2018 and 2019, the FASB issued additional guidance and clarification. The company adopted the guidance in 2020 using a modified retrospective method. The adoption of this guidance reduced accounts receivable and retained earnings by $1 million on January 1, 2020.

In February 2016, the FASB issued new guidance which requires lessees to record most leases on their balance sheets as lease liabilities, initially measured at the present value of the future lease payments, with corresponding right-of-use assets. The new guidance also sets forth new disclosure requirements related to leases. During 2017 - 2019, the FASB issued additional guidance and clarification. The company adopted this guidance in January 2019. The company elected to adopt the guidance using a modified retrospective method, by applying the transition approach as of the beginning of the period of adoption. Comparative periods have not been restated. As permitted upon transition, the company did not reassess whether any expired or

existing contracts were or contained embedded leases, the lease classification for any expired or existing leases, initial direct costs for any leases, or whether land easements met the definition of a lease if they were not accounted for as leases under the prior guidance. The adoption of this guidance increased retained earnings by $4 million on January 1, 2019.

Note 2. Acquisitions and Disposition

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

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

2021

On January 15, 2021, the company acquired, within the Laboratory Products and Biopharma Services segment, the Belgium-based European viral vector manufacturing business of Groupe Novasep SAS for $830 million in net cash consideration. The European viral vector manufacturing business provides manufacturing services for vaccines and therapies to biotechnology companies and large biopharma customers. The acquisition expands the segment's capabilities for cell and gene vaccines and therapies. The goodwill recorded as a result of this business combination is not tax deductible.

On February 25, 2021, the company acquired, within the Life Sciences Solutions segment, Mesa Biotech, Inc., a U.S.-based molecular diagnostic company, for $407 million in net cash consideration and contingent consideration with an initial fair value of $65 million due upon the completion of certain milestones. Mesa Biotech has developed and commercialized a polymerase chain reaction (PCR) based rapid point-of-care testing platform available for detecting infectious diseases including COVID-19. The acquisition enables the company to accelerate the availability of reliable and accurate advanced molecular diagnostics at the point of care. The goodwill recorded as a result of this business combination is not tax deductible.

On September 30, 2021, the company assumed operating responsibility, within the Laboratory Products and Biopharma Services segment, of a new state-of-the-art biologics manufacturing facility in Lengnau, Switzerland from CSL Limited to perform pharma services for CSL with capacity to serve other customers as well. The company expects to make fixed lease payments aggregating to $555 million (excluding renewals) from 2021 to 2041, with additional amounts dependent on the extent of revenues from customers of the facility other than CSL. The goodwill recorded as a result of this business combination is not tax deductible.

On December 8, 2021, the company acquired, within the Laboratory Products and Biopharma Services segment, PPD, Inc., a U.S.-based global provider of clinical research services to the pharma and biotech industry, for $15.99 billion in net cash consideration and $43 million of equity awards exchanged. The addition of PPD's clinical research services enhances our offering to biotech and pharma customers by enabling them to accelerate innovation and increase their productivity within the drug development process. The goodwill recorded as a result of this business combination is not tax deductible.

On December 30, 2021, the company acquired, within the Life Sciences Solutions segment, PeproTech, Inc., a U.S. based developer and manufacturer of recombinant proteins, for $1.86 billion in net cash consideration. PeproTech provides bioscience reagents known as recombinant proteins, including cytokines and growth factors. The acquisition expands the segment's bioscience offerings. The goodwill recorded as a result of this business combination is not tax deductible.

In addition, in 2021, the company acquired, within the Life Sciences Solutions segment, cell sorting technology assets, an Ireland-based life sciences distributor and a developer of a digital PCR platform; within the Analytical Instruments segment, a Belgium-based developer of micro-chip based technology for liquid chromatography columns; and within the Specialty Diagnostics segment, a transplant diagnostics information system provider.

The components of the purchase price and net assets acquired for 2021 acquisitions are as follows:

(In millions)	PPD	PeproTech	European Viral Vector Business	Mesa Biotech	Lengnau biologics manufacturing facility	Other
Purchase price						
Cash paid	$ 17,237	$ 1,947	$ 848	$ 421	$ 17	$ 298
Fair value of equity awards exchanged	43	—	—	—	—	—
Fair value of contingent consideration	—	—	—	65	1	117
Cash acquired	(1,244)	(83)	(18)	(14)	—	(13)
	$ 16,036	$ 1,864	$ 830	$ 472	$ 18	$ 402
Net assets acquired						
Current assets	$ 2,510	$ 63	$ 39	$ 54	$ —	$ 12
Property, plant and equipment	562	18	59	2	92	2
Definite-lived intangible assets:						
Customer relationships	6,264	514	302	—	—	2
Product technology	—	282	25	279	—	224
Tradenames	603	—	—	2	—	2
Backlog	1,060	—	—	—	—	—
Goodwill	13,781	1,190	600	237	18	198
Other assets	1,108	11	3	3	376	2
Contract liabilities	(1,570)	—	(59)	—	—	(1)
Deferred tax assets (liabilities)	(1,803)	(193)	(80)	(72)	—	(28)
Finance lease liabilities	(86)	—	(24)	—	(82)	—
Debt assumed	(4,299)	—	—	—	—	—
Other liabilities assumed	(1,972)	(21)	(35)	(33)	(386)	(11)
Redeemable noncontrolling interest	(122)	—	—	—	—	—
	$ 16,036	$ 1,864	$ 830	$ 472	$ 18	$ 402

The weighted-average amortization periods for definite-lived intangible assets acquired in 2021 are 17 years for customer relationships, 11 years for product technology, 7 years for tradenames and 3 years for backlog. The weighted average amortization period for all definite-lived intangible assets acquired in 2021 is 14 years.

The preliminary allocations of the purchase price for the acquisitions of the Lengnau biologics manufacturing facility, PPD and PeproTech were based on estimates of the fair value of the net assets acquired and are subject to adjustment upon finalization, largely with respect to acquired intangible assets, lease assets and liabilities, and the related deferred taxes. Measurements of these items inherently require significant estimates and assumptions.

Unaudited Pro Forma Information

The following unaudited pro forma information provides the effect of the company's 2021 acquisition of PPD as if the acquisition had occurred on January 1, 2020:

	Year Ended	
(In millions)	December 31, 2021	December 31, 2020
Revenues	$ 44,886	$ 36,887
Net income attributable to Thermo Fisher Scientific Inc.	$ 7,369	$ 5,361

The historical consolidated financial information of the company and PPD 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 and are factually supportable.

To reflect the acquisition of PPD as if it had occurred on January 1, 2020, 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 attributable to Thermo Fisher Scientific Inc. for the year ended December 31, 2021, excludes $312 million of transaction costs, initial restructuring costs, and debt extinguishment costs directly attributable to the PPD acquisition that were included in the determination of net income attributable to Thermo Fisher Scientific Inc. for that period. These items have reduced pro forma net income attributable to Thermo Fisher Scientific Inc. for the year ended December 31, 2020, by $197 million.

The company’s results would not have been materially different from its pro forma results had the company’s other 2021 acquisitions occurred at the beginning of 2020.

