B Consolidated Financial Statements

Bayer Group Consolidated Income Statements

B 1

€ million	Note	2018	2019
Net sales	**[6]**	**36,742**	**43,545**
Cost of goods sold		(15,381)	(17,467)
Gross profit		**21,361**	**26,078**
Selling expenses		(12,210)	(12,274)
Research and development expenses		(5,105)	(5,342)
General administration expenses		(2,657)	(3,890)
Other operating income	[7]	5,043	1,633
Other operating expenses	[8]	(2,978)	(2,016)
EBIT[1]		**3,454**	**4,189**
Equity-method income (loss)	[10.1]	68	160
Financial income		908	475
Financial expenses		(2,544)	(1,944)
Financial result	**[10]**	**(1,568)**	**(1,309)**
Income before income taxes		**1,886**	**2,880**
Income taxes	[11]	(496)	(450)
Income from continuing operations after income taxes		**1,390**	**2,430**
of which attributable to noncontrolling interest		16	19
of which attributable to Bayer AG stockholders		1,374	2,411
Income from discontinued operations after income taxes	**[5.3]**	**321**	**1,680**
of which attributable to noncontrolling interest		–	–
of which attributable to Bayer AG stockholders		321	1,680
Income after income taxes		**1,711**	**4,110**
of which attributable to noncontrolling interest	[12]	16	19
of which attributable to Bayer AG stockholders (net income)		**1,695**	**4,091**
€			
Earnings per share	**[13]**		
From continuing operations	**[13]**		
Basic		1.46	2.46
Diluted		1.46	2.46
From discontinued operations	**[13]**		
Basic		0.34	1.71
Diluted		0.34	1.71
From continuing and discontinued operations	**[13]**		
Basic		1.80	4.17
Diluted		1.80	4.17

2018 figures restated
[1] For definition see A 2.3 “Alternative Performance Measures Used by the Bayer Group.”

Bayer Group Consolidated Statements of Comprehensive Income

B 2

€ million	Note	2018	2019
Income after income taxes		**1,711**	**4,110**
of which attributable to noncontrolling interest	[12]	16	19
of which attributable to Bayer AG stockholders		1,695	4,091
Remeasurements of the net defined benefit liability for post-employment benefit plans	[22]	(612)	(1,347)
Income taxes	[11]	129	381
Other comprehensive income from remeasurements of the net defined benefit liability for post-employment benefit plans		**(483)**	**(966)**
Change in the fair value of own credit risk component of financial liabilities measured at fair value		(6)	(3)
Income taxes	[11]	2	1
Other comprehensive income relating to own credit risk component of financial liabilities measured at fair value		**(4)**	**(2)**
Changes in fair values of equity instruments measured at fair value		48	201
Income taxes	[11]	(2)	(6)
Other comprehensive income from equity instruments measured at fair value		**46**	**195**
Other comprehensive income relating to associates accounted for using the equity method		**19**	**21**
Other comprehensive income that will not be reclassified subsequently to profit or loss		**(422)**	**(752)**
Changes in fair values of derivatives designated as cash flow hedges	[27.3]	125	(115)
Reclassified to profit or loss		124	107
Income taxes	[11]	(80)	6
Other comprehensive income from cash flow hedges		**169**	**(2)**
Changes in exchange differences recognized on translation of operations outside the eurozone		1,008	790
Reclassified to profit or loss		118	(130)
Other comprehensive income from exchange differences		**1,126**	**660**
Other comprehensive income relating to associates accounted for using the equity method		**1**	**1**
Other comprehensive income that may be reclassified subsequently to profit or loss		**1,296**	**659**
Total other comprehensive income[1]		**874**	**(93)**
of which attributable to noncontrolling interest		(8)	(1)
of which attributable to Bayer AG stockholders		882	(92)
Total comprehensive income		**2,585**	**4,017**
of which attributable to noncontrolling interest		8	18
of which attributable to Bayer AG stockholders		2,577	3,999

[1] Other comprehensive income is recognized outside profit or loss in equity.

Bayer Group Consolidated Statements of Financial Position

B 3

€ million	Note	Dec. 31, 2018	Dec. 31, 2019
Noncurrent assets			
Goodwill	[14]	38,442	39,126
Other intangible assets	[14]	36,696	34,709
Property, plant and equipment	[15]	12,943	12,479
Investments accounted for using the equity method	[16]	515	522
Other financial assets	[17]	2,212	1,536
Other receivables	[20]	526	751
Deferred taxes	[11]	4,333	4,576
		95,667	**93,699**
Current assets			
Inventories	[18]	11,132	10,770
Trade accounts receivable	[19]	11,714	11,678
Other financial assets	[17]	1,166	2,326
Other receivables	[20]	1,958	1,811
Claims for income tax refunds		809	1,652
Cash and cash equivalents		4,052	3,185
Assets held for sale	[5.3]	234	1,137
		31,065	**32,559**
Total assets		**126,732**	**126,258**
Equity	**[21]**		
Capital stock		2,387	2,515
Capital reserves		18,388	18,261
Other reserves		25,202	26,561
Equity attributable to Bayer AG stockholders		**45,977**	**47,337**
Equity attributable to noncontrolling interest		171	180
		46,148	**47,517**
Noncurrent liabilities			
Provisions for pensions and other post-employment benefits	[22]	8,717	8,213
Other provisions	[23]	3,418	3,766
Refund liabilities	[6]	160	105
Contract liabilities	[6]	986	733
Financial liabilities	[24]	37,712	36,912
Income tax liabilities		1,433	1,603
Other liabilities	[26]	366	439
Deferred taxes	[11]	4,667	3,755
		57,459	**55,526**
Current liabilities			
Other provisions	[23]	3,365	3,251
Refund liabilities	[6]	3,622	4,134
Contract liabilities	[6]	3,235	3,319
Financial liabilities	[24]	3,682	2,182
Trade accounts payable	[25]	6,038	6,426
Income tax liabilities		1,050	758
Other liabilities	[26]	2,121	2,483
Liabilities directly related to assets held for sale	[5.3]	12	662
		23,125	**23,215**
Total equity and liabilities		**126,732**	**126,258**

2018 figures restated

Bayer Group Consolidated Statements of Changes in Equity

B 4

€ million	Capital stock	Capital reserves	Retained earnings incl. net income	Exchange differences	Fair-Value measurement of equity instruments
Dec. 31, 2017	**2,117**	**9,658**	**26,851**	**(1,870)**	**98**
Adjustments on adoption of IFRS 9 (after tax)			(43)		(17)
Adjustments on adoption of IFRS 15 (after tax)			86		
Jan. 1, 2018, adjusted	**2,117**	**9,658**	**26,894**	**(1,870)**	**81**
Equity transactions with owners					
Capital increase	270	8,730			
Dividend payments			(2,402)		
Other changes			1		
Other comprehensive income			(478)	1,134	61
Miscellaneous other changes			24		(20)
Income after income taxes			1,695		
Dec. 31, 2018	**2,387**	**18,388**	**25,734**	**(736)**	**122**
Equity transactions with owners					
Capital increase	128	(128)			
Dividend payments			(2,611)		
Other changes		1	(19)		
Other comprehensive income			(965)	661	216
Miscellaneous other changes			5		(28)
Income after income taxes			4,091		
Dec. 31, 2019	**2,515**	**18,261**	**26,235**	**(75)**	**310**

B4 (continued)

€ million	Cash flow hedges	Other reserves[1]	Equity attributable to Bayer AG stockholders	Equity attributable to non-controlling interest	Equity
Dec. 31, 2017	**(66)**	**13**	**36,801**	**60**	**36,861**
Adjustments on adoption of IFRS 9 (after tax)			(60)		(60)
Adjustments on adoption of IFRS 15 (after tax)			86		86
Jan. 1, 2018, adjusted	**(66)**	**13**	**36,827**	**60**	**36,887**
Equity transactions with owners					
Capital increase			9,000		9,000
Dividend payments			(2,402)	(5)	(2,407)
Other changes			1	(53)	(52)
Other comprehensive income	169	(4)	882	(8)	874
Miscellaneous other changes	(26)	(4)	(26)	161	135
Income after income taxes			1,695	16	1,711
Dec. 31, 2018	**77**	**5**	**45,977**	**171**	**46,148**
Equity transactions with owners					
Capital increase					
Dividend payments			(2,611)	(4)	(2,615)
Other changes			(18)	(4)	(22)
Other comprehensive income	(2)	(2)	(92)	(1)	(93)
Miscellaneous other changes	16	(3)	(10)	(1)	(11)
Income after income taxes			4,091	19	4,110
Dec. 31, 2019	**91**	**–**	**47,337**	**180**	**47,517**

[1] Other reserves include the reserve for changes in own credit risk amounting to minus €6 million and the revaluation reserve of €6 million (2018: €5 million).

Bayer Group Consolidated Statements of Cash Flows

B 5

€ million	Note	2018	2019
Income from continuing operations after income taxes		1,390	2,430
Income taxes		496	450
Financial result		1,568	1,309
Income taxes paid		(2,028)	(2,561)
Depreciation, amortization and impairments		6,241	5,365
Change in pension provisions		(281)	(168)
(Gains) losses on retirements of noncurrent assets		(4,251)	(448)
Decrease (increase) in inventories		636	(103)
Decrease (increase) in trade accounts receivable		2,520	14
(Decrease) increase in trade accounts payable		257	759
Changes in other working capital, other noncash items		985	954
Net cash provided by (used in) operating activities from continuing operations		**7,533**	**8,001**
Net cash provided by (used in) operating activities from discontinued operations		384	206
Net cash provided by (used in) operating activities		**7,917**	**8,207**
Cash outflows for additions to property, plant, equipment and intangible assets		(2,593)	(2,650)
Cash inflows from sales of property, plant, equipment and other assets		230	283
Cash inflows from divestments less divested cash		7,563	2,546
Cash inflows from noncurrent financial assets		4,212	149
Cash outflows for noncurrent financial assets		(1,333)	(421)
Cash outflows for acquisitions less acquired cash		(45,316)	(410)
Interest and dividends received		247	135
Cash inflows from (outflows for) current financial assets		2,838	(303)
Net cash provided by (used in) investing activities		**(34,152)**	**(671)**
Capital contributions		8,986	–
Dividend payments		(2,407)	(2,615)
Issuances of debt		65,090	7,464
Retirements of debt		(47,271)	(11,760)
Interest paid including interest-rate swaps		(1,331)	(1,517)
Interest received from interest-rate swaps		412	39
Cash outflows for the purchase of additional interests in subsidiaries		(47)	–
Net cash provided by (used in) financing activities		**23,432**	**(8,389)**
Change in cash and cash equivalents due to business activities	[31]	**(2,803)**	**(853)**
Cash and cash equivalents at beginning of year		**7,435**	**4,052**
Change in cash and cash equivalents due to changes in scope of consolidation		1	(20)
Change in cash and cash equivalents due to exchange rate movements		(581)	6
Cash and cash equivalents at end of year		**4,052**	**3,185**

2018 figures restated

Notes to the Consolidated Financial Statements of the Bayer Group

1. General information

Bayer Aktiengesellschaft (Bayer AG), which is entered in the commercial register of the Local Court of Cologne, Germany, HRB 48248, is a global enterprise based in Germany. Its registered office is at Kaiser-Wilhelm-Allee 1, 51368 Leverkusen. The material business activities of the Bayer Group in the fields of agriculture and health care took place in the reporting period in the Crop Science, Pharmaceuticals and Consumer Health segments. The activities of each segment are outlined in Note [4] .

The declarations required under Section 161 of the German Stock Corporation Act concerning the German Corporate Governance Code have been issued and made available to stockholders.

The Board of Management of Bayer AG prepared the consolidated financial statements of the Bayer Group as of December 31, 2019, at its meeting on February 18, 2020, submitted the prepared statements to the Audit Committee and the Supervisory Board for examination and approval, and released them for publication. The consolidated financial statements were discussed by the Audit Committee of the Supervisory Board of Bayer AG at its meeting on February 25, 2020, and approved by the Supervisory Board at its plenary meeting on February 26, 2020.

2. Effects of new financial reporting standards

Financial reporting standards applied for the first time in 2019
Details of the new standards whose first-time application has a material impact on the Group's financial position and results of operations are given below.

In January 2016, the IASB published the new standard for lease accounting, IFRS 16 (Leases), which replaces the rules contained in IAS 17 (Leases) and the associated interpretations. The new standard is to be applied for annual periods beginning on or after January 1, 2019. The standard introduces a single lessee accounting model, requiring lessees to recognize right-of-use assets for granted rights of use and corresponding lease liabilities. It eliminates the requirement for lessees to differentiate between operating leases – without recognizing the respective assets or liabilities – and finance leases. However, IFRS 16 contains the option of exercising exemptions for the recognition of short-term leases and those pertaining to low-value assets. As under the previous standard, IAS 17, lessors still have to differentiate between operating and finance leases. According to IFRS 16, subleases are classified with reference to the right-of-use asset arising from the sublease in relation to the head lease.

Bayer applied IFRS 16 for the first time as of January 1, 2019, retrospectively without restating the prior-year figures. In this connection, various options and practical expedients were exercised as of the transition date for contracts in which a Bayer company is the lessee. Thus no additional assessment was undertaken upon the first-time application of the new standard with regard to whether a contract is or contains a lease. For contracts previously classified as operating leases, Bayer measured the lease liabilities as of the date of first-time application of IFRS 16 at the present value of the outstanding lease payments, using as the discount rate the respective incremental borrowing rate as of that date. On the date of first-time application, right-of-use assets were generally measured at the amount of the lease liability, adjusted by the amounts of any prepaid or accrued lease payments and / or provisions for onerous leases recognized in the statement of financial position as of December 31, 2018. Initial direct costs were not taken into account in the measurement of right-of-use assets as of the date of first-time application. The terms of leases with extension or termination options were determined retrospectively.

Bayer exercised the option of exempting intangible assets from the scope of application of IFRS 16 and applying the exemptions for short-term leases to certain leases ending in 2019. It is also applying these exemptions for short-term leases beginning after December 31, 2018.

The first-time application of IFRS 16 as of January 1, 2019, resulted in the recognition of additional lease liabilities of €1.0 billion and a corresponding increase in net financial debt. Right-of-use assets, including those recognized as finance leases according to IAS 17 until December 31, 2018, rose in line with the lease liabilities by €1.0 billion as of January 1, 2019, after the adjustments resulting from the first-time application of IFRS 16.

The significant effects on the individual items in the statement of financial position that were recognized as of December 31, 2018, in line with previous requirements were as follows:

B 2/1

IFRS 16 Accounting Changes: Consolidated Statement of Financial Position as of January 1, 2019

€ million	Dec. 31, 2018	Adjustments due to IFRS 16	Jan. 1, 2019
Property, plant and equipment	12,943	1,012	13,955
Financial liabilities	41,394	1,012	42,406

In the statement of comprehensive income, Bayer ceased recognizing expenses for operating leases in operating income and instead recognized the depreciation of the right-of-use assets and the interest expense for the lease liabilities under IFRS 16. An analogous effect occurred in the statement of cash flows, where IFRS 16 had a positive effect on the operating cash flow by reducing cash outflows for operating activities, while the repayment component of lease payments and the interest expense were recognized in the financing cash flow.

Material items in connection with the reconciliation of the operating lease commitments of €1,271 million as of December 31, 2018, under IAS 17 to the lease liabilities recognized as of January 1, 2019, under IFRS 16 comprised €399 million in finance leases already recognized as liabilities, the €187 million discount on the lease liabilities initially recognized under IFRS 16 and €35 million in lease commitments not recognized under IFRS 16 that pertained to intangible assets.

The weighted average incremental borrowing rate for leases initially recognized upon the first-time application of IFRS 16 was 5.0%.

In addition to IFRS 16, the following changes were applied as of January 1, 2019, but did not have any material impact on the Group’s financial position or results of operations.

B 2/2

Financial Reporting Standards Amendments With No Material Impact

Amendments to standards / interpretations		Mandatory application
IFRS 9	Amendments to IFRS 9: Prepayment Features with Negative Compensation	Jan. 1, 2019
IAS 19	Amendments to IAS 19 – (Employee Benefits): Plan Amendment, Curtailment or Settlement	Jan. 1, 2019
IAS 28	Amendment to IAS 28: Long-term Interests in Associates and Joint Ventures	Jan. 1, 2019
IFRIC 23	Uncertainty over Income Tax Treatments	Jan. 1, 2019
	Annual Improvements to IFRS Standards 2015-2017 Cycle	Jan. 1, 2019

Published financial reporting standards that have not yet been applied

The IASB has issued the following standards and amendments to standards whose application was not yet mandatory for the 2019 fiscal year and for some of which the European Union had not yet completed the endorsement process. The following standards have not yet been applied by Bayer:

B 2/3

Published Financial Reporting Standards That Have Not Yet Been Applied

Amendments to standards / interpretations		Mandatory application	Anticipated effects
Conceptual Framework	Amendments to References to the Conceptual Framework in IFRS Standards	Jan. 1, 2020	No material effects expected
IFRS 3	Amendment to IFRS 3 Business Combinations	Jan. 1, 2020	No material effects expected
IFRS 9, IAS 39, IFRS 7	Amendments to IFRS 9, IAS 39 and IFRS 7: Interest Rate Benchmark Reform	Jan. 1, 2020	No material effects expected
IFRS 17	Insurance Contracts	Jan. 1, 2021	Effects currently being evaluated
IAS 1, IAS 8	Definition of Material (Amendments to IAS 1 and IAS 8)	Jan. 1, 2020	No material effects expected
IAS 1	Classification of Liabilities as Current or Non-current (Amendments to IAS 1)	Jan. 1, 2022	Effects currently being evaluated

3. Reporting policies, methods and critical accounting estimates

The consolidated financial statements as of December 31, 2019, of Bayer AG and its subsidiaries (Bayer Group) were prepared according to the International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB), London, United Kingdom, and the interpretations of the IFRS Interpretations Committee (IFRS IC) as endorsed by the European Union. The applicable further requirements of Section 315e of the German Commercial Code were also taken into account.

The consolidated financial statements were drawn up in euros. Except where otherwise indicated, amounts are stated in millions of euros (€ million) and rounded to the nearest million. Adding the individual figures may therefore not always result in the exact total given.