PPD’s revenues and losses attributable to Thermo Fisher Scientific Inc. in 2021, subsequent to the acquisition date, were $378 million and $(60) million, respectively. The loss includes non-recurring transaction and compensation costs.

2020

In 2020, the company acquired, within the Life Sciences Solutions segment, a U.S.-based provider of a spectral dye platform for high-resolution biology applications which will extend the company’s existing tools for protein and cell analysis applications, for a total purchase price of $63 million including the fair value of contingent consideration.

2019

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

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

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

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

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

Disposition

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

Note 3. Revenues and Contract-related Balances

Disaggregated Revenues

Revenues by type are as follows:

(In millions)	2021	2020	2019
Revenues			
Consumables	$ 22,608	$ 18,527	$ 13,109
Instruments	7,753	6,779	6,387
Services	8,850	6,912	6,046
Consolidated revenues	$ 39,211	$ 32,218	$ 25,542

Revenues by geographic region based on customer location are as follows:

(In millions)	2021	2020	2019
Revenues			
North America	$ 19,659	$ 17,081	$ 12,896
Europe	11,134	8,284	6,358
Asia-Pacific	7,218	5,822	5,524
Other regions	1,200	1,031	764
Consolidated revenues	$ 39,211	$ 32,218	$ 25,542

Each reportable segment earns revenues from consumables, instruments and services in North America, Europe, Asia-Pacific and other regions. See Note 4 for revenues 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, 2021 was $28.30 billion. The company will recognize revenues for these performance obligations as they are satisfied, approximately 59% of which is expected to occur within the next twelve months. Amounts expected to occur thereafter generally relate to contract manufacturing, clinical research and extended warranty service agreements, which typically have durations of three to five years.

Contract-related Balances

Noncurrent contract assets are included within other assets in the accompanying balance sheet. 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, 2021	December 31, 2020
Current contract assets, net	$ 968	$ 731
Noncurrent contract assets, net	9	11
Current contract liabilities	2,655	1,271
Noncurrent contract liabilities	1,238	763

Substantially all of the current contract liabilities balance at December 31, 2020 and 2019 was recognized in revenues during 2021 and 2020, respectively.

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 (including COVID-19 through its polymerase chain reaction (PCR) testing and sample preparation capabilities). 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 Biopharma Services (formerly known as 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, clinical research services 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)	2021	2020	2019
Revenues			
Life Sciences Solutions	$ 15,631	$ 12,168	$ 6,856
Analytical Instruments	6,069	5,124	5,522
Specialty Diagnostics	5,659	5,343	3,718
Laboratory Products and Biopharma Services	14,862	12,245	10,599
Eliminations	(3,010)	(2,662)	(1,153)
Consolidated revenues	39,211	32,218	25,542
Segment Income			
Life Sciences Solutions	7,817	6,109	2,446
Analytical Instruments	1,197	808	1,273
Specialty Diagnostics	1,280	1,368	930
Laboratory Products and Biopharma Services	1,844	1,271	1,324
Subtotal reportable segments	12,138	9,556	5,973
Cost of revenues charges	(8)	(6)	(17)
Selling, general and administrative (charges) credits	(144)	10	(62)
Restructuring and other (costs) income	(197)	(99)	413
Amortization of acquisition-related intangible assets	(1,761)	(1,667)	(1,713)
Consolidated operating income	10,028	7,794	4,594
Interest income	43	65	224
Interest expense	(536)	(553)	(676)
Other income/(expense)	(694)	(76)	(70)
Income before income taxes	$ 8,841	$ 7,230	$ 4,072
Depreciation			
Life Sciences Solutions	$ 197	$ 140	$ 130
Analytical Instruments	83	76	75
Specialty Diagnostics	128	100	67
Laboratory Products and Biopharma Services	423	342	292
Consolidated depreciation	$ 831	$ 658	$ 564

Cost of revenues charges included in the above table consist of charges for the sale of inventories revalued at the date of acquisition and accelerated depreciation on fixed assets to estimated disposal value in connection with the consolidation of operations. Selling, general and administrative charges/credits included in the above table consist of third-party transaction/integration costs (including reimbursement thereof) related to recent/terminated acquisitions, charges/credits for changes in estimates of contingent acquisition consideration, and charges/credits related to product liability litigation.

(In millions)	2021	2020	2019
Total assets			
Life Sciences Solutions	$ 22,751	$ 20,209	$ 18,306
Analytical Instruments	9,692	9,773	9,896
Specialty Diagnostics	6,010	6,534	5,867
Laboratory Products and Biopharma Services	52,639	22,711	21,761
Corporate/other (a)	4,031	9,825	2,551
Consolidated total assets	$ 95,123	$ 69,052	$ 58,381
Capital expenditures			
Life Sciences Solutions	$ 810	$ 392	$ 151
Analytical Instruments	79	74	64
Specialty Diagnostics	167	175	83
Laboratory Products and Biopharma Services	1,327	772	554
Corporate/other	140	61	74
Consolidated capital expenditures	$ 2,523	$ 1,474	$ 926

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

Geographical Information

(In millions)	2021	2020	2019
Revenues (b)			
United States	$ 18,907	$ 16,435	$ 12,366
China	3,444	2,797	2,752
Other	16,860	12,986	10,424
Consolidated revenues	$ 39,211	$ 32,218	$ 25,542
Long-lived Assets (c)			
United States	$ 5,578	$ 3,686	$ 3,099
Other	4,286	3,001	2,349
Consolidated long-lived assets	$ 9,864	$ 6,687	$ 5,448

(b) Revenues are attributed to countries based on customer location.
(c) Includes property, plant and equipment, net, and operating lease ROU assets.

Note 5. Other Income/(Expense)

In all periods, other income/(expense) includes currency transaction gains and losses on non-operating 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 2021, other income/(expense) includes $767 million of losses on the early extinguishment of debt (Note 10), $36 million of financing costs associated with obtaining bridge financing commitments in connection with the agreement to acquire PPD (Note 2), offset in part by $66 million of net gains on investments. The company had a cash outlay of $36 million in 2021 associated with obtaining the bridge financing commitments, included in other financing activities, net, in the accompanying statement of cash flows.

In 2020, other income/(expense) includes $81 million of financing costs for a terminated acquisition, primarily for loan commitment fees and entering into hedging contracts and $42 million reclassified from accumulated other comprehensive items related to a hedge arrangement (Note 14), offset in part by $10 million of net gains on investments. The company had a cash outlay of $51 million in 2020 associated with obtaining the loan commitments included in other financing activities, net, in the accompanying statement of cash flows.

In 2019, other income/(expense) includes $184 million of losses on the early extinguishment of debt (Note 10), offset in part by $44 million of net gains on investments. The investment gains include a $28 million gain on the sale of a joint venture for net proceeds of $42 million.

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 vesting. 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, and is primarily included in selling, general and administrative expenses.

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:

	2021	2020	2019
Expected stock price volatility	26 %	22 %	21 %
Risk free interest rate	0.8 %	1.1 %	2.4 %
Expected life of options (years)	4.3	4.3	4.3
Expected annual dividend	0.2 %	0.3 %	0.3 %

The weighted average per share grant-date fair values of options granted during 2021, 2020 and 2019 were $123.97, $61.19 and $53.37, respectively. The total intrinsic value of options exercised during the same periods was $501 million, $457 million and $320 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, 2021 is presented below:

	Shares (in millions)	Weighted average exercise price	Weighted average remaining contractual term (in years)	Aggregate intrinsic value (in millions)
Outstanding at December 31, 2020	5.9	$ 221.22		
Granted	1.5	552.26		
Issued in connection with an acquisition	0.2	492.35		
Exercised	(1.4)	183.63		
Canceled/expired	(0.2)	341.83		
Outstanding at December 31, 2021	6.0	$ 319.95	4.5	$ 2,094
Vested and unvested expected to vest at December 31, 2021	5.7	$ 306.64	4.3	$ 2,035
Exercisable at December 31, 2021	2.8	$ 193.39	2.9	$ 1,307

As of December 31, 2021, there was $243 million of total unrecognized compensation cost related to unvested stock options granted. The cost is expected to be recognized through 2025 with a weighted average amortization period of 2.9 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, 2021 is presented below:

	Units (in millions)	Weighted average grant-date fair value
Unvested at December 31, 2020	0.8	$ 276.74
Granted	0.4	444.61
Issued in connection with an acquisition	0.2	628.71
Vested	(0.5)	295.70
Forfeited	(0.1)	326.90
Unvested at December 31, 2021	0.8	$ 425.39

The total fair value of shares vested during 2021, 2020 and 2019 was $151 million, $126 million and $118 million, respectively.

As of December 31, 2021, there was $250 million of total unrecognized compensation cost related to unvested restricted stock unit awards. The cost is expected to be recognized through 2025 with a weighted average amortization period of 2.1 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 2021, 2020 and 2019 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 2021, 2020 and 2019, the company charged to expense $299 million, $254 million and $232 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 liabilities and costs associated with the company's postretirement healthcare programs are generally funded on a self-insured and insured-premium basis and are not material for any period presented.

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 2021, 2020 and 2019, the company made cash contributions of approximately $34 million, $96 million and $50 million, respectively. Contributions to the plans included in the following table are estimated at between $40 and $60 million for 2022.

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

	Domestic pension benefits		Non-U.S. pension benefits	
(In millions)	2021	2020	2021	2020
Change in projected benefit obligations				
Benefit obligation at beginning of year	$ 1,302	$ 1,302	$ 1,486	$ 1,303
Acquisitions	—	—	170	—
Service costs	—	—	27	24
Interest costs	23	35	11	18
Settlements	—	—	(7)	(38)
Plan participants' contributions	—	—	6	5
Actuarial (gains) losses	20	44	(57)	119
Benefits paid	(85)	(79)	(30)	(26)
Currency translation and other	—	—	(54)	81
Benefit obligation at end of year	$ 1,260	$ 1,302	$ 1,552	$ 1,486
Change in fair value of plan assets				
Fair value of plan assets at beginning of year	$ 1,267	$ 1,201	$ 1,160	$ 986
Acquisitions	—	—	158	—
Actual return on plan assets	37	138	14	92
Employer contribution	7	7	27	87
Settlements	—	—	(7)	(38)
Plan participants' contributions	—	—	6	5
Benefits paid	(85)	(79)	(30)	(26)
Currency translation and other	—	—	(26)	54
Fair value of plan assets at end of year	$ 1,226	$ 1,267	$ 1,302	$ 1,160
Funded status	$ (34)	$ (35)	$ (250)	$ (326)
Accumulated benefit obligation	$ 1,260	$ 1,302	$ 1,475	$ 1,417
Amounts recognized in balance sheet				
Noncurrent assets	$ 32	$ 38	$ 205	$ 157
Current liability	(7)	(8)	(10)	(9)
Noncurrent liabilities	(59)	(65)	(445)	(474)
Net amount recognized	$ (34)	$ (35)	$ (250)	$ (326)
Amounts recognized in accumulated other comprehensive items				
Net actuarial loss	$ 157	$ 142	$ 167	$ 242
Prior service credits	—	—	(3)	(2)
Net amount recognized	$ 157	$ 142	$ 164	$ 240

For domestic pension plans, actuarial losses experienced in 2021 were driven by differences between actual and expected returns on plan assets for certain portions of plan benefits indexed to asset returns, which were partially offset by actuarial gains due to increases in the weighted average discount rates used to determine the projected benefit obligation differences. For non-U.S. pension plans, actuarial gains experienced in 2021 were principally driven by increases in the weighted average discount rates used to determine the projected benefit obligation.

For both domestic and non-U.S. pension plans, actuarial losses experienced in 2020 were principally driven by decreases in the weighted average discount rates used to determine the projected benefit obligation. For domestic pension plans, the 2020 actuarial losses were partially offset by gains recognized due to the adoption of an updated mortality assumption.

The actuarial assumptions used to compute the funded status for the plans are based upon information available as of December 31, 2021 and 2020 and are as follows:

	Domestic pension benefits		Non-U.S. pension benefits	
	2021	2020	2021	2020
Weighted average assumptions used to determine projected benefit obligations				
Discount rate for determining benefit obligation	2.70 %	2.33 %	1.45 %	0.95 %
Interest crediting rate for cash balance plans	2.58 %	2.16 %	1.25 %	1.25 %
Average rate of increase in employee compensation	N/A	N/A	2.73 %	2.30 %

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		
	2021	2020	2019	2021	2020	2019
Weighted average assumptions used to determine net benefit cost (income)						
Discount rate - service cost	N/A	N/A	N/A	0.65 %	1.21 %	1.97 %
Discount rate - interest cost	2.33 %	3.13 %	4.22 %	0.80 %	1.44 %	2.06 %
Average rate of increase in employee compensation	N/A	N/A	N/A	2.30 %	2.27 %	2.47 %
Expected long-term rate of return on assets	4.25 %	5.00 %	5.76 %	2.02 %	2.33 %	3.25 %

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 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:

	Pension plans	
(In millions)	2021	2020
Pension plans with projected benefit obligations in excess of plan assets		
Projected benefit obligation	$ 2,010	$ 2,047
Fair value of plan assets	1,521	1,529

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:

	Pension plans	
(In millions)	2021	2020
Pension plans with accumulated benefit obligations in excess of plan assets		
Accumulated benefit obligation	$ 1,937	$ 1,976
Fair value of plan assets	1,521	1,526

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

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

	Domestic pension benefits			Non-U.S. pension benefits		
(In millions)	2021	2020	2019	2021	2020	2019
Components of net benefit cost (income)						
Service cost	$ —	$ —	$ —	$ 27	$ 24	$ 23
Interest cost on benefit obligation	23	35	45	11	18	24
Expected return on plan assets	(40)	(47)	(55)	(19)	(19)	(30)
Amortization of actuarial net loss	7	6	2	12	10	6
Amortization of prior service benefit	—	—	—	—	(1)	(1)
Settlement/curtailment loss	—	—	—	—	8	4
Net periodic benefit cost (income)	$ (10)	$ (6)	$ (8)	$ 31	$ 40	$ 26