In the income statement and statement of comprehensive income, statement of financial position, statement of cash flows and statement of changes in equity, certain items are combined for the sake of clarity. These are explained in the Notes. The income statement was prepared using the cost-of-sales method. Assets and liabilities are classified by maturity. They are regarded as current if they mature within one year or within the normal business cycle of the company or the Group, or are held for sale. The normal business cycle is defined for this purpose as beginning with the procurement of the resources necessary for the production process and ending with the receipt of cash or cash equivalents as consideration for the sale of the goods or services produced in that process. Inventories and trade accounts receivable and payable are always presented as current items. Deferred tax assets and liabilities, and pension provisions are always presented as noncurrent items.

The financial statements of the individual companies consolidated are prepared according to uniform recognition and measurement methods. The consolidated financial statements are based on the principle of the historical cost of acquisition, construction or production, with the exception of the items reflected at fair value, such as equity instruments held, debt instruments held that do not solely comprise principal and interest payments, and derivatives and liabilities designated at fair value through profit or loss.

In preparing the consolidated financial statements, management has to make certain assumptions and estimates that may substantially impact the presentation of the Group's financial position and / or results of operations. Such estimates, assumptions or the exercise of discretion mainly relate to the useful life of noncurrent assets, the discounted cash flows used for impairment testing and purchase price allocations, and the recognition of provisions, including those for litigation-related expenses, pensions and other benefits, taxes, environmental compliance and remediation costs, product liability and guarantees, as well as the recognition of refund liabilities. Essential estimates and assumptions that may affect reporting in the various item categories of the financial statements are described in the following sections of this Note. Estimates are based on historical experience and other assumptions that are considered reasonable under given circumstances. They are continually reviewed but may vary from the actual values.

New or revised financial reporting standards often contain options regarding the first-time application of new recognition and measurement methods. The income statement for the previous year and the opening statement of financial position for that year may be adjusted depending on the option Bayer exercises. For detailed information on the standards to be applied for the first time from January 1, 2019, see Note [2].

Consolidation

The consolidated financial statements include subsidiaries, joint operations, joint ventures and associates. The financial statements of the individual companies consolidated are prepared as of the closing date of the Group financial statements.

Subsidiaries are companies over which Bayer AG is currently able to exercise power by virtue of existing rights. Power means the ability to direct the relevant activities that significantly affect a company's profitability. Control is therefore only deemed to exist if Bayer AG is exposed, or has rights, to variable returns from its involvement with a company and has the ability to use its power over that company to affect the amount of that company's returns. The ability to control another company generally derives from Bayer AG's direct or indirect ownership of a majority of the voting rights. In the case of structured entities, however, control is based on contractual agreements. Inclusion of an entity's accounts in the consolidated financial statements begins when the Bayer Group is able to exercise control over the entity and ceases when it is no longer able to do so.

A joint operation or a joint venture exists where the Bayer Group controls an entity's activities jointly with a third party on the basis of a contractual agreement and decisions about the relevant activities require the unanimous consent of the parties sharing control. The parties to a joint operation have rights to the assets, and obligations for the liabilities, relating to the arrangement. The Bayer Group recognizes its share of the assets, liabilities, revenues and expenses in the consolidated financial statements in accordance with its rights and obligations. The parties jointly controlling a joint venture have rights to the net assets of the arrangement. Joint ventures are accounted for using the equity method.

Associates are companies over which Bayer AG exerts significant influence, generally through an ownership interest between 20% and 50%. They also are accounted for using the equity method. The carrying amount of a company accounted for using the equity method is adjusted annually by the change in its equity corresponding to Bayer's percentage interest in the company. Differences arising upon first-time inclusion using the equity method are accounted for according to full-consolidation principles. Bayer's share of changes – recognized in profit or loss – in these companies' equity and impairment losses recognized on goodwill are reflected in equity-method income / loss. Gains and losses from the sale of investments accounted for using the equity method are recognized in financial income or expenses, respectively, within income from investments in affiliated companies.

Interests in subsidiaries, joint ventures and associates that do not have a material impact on the Group's financial position or results of operations, either individually or in aggregate, are not consolidated but recognized as financial investments in equity instruments.

Foreign currency translation

The assets and liabilities of the subsidiaries that do not use the euro as their functional currency are translated into euros at closing rates. All changes occurring during the year and all income and expense items and cash flows are translated into euros at average monthly rates. Equity components are translated at the historical exchange rates prevailing at the respective dates of their first-time recognition in Group equity. The exchange differences arising between the resulting amounts and those obtained by translating at closing rates are recognized outside profit or loss as “Exchange differences on translation of operations outside the eurozone” (in other comprehensive income) or presented as “Exchange differences” in the tables in the Notes. When a company is deconsolidated or the net investment in a foreign operation is reduced, such exchange differences are reclassified from equity to profit or loss and recognized in the financial result. The exchange rates for major currencies against the euro varied as follows:

B 3/1

Exchange Rates for Major Currencies

		BRL	CAD	CNY	GBP	JPY	RUB	USD
		Brazil	**Canada**	**China**	**U.K.**	**Japan**	**Russia**	**U.S.A.**
Closing rate	2018	4.44	1.56	7.87	0.89	125.87	79.76	1.15
	2019	4.52	1.46	7.82	0.85	121.87	69.94	1.12
Average rate	2018	4.29	1.53	7.80	0.88	130.38	73.87	1.18
	2019	4.41	1.49	7.74	0.88	122.01	72.44	1.12

Since July 1, 2018, IAS 29 (Financial Reporting in Hyperinflationary Economies) has been applied for Bayer S.A., Argentina. On the date of first-time application, the adjustment of the carrying amounts of nonmonetary assets and liabilities was recognized in equity based on the general price index. Gains and losses incurred from the current hyperinflation of nonmonetary assets and liabilities and of equity are recognized in the income statement as other operating income and expenses.

Foreign currency measurement

Monetary items, such as receivables and liabilities, that are denominated in currencies other than a Group company’s functional currency are measured at closing rates. Related exchange differences are recognized as exchange gains or losses under other financial income or expenses.

Sales, refund liabilities, right-of-return assets and contract liabilities

All revenues derived from the selling of products, rendering of services or from licensing agreements are recognized as sales. This is done on the basis of customer contracts and the performance obligations contained therein, which are individually identified and may be presented separately for the purpose of revenue recognition. Revenues are recognized in profit or loss when or as soon as the entity transfers control of goods or services to a customer either over time or at a point in time. Control lies with the customer if the customer can independently determine the use of and consume the benefit derived from a product or service. Revenues from product deliveries are recognized at a point in time based on an overall assessment of the existence of a right to payment, the allocation of ownership rights, the transfer of physical possession, the transfer of risks and rewards, and acceptance by the customer. In the case of product deliveries undertaken by the Bayer Group, the transfer of risks and rewards and the right to determine the product shipment destination are particularly important. Revenues from services, on the other hand, are recognized over the period of time when services are rendered and in accordance with a reasonable measure of progress.

Net sales are limited to the amount the Bayer Group expects to receive for the fulfillment of performance obligations. Payment components to be withheld for third parties are deducted. Sales are therefore reduced by sales taxes and by actual and expected sales deductions resulting from rebates, discounts and bonuses. Sales deductions are estimated primarily on the basis of historical experience, specific contractual terms and thus future expectations of sales development. Revenues from contracts involving noncash consideration, such as exchange transactions, are measured at the fair value of the assets received. Furthermore, sales are reduced by the amount of the refund liability for expected returns of defective goods or of saleable products that may be returned under contractual arrangements. The net sales are reduced on the date of sale or on the date when the amount of future product returns can be reasonably estimated. **Refund liabilities** are recognized for expected sales deductions and product returns.

Assets from expected product returns are recognized in inventories as **right-of-return assets** at the previous carrying amounts less any recovery and processing costs and potential impairments. For unilaterally fulfilled customer contracts where more than one year passes between performance and payment, significant financing components are accounted for separately based on their present values and the subsequent unwinding of the discount. The underlying discount rate takes into account the individual credit risk of the contracting party that receives the financing.

Some of the Bayer Group’s revenues are generated on the basis of licensing agreements under which third parties have been granted the right to use or access products and technologies. A right-to-use license is characterized by the underlying technology remaining essentially unchanged over the period for which the rights are granted. With a right-to-access license, by contrast, the customer’s interest is directed toward the consistent further development of that intellectual property (IP). Revenues from right-to-use licenses are recognized at a specific point in time, while those from right-to-access licenses are recognized over time according to the underlying measure of progress. Milestone payments related to right-to-access licenses are allocated to satisfied and unsatisfied portions of the underlying performance obligation, as applicable. Consideration relating to already satisfied obligations is recognized as catch-up adjustments to revenue. Payment elements still to be earned are deferred as **contract liabilities**. Sales- or usage-based royalties agreed in connection with outlicensing arrangements are only recognized if the sale or the usage is sufficiently verified and the underlying performance obligation has been fulfilled.

Research and development expenses

Research expenses are recognized through profit or loss. Development expenses are only capitalized as internally generated intangible assets if the recognition criteria of IAS 38 are met. These include sufficient certainty that the development activity will give rise to future financial cash flows that also cover the respective development expenses. Since our own development projects are often subject to regulatory approval procedures and other uncertainties, the conditions for the capitalization of costs incurred before receipt of approvals generally are not satisfied. Capitalized development expenses are recognized at the cost of generation and amortized over their expected useful lives. Impairment testing is also performed on an annual or event-driven basis.

Income taxes

Income taxes comprise the taxes levied on taxable income in the individual countries along with changes in deferred tax assets and liabilities that are recognized in profit or loss. The income taxes recognized are reflected at the amounts likely to be payable under the statutory regulations in force, or already enacted in relation to future periods, at the end of the reporting period. Complex tax regulations may give rise to uncertainties with respect to their interpretation and the amounts and timing of future taxable income. Given the wide range of international business relationships and the long-term nature and complexity of existing contractual agreements, differences arising between the actual results and the assumptions made, or future changes to such assumptions, could necessitate adjustments to tax income and expense in future periods. Liabilities to tax authorities that are uncertain as to their amount and the probability of their occurrence are recognized as tax liabilities based on reasonable estimates. The amounts recognized are based on various factors, such as experience with previous tax audits and differing legal interpretations by the taxable entity and the responsible tax authority.

In compliance with IAS 12 (Income Taxes), deferred taxes are recognized for temporary differences between the carrying amounts of assets and liabilities in the statement of financial position prepared according to IFRS and their tax bases. Deferred taxes are also recognized for consolidation measures and for loss carryforwards, interest carryforwards and tax credits that are likely to be usable. Deferred tax assets relating to deductible temporary differences, tax credits, loss carryforwards and interest carryforwards are recognized where it is probable that taxable income or sufficiently taxable temporary differences will be available in the future to enable them to be used. Deferred tax liabilities are recognized on temporary differences taxable in the future. Deferred taxes are calculated at the rates which – on the basis of the statutory regulations in force, or already enacted in relation to future periods, as of the closing date – are expected to apply in the individual countries at the time of realization. Deferred tax assets and deferred tax liabilities are offset if they relate to income taxes levied by the same taxation authority and Bayer has a legal right to settle on a net basis. Material effects of changes in tax rates or tax law on deferred tax assets and liabilities are generally accounted for in the period in which the changes are enacted. Such effects are recognized in profit or loss except where they relate to deferred taxes that were recognized outside profit or loss, in which case they are recognized in other comprehensive income or directly in equity.

Deferred and current taxes are recognized in profit or loss unless they relate to items recognized outside profit or loss, in which case they, too, are recognized in other comprehensive income or directly in equity. The probability that deferred tax assets resulting from temporary differences, loss carryforwards or interest carryforwards can be used in the future is the subject of forecasts by the individual consolidated companies regarding their future earnings situation and other parameters. Deferred tax liabilities are recognized on planned dividend payments by subsidiaries. Where no dividend payment is planned for the foreseeable future, no deferred tax liability is recognized on the difference between the proportionate net assets according to IFRS and the tax base of the investment in the subsidiary.

Goodwill

In a business combination, goodwill is capitalized at the acquisition date (see “Acquisition accounting”). Goodwill is not amortized but is tested for impairment at least annually or when there is an indication of possible impairment.

Other intangible assets

Other intangible assets are capitalized at the acquisition date at their cost of acquisition or generation. Those with a definite useful life are amortized on a straight-line basis over the following periods, except where their actual depletion demands a different amortization pattern.

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Useful Lives of Other Intangible Assets

Patents and technologies	8 to 30 years
Trademarks	10 to 35 years
Marketing and distribution rights	5 to 30 years
Production rights	14 to 19 years
Other rights	2 to 12 years

The expected useful lives of such assets and the amortization patterns are determined based on estimates of the period for which they will generate cash flows. In addition, impairment testing is performed.

Property, plant and equipment

Property, plant and equipment is initially recognized at the cost of acquisition or construction plus the estimated amounts of any redevelopment or decommissioning costs. Thereafter it is depreciated by the straight-line method over its expected useful life, except where use-related depreciation is more appropriate.

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Useful Lives of Property, Plant and Equipment

Buildings	5 to 50 years
Plant installations and machinery	4 to 40 years
Furniture, fixtures and other equipment	2 to 15 years

In addition, impairment testing is performed. When assets are sold, closed down or scrapped, the difference between the net proceeds and the net carrying amount of the assets is recognized as a gain or loss in other operating income or expenses, respectively.

Grants and subsidies from third parties that serve to promote investment are reflected in the statement of financial position under other liabilities and amortized to income over the useful lives of the respective investments or in line with the terms of the grant or subsidy.

Investment property comprises land and buildings not being used for operational or administrative purposes. It is measured using the cost model. The fair values of buildings and developed sites reported in the Notes are primarily determined on the basis of internal valuations using the income approach, while those of undeveloped sites are mainly calculated using the market comparison approach.

Impairment testing

An impairment test is performed if there is an indication of possible impairment for an intangible asset, an item of property, plant and equipment, or a cash-generating unit or unit group to which goodwill has been allocated. Other intangible assets with an indefinite useful life (such as the Bayer Cross trademark), intangible assets that are not yet available for use (such as R&D projects) and cash-generating units or unit groups to which goodwill has been allocated are tested annually for impairment.

A cash-generating unit is the smallest identifiable group of assets generating cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The Bayer Group primarily regards product families as well as seeds and the corresponding traits as cash-generating units and subjects them to global impairment testing. Goodwill is tested for impairment at segment level.

Impairment testing involves comparing the carrying amount of each cash-generating unit or unit group, intangible asset or item of property, plant and equipment to the recoverable amount, which is the higher of its fair value less costs of disposal or value in use. If the carrying amount exceeds the recoverable amount, an impairment loss must be recognized for the difference. In this case an impairment loss is first recognized on any goodwill allocated to the cash-generating unit or unit group. Any remaining impairment loss is allocated among the other noncurrent nonfinancial assets in proportion to their carrying amounts, unless this is prohibited under any other rule. The resulting expense is reflected in the operating expense item in which the depreciation or amortization of the respective asset is recognized. The same applies to income from impairment loss reversals. Impairment losses recognized on goodwill are included in other operating expenses.

The recoverable amount is generally determined on the basis of the fair value less costs of disposal, taking into account the present value of the future net cash flows as market prices for the individual units are not normally available. These are forecasted on the basis of the Bayer Group's current planning, the planning horizon being up to four years. Forecasting involves making assumptions, especially regarding future selling prices, sales volumes, costs, market growth rates, economic cycles and exchange rates. These assumptions are based on internal estimates along with external market studies. Where the recoverable amount is the fair value less costs of disposal, measurement is undertaken from the viewpoint of an independent market participant. Where the recoverable amount is the value in use, the object of valuation is measured as currently used. In either case, net cash flows beyond the planning period are determined on the basis of long-term business expectations using the respective individual growth rates derived from market information. The fair value less costs of disposal is determined on the basis of unobservable inputs (Level 3).

The net cash inflows are discounted at a rate equivalent to the weighted average cost of equity and debt capital. To allow for the different risk and return profiles of the Bayer Group's principal businesses, the after-tax cost of capital is calculated separately for each reporting segment while taking into account regional focus areas, and a segment-specific capital structure is defined by benchmarking against comparable companies in the same industry sector. The cost of equity corresponds to the return expected by stockholders, while the cost of debt is based on the conditions on which comparable companies can obtain long-term financing. Both components are derived from capital market information.

Although the estimates of the useful lives of certain assets, assumptions concerning the macroeconomic environment and industry developments, and estimates of the discounted future cash flows are believed to be appropriate, changes in assumptions or circumstances could require changes in the carrying amounts. This could lead to the recognition of additional impairment losses in the future or – except in the case of goodwill – to reversals of previously recognized impairment losses if developments are contrary to expectations.

Financial assets

Financial assets comprise receivables, acquired equity and debt instruments, cash and cash equivalents, and derivatives with positive fair values. A financial asset (other than a derivative) is initially recognized at fair value, plus transaction costs in most cases, on the settlement date.

The classification and measurement of financial assets is based in each case on the business model and the characteristics of the cash flows. Trade accounts receivable are measured at amortized cost. Other debt instruments are measured at amortized cost or at fair value through profit or loss. Equity instruments are generally held for medium- to long-term strategic purposes and are therefore measured at fair value through other comprehensive income. In special cases they are measured at fair value through profit or loss; this applies to the shares in Covestro AG.

Loss allowances for expected credit losses are recognized for financial assets measured at amortized cost. Under the simplified impairment model, a default on receivables expected over the respective term (stage 2 of the impairment model) is determined for trade accounts receivable based on portfolio-specific default rates. These expected default rates are mainly based on the average defaults on receivables in recent years. These default rates are adjusted during the year for the respective customer portfolio if a significant change in the default rate is expected in the future. When determining the expected default rates, the business model, the respective customer and the economic environment of the geographic region are accounted for as follows. Specific default rates are applied for the individual Group companies; a standard calculation for countries with a comparable credit risk is undertaken for smaller companies. Further differentiation is achieved by taking into account the segments' various customer groups. Throughout the Bayer Group, customers are also assigned to risk classes with different expected default rates depending on their individual credit risk assessments.

Where action such as insolvency or comparable proceedings has been initiated against a defaulter or other objective indications exist that receivables are impaired (such as a considerable worsening of creditworthiness or a financial restructuring), the receivables are individually tested for impairment (stage 3 of the impairment model). In addition, all receivables more than 90 days past due are individually tested for impairment during the year.

For other financial assets, the expected credit loss for the next 12 months is determined on first-time recognition and on subsequent measurement using the Monte Carlo simulation method (stage 1 of the impairment model). In the event of a significant increase in the default risk, which is defined as a more than 0.25% increase in the probability of default, the expected credit losses over the respective term of the asset are taken into account (stage 2 of the impairment model). An impairment loss is recognized if there are objective indications of an impairment.

Financial assets are derecognized when contractual rights to receive cash flows from the financial assets expire or the financial assets were transferred together with all material risks and benefits. Receivables are also derecognized if they have been finally assessed as irrecoverable and we have ceased efforts to collect them following the completion of insolvency proceedings, for example. Receivables are not derecognized while they remain subject to enforcement.

Inventories

Inventories are recognized at their cost of acquisition or production (production-related full costs) – calculated by the weighted-average method – or at their net realizable value, whichever is lower.

Cash and cash equivalents

Cash includes cash in hand, checks received and balances with banks and companies. Cash equivalents are financial investments with maximum maturities of three months from the acquisition date that are subject to no more than insignificant fluctuations in value and will give rise to predefined cash inflows. Cash and cash equivalents are measured at amortized cost.

Provisions for pensions and other post-employment benefits

Within the Bayer Group, post-employment benefits are provided under defined contribution and / or defined benefit plans. In the case of defined contribution plans, the company pays contributions to publicly or privately administered pension plans on a mandatory, contractual or voluntary basis. Once the contributions have been paid, the company has no further payment obligations. The regular contributions constitute operating expenses and as such are included in the respective income statement items.

All remaining commitments under pension and other post-employment benefit plans are measured in terms of the defined benefit obligation (DBO) using the projected unit credit method, with entitlements already earned being measured at the present value of the DBO. This is based on factors such as expected future salary and pension increases, changes in health care costs, mortality rates and beneficiary structure. The uniform discount rates are based on the yields of high-quality bond portfolios (AA-rated corporate bonds) in specific currencies with weighted residual maturities approximately equal to the duration of the expected disbursements from the pension plans. The pension service cost and the net interest on the net liability are determined on the basis of the assumptions as of the previous closing date.

For funded obligations, the net liability is determined by deducting the fair value of plan assets. The obligations and plan assets are measured at regular intervals. Where no quoted prices for plan assets exist in active markets, their fair values are determined by applying the usual measurement methods and on the basis of freely accessible data such as interest rate curves and credit spreads. The net defined benefit asset is recognized in other receivables.

Current and past service cost and effects of plan settlements are recognized in operating income. The net interest on the net liability is reflected in the financial result under other financial income and expenses. The effects of remeasurements of the net defined benefit liability are reflected in the statement of comprehensive income as other comprehensive income. They consist of actuarial gains and losses, the return on plan assets and changes in the effects of the asset ceiling, less the amounts included in net interest and related deferred taxes.

Other provisions

Other provisions are recognized for present legal and constructive obligations arising from past events that will probably give rise to a future outflow of resources, provided that a reliable estimate can be made of the amount of the obligations. They are established at the present value of the expected future cash outflows and recognized in the respective operating expense items. The interest cost is reflected in the financial result under other financial income and expenses. If the projected obligation declines as a result of a change in the estimate, the provision is reversed by the corresponding amount and the resulting income recognized in the operating expense item(s) in which the original charge was recognized.

Costs arising from obligations to decommission or dismantle property, plant and equipment are included as a component of the acquisition or construction costs if they can be reliably estimated. If changes in the estimates require the provisions to be adjusted, the carrying amounts of the respective assets are reduced or increased accordingly.

Estimating the future costs for environmental protection and similar measures involves, in particular, uncertainties with regard to the applicable laws and regulations and the actual local conditions. Significant factors in estimating the costs include previous experiences in similar cases, expert opinions, current costs and new developments affecting costs, management’s interpretation of current environmental regulations, the financial position of third parties that may become obligated to participate in any remediation costs on the basis of joint liability, and the remediation methods likely to be deployed. Changes in these assumptions could impact future reported results of the Group. Taking into consideration the experience gained to date and the knowledge and circumstances as of the closing date, provisions are believed to be adequate. However, material additional costs could be incurred beyond the amounts accrued that result in additional expenses in subsequent periods.

Provisions for employment termination benefits are established where the amounts of severance payments, additional pension plan modules to be granted or other benefits can be reliably estimated. However, material additional costs could be incurred beyond the amounts accrued that result in additional expenses in subsequent periods.

Provisions for stock-based compensation are established for the programs offered collectively to different groups of employees. As required by IFRS 2 (Share-based Payment) for compensation systems involving cash settlement, awards to be made under the stock-based programs are covered by provisions in the amount of the fair value of the obligations existing as of the date of the financial statements vis-à-vis the respective employee group. All resulting valuation adjustments are recognized in profit or loss.

Provisions for litigations are established under certain conditions in the case of legal risks. Litigations and other judicial proceedings often raise complex issues and are subject to many uncertainties and complexities including, but not limited to, the facts and circumstances of each particular case, the jurisdiction in which each suit is brought and differences in applicable law. The outcomes of currently pending and future proceedings generally cannot be predicted. It is particularly difficult to assess the likely outcomes of class actions for damages or mass compensation claims in the United States, which may give rise to significant financial risks for the Bayer Group. As a result of a final judgment in court proceedings, regulatory decisions or the conclusion of a settlement, the Bayer Group may incur charges for which no accounting measures have yet been taken for lack of reasonable estimability or which exceed presently established provisions and the insurance coverage.

The Bayer Group considers the need for accounting measures in respect of pending or future litigations, and the extent of any such measures, on the basis of the information available to its legal department and in close consultation with legal counsel acting for the Bayer Group. Where it is more likely than not that such a litigation will result in an outflow of resources that is already reasonably estimable, a provision for litigation is recorded in the amount of the present value of the expected cash outflows. Such provisions cover the estimated payments to the plaintiffs, court and procedural costs, attorney costs and the cost of potential settlements.

It is frequently impossible to reliably determine the existence of a present obligation or reasonably estimate the probability that a potential outflow of resources will result from a pending or future litigation. The status of the material “legal risks” is described in Note [30]. Due to the special nature of these litigations, provisions generally are not established until initial settlements allow an estimate of potential amounts or judgments have been issued. Provisions for legal defense costs are established if it is probable that material costs will have to be incurred for external legal counsel to defend the company’s legal position.

Internal and external legal counsel evaluate the current status of the Bayer Group’s material legal risks at the end of each reporting period. The need to establish or adjust a provision and the amount of the provision or adjustment are determined on this basis. Adjusting events are reflected up to the date of preparation of the consolidated financial statements. The measurement of provisions in the case of class actions or mass compensation claims is mainly based on any settlements reached during the past year and on pending or anticipated future claims.

Under IAS 37.92, further information on aspects such as the processes, risks and related measures as well as on estimated financial effects, uncertainties, the amounts of individual provisions and contingent liabilities and their maturities can be withheld in exceptional cases if disclosing it could prejudice the company’s position. Such information may include, in particular, risks in the areas of product liability, competition and antitrust law, patent disputes, tax assessments and environmental matters.

Financial liabilities

Financial liabilities are generally measured at amortized cost using the effective-interest method. Derivatives with negative fair values, liabilities for contingent consideration in business combinations and liabilities designated at fair value through profit or loss are measured at fair value.

Mandatory convertible notes are assessed to determine whether they should be accounted for entirely as debt or split into an equity component and a debt component. This involves examining whether Bayer’s early conversion rights have economic substance. These rights may have economic substance with respect to maintaining the current credit rating if early conversion can prevent a rating downgrade. In this event, future savings of credit interest would more than offset the cost of early conversion by Bayer. If the right to early conversion is deemed to have economic substance, components of the mandatory convertible notes are classified as equity.

The mandatory convertible notes issued are accounted for as a hybrid financial instrument. The directly attributable costs along with the debt component, which corresponds to the present value of the future interest payments, are deducted from the proceeds of the issue. The debt component is included in financial liabilities. The remaining amount is the equity component, which is reflected in capital reserves. The mandatory convertible notes issued in 2016 were redeemed at maturity in November 2019.

Financial liabilities with one or multiple embedded derivatives (hybrid financial instruments), where at least one of the derivatives has to be separated from the host contract and significantly modifies the contractual cash flows, can be designated in their entirety at fair value through profit or loss. Use was made of this option for the debt instruments issued in June 2017 (exchangeable bond 2017/2020), which are exchangeable into Covestro shares. Changes in the fair value of these instruments are recognized in other financial income and expenses with the exception of those attributable to Bayer's own credit risk, which are recognized in other comprehensive income in the statement of comprehensive income.

Financial liabilities are derecognized when the contractual obligation is discharged or canceled, or has expired.

Derivatives

The Bayer Group uses derivatives to mitigate the risk of changes in exchange rates, interest rates or commodity prices (such as for soybeans and corn) and to hedge stock-based compensation programs. The instruments used include forward exchange contracts, interest-rate swaps, forward commodity contracts and forward stock transactions. Derivatives are recognized at the trade date and are remeasured to fair value on each closing date. Positive fair values are reflected in financial assets, negative fair values in financial liabilities.

Raw material supply contracts (at Crop Science, for example) that are concluded in order to receive or deliver nonfinancial items for the company's own purposes are not accounted for as derivatives but treated as pending transactions (own-use exemption).

Where embedded derivatives are identified in contracts, they are assessed for any close economic relationship with the host contract. If no such relationship is found, they are accounted for separately as derivatives.

Derivatives are designated as held for trading at fair value through profit or loss unless they qualify for hedge accounting. This mainly applies to the exchange hedging of accounting risks, the effects of which are reflected in other financial income and expenses as exchange gains or losses.

The effective portion of derivatives designated as cash flow hedges is initially recognized outside profit or loss in other comprehensive income. Any ineffective portions are recognized directly in profit or loss. Only when the hedged item is recognized through profit or loss is the effective portion of the hedging instrument also recognized in the income statement. In the case of commodity futures and options, reclassification is to the cost of goods sold. The effects of interest-rate hedges in the income statement are reflected in interest income or expense. The effects of the hedging of forecasted sales transactions in foreign currencies are recognized in other operating income or expenses at the time of revenue recognition. The hedging of stock-based employee compensation is recognized in the respective operating expense items over the duration of the Aspire programs.

Changes in the fair values of derivatives designated as fair value hedges are recognized in income along with the adjustments in the carrying amounts of the hedged items (for example, in inventories or as separate assets). This mainly applies to the hedging of firm purchase commitments for goods at Crop Science. These effects are recognized in the cost of goods sold. The effects of interest-rate hedges are reflected in interest income or expense.

Acquisition accounting

Acquired businesses are accounted for using the acquisition method, which in principle requires that the assets acquired and liabilities assumed be recorded at their respective fair values on the date Bayer obtains control. The difference between the consideration transferred (plus the fair value of the pre-existing equity interest in the acquiree in the case of step acquisitions) and the fair values of the acquired assets and assumed liabilities is recognized as goodwill. The results of foreign currency cash flow hedges are factored into the translation of foreign currency purchase price payments. For significant acquisitions, the purchase price allocation is carried out with assistance from independent third-party valuation specialists. The related valuations are based on the information available at the acquisition date. Ancillary acquisition costs are recognized as expenses in the periods in which they occur.

The application of the acquisition method requires certain estimates and assumptions to be made, especially concerning the fair values of the acquired intangible assets, property, plant and equipment and the liabilities assumed at the acquisition date, and the useful lives of the acquired intangible assets, property, plant and equipment. Measurement is based to a large extent on anticipated cash flows. If actual cash flows vary from those used in calculating fair values, this may materially affect the Group's future results of operations. In particular, the estimation of discounted cash flows from intangible assets under development, patented and unpatented technologies, customer relationships and brands is based on assumptions concerning, for example:

// The outcomes of R&D activities regarding the efficacy of a crop protection product, trait, seed or compound, and results of clinical trials
// The probability of obtaining regulatory approvals in individual countries
// Long-term sales projections
// Possible selling price erosion due to offerings of unpatented products following patent expirations
// The behavior of competitors (launch of competing products, marketing initiatives, etc.)

Divestment accounting

Divestments of shares in subsidiaries that result in a loss of control are generally accounted for in profit or loss. When shares in a subsidiary are gradually divested in several tranches, a reduction in the majority shareholding without the loss of control is reflected outside profit or loss and results in an increase in the equity attributable to noncontrolling interest. After the loss of control, the interest remaining at the time of the loss of control is recognized at fair value.

Leases

Leases are accounted for as described in Note [2].

4. Segment reporting

At Bayer, the Board of Management – as the chief operating decision-maker – allocates resources to the operating segments and assesses their performance. The reportable segments and regions are identified, and the disclosures selected, in line with the internal financial reporting system (management approach) and based on the Group accounting policies outlined in Note [3].

As of December 31, 2019, the Bayer Group comprised the three reportable segments Crop Science, Pharmaceuticals and Consumer Health. Their activities are as follows:

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Activities of the Segments

Segment	Activities
Crop Science	Development, production and marketing of a broad portfolio of products in seeds and plant traits, crop protection, digital solutions and customer services to promote sustainable agriculture
Pharmaceuticals	Development, production and marketing of prescription products, especially for cardiology and women's health; specialty therapeutics in the areas of oncology, hematology and ophthalmology; diagnostic imaging equipment and the necessary contrast agents
Consumer Health	Development, production and marketing of mainly nonprescription (OTC = over-the-counter) products in the categories of pain, cardiovascular risk prevention, dermatology, nutritional supplements, digestive health, allergy, and cough and cold

The operational businesses of Animal Health and the Currenta Group are no longer included in segment reporting for continuing operations because they were reclassified to discontinued operations under IFRS 5. The service company Currenta is no longer part of the Bayer Group after the sale of our majority stake closed in November 2019.

Business activities that cannot be allocated to any other segment are reported under "All Other Segments" within the Reconciliation. These mainly include the services provided by Business Services. Also recognized are gains and losses incurred upon the ongoing revaluation of assets and liabilities and of equity under IAS 29 for Bayer S.A. in Argentina.

The items in "Enabling Functions and Consolidation" as part of the Reconciliation mainly comprise the Bayer holding companies and Leaps by Bayer, which focuses on the development of crucial, cross-species innovations. They also include the increase or decrease in expenses for Group-wide long-term stock-based compensation (Aspire) arising from fluctuations in the performance of Bayer stock, and the consolidation of intersegment sales (2019: €2.4 billion; 2018: €2.4 billion). In addition, they contain certain contingent liabilities unrelated to the current business along with expenses, income, assets and liabilities of comparable central functions of the acquired Monsanto Group.

The segment data is calculated as follows:

// The intersegment sales reflect intra-Group transactions effected at transfer prices fixed on an arm's-length basis.
// The net cash provided by operating activities is the cash flow from operating activities as defined in IAS 7 (Statement of Cash Flows).

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Key Data by Segment

€ million	Crop Science 2018	Crop Science 2019	Pharmaceuticals 2018	Pharmaceuticals 2019	Consumer Health 2018	Consumer Health 2019
Net sales (external)	14,266	19,832	16,746	17,962	5,450	5,462
Currency-and portfolio-adjusted change[1]	+6.1%	+1.4%	+3.4%	+5.6%	−0.7%	+2.6%
Intersegment sales	14	16	21	32	1	10
Net sales (total)	14,280	19,848	16,767	17,994	5,451	5,472
EBIT[1]	3,138	582	3,213	4,762	(2,077)	713
EBITDA before special items[1]	2,651	4,796	5,598	5,975	1,096	1,090
EBITDA margin before special items[1]	18.6%	24.2%	33.4%	33.3%	20.1%	20.0%
ROCE[1]	6.3%	0.8%	16.6%	24.1%	(12.9)%	5.1%
Net cash provided by operating activities	3,743	4,209	4,376	4,523	727	841
Capital expenditures	1,030	1,414	888	974	228	222
Depreciation, amortization and impairments	1,362	3,313	1,584	1,189	3,112	590
of which impairment losses / impairment loss reversals	13	567	603	127	2,732	232
Depreciation and amortization before special items[1]	1,354	2,791	1,023	1,076	397	359
Research and development expenses	1,950	2,344	2,893	2,752	226	230

2018 figures restated
[1] For definition see A 2.3 "Alternative Performance Measures Used by the Bayer Group."

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Key Data by Segment

€ million	All Other Segments 2018	All Other Segments 2019	Reconciliation: Enabling Functions and Consolidation 2018	Reconciliation: Enabling Functions and Consolidation 2019	Group 2018	Group 2019
Net sales (external)	262	277	18	12	36,742	43,545
Currency-and portfolio-adjusted change[1]	+8.7%	+2.7%	–	–	+3.5%	+3.5%
Intersegment sales	2,383	2,370	(2,419)	(2,428)	–	–
Net sales (total)	2,645	2,647	(2,401)	(2,416)	36,742	43,545
EBIT[1]	249	(108)	(1,069)	(1,760)	3,454	4,189
EBITDA before special items[1]	515	293	(891)	(651)	8,969	11,503
EBITDA margin before special items[1]	–	–	–	–	24.4%	26.4%
ROCE[1]	–	–	–	–	4.0%	3.8%
Net cash provided by operating activities	211	522	(1,524)	(2,094)	7,533	8,001
Capital expenditures	213	283	9	27	2,368	2,920
Depreciation, amortization and impairments	168	258	15	15	6,241	5,365
of which impairment losses / impairment loss reversals	–	2	–	–	3,348	928
Depreciation and amortization before special items[1]	167	255	15	15	2,956	4,496
Research and development expenses	3	–	33	16	5,105	5,342

2018 figures restated
[1] For definition see A 2.3 "Alternative Performance Measures Used by the Bayer Group."

Leases between fully consolidated companies continue to be recognized as operating leases under IAS 17 within the segment data in the consolidated financial statements of the Bayer Group even after the first-time application of IFRS 16 as of January 1, 2019. This does not have any relevant impact on the respective key data used in the steering of the company and internal reporting to the Board of Management as the chief operating decision maker.