Expected benefit payments are estimated using the same assumptions used in determining the company's benefit obligation at December 31, 2021. 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
Expected benefit payments		
2022	$ 93	$ 45
2023	89	45
2024	88	49
2025	86	52
2026	84	56
2027-2031	368	307

Domestic Pension Plan Assets

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

Non-U.S. Pension Plan Assets

The company maintains specific plan assets for many of the individual pension plans outside the U.S. The investment strategy of each plan has been uniquely established based on the country specific standards and characteristics of the plans. Several of the plans have contracts with insurance companies whereby the market risks of the benefit obligations are borne by the insurance companies. When assets are held directly in investments, generally the objective is to invest in a portfolio of

diversified assets with a variety of fund managers. The investments may include equity funds, fixed income funds, hedge funds, multi-asset funds, alternative investments and derivative funds with the target asset allocations ranging from approximately 0% - 25% for equity funds, 40% - 90% for fixed income funds, 0% - 35% for multi-asset funds, and 0% - 30% for funds holding derivatives. The derivatives held by the funds are primarily interest rate swaps intended to match the movements in the plan liabilities. 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, 2021 and 2020, by asset category are as follows:

(In millions)	December 31, 2021	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Not subject to leveling (a)
Domestic pension plan assets					
U.S. equity funds	$ 124	$ —	$ —	$ —	$ 124
International equity funds	117	—	—	—	117
Fixed income funds	966	—	—	—	966
Money market funds	19	—	—	—	19
Total domestic pension plans	$ 1,226	$ —	$ —	$ —	$ 1,226
Non-U.S. pension plan assets					
Equity funds	$ 17	$ —	$ —	$ —	$ 17
Fixed income funds	651	—	—	—	651
Hedge funds	3	—	—	—	3
Multi-asset funds	73	—	—	—	73
Derivative funds	253	—	—	—	253
Alternative investments	1	—	—	—	1
Insurance contracts	295	—	295	—	—
Cash / money market funds	9	5	—	—	4
Total non-U.S. pension plans	$ 1,302	$ 5	$ 295	$ —	$ 1,002

(a) 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, 2020	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)	Not subject to leveling (a)
Domestic pension plan assets					
U.S. equity funds	$ 125	$ —	$ —	$ —	$ 125
International equity funds	126	—	—	—	126
Fixed income funds	1,001	—	—	—	1,001
Money market funds	15	—	—	—	15
Total domestic pension plans	$ 1,267	$ —	$ —	$ —	$ 1,267
Non-U.S. pension plan assets					
Equity funds	$ 74	$ —	$ —	$ —	$ 74
Fixed income funds	510	—	—	—	510
Hedge funds	59	—	—	—	59
Multi-asset funds	45	—	—	—	45
Derivative funds	149	—	—	—	149
Alternative investments	6	—	—	—	6
Insurance contracts	262	—	262	—	—
Cash / money market funds	55	7	—	—	48
Total non-U.S. pension plans	$ 1,160	$ 7	$ 262	$ —	$ 891

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

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

Note 8. Income Taxes

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

(In millions)	2021	2020	2019
U.S.	$ 3,340	$ 4,762	$ 2,280
Non-U.S.	5,501	2,468	1,792
Income before income taxes	$ 8,841	$ 7,230	$ 4,072

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

(In millions)	2021	2020	2019
Current income tax provision			
Federal	$ 446	$ 521	$ 267
Non-U.S.	1,148	423	544
State	160	175	62
	1,754	1,119	873
Deferred income tax provision (benefit)			
Federal	$ (227)	$ (237)	$ (222)
Non-U.S.	(399)	(18)	(252)
State	(19)	(14)	(25)
	(645)	(269)	(499)
Provision for income taxes	$ 1,109	$ 850	$ 374

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 before income taxes due to the following:

(In millions)	2021		2020		2019	
Statutory federal income tax rate	21	%	21	%	21	%
Provision for income taxes at statutory rate	$ 1,857		$ 1,518		$ 855	
Increases (decreases) resulting from:						
Foreign rate differential	(255)		(223)		(204)	
Income tax credits	(315)		(335)		(213)	
Global intangible low-taxed income	76		86		92	
Foreign-derived intangible income	(119)		(156)		(111)	
Excess tax benefits from stock options and restricted stock units	(124)		(114)		(80)	
Provision for (reversal of) tax reserves, net	(17)		(26)		62	
Intra-entity transfers	(284)		—		(79)	
Foreign exchange loss on inter-company debt refinancing	—		(47)		(62)	
Domestication transaction	—		(263)		—	
Valuation allowance	36		379		(4)	
Withholding taxes	164		115		38	
Basis difference on disposal of business	—		—		73	
Tax return reassessments and settlements	1		(196)		(6)	
State income taxes, net of federal tax	82		147		22	
Other, net	7		(35)		(9)	
Provision for income taxes	$ 1,109		$ 850		$ 374	

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.

During 2021, the company recorded a $188 million income tax benefit related to the deferred tax implications of an intra-entity transfer of assets. Also in 2021, the company recorded a $96 million income tax benefit related to a capital loss resulting from certain intra-entity transactions.

During 2020, the company settled an IRS audit relating to the 2014, 2015, and 2016 tax years. The company recorded a $25 million net tax benefit primarily from this settlement and related impacts, which resulted in a decrease in the company’s unrecognized tax benefits of $378 million, of which $144 million was reclassified to income taxes payable. The company recorded $53 million of charges for expired tax credits and other related components of the settlement. The company recorded a charge of $156 million to establish a valuation allowance against certain U.S. foreign tax credits which the company believes will more likely than not expire unutilized.

In 2020, the company recorded a $263 million income tax benefit related to a domestication transaction involving the transfer of certain non-U.S. subsidiaries to the U.S., including interest expense of those subsidiaries. The company also recorded a valuation allowance of $212 million against the amount of interest expense that the company believes will more likely than not go unused. Also in 2020, the company recorded a $47 million income tax benefit, including both U.S. federal and state taxes, related to a foreign exchange loss for tax purposes on certain intercompany financing arrangements.

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

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 2020, the company implemented foreign tax credit planning in Sweden which resulted in $96 million of foreign tax credits, with no related incremental U.S. income tax expense.

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

The company generally receives a tax deduction upon the exercise of non-qualified stock options by employees, or the vesting of restricted stock units held by employees, for the difference between the exercise price and the market price of the underlying common stock on the date of exercise. The company uses the incremental tax benefit approach for utilization of tax attributes. These excess tax benefits reduce the tax provision. In 2021, 2020 and 2019, the company's tax provision was reduced by $124 million, $114 million and $80 million, respectively, of such benefits.