Reconciliations

The reconciliation of EBITDA before special items, EBIT before special items and EBIT to Group income before income taxes is given in the following table:

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Reconciliation of Segments' EBITDA Before Special Items to Group Income Before Income Taxes

€ million	2016	2019
EBITDA before special items of segments	9,860	12,154
EBITDA before special items of Enabling Functions and Consolidation	(891)	(651)
EBITDA before special items[1]	**8,969**	**11,503**
Depreciation, amortization and impairment losses/loss reversals before special items of segments	(2,941)	(4,481)
Depreciation, amortization and impairment losses/loss reversals before special items of Enabling Functions and Consolidation	(15)	(15)
Depreciation, amortization and impairment losses/loss reversals before special items	**(2,956)**	**(4,496)**
EBIT before special items of segments	6,919	7,673
EBIT before special items of Enabling Functions and Consolidation	(906)	(666)
EBIT before special items[1]	**6,013**	**7,007**
Special items of segments	(2,396)	(1,724)
Special items of Enabling Functions and Consolidation	(163)	(1,094)
Special items[1]	**(2,559)**	**(2,818)**
EBIT of segments[2]	4,523	5,949
EBIT of Enabling Functions and Consolidation[2]	(1,069)	(1,760)
EBIT[1]	**3,454**	**4,189**
Financial result	(1,568)	(1,309)
Income before income taxes	**1,886**	**2,880**

2018 figures restated
[1] For definition see A 2.3 "Alternative Performance Measures Used by the Bayer Group."
[2] Prior to April 1, 2019, special items in EBIT pertaining to the integration of Monsanto's corporate functions were included in the acquisition/integration category at Crop Science (2019: €30 million; 2018: €130 million). Effective April 1, 2019, these special items were included in restructuring under Enabling Functions and Consolidation as part of the Bayer 2022 platform program.

Information on geographical areas

The following table provides a regional breakdown of external sales by market and of intangible assets, property, plant and equipment:

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Information on Geographical Areas

	Net sales (external) – by market		Intangible assets and property, plant and equipment	
€ million	2018	2019	2018	2019
Europe/Middle East/Africa	12,393	13,184	26,478	24,877
of which Germany	2,439	2,364	16,167	15,267
of which Switzerland	446	505	5,469	5,310
North America	10,942	15,087	55,644	55,585
of which United States	9,190	13,556	54,073	53,889
Asia/Pacific	7,796	8,611	1,997	2,074
of which China	3,114	3,726	529	554
Latin America	5,611	6,663	3,717	3,764
of which Brazil	2,826	3,539	2,573	2,547
Total	**36,742**	**43,545**	**87,836**	**86,300**

2018 figures restated

Information on major customers

Revenues from transactions with a single customer in no case exceeded 10% of Bayer Group sales in 2019 or 2018.

5. Scope of consolidation; subsidiaries and affiliates

5.1 Changes in the scope of consolidation

Changes in the scope of consolidation in 2019 were as follows:

B 5.1/1

Change in the Number of Consolidated Companies

Bayer AG and consolidated companies	Germany	Other countries	Total
December 31, 2018	55	365	420
Changes in scope of consolidation	–	(15)	(15)
Additions	–	–	–
Retirements	(6)	(7)	(13)
December 31, 2019	**49**	**343**	**392**

In conjunction with the acquisition of the consumer care business of Merck & Co., Inc., United States, Bayer entered into a strategic collaboration with that company in 2014. This collaboration is included in the consolidated financial statements as a joint operation. Bayer and Merck & Co., Inc., have mutually agreed to collaborate on the development, production, life-cycle management and marketing of active ingredients and products in the field of soluble guanylate cyclase (sGC) modulation.

With the acquisition of Bayer's prescription dermatology business by LEO Pharma A/S, Ballerup, Denmark, the U.S. business was transferred in 2018 and the business in all other countries on July 1, 2019.

The sale of Bayer's 60% interest in the chemical park operator Currenta to funds managed by Macquarie Infrastructure and Real Assets (MIRA) was completed on November 29, 2019, and accounted for most of the decrease in the number of consolidated companies in Germany.

Following the establishment of BlueRock Therapeutics in 2016 as a joint venture with Versant Ventures, Bayer acquired the remaining interest in 2019, thus completing the full acquisition of this unlisted U.S.-based biotech company.

Twelve (2018: five) associates and five (2018: ten) joint ventures were accounted for in the consolidated financial statements using the equity method. Details of these companies are given in Note [16].

Flagship Ventures V Agricultural Fund, L.P., United States, was included in the consolidated financial statements for the first time in 2015 and classified as an associate. Bayer has no control over this associate despite owning 99.9% of the capital, but is able to significantly influence its financial and operating policy decisions.

Nanjing Baijingyu Pharmaceutical Co., Ltd., China, was classified as an associate in view of Bayer's representation on its executive committee and supervisory board. This enables Bayer to significantly influence its financial and operating policy decisions despite owning only 15% of its voting rights and capital.

A total of 62 (2018: 67) subsidiaries, including one (2018: one) structured entity and 12 (2018: 17) associates or joint ventures that in aggregate are immaterial to the Bayer Group's financial position and results of operations are neither consolidated nor accounted for using the equity method, but are recognized at fair value. The immaterial subsidiaries accounted for less than 0.1% of Group sales, less than 0.1% of equity and less than 0.2% of total assets.

Details of the companies included in the consolidated financial statements, the subsidiary and affiliated companies of the Bayer Group pursuant to Section 313, Paragraph 2 of the German Commercial Code, and a list of domestic subsidiaries that availed themselves in 2019 of certain exemptions granted under Section 264, Paragraph 3, and Section 264b of the German Commercial Code, are included in the audited consolidated financial statements that have been submitted for publication in the electronic version of the Federal Gazette. This information can also be accessed at www.bayer.com/shareownership2019.

5.2 Business combinations and other acquisitions

Acquisitions in 2019

On September 20, 2019, Bayer raised its stake in the joint venture BlueRock Therapeutics L.P., Cambridge, Massachusetts, United States, from 40.8% to 100%. Bayer made an upfront payment of €201 million for the remaining stake. Further amounts totaling up to €325 million are payable upon the achievement of pre-defined research-based milestones. A liability of €185 million was recognized for this purpose. This company, previously accounted for using the equity method, was therefore fully consolidated. Remeasurement of the shares previously accounted for using the equity method resulted in an amount of €296 million. The gain of €245 million resulting from the derecognition of the shares previously accounted for using the equity method was recognized in the financial result. The consideration transferred pertained to goodwill of €501 million, internally developed IP R&D of €114 million and other net assets of €67 million. The goodwill primarily pertains to the expected innovation potential. BlueRock Therapeutics is allocated to the Pharmaceuticals segment and focuses on the development of cell therapies across neurology, cardiology and immunology indications using its proprietary CELL+GENE™ platform for induced pluripotent stem cells (iPSC). Sales of €0 million and after-tax income of minus €14 million were recorded for the acquired business since the date of first-time consolidation. Had the above-mentioned acquisition already been made as of January 1, 2019, this would have had no effect on sales, after-tax income or earnings per share of the Bayer Group owing to the way the joint venture agreement governing profit realization had been structured.

On June 21, 2019, Bayer acquired 28% of the shares of Century Therapeutics LLC, Philadelphia, Pennsylvania, United States. The purchase price was €129 million, comprising an initial payment of €67 million and an assumed liability of €62 million. A further payment of €62 million will be made upon the achievement of certain milestones, bringing Bayer's interest in Century Therapeutics LLC to 36%. In view of Bayer's significant influence, the investment is accounted for in the consolidated financial statements as an associate using the equity method. Century Therapeutics LLC, founded in 2018 by U.S. companies Versant Ventures, San Francisco, and Fujifilm Cellular Dynamics, Inc., Madison, develops allogeneic immune cell therapies for cancer. The foundational technology is built on induced pluripotent stem cells that have unlimited self-renewing capacity.

Acquisitions in 2018

On June 7, 2018, Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States. The acquisition of Monsanto brought together two strong and highly complementary businesses: Bayer's innovative chemical and biological crop protection portfolio and Monsanto's exceptional expertise in the field of seeds and traits. Monsanto has production facilities in locations including Luling, Muscatine and Soda Springs (all United States), Antwerp (Belgium), Zarate (Argentina) and Camacari (Brazil). Monsanto's portfolio of established brands includes DEKALB™, Asgrow™ and Roundup™, among others. The purchase price of €48,029 million pertained mainly to intangible assets for technologies in the areas of seeds and traits (useful lives of between 9 and 30 years), herbicides (useful lives of 20 years) and digital platforms (useful lives of 15 years), as well as for R&D projects and brands (useful lives of between 10 and 30 years), property, plant and equipment, inventories and goodwill. No value was assigned to the company name "Monsanto."

The goodwill included expected synergies in administration processes and infrastructure, including cost savings in the selling, R&D and general administration functions, as well as expected sales synergies resulting from the combined offering of products. The goodwill is non-tax-deductible.

The following bonds with total nominal volumes of US$15 billion and €5 billion in total were issued in June 2018 to finance the acquisition:

B 5.2/1

Newly Issued Bonds

Issuer	Coupon (%)	Nominal volume	Issue date	Maturity date
Bayer U.S. Finance II LLC, U.S.A.				
	3.5	US$1,250 million	Jun. 25, 2018	Jun. 25, 2021
	3-month USD LIBOR + 0.63	US$1,250 million	Jun. 25, 2018	Jun. 25, 2021
	3.875	US$2,250 million	Jun. 25, 2018	Dec. 15, 2023
	3-month USD LIBOR + 1.01	US$1,250 million	Jun. 25, 2018	Dec. 15, 2023
	4.25	US$2,500 million	Jun. 25, 2018	Dec. 15, 2025
	4.375	US$3,500 million	Jun. 25, 2018	Dec. 15, 2028
	4.625	US$1,000 million	Jun. 25, 2018	Jun. 25, 2038
	4.875	US$2,000 million	Jun. 25, 2018	Jun. 25, 2048
Bayer Capital Corporation B.V., Netherlands				
	3-month EURIBOR + 0.55	€750 million	Jun. 26, 2018	Jun. 26, 2022
	0.625	€1,000 million	Jun. 26, 2018	Dec. 15, 2022
	1.5	€1,750 million	Jun. 26, 2018	Jun. 26, 2026
	2.125	€1,500 million	Jun. 26, 2018	Dec. 15, 2029

As part of the acquisition, bonds with a nominal volume of US$6.9 billion were taken over from Monsanto.

The purchase price allocation for Monsanto was completed in the second quarter of 2019. The effects of adjustments to the purchase price allocation in 2018 and through the second quarter of 2019 on the Group's assets and liabilities were as follows:

B 5.2/2

Acquired Assets and Assumed Liabilities (Fair Values at the Respective Acquisition Dates) and Adjustments (Monsanto)

€ million	Prior to adjustment of the purchase price allocation	Adjustment of the purchase price allocation	After adjustment of the purchase price allocation
Goodwill	22,998	1,746	24,744
Patents and technologies	17,350	(212)	17,138
Trademarks	4,195	(254)	3,941
Marketing and distribution rights	821	24	845
R&D projects	4,300	302	4,602
Production rights	–	11	11
Other rights	394	(34)	360
Property, plant and equipment	6,293	(639)	5,654
Investments accounted for using the equity method	52	–	52
Other financial assets	250	(52)	198
Inventories	4,882	(153)	4,729
Receivables	7,201	54	7,255
Other current assets	27	(1)	26
Cash and cash equivalents	2,657	–	2,657
Deferred tax assets	1,548	302	1,850
Provisions for pensions and other post-employment benefits	(367)	(22)	(389)
Other provisions	(1,297)	(632)	(1,929)
Refund liabilities	(3,321)	8	(3,313)
Financial liabilities	(8,656)	1	(8,655)
Miscellaneous liabilities	(3,102)	(566)	(3,668)
Deferred tax liabilities	(8,019)	117	(7,902)
Net assets	**48,206**	**–**	**48,206**

Adjustments to the purchase price allocation for Monsanto after December 31, 2018, had no effect on income after income taxes.

On May 2, 2018, Bayer increased its interest in the joint venture Bayer Zydus Pharma Private Limited, Thane, India, from 50% to 75% plus one share. A purchase price of €28 million was agreed. Bayer is obligated to purchase the remaining 25% minus one share of Bayer Zydus Pharma by 2021 and has recognized a liability of €9 million in connection with this obligation. As a result, the accounting method used for this business changed from the equity method to full consolidation, with 100% of the shares of Bayer Zydus Pharma being consolidated. Remeasurement of the shares previously accounted for using the equity method resulted in an amount of €18 million. The gain of €15 million resulting from the derecognition of the shares previously accounted for using the equity method was recognized in the financial result. The purchase price pertained mainly to goodwill that in turn was based primarily on a control premium. Bayer Zydus Pharma is active in core segments of the Indian pharmaceutical market and focuses on women's health, diagnostic imaging, cardiovascular disease, diabetes treatment and oncology. This acquisition increases Bayer's presence in the Indian pharmaceutical market.

5.3 Discontinued operations, assets and liabilities held for sale, and divestments

Discontinued operations

On August 20, 2019, Bayer and Elanco Animal Health LLC (Elanco), Greenfield, Indiana, United States, signed an agreement for Bayer to sell its Animal Health business to Elanco for a purchase price of €6,845 million consisting of €4,791 million in cash, subject to customary purchase price adjustments, and €2,053 million in Elanco stock based on the unaffected 30-day volume-weighted average price of €30.26 as of August 6, 2019. The number of shares constituting the equity component is fixed within a 7.5% collar. This means the number of shares will be increased (decreased) for share price decreases (increases) within this corridor of €28.15 to €32.71. Based on Elanco's share price of €26.52 as of December 31, 2019, the value of the equity consideration, taking into account the corresponding fair value, would be €1,868 million and Bayer would receive 73 million Elanco shares.

On November 29, 2019, Bayer completed the sale of its shares in the chemical park operator Currenta. Bayer had signed an agreement on August 6, 2019, to sell the stake in Currenta to InfraChem Holdings S.à r.l., Luxembourg, Luxembourg, a company managed by Macquarie Infrastructure and Real Assets. Currenta manages and operates infrastructure, energy supply and other essential services across the chemical parks in Leverkusen, Dormagen and Krefeld-Uerdingen. The preliminary sale price for Bayer's interest in Currenta is €1,104 million. In addition, Bayer sold a real estate and infrastructure portfolio to Currenta for €180 million. Other divested net assets mainly included pension provisions of €1,584 million. The provisional divestment gain amounts to €1,637 million.

Animal Health and Currenta are being presented as discontinued operations in the income statements from the third quarter of 2019 onward and for all prior periods.

The income statements for the discontinued operations are given below:

B 5.3/1

Income Statements for Discontinued Operations

€ million	Currenta 2018	Currenta 2019	Animal Health 2018	Animal Health 2019	Covestro 2018	Covestro 2019	Total 2018	Total 2019
Net sales	**1,343**	**1,171**	**1,501**	**1,571**	**–**	**–**	**2,844**	**2,742**
Cost of goods sold	(1,156)	(954)	(473)	(501)	–	–	(1,629)	(1,455)
Gross profit	**187**	**217**	**1,028**	**1,070**	**–**	**–**	**1,215**	**1,287**
Selling expenses	(11)	(9)	(530)	(535)	–	–	(541)	(544)
Research and development expenses	2	1	(143)	(143)	–	–	(141)	(142)
General administration expenses	(24)	(59)	(46)	(127)	–	–	(70)	(186)
Other operating income/expenses	(6)	1,624	3	(4)	8	–	5	1,620
EBIT[1]	**148**	**1,774**	**312**	**261**	**8**	**–**	**468**	**2,035**
Financial result	**(24)**	**(44)**	**(5)**	**(4)**	**–**	**–**	**(29)**	**(48)**
Income before income taxes	**124**	**1,730**	**307**	**257**	**8**	**–**	**439**	**1,987**
Income taxes	(27)	(226)	(83)	(81)	(8)	–	(118)	(307)
Income after income taxes	**97**	**1,504**	**224**	**176**	**–**	**–**	**321**	**1,680**
of which attributable to noncontrolling interest	–	–	–	–	–	–	–	–
of which attributable to Bayer AG stockholders (net income)	97	1,504	224	176	–	–	321	1,680

[1] For definition see A 2.3 "Alternative Performance Measures Used by the Bayer Group."

The cash flows for the discontinued operations are as follows:

B 5.3/2

Cash Flows from Discontinued Operations

€ million	Currenta 2018	Currenta 2019	Animal Health 2018	Animal Health 2019	Total 2018	Total 2019
Net cash provided by (used in) operating activities	129	37	255	169	384	206
Net cash provided by (used in) investing activities	(144)	(116)	(55)	(82)	(199)	(198)
Net cash provided by (used in) financing activities	15	79	(200)	(87)	(185)	(8)
Change in cash and cash equivalents	**–**	**–**	**–**	**–**	**–**	**–**

As no cash is assigned to the discontinued operations, the balance of the cash provided is deducted again in financing activities.

Assets and liabilities held for sale

The assets and liabilities held for sale in 2019 were mainly those of the businesses to be divested to Elanco, and were comprised as follows:

B 5.3/3

Assets and Liabilities Held for Sale

€ million	Dec. 31, 2018	Dec. 31, 2019
Goodwill	156	99
Other intangible assets	32	145
Property, plant and equipment	42	421
Other assets	4	–
Deferred taxes	–	130
Inventories	–	314
Trade accounts receivable	–	6
Other receivables	–	17
Claims for income tax refunds	–	4
Cash and cash equivalents	–	1
Assets held for sale	**234**	**1,137**
Provisions for pensions and other post-employment benefits	5	454
Other provisions	–	39
Refund liabilities	–	53
Financial liabilities	–	2
Miscellaneous liabilities	–	18
Deferred taxes	7	19
Income tax liabilities	–	29
Trade accounts payable	–	48
Liabilities directly related to assets held for sale and discontinued operations	**12**	**662**

The assets and liabilities held for sale in 2018 were mainly those of the businesses sold to LEO Pharma in the United States.

Divestments in 2019

On December 13, 2019, Bayer and CRISPR Therapeutics AG, Zug, Switzerland, agreed to terminate their collaboration in the joint venture Casebia, which was established in 2015. As part of the agreement, Bayer transferred its interest in the joint venture to CRISPR and received co-marketing rights and a payment of €14 million. A capital contribution of €59 million, previously recognized in liabilities, to which Bayer had committed but was still outstanding, must no longer be made.

Bayer completed the sale of its Dr. Scholl's business on November 1, 2019. Yellow Wood Partners LLC, Boston, United States, had signed an agreement with Bayer on July 19, 2019, to acquire this business. Under IFRS 5 the assets and liabilities pertaining to the business were recognized since the second quarter of 2019 as held for sale. Impairment losses of €429 million on the disposal groups, including €208 million on goodwill, were recognized through profit or loss. The preliminary purchase price amounts to €516 million and corresponds to the carrying amount of the derecognized net assets.

On August 30, 2019, Bayer completed the sale of the Coppertone™ business to Beiersdorf AG, Hamburg, Germany, the two companies having signed a purchase agreement in May 2019. Under IFRS 5 the assets and liabilities pertaining to the business were recognized in the second quarter of 2019 as held for sale. The preliminary purchase price amounts to €501 million and corresponds to the carrying amount of the derecognized net assets.