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

(In millions)	2021	2020
Deferred tax asset (liability)		
Depreciation and amortization	$ (4,687)	$ (2,962)
Net operating loss and credit carryforwards	1,652	1,668
Reserves and accruals	162	164
Accrued compensation	318	253
Inventory basis difference	181	112
Deferred interest	295	227
Unrealized (gains) losses on hedging instruments	(33)	242
Other, net	251	124
Deferred tax liabilities, net before valuation allowance	(1,861)	(172)
Less: Valuation allowance	968	933
Deferred tax liabilities, net	$ (2,829)	$ (1,105)

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, 2021, all of the company’s valuation allowance relates to deferred tax assets, primarily net operating losses and disallowed interest expense carryforward, 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)	2021	2020	2019
Beginning balance	$ 933	$ 408	$ 471
Additions (reductions) charged to income tax provision, net	24	514	(27)
Additions due to acquisitions	30	—	—
Reduction due to a divestiture	—	—	(33)
Currency translation and other	(19)	11	(3)
Ending balance	$ 968	$ 933	$ 408

At December 31, 2021, the company had net federal, state and non-U.S. net operating loss carryforwards of $72 million, $88 million and $1.18 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 2022 through 2041. Of the net non-U.S. net operating loss carryforwards, $419 million expire in the years 2025 through 2041, and the remainder do not expire.

At December 31, 2021, the company had foreign tax credit carryforwards of $610 million and deferred interest carryforwards of $295 million. The foreign tax credit carryforwards will expire in the years 2022 through 2030 while deferred interest carryforwards do not expire.

U.S. federal taxes have been recorded on $24 billion of undistributed foreign earnings as of December 31, 2021. A provision has not been made for certain U.S. state income taxes or additional non-U.S. taxes that would be due when cash is repatriated to the U.S. as the company's undistributed foreign earnings are intended to be reinvested outside of the U.S. indefinitely. The determination of the amount of the unrecognized deferred tax liability related to the undistributed foreign earnings is not practicable due to the uncertainty in the manner in which these earnings will be distributed. The company's intent is to only make distributions from non-U.S. subsidiaries in the future when they can be made at no net tax cost.

Unrecognized Tax Benefits

As of December 31, 2021, the company had $1.12 billion of unrecognized tax benefits substantially all of 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)	2021	2020	2019
Beginning balance	$ 1,091	$ 1,552	$ 1,442
Additions due to acquisitions	26	—	—
Additions for tax positions of current year	32	8	53
Additions for tax positions of prior years	60	—	69
Reductions for tax positions of prior years	(5)	(296)	(7)
Closure of tax years	(27)	—	—
Settlements	(53)	(173)	(5)
Ending balance	$ 1,124	$ 1,091	$ 1,552

Substantially all of the unrecognized tax benefits are classified as long-term liabilities. The company does not expect its unrecognized tax benefits to change significantly over the next twelve months.

During 2021, the company's unrecognized tax benefits increased by $80 million as a result of uncertain tax positions relating to foreign tax positions and decreased $75 million relating to U.S. federal and state tax positions. The company also assumed $26 million of uncertain tax benefits as part of the acquisition of PPD.

During 2020, the company's unrecognized tax benefits decreased $51 million as a result of uncertain tax positions relating to foreign tax positions and $410 million relating to U.S. federal and state tax positions which included $378 million from the settlement of the IRS audit of the 2014, 2015 and 2016 tax years.

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

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, 2021 and 2020 was $59 million and $78 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. state and local or non-U.S. income tax examinations for years before 2012 and no longer subject to U.S. federal income tax examinations for years before 2017.

Note 9. Earnings per Share

(In millions except per share amounts)	2021	2020	2019
Net income attributable to Thermo Fisher Scientific Inc.	$ 7,725	$ 6,375	$ 3,696
Basic weighted average shares	394	396	400
Plus effect of: stock options and restricted stock units	3	3	3
Diluted weighted average shares	397	399	403
Basic earnings per share	$ 19.62	$ 16.09	$ 9.24
Diluted earnings per share	$ 19.46	$ 15.96	$ 9.17
Antidilutive stock options excluded from diluted weighted average shares	1	1	1

Note 10. Debt and Other Financing Arrangements

(Dollars in millions)	Effective interest rate at December 31, 2021	December 31, 2021	December 31, 2020
Commercial Paper	0.01 %	$ 2,522	$ —
2.15% 7-Year Senior Notes, Due 7/21/2022 (euro-denominated)		—	611
3.00% 7-Year Senior Notes, Due 4/15/2023		—	1,000
Floating Rate (SOFR + 0.35%) 1.5-Year Senior Notes, Due 4/18/2023		1,000	—
Floating Rate (SOFR + 0.39%) 2-Year Senior Notes, Due 10/18/2023		500	—
0.797% 2-Year Senior Notes, Due 10/18/2023	1.03 %	1,350	—
Floating Rate (EURIBOR + 0.20%) 2-Year Senior Notes Due 11/18/2023 (euro-denominated)	0.00 %	1,933	—
0.000% 2-Year Senior Notes Due 11/18/2023 (euro-denominated)	0.06 %	625	—
4.15% 10-Year Senior Notes, Due 2/1/2024		—	1,000
0.75% 8-Year Senior Notes, Due 9/12/2024 (euro-denominated)	0.94 %	1,137	1,222
1.215% 3-Year Senior Notes, Due 10/18/2024	1.42 %	2,500	—
Floating Rate (SOFR + 0.53%) 3-Year Senior Notes, Due 10/18/2024		500	—
0.125% 5.5-Year Senior Notes, Due 3/1/2025 (euro-denominated)	0.41 %	910	977
4.133% 5-Year Senior Notes, Due 3/25/2025		—	1,100
2.00% 10-Year Senior Notes, Due 4/15/2025 (euro-denominated)	2.10 %	728	782
0.000% 4-Year Senior Notes Due 11/18/2025 (euro-denominated)	0.16 %	625	—
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 %	796	855
2.95% 10-Year Senior Notes, Due 9/19/2026		—	1,200

(Dollars in millions)	Effective interest rate at December 31, 2021	December 31, 2021	December 31, 2020
1.45% 10-Year Senior Notes, Due 3/16/2027 (euro-denominated)	1.66 %	568	611
1.75% 7-Year Senior Notes, Due 4/15/2027 (euro-denominated)	1.97 %	682	733
3.20% 10-Year Senior Notes, Due 8/15/2027		—	750
0.50% 8.5-Year Senior Notes, Due 3/1/2028 (euro-denominated)	0.77 %	910	977
1.375% 12-Year Senior Notes, Due 9/12/2028 (euro-denominated)	1.46 %	682	733
1.750% 7-Year Senior Notes, Due 10/15/2028	1.89 %	700	—
1.95% 12-Year Senior Notes, Due 7/24/2029 (euro-denominated)	2.08 %	796	855
2.60% 10-Year Senior Notes, Due 10/1/2029	2.74 %	900	900
4.497% 10-Year Senior Notes, Due 3/25/2030		—	1,100
0.80% 9-Year Senior Notes, Due 10/18/2030 (euro-denominated)	0.89 %	1,990	—
0.875% 12-Year Senior Notes, Due 10/1/2031 (euro-denominated)	1.13 %	1,023	1,099
2.00% 10-Year Senior Notes, Due 10/15/2031	2.23 %	1,200	—
2.375% 12-Year Senior Notes, Due 4/15/2032 (euro-denominated)	2.55 %	682	733
1.125% 12-Year Senior Notes, Due 10/18/2033 (euro-denominated)	1.21 %	1,706	—
2.875% 20-Year Senior Notes, Due 7/24/2037 (euro-denominated)	2.94 %	796	855
1.50% 20-Year Senior Notes, Due 10/1/2039 (euro-denominated)	1.73 %	1,023	1,099
2.80% 20-Year Senior Notes, Due 10/15/2041	2.90 %	1,200	—
1.625% 20-Year Senior Notes, Due 10/18/2041 (euro-denominated)	1.78 %	1,421	—
5.30% 30-Year Senior Notes, Due 2/1/2044	5.37 %	400	400
4.10% 30-Year Senior Notes, Due 8/15/2047	4.23 %	750	750
1.875% 30-Year Senior Notes, Due 10/1/2049 (euro-denominated)	1.98 %	1,137	1,222
2.00% 30-Year Senior Notes, Due 10/18/2051 (euro-denominated)	2.07 %	853	—
Other		76	5
Total borrowings at par value		34,971	21,919
Fair value hedge accounting adjustments		—	25
Unamortized discount		(117)	(102)
Unamortized debt issuance costs		(184)	(114)
Total borrowings at carrying value		34,670	21,728
Finance lease liabilities		200	7
Less: Short-term obligations and current maturities		2,537	2,628
Long-term obligations		$ 32,333	$ 19,107