On July 27, 2018, Bayer signed the agreements to sell the prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark. On September 4, 2018, the prescription dermatology business of the Consumer Health segment in the United States was transferred to the acquirer. The final purchase price amounted to €58 million and the final divestment gain to €35 million. The remaining global business outside the United States was transferred to the acquirer on July 1, 2019. The divested portfolio comprises prescription brands including Advantan™, Skinoren™ and Travocort™. The final purchase price amounted to €617 million and the final divestment gain to €347 million.

Divestments in 2018

In connection with the acquisition of Monsanto, Bayer had signed an agreement with BASF SE, Ludwigshafen, Germany, on October 13, 2017, concerning the sale of selected Crop Science businesses. All of the respective transactions closed on August 1, 2018, except for the sale of the vegetable seed business, which closed on August 16, 2018. In accordance with the conditions imposed by antitrust authorities, the divestment of Crop Science businesses to BASF also comprises further significant obligations by Bayer that will be fulfilled over a number of years subsequent to the date of divestment. Another of these conditions is for deliveries under the supply agreement (finished products and active ingredients) to be made at prices based on the respective variable costs. In this connection, a contract liability of €0.2 billion was determined based on customary sales prices and recognized in the statement of financial position. It will be dissolved as the obligations are fulfilled. The final purchase price received from BASF amounted to €7.4 billion, and the divestment gain before taxes to €4.0 billion. The divested net assets amounted to €2.8 billion and pertained mainly to property, plant and equipment, goodwill and other assets and provisions.

On June 30, 2018, the Pharmaceuticals segment sold its MK Generics business in Central America and the Caribbean to Tecnoquímicas S.A., Cali, Colombia. The divested business includes the Bonima production plant in El Salvador. The base purchase price was €44 million.

Bayer ceded de facto control of Covestro and deconsolidated the company at the end of September 2017. From the loss of control and through the second quarter of 2018, Covestro fulfilled the conditions for presentation as a discontinued operation. In connection with the sale of Covestro AG shares in 2017, Bayer AG entered into derivative contracts. These resulted in gains of €8 million through the second quarter of 2018.

Notes to the Income Statements

6. Net sales

Total reported net sales in 2019 posted year-on-year growth of €6,803 million, or 18.5 %, to €43,545 million. Sales were derived primarily from product deliveries and licenses. Breakdowns of net sales by segment and geographical area are given in the overview in Note [4].

Sales of €1,685 million were recognized in 2019 (2018: €664 million) from performance obligations already satisfied in previous years. These sales primarily resulted from right-to-use licenses granted against sales-based royalties and from adjustments to refund liabilities for expected product returns and rebates to be granted.

Contractually agreed sales volumes pertaining to performance obligations not yet satisfied as of December 31, 2019, are expected to be reclassified to profit or loss as follows, taking into account anticipated sales deductions:

B 6/1

Allocation of Transaction Price to Unfulfilled Performance Obligations

€ million	2018	2019
Transaction price outstanding as of Dec. 31	**2,023**	**1,204**
of which to be recognized within 1 year	265	238
of which to be recognized between 1 and 2 years	250	177
of which to be recognized between 2 and 3 years	203	121
of which to be recognized between 3 and 4 years	146	118
of which to be recognized between 4 and 5 years	137	97
of which to be recognized after more than 5 years	1,022	453

2018 figures restated

The description above only accounts for customer contracts with an original contractual term of more than one year.

Contract liabilities mainly result from advance payments by customers for product deliveries and are predominantly recognized as sales within one year. In connection with the acquisition of Monsanto, certain Crop Science businesses were transferred to BASF. Portions of the purchase price were recognized as contract liabilities since certain payment components were not yet earned. Further significant amounts of contract liabilities comprise milestone payments already received for right-to-access licenses and are recognized as sales over a period of more than five years.

The change in contract liabilities was due to the following factors:

B 6/2

Roll-Forward of Contract Liabilities

€ million	2018	2019
Contract liability balance as of Jan. 1	**1,530**	**4,221**
Changes due to business combinations	418	–
Additions	5,845	7,122
Revenue recognized in the current year that was included in the contract liability balance as of Jan. 1	(770)	(3,266)
Revenue recognized in the current year that was not included in the contract liability balance as of Jan. 1	(2,782)	(3,970)
Other	–	(115)
Exchange differences	(20)	60
Contract liability balance as of Dec. 31	**4,221**	**4,052**

Amounts for rebates, which are reported separately as refund liabilities, amounted to 8.5% of total net sales in 2019 (2018: 8.9%).

The refund liabilities for product returns in 2019 amounted to 1.3% of total net sales (2018: 1.3%).

7. Other operating income

Other operating income was comprised as follows:

B 7/1

Other Operating Income

€ million	2018	2019
Gains on retirements of noncurrent assets	4,309	563
Income from reversals of impairment losses on receivables	183	148
Income from reversals of unutilized provisions	12	11
Gains from derivatives	217	421
Miscellaneous operating income	322	490
Total	**5,043**	**1,633**

2018 figures restated

Gains on retirements of noncurrent assets included proceeds of €347 million in connection with the sale of the prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark (Consumer Health segment). The sale of two active ingredients in the Crop Science segment resulted in a further gain of €59 million. The divestment of several noncore brands at Consumer Health yielded a gain of €35 million. In addition, the sale of activated transfer rights at Bayer 04 Leverkusen Fussball GmbH, Germany, brought a gain of €32 million (All Other Segments).

Miscellaneous operating income included €255 million in payments from insurers. This included €202 million in reimbursements for the Xarelto™ litigation in the Pharmaceuticals segment less expenses of €27 million due to the membership of Bayer subsidiary Pandias Re AG, Luxembourg, in the insurance consortium.

Also reflected here is a net gain of €34 million incurred on the ongoing revaluation of nonmonetary assets and liabilities and of equity in hyperinflationary economies.

8. Other operating expenses

Other operating expenses were comprised as follows:

B 8/1

Other Operating Expenses

€ million	2018	2019
Losses on retirements of noncurrent assets	(32)	(124)
Impairment losses on receivables	(197)	(209)
Expenses related to significant legal risks	(677)	(546)
Losses from derivatives	(213)	(596)
Miscellaneous operating expenses	(1,859)	(541)
Total	**(2,978)**	**(2,016)**

2018 figures restated

Of the impairment losses on receivables, €64 million pertained to receivables in Brazil.

The miscellaneous operating expenses included €208 million in impairment losses on the share of goodwill pertaining to the divested Dr. Scholl's™ brand (Consumer Health segment). Also reflected here were €58 million in expenses from the retrospective final purchase price adjustment in connection with the divestments to BASF.

The remaining amount comprised a number of individually immaterial items at the subsidiaries.

Information on the legal risks can be found in Note [30].

9. Personnel expenses and employee numbers

Personnel expenses for continuing operations rose by €1,010 million in 2019 to €11,788 million (2018: €10,778 million). The increase was mainly due to the first-time inclusion of the employees of the acquired agriculture business for the full year and the allocations to provisions for restructuring measures.

B 9/1

Personnel Expenses

€ million	2018	2019
Salaries	8,588	9,849
Social expenses and expenses for pensions and other benefits	2,190	1,939
of which for defined contribution pension plans	449	456
of which for defined benefit and other pension plans	382	512
Total	**10,778**	**11,788**

2018 figures restated

The interest portion of the allocation to personnel-related provisions – mainly for pensions and other post-employment benefits – is included in the financial result under other financial expenses (Note [10.3]).

The average numbers of employees, classified by functional area, were as shown in the table below:

B 9/2

Employees

	2018	2019
Production	38,271	42,037
Marketing and distribution	38,433	38,152
Research and development	16,121	16,308
General administration	8,968	9,595
Total	**101,793**	**106,092**
Apprentices	1,428	1,343

2018 figures restated

The number of employees on either permanent or temporary contracts is stated in full-time equivalents (FTE), with part-time employees included on a pro-rated basis in line with their contractual working hours. The figures do not include apprentices.

10. Financial result

The financial result for 2019 was minus €1,309 million (2018: minus €1,568 million), comprising equity-method income of €160 million (2018: €68 million), financial expenses of €1,944 million (2018: €2,544 million) and financial income of €475 million (2018: €908 million). Details of the components of the financial result are provided in the following sections.

10.1 Income (loss) from investments in affiliated companies

The net income (loss) from investments in affiliated companies was comprised as follows:

B 10.1/1

Income (Loss) from Investments in Affiliated Companies

€ million	2018	2019
Net income (loss) from investments accounted for using the equity method (equity-method income / loss)	68	160
Expenses		
Losses from the sale of investments in affiliated companies	–	–
Miscellaneous expenses from investments in affiliated companies	(459)	(19)
Income		
Gains from the sale of investments in affiliated companies	304	–
Miscellaneous income from investments in affiliated companies	–	49
Total	**(87)**	**190**

Income from investments accounted for using the equity method mainly comprised equity-method income of €200 million (2018: equity-method loss of €26 million) pertaining to the BlueRock joint ventures and an equity-method loss of €31 million (2018: €22 million) pertaining to the Casebia Group. The equity-method result from the investment in BlueRock contains a gain of €246 million resulting from the remeasurement of the interest that was accounted for using the equity method until September 2019. Once the remaining interest had been acquired, BlueRock was fully consolidated.

In 2018, income from investments in affiliated companies accounted for using the equity method primarily comprised equity-method income of €103 million from the interest in Covestro, which until May 2018 was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method.

Miscellaneous expenses from investments in affiliated companies included changes in the fair value of the interest in Covestro, which has been presented as an equity instrument since May 2018.

In 2018, gains from the sale of investments in affiliated companies included the income from the partial sale of the interest in Covestro.

The miscellaneous income from investments in affiliated companies consisted of the €31 million dividend received on the Covestro shares.

Further details of the companies accounted for using the equity method are given in Note [16].

10.2 Net interest expense

The net interest expense was comprised as follows:

B 10.2/1

Net Interest Expense

€ million	2018	2019
Interest and similar expenses	**(1,383)**	**(1,575)**
of which interest expense relating to nonfinancial liabilities	(91)	(18)
Interest and similar income	**319**	**294**
of which interest income relating to nonfinancial assets	65	56
Total	**(1,064)**	**(1,281)**

2018 figures restated

10.3 Other financial income and expenses

Other financial income and expenses were comprised as follows:

B 10.3/1

Other Financial Income and Expenses

€ million	2018	2019
Expenses		
Interest portion of interest-bearing provisions	(177)	(273)
Net exchange loss	(269)	–
Miscellaneous financial expenses	(256)	(77)
Income		
Net exchange gain	–	58
Miscellaneous financial income	285	74
Total	**(417)**	**(218)**

2018 figures restated

The interest portion of noncurrent provisions comprised €159 million (2018: €144 million) in interest expense for pension and other post-employment benefit provisions and minus €114 million (2018: minus €33 million) in effects of interest expense and interest-rate fluctuations for other provisions and corresponding overfunding. The interest expense for pension and other post-employment benefit provisions included €595 million (2018: €535 million) for the unwinding of discount on the present value of the defined benefit obligation and €436 million (2018: €391 million) in interest income from plan assets.

The €3 million in negative fair value changes (2018: €230 million in positive fair value changes) of the debt instruments (exchangeable bond) issued in June 2017 was recognized in miscellaneous financial expenses.

In 2018, the exchange losses included a €132 million currency translation loss resulting from the deconsolidation of Bayer S.A., Venezuela, as of September 30, 2018.

In 2018, the miscellaneous financial expenses included €124 million in commitment fees and other fees related to the syndicated bank financing for the acquisition of Monsanto.

11. Taxes

The breakdown of tax expenses by origin was as follows:

B 11/1

Tax Expense by Origin

€ million	2018	2018 Of which income taxes	2019	2019 Of which income taxes
Taxes paid or accrued				
Current income taxes				
Germany	(1,134)	(1,134)	(1,087)	(1,087)
Other countries	(1,289)	(1,289)	(704)	(704)
Other taxes				
Germany	(30)		(47)	
Other countries	(162)		(181)	
	(2,615)	**(2,423)**	**(2,019)**	**(1,791)**
Deferred taxes				
from temporary differences	2,053	2,053	1,352	1,352
from tax loss and interest carryforwards and tax credits	(126)	(126)	(11)	(11)
	1,927	**1,927**	**1,341**	1,341
Total	**(688)**	**(496)**	**(678)**	**(450)**

2018 figures restated

Other taxes mainly included land, vehicle and other indirect taxes and are included in the respective operating expense items.

The deferred tax assets and liabilities were allocable to the following items in the statements of financial position:

B 11/2

Deferred Tax Assets and Liabilities

€ million	Dec. 31, 2018 Deferred tax assets	Dec. 31, 2018 Deferred tax liabilities	Dec. 31, 2019 Deferred tax assets	Dec. 31, 2019 Deferred tax liabilities
Intangible assets	860	6,995	1,155	6,671
Property, plant and equipment	451	882	241	533
Financial assets	158	193	68	88
Inventories	1,405	214	1,722	362
Receivables	154	568	121	410
Other assets	177	176	104	60
Provisions for pensions and other post-employment benefits	2,792	408	2,676	367
Other provisions	1,580	54	1,633	64
Liabilities	887	331	932	269
Tax loss and interest carryforwards	540	–	570	–
Tax credits	483	–	423	–
	9,487	**9,821**	**9,645**	**8,824**
Set-off	(5,154)	(5,154)	(5,069)	(5,069)
Total	**4,333**	**4,667**	**4,576**	**3,755**

2018 figures restated

The use of tax loss carryforwards reduced current income taxes in 2019 by €162 million (2018: €157 million). The use of tax credits reduced current income taxes by €278 million (2018: €78 million).

Of the total tax loss and interest carryforwards of €10,446 million, including interest carryforwards of €189 million (2018: €8,677 million, including interest carryforwards of €174 million), an amount of €3,772 million, including interest carryforwards of €0 million (2018: €4,254 million, including interest carryforwards of €0 million) is expected to be usable within a reasonable period. The increase in tax loss and interest carryforwards mainly resulted from the general business development in Germany and the United States. Deferred tax assets of €570 million (2018: €540 million) were recognized for the amount of tax loss and interest carryforwards expected to be usable.

The use of €6,674 million of tax loss and interest carryforwards, including interest carryforwards of €189 million (2018: €4,422 million, including interest carryforwards of €174 million) was subject to legal or economic restrictions. Consequently, no deferred tax assets were recognized for this amount. If these tax loss and interest carryforwards had been fully usable, deferred tax assets of €412 million (2018: €378 million) would have been recognized.

Tax credits of €423 million were recognized in 2019 (2018: €483 million) as deferred tax assets. The decrease in tax credits mainly resulted from their utilization within the U.S. consolidated tax group. The use of €65 million (2018: €32 million) of tax credits was subject to legal or economic restrictions. Consequently, no deferred tax assets were recognized for this amount.

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Expiration of Unusable Tax Credits, Tax Loss Carryforwards and Interest Carryforwards

	Tax credits		Tax loss and interest carryforwards	
€ million	**Dec. 31, 2018**	**Dec. 31, 2019**	**Dec. 31, 2018**	**Dec. 31, 2019**
Within one year	1	1	22	105
Within two years	1	4	105	69
Within three years	2	–	222	279
Within four years	2	1	91	44
Within five years	–	2	69	212
Thereafter	26	57	3,913	5,965
Total	**32**	**65**	**4,422**	**6,674**

In 2019, subsidiaries that reported losses for 2019 or 2018 recognized net deferred tax assets totaling €1,569 million (2018: €1,487 million) from temporary differences and tax loss carryforwards. These assets were considered to be unimpaired because the companies concerned were expected to generate taxable income in the future or sufficiently taxable temporary differences.

Deferred tax liabilities of €16 million were recognized in 2019 (2018: €44 million) for planned dividend payments by subsidiaries. Deferred tax liabilities were not recognized for differences on €17,557 million (2018: €15,827 million) of retained earnings of subsidiaries because these earnings are to be reinvested for an indefinite period.

The reconciliation of expected to actual income tax expense (2019: €184 million; 2018: €61 million) and of the expected to the effective tax rate for the Group was as follows:

B 11/4

Reconciliation of Expected to Actual Income Tax Expense

	2018		2019	
	€ million	%	€ million	%
Expected income tax expense[1] and expected tax rate	**435**	**23.1**	**634**	**22.0**
Reduction in taxes due to tax-free income				
Income related to the operational business	(164)	(8.7)	(27)	(0.9)
Income from affiliated companies and divestment proceeds	(272)	(14.4)	(189)	(6.6)
First-time recognition of previously unrecognized deferred tax assets on tax loss and interest carryforwards[2]	(58)	(3.1)	(159)	(5.5)
Use of tax loss and interest carryforwards on which deferred tax assets were not previously recognized	(11)	(0.6)	(59)	(2.1)
Increase in taxes due to non-tax-deductible expenses				
Expenses related to the operational business	222	11.8	255	8.8
Impairment losses on investments in affiliated companies	13	0.7	36	1.3
New tax loss and interest carryforwards unlikely to be usable	64	3.4	146	5.1
Existing tax loss and interest carryforwards on which deferred tax assets were previously recognized but which are unlikely to be usable	76	4.0	12	0.4
Tax income (–) and expenses (+) relating to other periods	(42)	(2.2)	(131)	(4.5)
Tax effects of changes in tax rates	(208)	(11.0)	107	3.7
Other tax effects	441	23.4	(175)	(6.1)
Actual income tax expense and effective tax rate	**496**	**26.4**	**450**	**15.6**

2018 figures restated
[1] Expected income tax expense is calculated by applying an expected weighted average tax rate to the pre-tax income of the Group. This average rate was determined on the basis of expected tax rates for the individual Group companies.
[2] Including the first-time recognition of a deferred tax asset on new loss carryforwards in the Netherlands

The other tax effects primarily comprised an amount of minus €65 million due to a change in the accounting method applied for the investment in BlueRock Therapeutics L.P. from equity method to full consolidation, and an amount of minus €109 million pertaining to tax credits.

The reported tax expense for 2018 contained €175 million in one-time effects recognized under other tax effects that related to the integration of Monsanto into Bayer’s corporate structures, along with an amount of €140 million resulting from the impairment losses recognized on the goodwill of Consumer Health.

12. Income/losses attributable to noncontrolling interest

Income attributable to noncontrolling interest amounted to €19 million (2018: €16 million). Losses attributable to noncontrolling interest amounted to €0 million (2018: €0 million). This income primarily related to BCS Limited, India.