SOFR - Secured Overnight Financing Rate
EURIBOR - Euro Interbank Offered Rate

The effective interest rates for the fixed-rate debt include the stated interest on the notes, the accretion of any discount and the amortization of any debt issuance costs.

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

As of December 31, 2021, the annual repayment requirements for debt obligations are as follows:

(In millions)	Borrowings	Finance Lease Liabilities
2022	$ 2,522	$ 15
2023	5,396	12
2024	4,138	12
2025	2,610	12
2026	797	12
2027 and thereafter	19,508	137
	$ 34,971	$ 200

In addition to available borrowings under the company's revolving credit agreements, discussed below, the company had unused lines of credit of $78 million as of December 31, 2021. These unused lines of credit generally provide for short-term unsecured borrowings at various interest rates.

Credit Facilities

On January 7, 2022, the company entered into a new revolving credit facility (the Facility) with a bank group that provides for up to $5.00 billion of unsecured multi-currency revolving credit The Facility replaces the company's $3.00 billion credit facility which was in place at December 31, 2021 (the prior credit facility). The Facility expires on January 7, 2027. The revolving credit agreement calls for interest at either a Term SOFR, 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 the Facility include a Consolidated Net Interest Coverage Ratio (Consolidated EBITDA to Consolidated Net 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 minimum Consolidated Interest Coverage Ratio of 3.5:1.0 as of the last day of any fiscal quarter. As of December 31, 2021, no borrowings were outstanding under the prior credit facility, although available capacity was reduced by approximately $4 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, 2021, there were $2.52 billion outstanding borrowings under these programs.

Senior Notes

Interest is payable quarterly on the floating rate senior notes, annually on the euro-denominated fixed rate senior notes and semi-annually on all other senior notes. Each of the fixed rate senior notes may be redeemed at a redemption price of 100% of the principal amount plus a specified make-whole premium and accrued interest. Except for the euro-denominated floating rate senior notes, which may not be redeemed early, the floating rate senior notes may be redeemed in whole or in part on or after their applicable call dates at a redemption price of 100% of the principal amount plus 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. The company was in compliance with all covenants at December 31, 2021.

The company intends to allocate an amount equal to the net proceeds from the 0.000% senior notes due 2025 to finance or refinance, in whole or in part, certain green or social eligible projects. Pending allocation to green or social eligible projects, such net proceeds may be temporarily invested in cash, cash equivalents, short-term investments, or used to repay other borrowings.

In 2021, the company redeemed some of its existing senior notes. In connection with these redemptions, the company incurred $767 million of losses on the early extinguishment of debt included in other income/(expense) on the accompanying

statement of income. Upon redemption of the senior notes, the company terminated the related fixed to floating rate interest rate swap arrangements and received $22 million, included in other financing activities, net, in the accompanying statement of cash flows.

In 2019, the company refinanced certain of its debt by issuing new senior notes and using the proceeds to redeem some of its existing senior notes. In connection with these redemptions, the company incurred $184 million of losses on the early extinguishment of debt included in other income/(expense) on the accompanying statement of income. Upon redemption of the senior notes, the company terminated the related fixed to floating rate interest rate swap arrangements and paid $17 million, included in other financing activities, net, in the accompanying statement of cash flows. The company also terminated related cross-currency interest rate swap arrangements and received $44 million, included in other investing activities, net, in the accompanying statement of cash flows.

In February 2022, the company redeemed all of its 3.650% Senior Notes due 2025. In connection with the redemption the company incurred approximately $26 million of losses on the early extinguishment of debt in the first quarter of 2022.

Thermo Fisher Scientific (Finance I) B.V. (Thermo Fisher International), a wholly-owned finance subsidiary of the company, issued each of the Floating Rate Senior Notes due 2023, the 0.00% Senior Notes due 2023, the 0.00% Senior Notes due 2025, the 0.80% Senior Notes due 2030, the 1.125% Senior Notes due 2033, the 1.625% Senior Notes due 2041, and the 2.00% Senior Notes due 2051 included in the table above (collectively, the “Euronotes”) in registered public offerings. The company has fully and unconditionally guaranteed all of Thermo Fisher International’s obligations under the Euronotes and all of Thermo Fisher International’s other debt securities, and no other subsidiary of the company will guarantee these obligations. Thermo Fisher International is a “finance subsidiary” as defined in Rule 13-01(a)(4)(vi) of the Exchange Act, with no assets or operations other than those related to the issuance, administration and repayment of the Euronotes and other debt securities issued by Thermo Fisher International from time to time. The financial condition, results of operations and cash flows of Thermo Fisher International are consolidated in the financial statements of the company.

Note 11. Leases

As a lessee, the company leases certain logistics, office, and manufacturing facilities, as well as vehicles, copiers, and other equipment. These operating leases generally have remaining lease terms between 1 month and 30 years, and some include options to extend (generally for 1 to 10 years) or have options to terminate the arrangement within 1 year.

The company has guaranteed the residual value of three leased operating facilities with lease terms ending in 2023, 2024 and 2025. The company has agreed with the lessor to comply with certain financial covenants consistent with its other debt arrangements (Note 10). The aggregate maximum guarantee under these three lease arrangements is $147 million. Operating lease ROU assets and lease liabilities for these lease arrangements are recorded on the consolidated balance sheet as of December 31, 2021, but exclude any amounts for residual value guarantees.

As a lessee, the consolidated financial statements include the following relating to operating leases:

(In millions)	2021	2020	2019
Balance sheet			
ROU assets	$ 1,531	$ 775	
Operating lease liabilities - current	266	184	
Operating lease liabilities - noncurrent	1,203	626	
Statement of income			
Operating lease costs	$ 254	$ 224	$ 208
Variable lease costs	66	49	41
Statement of cash flows			
Cash used in operating activities for payments of amounts included in the measurement of operating lease liabilities	$ 288	$ 222	$ 208
Operating lease ROU assets obtained in exchange for new operating lease liabilities	293	202	205
Weighted average at end of year			
Remaining operating lease term	9.9 years	6.3 years	6.2 years
Discount rate	2.6 %	3.4 %	4.0 %

ROU assets are classified in other assets in the consolidated balance sheet. Operating lease liabilities are classified in other accrued expenses and other long-term liabilities, respectively, in the consolidated balance sheet.