13. Earnings per share

Earnings per share are determined according to IAS 33 by dividing the net income for the period attributable to Bayer AG stockholders by the weighted average number of shares. As no dilutive financial instruments were in circulation at the end of the reporting period, diluted earnings per share were equivalent to basic earnings per share.

In November 2016, Bayer placed €4 billion in mandatory convertible notes without granting subscription rights to existing stockholders of the company. According to IAS 33.23, the weighted average number of shares increases as soon as the notes contract is signed, and this increase must be taken into account in calculating earnings per share. The new weighted average number of shares is based on the maximum conversion ratio resulting from the final minimum conversion price of €80.15. An adjustment is not undertaken for financing expenses incurred in connection with the mandatory convertible notes because the interest component was recognized outside profit or loss when the notes were placed.

The mandatory convertible notes matured on November 22, 2019, resulting in the issuance of a total of 49,832,614 new shares. The final conversion price was €80.15 per share.

Further details of the mandatory convertible notes are provided in Note [21].

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Earnings per Share

	€ million		Earnings per share (€)	
	2018	**2019**	**2018**	**2019**
Income after income taxes (attributable to Bayer AG stockholders)	**1,695**	**4,091**	**1.80**	**4.17**
of which income after income taxes from continuing operations (attributable to Bayer AG stockholders)	1,374	2,411	1.46	2.46
of which income after income taxes from discontinued operations (attributable to Bayer AG stockholders)	321	1,680	0.34	1.71
Weighted average number of shares[1]	**940.76**	**981.69**		

[1] The weighted average number of shares was restated for all periods prior to June 2018 to reflect the effect of the bonus component of the subscription rights issued for the June 2018 capital increase.

Notes to the Statements of Financial Position

14. Goodwill and other intangible assets

Changes in intangible assets in 2019 were as follows:

B 14/1

Changes in Intangible Assets

€ million	Acquired goodwill	Patents and technologies	Trademarks	Marketing and distribution rights	Production rights	R&D projects	Other rights and advance payments	Total
Cost of acquisition or generation, December 31, 2018	**39,989**	**30,253**	**14,642**	**3,427**	**1,857**	**5,286**	**2,075**	**97,529**
Acquisitions	586	–	69	–	–	114	–	769
Capital expenditures	–	90	–	245	–	144	432	911
Retirements	–	(9)	(53)	(22)	–	(15)	(117)	(216)
Transfers	–	6	–	43	(5)	(38)	(6)	–
Transfers (IFRS 5)	(503)	(15)	(1,328)	(56)	(48)	(10)	(78)	(2,038)
Divestments / changes in scope of consolidation	–	(2)	(3)	–	–	2	(1)	(4)
Inflation adjustment (IAS 29)	8	3	–	1	–	–	3	15
Exchange differences	615	364	187	39	2	89	25	1,321
December 31, 2019	**40,695**	**30,690**	**13,514**	**3,677**	**1,806**	**5,572**	**2,333**	**98,287**
Accumulated amortization and impairments, December 31, 2018	**1,547**	**10,738**	**5,538**	**1,418**	**1,782**	**79**	**1,289**	**22,391**
Retirements	–	(7)	(44)	(22)	–	(6)	(81)	(160)
Amortization and impairment losses	208	1,850	677	199	18	7	272	3,231
Amortization	–	1,829	456	199	18	–	268	2,770
Impairment losses	208	21	221	–	–	7	4	461
Impairment loss reversals	–	–	(214)	–	–	–	–	(214)
Transfers	–	–	–	–	(5)	–	5	–
Transfers (IFRS 5)	(208)	(21)	(595)	(24)	(47)	–	(34)	(929)
Divestments / changes in scope of consolidation	–	(2)	(1)	–	–	–	(1)	(4)
Inflation adjustment (IAS 29)	3	3	1	–	–	–	3	10
Exchange differences	19	28	50	15	–	1	14	127
December 31, 2019	**1,569**	**12,589**	**5,412**	**1,586**	**1,748**	**81**	**1,467**	**24,452**
Carrying amounts, December 31, 2019	**39,126**	**18,101**	**8,102**	**2,091**	**58**	**5,491**	**866**	**73,835**
Carrying amounts, December 31, 2018	**38,442**	**19,515**	**9,104**	**2,009**	**75**	**5,207**	**786**	**75,138**

2018 figures restated

In the Crop Science segment, a €21 million impairment loss was recognized on an intangible asset in the area of insecticides in connection with a streamlining of the portfolio.

In the Consumer Health segment, a €429 million impairment loss was recognized prior to the formation of a disposal group under IFRS 5 for the sale of the Dr. Scholl's™ foot care brand. Of this amount, €208 million pertained to goodwill and €221 million to the trademark. The carrying amount exceeded the sale proceeds. For the Claritin™ allergy brand, however, a €211 million impairment loss reversal was recorded based on the annual impairment testing, mainly in light of lower capital costs.

Changes in intangible assets in 2018 were as follows:

B 14/2

Changes in Intangible Assets (Previous Year)

€ million	Acquired goodwill	Patents and technol-ogies	Trade-marks	Marketing and distribution rights	Production rights	R&D projects	Other rights and advance payments	Total
Cost of acquisition or generation, December 31, 2017	**14,751**	**12,861**	**10,453**	**1,911**	**1,923**	**1,044**	**1,564**	**44,507**
Acquisitions	24,792	17,138	3,941	845	11	4,602	360	51,689
Capital expenditures	–	46	–	358	–	53	243	700
Retirements	–	(26)	(7)	(55)	–	(149)	(41)	(278)
Transfers	–	3	–	334	–	(280)	(57)	–
Transfers (IFRS 5)	(318)	(273)	(40)	(17)	(76)	(109)	(22)	(855)
Divestments / changes in scope of consolidation	–	–	(4)	–	–	–	(2)	(6)
Inflation adjustment (IAS 29)	20	6	–	1	–	–	6	33
Exchange differences	744	498	299	50	(1)	125	24	1,739
December 31, 2018	**39,989**	**30,253**	**14,642**	**3,427**	**1,857**	**5,286**	**2,075**	**97,529**
Accumulated amortization and impairments, December 31, 2017	**–**	**9,638**	**4,041**	**1,283**	**1,836**	**117**	**1,167**	**18,082**
Retirements	–	(23)	(10)	(31)	–	(149)	(27)	(240)
Amortization and impairment losses	1,547	1,300	1,477	149	23	65	202	4,763
Amortization	–	1,300	429	138	23	–	200	2,090
Impairment losses	1,547	–	1,048	11	–	65	2	2,673
Impairment loss reversals	–	–	–	–	–	–	–	–
Transfers	–	–	–	–	–	46	(46)	–
Transfers (IFRS 5)	–	(230)	(29)	(8)	(76)	–	(24)	(367)
Divestments / changes in scope of consolidation	–	–	3	–	–	–	–	3
Inflation adjustment (IAS 29)		6		1			5	12
Exchange differences	–	47	56	24	(1)	–	12	138
December 31, 2018	**1,547**	**10,738**	**5,538**	**1,418**	**1,782**	**79**	**1,289**	**22,391**
Carrying amounts, December 31, 2018	**38,442**	**19,515**	**9,104**	**2,009**	**75**	**5,207**	**786**	**75,138**
Carrying amounts, December 31, 2017	**14,751**	**3,223**	**6,412**	**628**	**87**	**927**	**397**	**26,425**

2018 figures restated

The growth rates and capital cost factors used in the impairment testing of goodwill in 2018 and 2019 are shown in the following table:

B 14/3

Impairment Testing Parameters

	Growth rate		After-tax cost of capital	
%	2018	2019	2018	2019
Crop Science	2.0	2.0	7.8	6.7
Pharmaceuticals	0.0	0.0	7.6	5.9
Consumer Health	1.0	1.0	7.9	6.4

Testing goodwill for impairment involves calculating the fair value less costs to sell. No impairment loss was recognized on goodwill in 2019 (2018: €1,547 million in the Consumer Health segment).

A sensitivity analysis undertaken for the impairment testing of goodwill in the Pharmaceuticals and Consumer Health segments was based on a 10% reduction in future cash flows, a 10% increase in the weighted average cost of capital or a one-percentage-point reduction in the long-term growth rate. The sensitivity analysis showed that no impairment loss (2018: €1.1 billion) would need to be recognized for the cash-generating unit Consumer Health in the event of a 10% reduction in future cash flows or a 10% increase in the weighted average cost of capital. Likewise, a one percentage point reduction in Consumer Health's long-term growth rate would not require any impairment losses to be recognized (2018: €0.6 billion). Crop Science operates in a volatile market environment that shows a robust long-term growth trend driven by an increasing world population, declining acreages per capita and Crop Science's own innovation strength. For the goodwill impairment test a mid-term market recovery is expected, leading to a steady state on which the terminal value calculation is based. The assumptions used for the forecast period were average sales growth of 4% and an increase in the EBITDA margin before special items (for definition see A 2.3 "Alternative Performance Measures Used by the Bayer Group") to 30%. If the cash flow decreased by 8.0%, the weighted average cost of capital increased by 0.5 percentage points or the long-term growth rate decreased by 0.5 percentage points, the recoverable amount of the Crop Science goodwill would correspond to the carrying amount.

The levels at which impairment testing is performed are explained in Note [3]. Unamortized intangible assets and goodwill that are of material significance for the Bayer Group are allocated to the following segments:

B 14/4

Unamortized Intangible Assets

	Goodwill (€ million)		Material unamortized assets (€ million)	
Reporting segment	2018	2019	2018	2019
Crop Science	26,817	27,410	4,753	4,834
Pharmaceuticals	7,247	7,797	510	731
Consumer Health	4,274	3,919	32	34

Research and development projects were capitalized in unamortized intangible assets at a total amount of €5,491 million as of the end of 2019 (2018: €5,207 million).

Another unamortized intangible asset is the Bayer Cross, which was reacquired for the North America region in 1994, having been awarded to the United States and Canada under the reparations agreements at the end of the First World War. The period for which the Bayer Group will derive an economic benefit from this name cannot be determined as Bayer intends to make continuous use of it. The Bayer Cross is capitalized at €108 million (2018: €108 million).

15. Property, plant and equipment

Changes in property, plant and equipment in 2019 were as follows:

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Changes in Property, Plant and Equipment

€ million	Land and buildings	Plant installations and machinery	Furniture, fixtures and other equipment	Construction in progress and advance payments	Total
Cost of acquisition or construction, December 31, 2018	**9,195**	**11,332**	**2,036**	**2,895**	**25,458**
Additions from leases	726	13	273	–	1,012
Cost of acquisition or construction, January 1, 2019	**9,921**	**11,345**	**2,309**	**2,895**	**26,470**
Acquisitions	15	–	4	7	26
Capital expenditures	320	313	240	1,366	2,239
Retirements	(145)	(231)	(164)	(74)	(614)
Transfers	378	798	130	(1,306)	–
Transfers (IFRS 5)	(1,212)	(2,084)	(450)	(216)	(3,962)
Divestments / changes in the scope of consolidation	(5)	(1)	(4)	1	(9)
Inflation adjustment (IAS 29)	44	39	6	(4)	85
Exchange differences	51	49	16	29	145
December 31, 2019	**9,367**	**10,228**	**2,087**	**2,698**	**24,380**
Accumulated depreciation and impairments, December 31, 2018	**4,045**	**6,694**	**1,291**	**485**	**12,515**
Retirements	(98)	(198)	(144)	(64)	(504)
Depreciation and impairment losses	638	941	383	592	2,554
Depreciation	602	896	364	–	1,862
Impairment losses	36	45	19	592	692
Impairment loss reversals	–	(1)	(2)	(8)	(11)
Transfers	32	193	24	(249)	–
Transfers (IFRS 5)	(866)	(1,630)	(177)	(18)	(2,691)
Divestments / changes in the scope of consolidation	(12)	(10)	(4)	(5)	(31)
Inflation adjustment (IAS 29)	17	26	6	–	49
Exchange differences	12	5	7	(4)	20
December 31, 2019	**3,768**	**6,020**	**1,384**	**729**	**11,901**
Carrying amounts, December 31, 2019	**5,599**	**4,208**	**703**	**1,969**	**12,479**
Carrying amounts, December 31, 2018	**5,150**	**4,638**	**745**	**2,410**	**12,943**

2018 figures restated

Impairment losses on property, plant and equipment amounted to €692 million, mainly including impairment losses of €522 million in the Crop Science segment on the dicamba production facilities (Herbicides unit) due to a higher investment requirement and an expected adverse development of volumes in view of additional capacities in the market and reduced or delayed sales potential in Argentina in particular. At Pharmaceuticals, a €116 million impairment loss became necessary in connection with the sale of a facility under construction as the asset's carrying amount could not be realized upon the sale due to the specific nature of the facility.

In 2019, borrowing costs of €45 million (2018: €55 million) were capitalized as components of the cost of acquisition or construction of qualifying assets, applying an average interest rate of 3.0% (2018: 3.5%).

Right-of-use assets totaling €1,273 million held under leases were capitalized in property, plant and equipment. Further information on leases is given in Note [28].

Changes in property, plant and equipment in 2018 were as follows:

B 15/2

Changes in Property, Plant and Equipment (Previous Year)

€ million	Land and buildings	Plant installations and machinery	Furniture, fixtures and other equipment	Construction in progress and advance payments	Total
Cost of acquisition or construction, December 31, 2017	**6,706**	**8,646**	**1,721**	**1,763**	**18,836**
Acquisitions	2,209	2,166	318	961	5,654
Capital expenditures	196	378	183	1,108	1,865
Retirements	(79)	(370)	(174)	(6)	(629)
Transfers	370	704	49	(1,123)	–
Transfers (IFRS 5)	(356)	(329)	(79)	170	(594)
Divestments / changes in the scope of consolidation	(2)	–	4	1	3
Inflation adjustment (IAS 29)	63	58	13	10	144
Exchange differences	88	79	1	11	179
December 31, 2018	**9,195**	**11,332**	**2,036**	**2,895**	**25,458**
Accumulated depreciation and impairments, December 31, 2017	**3,661**	**6,267**	**1,256**	**19**	**11,203**
Retirements	(39)	(353)	(150)	(6)	(548)
Depreciation and impairment losses	473	802	235	471	1,981
Depreciation	316	752	233	–	1,301
Impairment losses	157	50	2	471	680
Impairment loss reversals	–	–	–	–	–
Transfers	4	7	(11)	–	–
Transfers (IFRS 5)	(116)	(101)	(47)	–	(264)
Divestments / changes in the scope of consolidation	–	–	2	–	2
Inflation adjustment (IAS 29)	34	46	10	–	90
Exchange differences	28	26	(4)	1	51
December 31, 2018	**4,045**	**6,694**	**1,291**	**485**	**12,515**
Carrying amounts, December 31, 2018	**5,150**	**4,638**	**745**	**2,410**	**12,943**
Carrying amounts, December 31, 2017	**3,045**	**2,379**	**465**	**1,744**	**7,633**

2018 figures restated

Investment property

The total carrying amount of investment property as of December 31, 2019, was €96 million (December 31, 2018: €96 million). The fair value of this property was €444 million (2018: €383 million). The rental income from investment property was €16 million (2018: €14 million), and the operating expenses directly allocable to this property amounted to €5 million (2018: €5 million).

16. Investments accounted for using the equity method

Twelve (2018: five) associates and five (2018: ten) joint ventures were accounted for in the consolidated financial statements using the equity method. A list of these companies is available at www.bayer.com/shareownership2019.

The following table contains a summary of the aggregated income statement data and aggregated carrying amounts of the associates and joint ventures accounted for using the equity method (excluding the Covestro Group):

B 16/1

Earnings Data and Carrying Amounts of Companies Accounted for Using the Equity Method

	Associates		Joint Ventures	
€ million	2018	2019	2018	2019
Income after income taxes	(2)	(24)	(75)	(136)
Other comprehensive income after income taxes	30	32	–	–
Total comprehensive income after income taxes	28	8	(75)	(136)
Share of income after income taxes	**(1)**	**(6)**	**(34)**	**166**
Share of total comprehensive income after income taxes	17	21	(34)	166
Carrying amount as of December 31	**95**	**356**	**420**	**166**

Information on the Covestro Group

Until May 2018, the interest in Covestro was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. Various share disposals led to the loss of significant influence on the financial and business policy decisions of Covestro. This in turn resulted in a change in the accounting method. Since May 2018, Bayer has reported its interest in Covestro as an equity instrument, with changes in fair value recognized through profit or loss. In 2018, the equity-method income of the Covestro Group amounted to €103 million.

17. Other financial assets

The other financial assets were comprised as follows:

B 17/1

Other Financial Assets

	Dec. 31, 2018		Dec. 31, 2019	
€ million	Total	Of which current	Total	Of which current
AC[1]	430	285	809	643
FVTPL[1]	2,355	665	2,304	1,291
of which debt instruments	1,759	665	1,821	808
of which equity instruments	596	–	483	483
FVTOCI[1]	330	–	568	285
of which equity instruments (no recycling)	330	–	568	285
Receivables from derivatives	253	216	181	107
Lease receivables	10	–	–	–
Total	**3,378**	**1,166**	**3,862**	**2,326**

[1] Measurement categories in accordance with IFRS 9:
AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss

The AC category included €630 million (2018: €270 million) in bank deposits. No material impairment losses were recognized for expected credit losses in 2019 or 2018.

The debt instruments in the FVTPL category included capital of €652 million (2018: €643 million) provided to Bayer-Pensionskasse VVaG (Bayer-Pensionskasse) for its effective initial fund, and jouissance right capital *(Genussrechtskapital)* of €154 million (2018: €152 million), also provided to Bayer-Pensionskasse. Also reported in this category were investments of €634 million (2018: €598 million) in money market funds.

The equity instruments in the FVTPL category comprised the interest in Covestro AG.

The equity instruments in the FVTOCI category comprised the following investments:

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Equity Instruments Measured at Fair Value Through Other Comprehensive Income

Company name	Fair value as of Dec. 31, 2018	Fair value as of Dec. 31, 2019
CRISPR Therapeutics AG, Switzerland	143	285
Innovative Seed Solutions LLC, U.S.A.	41	55
Arvinas Inc., U.S.A.	–	49
Flagship Ventures Fund V, L.P., U.S.A.	20	28
Matys Healthy Products LLC, U.S.A.	–	19
Medopad Ltd., U.K.	13	13
Hokusan Co. Ltd., Japan	12	13
Other investments	101	106
Total	**330**	**568**

No material equity investments were deconsolidated, nor were any material dividends received, in 2019 or 2018.

Further information on the accounting for receivables from derivatives is given in Note [27].

18. Inventories

Inventories were comprised as follows:

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Inventories

€ million	Dec. 31, 2018	Dec. 31, 2019
Raw materials and supplies	2,802	2,531
Work in process, finished goods and goods purchased for resale	8,231	8,123
Rights of return	85	111
Advance payments	14	5
Total	**11,132**	**10,770**

2018 figures restated

Impairment losses recognized on inventories were reflected in the cost of goods sold. They were comprised as follows:

B 18/2

Impairments of Inventories

€ million	2018	2019
Accumulated impairment losses, January 1	**(331)**	**(131)**
Impairment losses in the reporting period	(240)	(102)
Impairment loss reversals or utilization	321	107
Exchange differences	24	(1)
Transfers (IFRS 5)	95	–
Accumulated impairment losses, December 31	**(131)**	**(127)**

The cost of goods sold included acquisition and production costs of inventories amounting to €13,486 million (2018: €10,375 million) that were recognized as expenses.

19. Trade accounts receivable

Trade accounts receivable less impairment losses amounted to €11,678 million (2018: €11,714 million) on the closing date and pertained to the following regions and countries:

B 19/1

Trade Accounts Receivable

€ million	2018	2019
North America	3,126	3,255
of which U.S.A.	2,944	3,009
Europe / Middle East / Africa	3,764	3,575
of which Germany	1,202	823
Asia / Pacific	2,054	2,203
Latin America	3,413	3,326
of which Brazil	1,952	1,712
Trade accounts receivable (before impairments)	**12,357**	**12,359**
Accumulated impairment losses	(643)	(681)
Carrying amount, December 31	11,714	11,678
of which noncurrent	665	509

2018 figures restated

Trade accounts receivable mainly comprise amounts outstanding from diverse customer groups and distribution channels (including dealers and retailers for all units of the company, pharmacies for Pharmaceuticals and Consumer Health, and farmers for Crop Science). These receivables expose the company to a credit risk, though not to significant credit risk concentrations because the risk is spread among a large number of counterparties and customers. The unimpaired receivables were classified as recoverable on the basis of established credit management processes and individual estimates of customer risks. The impairment losses recognized at the closing date contained appropriate risk provisions.

Noncurrent trade accounts receivable comprised receivables of €436 million (2018: €540 million) in connection with rights to use technologies outlicensed to a customer that were acquired through the acquisition of Monsanto.

The gross carrying amounts of trade accounts receivable were as follows:

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Trade Accounts Receivable – Gross Carrying Amounts

€ million	Trade accounts receivable for which lifetime expected credit losses are calculated (collectively assessed)	Trade accounts receivable that are credit-impaired	Total
Gross carrying amounts as of January 1, 2018	**8,209**	**798**	**9,007**
Changes resulting from trade accounts receivables recognized, derecognized or written-off in the reporting period	(1,714)	(535)	(2,249)
Transfer to credit-impaired trade accounts receivable	(367)	367	–
Other changes:			
from acquisitions / divestments	5,893	16	5,909
from exchange differences	(276)	(34)	(310)
Gross carrying amounts as of December 31, 2018	**11,745**	**612**	**12,357**
Changes resulting from trade accounts receivables recognized, derecognized or written-off in the reporting period	429	–	429
Transfer to credit-impaired trade accounts receivable	(377)	377	–
Transfer from credit-impaired trade accounts receivable	93	(93)	–
Changes due to write-offs	–	(28)	(28)
Other changes:			
From acquisitions / divestments	(323)	(17)	(340)
From exchange differences	(50)	(9)	(59)
Gross carrying amounts as of December 31, 2019	**11,517**	**842**	**12,359**

2018 figures restated

Credit losses on trade accounts receivable were as follows:

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Trade Accounts Receivable – Loss Allowances

€ million	Lifetime expected credit losses (collectively assessed)	Loss allowance for credit-impaired trade accounts receivable	Total
Loss allowances as of January 1, 2018	**113**	**405**	**518**
Changes resulting from loss allowances newly recognized or derecognized in the reporting period and additions / reductions to existing loss allowances	23	78	101
Transfer to loss allowances for credit-impaired trade accounts receivable	(106)	106	–
Changes due to write-offs	–	(27)	(27)
Other changes:			
From acquisitions / divestments	101	16	117
From exchange differences	(19)	(47)	(66)
Loss allowances as of December 31, 2018	**112**	**531**	**643**
Changes resulting from loss allowances newly recognized or derecognized in the reporting period and additions/reductions to existing loss allowances	76	5	81
Transfer to loss allowances for credit-impaired trade accounts receivable	(53)	53	–
Transfer from loss allowances for credit-impaired trade accounts receivable	20	(20)	–
Changes due to write-offs	–	(28)	(28)
Other changes:			
From acquisitions / divestments	(7)	–	(7)
From exchange differences	(3)	(5)	(8)
Loss allowances as of December 31, 2019	**145**	**536**	**681**

The expected loss rates were as follows:

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Trade Accounts Receivable – Expected Loss Rates

	Expected loss rates				Credit impaired	Total
€ million	0 to 1%	>1 to 5%	>5 to 10%	>10%		
Gross carrying amount	8,498	2,432	81	506	842	**12,359**
Loss allowance provision	23	60	6	56	536	**681**

Receivables from government health service institutions, especially in Greece, Italy, Portugal and Spain, are under special observation in view of the government debt crisis. Although there were no material defaults on such receivables in 2019 or 2018, it is possible that future developments in these countries could result in payment delays and / or defaults. This could necessitate the recognition of impairment losses due to new occurrences. Trade accounts receivable from government health service institutions in the above countries at the end of 2019 totaled €103 million (2018: €103 million).

An excess-of-loss policy exists for the Pharmaceuticals, Consumer Health and Animal Health segments as part of a global credit insurance program. More than 80% of the receivables of these segments are insured up to a maximum total annual compensation payment of €150 million (2018: €150 million). A global excess-of-loss policy is in place for the Crop Science segment (excluding the newly acquired Monsanto business). In this global credit insurance program, more than 80% of this segment's receivables are insured up to a maximum total annual compensation payment of €300 million (2018: €300 million). Local credit insurance contracts are in place in certain countries for the newly acquired Monsanto business.

A further €992 million (2018: €992 million) of receivables was secured by advance payments, letters of credit or guarantees or by liens on land, buildings or harvest yields.

20. Other receivables

Other receivables were comprised as follows:

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Other Receivables

	Dec. 31, 2018		Dec. 31, 2019	
€ million	Total	Of which current	Total	Of which current
Other tax receivables	794	734	859	840
Deferred charges	390	344	316	290
Reimbursement claims	84	80	290	282
Net defined benefit asset	84	–	237	–
Receivables from employees	46	46	40	40
Miscellaneous receivables	1,086	754	820	359
Total	**2,484**	**1,958**	**2,562**	**1,811**

2018 figures restated

Other receivables are stated net of impairment losses of €69 million (2018: €71 million). As in the previous year, the impairment losses included €66 million related to already impaired tax reimbursement claims.

21. Equity

The foremost objectives of our financial management are to help bring about a sustained increase in Bayer's value for the benefit of all stakeholders and to ensure the Group's creditworthiness and liquidity. The pursuit of these goals means reducing our cost of capital, optimizing our capital structure, improving our financing cash flow and effectively managing risk.

The contracted rating agencies assess Bayer as follows: S & P Global assigns a long-term rating of BBB and a short-term rating of A-2 with a stable outlook, Moody's a Baa1 / P-2 with a negative outlook, and Fitch Ratings a BBB+ / F2 with a negative outlook. These investment grade ratings from all three agencies reflect the company's high solvency and ensure access to a broad investor base for financing purposes. The Group's capital management is based on the debt indicators published by the rating agencies. These indicators, which vary in their design, represent the ratio of cash inflows and outflows in a period to debt. The aim of our financial strategy is to regain long-term "A" ratings in the future.

Apart from utilizing cash inflows from our operational business to reduce net financial debt, we are implementing our financial strategy by way of vehicles such as the subordinated hybrid bonds issued in July 2014, April 2015 and November 2019, and a potential share buyback program.

The individual equity components and the changes therein during 2018 and 2019 are shown in the Bayer Group Consolidated Statements of Changes in Equity.

Capital stock and capital reserves

The capital stock of Bayer AG on December 31, 2019, amounted to €2,515 million (2018: €2,387 million), divided into 982,424,082 (2018: 932,551,964) registered no-par shares, and was fully paid in. Each no-par share confers one voting right.

On November 22, 2016, Bayer had placed mandatory convertible notes in the amount of €4.0 billion without granting subscription rights to existing stockholders of the company. The notes, denominated in units of €100,000, were issued by Bayer Capital Corporation B.V., Mijdrecht, Netherlands, under the subordinated guarantee of Bayer AG. Where holders had not already exercised the right of conversion, the notes were mandatorily converted into registered no-par shares of Bayer AG when they matured on November 22, 2019. Fractional amounts that could not be exchanged for shares upon the conversion of the bond units of €100,000 each were repaid in cash.

The authorizations issued by the Annual Stockholders' Meeting on April 29, 2014, to increase the capital stock out of authorized and conditional capital expired in 2019 and were not renewed.

Capital reserves contain premiums from the issuance of shares.

Accumulated comprehensive income

Accumulated comprehensive income comprises retained earnings and accumulated other comprehensive income. The retained earnings comprise prior years' undistributed income of consolidated companies and all remeasurements of the net defined benefit liability for pension or other post-employment benefits that are recognized outside profit or loss. The accumulated other comprehensive income comprises exchange differences, the changes in fair values of cash flow hedges and equity instruments, the revaluation surplus and reserves for the change in the company's own credit risk.

Dividend

Under the German Stock Corporation Act (AktG), the dividend payment is determined by the distributable profit reported in the annual financial statements of Bayer AG, which are prepared according to the German Commercial Code. Retained earnings were diminished by payment of the dividend of €2.80 per share for 2018. The proposed dividend for the 2019 fiscal year is €2.80 per share, which – based on the current number of shares – would result in a total dividend payment of €2,751 million. Payment of the proposed dividend is contingent upon approval by the stockholders at the Annual Stockholders' Meeting and therefore is not recognized as a liability in the consolidated financial statements.

Equity attributable to non-controlling interest

The changes in noncontrolling interest in equity during 2018 and 2019 are shown in the following table:

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Changes in Noncontrolling Interest in Equity

€ million	2018	2019
January 1	**60**	**171**
Changes in equity not recognized in profit or loss		
Remeasurements of the net liability under defined benefit pension plans	(1)	(1)
Exchange differences on translation of operations outside the eurozone	(7)	(1)
Other changes in equity	108	(4)
Dividend payments	(5)	(4)
Income after income taxes	**16**	**19**
December 31	**171**	**180**

As of December 31, 2019, a material subsidiary with third-party noncontrolling interest holders was Bayer CropScience Limited, India, where the interest and share of voting rights attributable to noncontrolling interest amounted to 28.6% as of December 31, 2019 (December 31, 2018: 31.3%). Monsanto India Ltd, India, reported under this item in the prior year, was merged with Bayer CropScience Limited, India, in 2019. The equity attributable to noncontrolling interest as of December 31, 2019, amounted to €170 million (2018: €163 million).

22. Provisions for pensions and other post-employment benefits

Provisions were established for defined benefit obligations pertaining to pensions and other post-employment benefits. The net liability was accounted for as follows:

B 22/1

Net Defined Benefit Liability Reflected in the Statement of Financial Position

€ million	Pensions		Other post-employment benefits		Total	
	Dec. 31, 2018	Dec. 31, 2019	Dec. 31, 2018	Dec. 31, 2019	Dec. 31, 2018	Dec. 31, 2019
Provisions for pensions and other post-employment benefits (net liability)	**8,445**	**7,987**	**272**	**226**	**8,717**	**8,213**
of which Germany	7,215	6,878	–	–	7,215	6,878
of which other countries	1,230	1,109	272	226	1,502	1,335
Net defined benefit asset	**83**	**237**	**1**	**–**	**84**	**237**
of which Germany	23	21	–	–	23	21
of which other countries	60	216	1	–	61	216
Net defined benefit liability	**8,362**	**7,750**	**271**	**226**	**8,633**	**7,976**
of which Germany	7,192	6,857	–	–	7,192	6,857
of which other countries	1,170	893	271	226	1,441	1,119

The expenses for defined benefit plans for pensions and other post-employment benefits comprised the following components:

B 22/2

Expenses for Defined Benefit Plans

€ million	Pension plans						Other post-employment benefit plans	
	Germany		Other countries		Total		Other countries	
	2018	2019	2018	2019	2018	2019	2018	2019
Current service cost	252	394	130	105	382	499	13	14
Past service cost	9	5	(22)	(7)	(13)	(2)	(6)	(2)
of which plan curtailments	–	–	(48)	(8)	(48)	(8)	(6)	–
Plan settlements	–	–	–	(10)	–	(10)	–	1
Plan administration cost paid out of plan assets	3	2	3	10	6	12	–	–
Net interest	101	108	29	38	130	146	13	14
Total	**365**	**509**	**140**	**136**	**505**	**645**	**20**	**27**

2018 figures restated

In addition, a total of minus €1,347 million (2018: minus €612 million) in effects of remeasurements of the net defined benefit liability was recognized in 2019 outside profit or loss. Of this amount, minus €1,398 million (2018: minus €654 million) related to pension obligations, €47 million (2018: €34 million) to other post-employment benefit obligations, and €4 million (2018: €8 million) to the effects of the asset ceiling. There were no significant plan curtailments in 2019 (2018: €54 million).

The net defined benefit liability developed as follows:

B 22/3

Changes in Net Defined Benefit Liability

€ million	Defined benefit obligation	Fair value of plan assets	Effects of the asset ceiling	Net defined benefit liability
Germany				
January 1, 2019	**(17,948)**	**10,756**	**–**	**(7,192)**
Acquisitions	–	–	–	–
Divestments / changes in the scope of consolidation	–	–	–	–
Current service cost	(423)			(423)
Past service cost	(5)			(5)
Net interest	(322)	196	–	(126)
Net actuarial gain / (loss)	(2,680)			(2,680)
of which due to changes in financial parameters	(2,692)			(2,692)
of which due to changes in demographic parameters	–			–
of which experience adjustments	12			12
Return on plan assets excluding amounts recognized as interest income		1,101		1,101
Employer contributions		49		49
Employee contributions	(35)	35		–
Payments due to plan settlements	–	–		–
Benefits paid out of plan assets	195	(195)		–
Benefits paid by the company	409			409
Plan administration cost paid out of plan assets		(2)		(2)
Reclassification to current assets / liabilities held for sale	3,634	(1,622)		2,012
December 31, 2019	**(17,175)**	**10,318**	**–**	**(6,857)**
Other countries				
January 1, 2019	**(8,621)**	**7,203**	**(23)**	**(1,441)**
Acquisitions	(6)	1	–	(5)
Divestments / changes in the scope of consolidation	1	–	–	1
Current service cost	(120)			(120)
Past service cost	10			10
Gains / (losses) from plan settlements	10			10
Net interest	(311)	261	(2)	(52)
Net actuarial gain / (loss)	(808)			(808)
of which due to changes in financial parameters	(1,013)			(1,013)
of which due to changes in demographic parameters	178			178
of which experience adjustments	27			27
Return on plan assets excluding amounts recognized as interest income		1,038		1,038
Remeasurement of asset ceiling			4	4
Employer contributions		81		81
Employee contributions	(18)	18		–
Payments due to plan settlements	15	(15)		–
Benefits paid out of plan assets	413	(413)		–
Benefits paid by the company	181			181
Plan administration costs paid out of plan assets		(10)		(10)
Reclassification to current assets / liabilities held for sale	11	(7)	–	4
Exchange differences	(194)	182	–	(12)
December 31, 2019	**(9,437)**	**8,339**	**(21)**	**(1,119)**
of which other post-employment benefits	(733)	507	–	(226)
Total, December 31, 2019	**(26,612)**	**18,657**	**(21)**	**(7,976)**

Currenta and Animal Health are included in the development of the net defined benefit liability.

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Changes in Net Defined Benefit Liability (Previous Year)

€ million	Defined benefit obligation	Fair value of plan assets	Effects of the asset ceiling	Net defined benefit liability
Germany				
January 1, 2018	**(17,837)**	**11,081**	**–**	**(6,756)**
Acquisitions	(18)	–	–	(18)
Divestments / changes in the scope of consolidation	–	–	–	–
Current service cost	(295)			(295)
Past service cost	(11)			(11)
Net interest	(333)	209	–	(124)
Net actuarial gain / (loss)	(62)			(62)
of which due to changes in financial parameters	175			175
of which due to changes in demographic parameters	(232)			(232)
of which experience adjustments	(5)			(5)
Return on plan assets excluding amounts recognized as interest income		(498)		(498)
Employer contributions		141		141
Employee contributions	(35)	35		–
Payments due to plan settlements	(53)	38		(15)
Benefits paid out of plan assets	201	(201)		–
Benefits paid by the company	424			424
Plan administration cost paid out of plan assets		(3)		(3)
Reclassification to current assets / liabilities held for sale	71	(46)		25
December 31, 2018	**(17,948)**	**10,756**	**–**	**(7,192)**
Other countries				
January 1, 2018	**(6,655)**	**5,458**	**(31)**	**(1,228)**
Acquisitions	(2,384)	2,192	–	(192)
Divestments / changes in the scope of consolidation	–	–	–	–
Current service cost	(145)			(145)
Past service cost	28			28
Gains / (losses) from plan settlements	–			–
Net interest	(251)	210	(3)	(44)
Net actuarial gain / (loss)	423			423
of which due to changes in financial parameters	448			448
of which due to changes in demographic parameters	42			42
of which experience adjustments	(67)			(67)
Return on plan assets excluding amounts recognized as interest income		(483)		(483)
Remeasurement of asset ceiling			8	8
Employer contributions		75		75
Employee contributions	(15)	15		–
Payments due to plan settlements	(87)	65		(22)
Benefits paid out of plan assets	350	(350)		–
Benefits paid by the company	148			148
Plan administration costs paid out of plan assets		(3)		(3)
Reclassification to current assets / liabilities held for sale	145	(79)	–	66
Exchange differences	(178)	103	3	(72)
December 31, 2018	**(8,621)**	**7,203**	**(23)**	**(1,441)**
of which other post-employment benefits	(700)	429	–	(271)
Total, December 31, 2018	**(26,569)**	**17,959**	**(23)**	**(8,633)**

Currenta and Animal Health are included in the development of the net defined benefit liability.