Lease costs arising from finance leases, short-term leases, and sublease income are not material. See Note 10 for additional information relating to finance leases.

As of December 31, 2021, future payments of operating lease liabilities are as follows:

(In millions)	
2022	$ 303
2023	248
2024	193
2025	144
2026	120
2027 and thereafter	650
Total lease payments	1,658
Less: imputed interest	189
Total operating lease liability	$ 1,469

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

Note 12. Commitments and Contingencies

Purchase Obligations

The company has entered into unconditional purchase obligations, in the ordinary course of business, that include agreements to purchase goods, services or fixed assets and to pay royalties that are enforceable and legally binding and that specify all significant terms including: fixed or minimum quantities to be purchased; fixed, minimum or variable price provisions; and the approximate timing of the transaction. Purchase obligations exclude agreements that are cancelable at any time without penalty. The aggregate amount of the company's unconditional purchase obligations totaled $2.51 billion at December 31, 2021 and the majority of these obligations are expected to be settled during 2022.

The Analytical Instruments segment recorded a charge to cost of product revenues for $108 million in 2020 related to an existing supply contract for components of electron microscopy instruments. The agreement requires the company to make future minimum purchases through 2025. The company developed and launched an alternative product beginning in 2020 and based on the expected demand for the internally developed product vs. the third-party product, the company does not expect to use all of the product it will be required to buy, resulting in a loss on the purchase commitment.

Letters of Credit, Guarantees and Other Commitments

Outstanding letters of credit and bank guarantees totaled $266 million at December 31, 2021. Substantially all of these letters of credit and guarantees expire before 2039.

Outstanding surety bonds and other guarantees totaled $95 million at December 31, 2021. The expiration of these bonds and guarantees ranges through 2023.

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, 2021 was $36 million.

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

Indemnifications

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

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

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

Environmental Matters

The company is currently involved in various stages of investigation and remediation related to environmental matters. The company cannot predict all potential costs related to environmental remediation matters and the possible impact on future operations given the uncertainties regarding the extent of the required cleanup, the complexity and interpretation of applicable laws and regulations, the varying costs of alternative cleanup methods and the extent of the company's responsibility. Expenses for environmental remediation matters related to the costs of installing, operating and maintaining groundwater-treatment systems and other remedial activities related to historical environmental contamination at the company's domestic and international facilities were not material in any period presented. The company records accruals for environmental remediation liabilities, based on current interpretations of environmental laws and regulations, when it is probable that a liability has been incurred and the amount of such liability can be reasonably estimated. The company calculates estimates based upon several factors, including input from environmental specialists and management's knowledge of and experience with these environmental matters. The company includes in these estimates potential costs for investigation, remediation and operation and

maintenance of cleanup sites. At December 31, 2021, the company's total environmental liability was approximately $65 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

The company is involved in various disputes, governmental and/or regulatory inspections, inquiries, investigations and proceedings, and litigation matters that arise from time to time in the ordinary course of business. The disputes and litigation matters include 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 company is involved in various proceedings and litigation that arise from time to time in connection with 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, 2021, was approximately $216 million to $375 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 $216 million at December 31, 2021 (or $223 million undiscounted). The accrual includes estimated defense costs and is gross of estimated amounts due from insurers of $100 million at December 31, 2021 (or $106 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, 2021, the company had a product liability accrual of $11 million (undiscounted) relating to divested businesses.

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, which could have a material adverse effect on the company's results of operations, financial position, and cash flows. 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.

Note 13. Comprehensive Income and Shareholders' Equity

Comprehensive Income (Loss)

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

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

(In millions)	Currency translation adjustment	Unrealized losses on hedging instruments	Pension and other postretirement benefit liability adjustment	Total
Balance at December 31, 2020	$ (2,438)	$ (91)	$ (278)	$ (2,807)
Other comprehensive items before reclassifications	373	—	36	409
Amounts reclassified from accumulated other comprehensive items	—	56	13	69
Net other comprehensive items	373	56	49	478
Balance at December 31, 2021	$ (2,065)	$ (35)	$ (229)	$ (2,329)

Shareholders' Equity

At December 31, 2021, the company had reserved 23 million unissued shares of its common stock for possible issuance under stock-based compensation plans.

Early in the first quarter of 2022, the company repurchased $2.00 billion of the company's common stock (3.3 million shares).

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

Fair Value Measurements

The company uses the market approach technique to value its financial instruments and there were no changes in valuation techniques during 2021. The company's financial assets and liabilities carried at fair value are primarily comprised of investments in publicly traded securities, insurance contracts, investments in derivative contracts, mutual funds holding publicly traded securities and other investments in unit trusts held as assets to satisfy outstanding deferred compensation and retirement liabilities; and acquisition-related contingent consideration.

Assets and liabilities carried at fair value are 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, 2021 and December 31, 2020:

(In millions)	December 31, 2021	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Assets				
Cash equivalents	$ 2,210	$ 2,210	$ —	$ —
Investments	298	298	—	—
Warrants	15	—	15	—
Insurance contracts	181	—	181	—
Derivative contracts	36	—	36	—
Total assets	$ 2,740	$ 2,508	$ 232	$ —
Liabilities				
Derivative contracts	$ 1	$ —	$ 1	$ —
Contingent consideration	317	—	—	317
Total liabilities	$ 318	$ —	$ 1	$ 317

(In millions)	December 31, 2020	Quoted prices in active markets (Level 1)	Significant other observable inputs (Level 2)	Significant unobservable inputs (Level 3)
Assets				
Cash equivalents	$ 8,971	$ 8,971	$ —	$ —
Investments	21	21	—	—
Warrants	7	—	7	—
Insurance contracts	157	—	157	—
Derivative contracts	28	—	28	—
Total assets	$ 9,184	$ 8,992	$ 192	$ —
Liabilities				
Derivative contracts	$ 132	$ —	$ 132	$ —
Contingent consideration	70	—	—	70
Total liabilities	$ 202	$ —	$ 132	$ 70

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 initially measures the fair value of acquisition-related contingent consideration based on amounts expected to be transferred (probability-weighted) discounted to present value. 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 (such as likelihood of achieving production or revenue milestones, as well as changes in the fair values of the investments underlying a

recapitalization investment portfolio), of the contingent consideration.

(In millions)	2021	2020
Contingent consideration		
Beginning balance	$ 70	$ 55
Acquisitions (including assumed balances)	403	28
Payments	(109)	(4)
Changes in fair value included in earnings	(47)	(9)
Ending balance	$ 317	$ 70

Derivative Contracts

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

(In millions)	December 31, 2021	December 31, 2020
Notional amount		
Interest rate swaps - fair value hedges	$ —	$ 1,000
Cross-currency interest rate swaps - designated as net investment hedges	900	900
Currency exchange contracts	2,149	5,206

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

	Fair value – assets		Fair value – liabilities	
(In millions)	December 31, 2021	December 31, 2020	December 31, 2021	December 31, 2020
Derivatives designated as hedging instruments				
Interest rate swaps (a)	$ —	$ 25	$ —	$ —
Cross-currency interest rate swaps (a)	25	—	—	46
Derivatives not designated as hedging instruments				
Currency exchange contracts (b)	11	3	1	86
Total derivatives	$ 36	$ 28	$ 1	$ 132

(a) The fair values of the interest rate swaps and cross-currency interest rate swaps are included in the accompanying balance sheet under the caption other assets or other long-term liabilities.

(b) The fair value of the currency exchange contracts is included in the accompanying 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 accompanying 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	
(In millions)	December 31, 2021	December 31, 2020	December 31, 2021	December 31, 2020
Long-term obligations	$ —	$ 1,020	$ —	$ 25

(In millions)	Gain (loss) recognized 2021	2020
Fair value hedging relationships		
Interest rate swaps		
Hedged long-term obligations - included in other income/(expense)	$ 25	$ (38)
Derivatives designated as hedging instruments - included in other income/(expense)	(3)	38
Derivatives designated as cash flow hedges		
Interest rate swaps		
Included in unrealized losses on hedging instruments within other comprehensive items	—	(85)
Amount reclassified from accumulated other comprehensive items to other income/(expense)	(73)	(59)
Financial instruments designated as net investment hedges		
Foreign currency-denominated debt		
Included in currency translation adjustment within other comprehensive items	922	(873)
Cross-currency interest rate swaps		
Included in currency translation adjustment within other comprehensive items	71	(79)
Included in other income/(expense)	8	11
Derivatives not designated as hedging instruments		
Currency exchange contracts		
Included in cost of product revenues	12	(17)
Included in other income/(expense)	162	(81)
Cross-currency interest rate swaps		
Included in other income/(expense)	—	(9)

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

The company 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. A portion of the company's euro-denominated senior notes and its 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 2020 and 2019, the company entered into interest rate swap arrangements to mitigate the risk of interest rates rising prior to completion of debt offerings. Based on the company's conclusion that the debt offerings were probable, the swaps hedged the cash flow risk for each of the interest payments on the planned fixed-rate debt issues. The aggregate fair value of the terminated hedges, net of tax, has been classified as a reduction to accumulated other comprehensive items and will be amortized to interest expense over the term of the related debt issuances. The company had cash outlays aggregating $85 million and $50 million in 2020 and 2019, respectively, associated with termination of the arrangements, included in other financing activities, net, in the accompanying statement of cash flows.

In late 2020, the company determined that the previously anticipated debt offerings were probable of not occurring and reclassified $42 million from accumulated other comprehensive items to other income/(expense). During 2021, in connection with the extinguishment of debt (Note 10), the company reclassified $65 million from accumulated other comprehensive items to other income/(expense).

Fair Value of Other Financial Instruments

The carrying value and fair value of the company's debt instruments are as follows:

	December 31, 2021		December 31, 2020	
(In millions)	Carrying value	Fair value	Carrying value	Fair value
Senior notes	$ 32,072	$ 33,449	$ 21,723	$ 24,653
Commercial paper	2,522	2,522	—	—
Other	76	76	5	5
	$ 34,670	$ 36,047	$ 21,728	$ 24,658

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

Note 15. Supplemental Cash Flow Information

(In millions)	2021	2020	2019
Cash paid for:			
Interest	$ 555	$ 471	$ 790
Income taxes	2,182	1,324	896
Non-cash investing and financing activities			
Acquired but unpaid property, plant and equipment	379	347	150
Fair value of equity awards exchanged	43	—	—
Fair value of acquisition contingent consideration	183	—	—
Finance lease ROU assets obtained in exchange for new finance lease liabilities	15	5	1
Declared but unpaid dividends	104	89	77
Issuance of stock upon vesting of restricted stock units	265	217	182

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

(In millions)	December 31, 2021	December 31, 2020
Cash and cash equivalents	$ 4,477	$ 10,325
Restricted cash included in other current assets	13	10
Restricted cash included in other assets	1	1
Cash, cash equivalents and restricted cash	$ 4,491	$ 10,336

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

Note 16. Restructuring and Other Costs (Income)

Restructuring and other costs in 2021 primarily included charges for impairments of an acquired technology asset and a tradename asset, and, to a lesser extent, compensation due to employees at acquired businesses on the date of acquisition. In 2021, severance actions associated with facility consolidations and cost reduction measures affected less than 1% of the company's workforce.

Restructuring and other costs in 2020 primarily 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, and charges for the write-off of acquired technology. In 2020, severance actions associated with facility consolidations and cost reduction measures affected approximately 1% of the company's workforce.

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

As of February 24, 2022, the company has identified restructuring actions that will result in additional charges of approximately $20 million, primarily in 2022, and expects to identify additional actions in future periods which will be recorded when specified criteria are met, such as communication of benefit arrangements or when the costs have been incurred.

Restructuring and other costs (income) by segment are as follows:

(In millions)	2021	2020	2019
Life Sciences Solutions	$ 129	$ 34	$ 24
Analytical Instruments	6	26	14
Specialty Diagnostics	18	9	(471)
Laboratory Products and Biopharma Services	35	23	17
Corporate	9	7	3
	$ 197	$ 99	$ (413)

The following table summarizes the changes in the company's accrued restructuring balance. Other amounts reported as restructuring and other costs in the accompanying statement of income have been summarized in the notes to the table. Accrued restructuring costs are included in other accrued expenses in the accompanying balance sheet.

(In millions)	Total (a)
Balance at December 31, 2018	$ 80
Cumulative effect of accounting change (b)	(28)
Net restructuring charges incurred in 2019 (c)	52
Payments	(69)
Currency translation	(1)
Balance at December 31, 2019	34
Net restructuring charges incurred in 2020 (d)	51
Payments	(57)
Currency translation	(7)
Balance at December 31, 2020	21
Net restructuring charges incurred in 2021 (e)	37
Payments	(40)
Currency translation	(1)
Balance at December 31, 2021	$ 17

(a) The movements in the restructuring liability principally consist of severance and other costs such as 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) Impact of adopting new lease accounting guidance on January 1, 2019.

(c) Excludes $465 million of net charges, principally $482 million of net gain on the sale of businesses recorded in the Specialty Diagnostics segment, partially offset by $17 million of other restructuring charges, net, across the company's segments primarily for the write-off of acquired technology, pre-acquisition litigation-related matters, and compensation due to employees at businesses at the date of acquisition.

(d) Excludes $48 million of charges, principally $32 million for impairment of acquired technology in the Life Sciences Solutions segment resulting from a reduction in expected cash flows and, to a lesser extent, charges across the company's segments for fixed asset writedowns and costs associated with environmental remediation at abandoned/previously owned facilities.

(e) Excludes $160 million of charges, principally $122 million for impairments of an acquired technology asset and a tradename asset in the Life Sciences Solutions and Laboratory Products and Biopharma Services segment, principally resulting from a reduction in expected cash flows, and $35 million of charges for compensation contractually due to employees of acquired businesses at the date of acquisition in the Life Sciences Solutions and Laboratory Products and Biopharma Services segments.

The company expects to pay accrued restructuring costs primarily through 2022.