The benefit obligations pertained mainly to Germany (65%; 2018: 68%), the United States (20%; 2018: 19%) and the United Kingdom (7%; 2018: 7%). In Germany, current employees accounted for about 42% (2018: 43%), retirees or their surviving dependents for about 50% (2018: 50%) and former employees with vested pension rights for about 8% (2018: 7%) of entitlements under defined benefit plans. In the United States, current employees accounted for about 27% (2018: 30%), retirees or their surviving dependents for about 58% (2018: 56%) and former employees with vested pension rights for about 15% (2018: 14%) of entitlements under defined benefit plans.

The actual return on the assets of defined benefit plans for pensions and for other post-employment benefits amounted to €2,512 million (2018: minus €537 million) and €84 million (2018: minus €24 million), respectively.

The following table shows the defined benefit obligations for pensions and other post-employment benefits along with the funded status of the funded obligations.

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Defined Benefit Obligation and Funded Status

	Pension obligation		Other post-employment benefit obligation		Total	
€ million	**2018**	**2019**	**2018**	**2019**	**2018**	**2019**
Defined benefit obligation	**25,869**	**25,879**	**700**	**733**	**26,569**	**26,612**
of which unfunded	1,244	652	136	153	1,380	805
of which funded	24,625	25,227	564	580	25,189	25,807
Funded status of funded obligation						
Overfunding	106	258	1	–	107	258
Underfunding	7,196	7,279	136	74	7,332	7,353

Pension and other post-employment benefit obligations

Group companies provide retirement benefits for most of their employees, either directly or by contributing to privately or publicly administered funds. The benefits vary depending on the legal, fiscal and economic conditions of each country. The obligations relate both to existing retirees' pensions and to pension entitlements of future retirees.

Bayer has set up funded pension plans for its employees in various countries. The most appropriate investment strategy is determined for each defined benefit pension plan based on the risk structure of the obligations (especially demographics, the current funded status, the structure of the expected future cash flows, interest sensitivity, biometric risks, etc.), the regulatory environment and the existing level of risk tolerance or risk capacity. A strategic target investment portfolio is then developed in line with the plan's risk structure, taking capital market factors into consideration. Further determinants are risk diversification, portfolio efficiency and the need for both a country-specific and a global risk / return profile centered on ensuring the payment of all future benefits. As the capital investment strategy for each pension plan is developed individually in light of the plan-specific conditions listed above, the investment strategies for different pension plans may vary considerably. The investment strategies are generally aligned less toward maximizing absolute returns and more toward the maximum probability of being able to finance pension commitments over the long term. For pension plans, stress scenarios are simulated and other risk analyses (such as value at risk) undertaken with the aid of risk management systems.

Bayer-Pensionskasse VVaG (Bayer-Pensionskasse), Leverkusen, Germany, is by far the most significant of the pension plans. It has been closed to new members since 2005. This legally independent fund is regarded as a life insurance company and therefore is subject to the German Insurance Supervision Act. The benefit obligations covered by Bayer-Pensionskasse comprise retirement, surviving dependents' and disability pensions. It constitutes a multi-employer plan, to which the active members and their employers contribute. The company contribution is a certain percentage of the employee contribution. This percentage is the same for all participating employers, including those outside the Bayer Group, and is set by agreement between the plan's executive committee and its supervisory board, acting on a proposal from the responsible actuary. It takes into account the differences between the actuarial estimates and the actual values for the factors used to determine liabilities and contributions. Bayer may also adjust the company contribution in agreement with the plan's executive committee and its supervisory board, acting on a proposal from the responsible actuary. The plan's liability is governed by Section 1, Paragraph 1, Sentence 3 of the German Law on the Improvement of Occupational Pensions (BetrAVG). This means that if the pension plan exercises its right under the articles of association to reduce benefits, each participating employer has to make up the resulting difference. Bayer is not liable for the obligations of participating employers outside the Bayer Group, even if they cease to participate in the plan.

Pension entitlements for people who joined Bayer in Germany in 2005 or later are granted via Rheinische Pensionskasse VVaG, Leverkusen. Future pension payments from this plan are based on contributions and the return on plan assets; a guaranteed interest rate applies.

Another important pension provision vehicle is Bayer Pension Trust e. V. (BPT). This covers further retirement provision arrangements of the Bayer Group, such as deferred compensation, pension obligations previously administered by Schering Altersversorgung Treuhand e. V., and components of other direct commitments.

The defined benefit pension plans in the United States are frozen and no significant new entitlements can be earned under these plans. The assets of all the U.S. pension plans are held by a master trust for reasons of efficiency. The applicable regulatory framework is based on the Employee Retirement Income Security Act (ERISA), which includes a statutory 80% minimum funding requirement to avoid benefit restrictions. The actuarial risks, such as investment risk, interest-rate risk and longevity risk, remain with the company.

The defined benefit pension plans in the United Kingdom have been closed to new members for some years. Plan assets in the U.K. are administered by independent trustees, who are legally obligated to act solely in the interests of the beneficiaries. A technical assessment is performed every three years in line with U.K. regulations. This serves as the basis for developing a plan to cover any potential financing requirements. Here, too, the actuarial risks remain with the company.

The other post-employment benefit obligations outside Germany mainly comprised health care benefit payments for retirees in the United States.

The fair value of the plan assets to cover pension and other post-employment benefit obligations was as follows:

B 22/6

Fair Value of Plan Assets as of December 31

	Pension obligations				Other post-employment obligations	
	Germany		Other countries		Other countries	
€ million	2018	2019	2018	2019	2018	2019
Plan assets based on quoted prices in active markets						
Real estate and special real estate funds	–	–	214	216	15	5
Equities and equity funds	1,988	2,832	2,443	2,004	146	104
Callable debt instruments	–	–	27	78	–	–
Noncallable debt instruments	–	–	565	2,920	124	317
Bond funds	4,777	4,695	2,592	1,635	93	23
Derivatives	10	5	3	3	–	–
Cash and cash equivalents	611	297	77	87	9	10
Other	–	–	25	130	–	–
	7,386	**7,829**	**5,946**	**7,073**	**387**	**459**
Plan assets for which quoted prices in active markets are not available						
Real estate and special real estate funds	514	418	296	195	–	–
Equities and equity funds	143	143	69	89	–	–
Callable debt instruments	1,241	843	–	–	–	–
Noncallable debt instruments	1,366	978	–	–	–	–
Bond funds	–	–	73	88	–	–
Derivatives	–	–	–	2	–	–
Other	106	107	390	385	42	48
	3,370	**2,489**	**828**	**759**	**42**	**48**
Total plan assets	**10,756**	**10,318**	**6,774**	**7,832**	**429**	**507**

Plan assets included assets with a carrying amount of €3,296 million (2018: €4,240 million) whose fair values are not determined based on quoted prices in active markets.

The fair value of plan assets in Germany included real estate leased by Group companies, recognized at a fair value of €77 million (2018: €82 million), and Bayer AG shares and bonds held through investment funds, recognized at their fair values of €33 million (2018: €21 million) and €10 million (2018: €6 million), respectively.

The other plan assets comprised mortgage loans granted, other receivables and qualified insurance policies.

Risks

The risks from defined benefit plans arise partly from the defined benefit obligations and partly from the investment in plan assets. These risks include the possibility that additional contributions will have to be made to plan assets in order to meet current and future pension obligations, and negative effects on provisions and equity.

Demographic / biometric risks

Since a large proportion of the defined benefit obligations comprises lifelong pensions or surviving dependents' pensions, longer claim periods or earlier claims may result in higher benefit obligations, higher benefit expense and / or higher pension payments than previously anticipated.

Investment risks

If the actual return on plan assets were below the return anticipated on the basis of the discount rate, the net defined benefit liability would increase, assuming there were no changes in other parameters. This could happen as a result of a drop in share prices, increases in market rates of interest for certain bonds, default of individual debtors or the purchase of low-risk but low-interest bonds, for example.

Interest-rate risk

A decline in capital market interest rates, especially for high-quality corporate bonds, would increase the defined benefit obligation. This effect would be at least partially offset by the ensuing increase in the market values of the debt instruments held.

Measurement parameters and their sensitivities

The following weighted parameters were used to measure the obligations for pensions and other post-employment benefits as of December 31 of the respective year:

B 22/7

Parameters for Benefit Obligations

	Germany		Other countries		Total	
%	2018	2019	2018	2019	2018	2019
Pension obligations						
Discount rate	1.90	1.00	3.55	2.60	2.40	1.55
of which U.S.A.			4.20	3.20	4.20	3.20
of which U.K.			2.80	1.95	2.80	1.95
Projected future salary increases	2.75	2.50	3.65	3.10	3.00	2.70
Projected future benefit increases	1.60	1.40	3.05	2.80	2.05	1.85
Other post-employment benefit obligations						
Discount rate	–	–	4.85	3.90	4.85	3.90

In Germany the Heubeck RT 2018 G mortality tables were used, in the United States the MP-2019 Mortality Tables, and in the United Kingdom 95% of S1NXA.

The following weighted parameters were used to measure the expense for pension and other post-employment benefits in the respective year:

B 22/8

Parameters for Benefit Expense

	Germany		Other countries		Total	
%	2018	2019	2018	2019	2018	2019
Pension obligations						
Discount rate	1.90	1.90	2.95	3.55	2.15	2.40
Projected future salary increases	2.75	2.75	3.60	3.65	2.95	3.00
Projected future benefit increases	1.70	1.60	3.25	3.05	2.10	2.05
Other post-employment benefit obligations						
Discount rate	–	–	4.25	4.85	4.25	4.85

The parameter sensitivities were computed by expert actuaries based on a detailed evaluation similar to that performed to obtain the data presented in Table B 22/3. Altering individual parameters by 0.5 percentage points or mortality by 10% per beneficiary while leaving the other parameters unchanged would have impacted pension and other post-employment benefit obligations as of year-end 2019 as follows:

B 22/9

Sensitivity of Benefit Obligations

€ million	Germany		Other countries		Total	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
Pension obligations						
0.5%-pt. change in discount rate	(1,489)	1,711	(559)	620	(2,048)	2,331
0.5%-pt. change in projected future salary increases	81	(75)	61	(58)	142	(133)
0.5%-pt. change in projected future benefit increases	881	(803)	203	(155)	1,084	(958)
10% change in mortality	(628)	712	(240)	242	(868)	954
Other post-employment benefit obligations						
0.5%-pt. change in discount rate	–	–	(36)	40	(36)	40
10% change in mortality	–	–	(22)	25	(22)	25

B 22/10

Sensitivity of Benefit Obligations (prior year)

€ million	Germany		Other countries		Total	
	Increase	Decrease	Increase	Decrease	Increase	Decrease
Pension obligations						
0.5%-pt. change in discount rate	(1,408)	1,608	(479)	536	(1,887)	2,144
0.5%-pt. change in projected future salary increases	81	(76)	42	(40)	123	(116)
0.5%-pt. change in projected future benefit increases	903	(825)	132	(101)	1,035	(926)
10% change in mortality	(584)	658	(197)	203	(781)	861
Other post-employment benefit obligations						
0.5%-pt. change in discount rate	–	–	(33)	36	(33)	36
10% change in mortality	–	–	(18)	20	(18)	20

Provisions are also established for the obligations, mainly of U.S. subsidiaries, to provide post-employment benefits in the form of health care cost payments for retirees. The valuation of health care costs was based on the assumption that they will increase at a rate of 7.0% (2018: 6.3%), which should gradually decline to 5% by 2028 (assumption in 2018: gradually decline to 5.0% by 2023). The following table shows the impact on other post-employment benefit obligations and total benefit expense of a one-percentage-point change in the assumed cost increase rates:

B 22/11

Sensitivity to Health Care Cost Increases

€ million	Increase of 1%-pt.		Decrease of 1%-pt.	
	2018	2019	2018	2019
Impact on other post-employment benefit obligations	47	51	(41)	(43)
Impact on benefit expense	3	2	(2)	(2)

Payments made and expected future payments

The following payments or asset contributions correspond to the employer contributions made or expected to be made to funded benefit plans:

B 22/12

Employer Contributions Paid or Expected

€ million	Germany 2018	Germany 2019	Germany 2020 expected	Other countries 2018	Other countries 2019	Other countries 2020 expected
Pension obligations	141	49	109	90	96	79
Other post-employment benefit obligations	–	–	–	(15)	(15)	2
Total	**141**	**49**	**109**	**75**	**81**	**81**

Bayer is currently committed to making deficit contributions for its U.K. pension plans of approximately GBP27 million annually through 2023. For its U.S. pension plans, Bayer made no payments in 2019 (2018: US$50 million) and expects to make zero or only very low regular payments in 2020 as most of these plans are closed and frozen.

Pensions and other post-employment benefits payable in the future from funded and unfunded plans are estimated as follows:

B 22/13

Future Benefit Payments

€ million	Payments out of plan assets: Pensions – Germany	Payments out of plan assets: Pensions – Other countries	Payments out of plan assets: Other post-employment benefits – Other countries	Payments out of plan assets: Total	Payments by the company: Pensions – Germany	Payments by the company: Pensions – Other countries	Payments by the company: Other post-employment benefits – Other countries	Payments by the company: Total
2020	179	415	25	619	431	108	27	566
2021	182	415	23	620	433	84	25	542
2022	182	423	24	629	435	89	24	548
2023	184	424	24	632	438	94	25	557
2024	184	434	26	644	439	96	26	561
2025–2029	933	2,153	132	3,218	2,201	542	132	2,875

The weighted average term of the pension obligations is 17.9 years (2018: 17.0 years) in Germany and 13.2 years (2018: 12.8 years) in other countries. The weighted average term of the obligations for other post-employment benefits in other countries is 11.0 years (2018: 10.5 years).

23. Other provisions

Changes in the various provision categories in 2019 were as follows:

B 23/1

Changes in Other Provisions

€ million	Other Taxes	Environ-mental protec-tion	Restruc-turing	Trade-related commit-ments	Litigations	Personnel commit-ments	Miscella-neous	Total
December 31, 2018	**35**	**754**	**773**	**190**	**1,419**	**2,497**	**1,115**	**6,783**
Acquisitions	–	–	–	–	–	3	1	4
Additions	138	23	973	627	576	2,758	475	5,570
Utilization	(92)	(52)	(340)	(518)	(826)	(2,096)	(438)	(4,362)
Reversal	(3)	(32)	(137)	(36)	(25)	(550)	(113)	(896)
Reclassification to liabilities held for sale	–	(106)	(4)	(23)	–	(136)	(25)	(294)
Interest cost	–	55	–	–	44	26	26	151
Exchange differences	–	13	2	–	18	18	10	61
December 31, 2019	**78**	**655**	**1,267**	**240**	**1,206**	**2,520**	**1,051**	**7,017**
of which current	29	98	270	229	482	1,784	359	3,251

2018 figures restated

The provisions were partly offset by claims for refunds in the amount of €77 million (2018: €74 million), which were recognized as receivables. These claims were primarily for refunds related to product liability.

Environmental protection

Provisions for environmental protection are mainly established for the expected costs of ensuring compliance with environmental regulations, remediation work on contaminated land, recultivation of landfills, and redevelopment and water protection measures.

Restructuring

Provisions for restructuring only cover expenses that arise directly from restructuring measures, are necessary for restructuring and are not related to future business operations. Such expenses include severance payments to employees and compensation payments in respect of rented property that is no longer used.

Restructuring measures may include the sale or termination of business units, site closures, relocations of business activities or fundamental reorganizations of business units.

Provisions for restructuring included €1,203 million (2018: €691 million) for severance payments and €64 million (2018: €82 million) for other restructuring expenses, which mainly comprised other costs related to the outsourcing of research activities. The breakdown of provisions by segment was as follows: €185 million (2018: €240 million) at Crop Science, €292 million at Pharmaceuticals (2018: €351 million), €31 million at Consumer Health (2018: €57 million), €0 million at Animal Health (2018: €6 million) and €759 million at Enabling Functions / All Other Segments (2018: €119 million).

Provisions were recognized in all segments in 2019 in connection with an extensive restructuring program aimed at strengthening Bayer’s core businesses, adapting the infrastructure and increasing productivity and earning power through a series of measures to be implemented through 2022. Provisions had already been recorded in 2018 for programs communicated in sufficient detail at that time. In 2019, provisions were established primarily in Germany, the United States and Japan. Further provisions are expected to be recognized in 2020.

As in the previous year, the main focus of restructuring activities in the Crop Science segment was on organizational adjustments following the integration of Monsanto.

In the Pharmaceuticals segment, provisions had already been recorded in 2018, mainly in view of the planned reorganization of R&D. By integrating research and development within a common organization, Bayer is looking to grow the value and productivity of the Pharmaceuticals portfolio. Extensive restructuring of the sales function was carried out in Japan in order to better address future market requirements.

At Consumer Health, the “Fit to Win” restructuring program was continued with the aim of making this segment a market leader by driving the transformation in the health care industry and creating a more agile and faster organization with fewer decision-making levels.

Under Enabling Functions and Consolidation, which forms part of the Reconciliation, provisions were established for early retirement programs and for severance payments, primarily in Germany. Restructuring was carried out in nearly all of the enabling functions. Appropriate accounting measures were also taken in connection with the planned site closures in Pittsburgh, Pennsylvania, and Mishawaka, Indiana, in the United States.

Trade-related commitments

Trade-related provisions are recorded mainly for obligations related to services performed but not yet invoiced and to sales commissions not recognized under trade accounts payable.

Litigations

The legal risks currently considered to be material, and their development, are described in Note [30].

Personnel commitments

Personnel-related provisions include those for variable, performance-related one-time payments to employees, stock-based payments, and payments related to long-service anniversaries, early retirement programs and pre-retirement part-time working arrangements. Provisions for severance payments resulting from restructuring are reflected in provisions for restructuring.

Stock-based compensation programs

Bayer offers stock-based compensation programs collectively to different groups of employees. As required by IFRS 2 (Share-based Payment) for compensation systems involving cash settlement, awards to be made under the stock-based programs are covered by provisions in the amount of the fair value of the obligations existing as of the date of the financial statements. All resulting valuation adjustments are recognized in profit or loss.

The following table shows the changes in provisions for the various programs:

B 23/2

Changes in Provisions for Stock-Based Compensation Programs

€ million	Aspire 2.0
December 31, 2018	**289**
Acquisitions / divestments	–
Additions	514
Reclassification to liabilities held for sale	(4)
Utilization	–
Reversal	(216)
Exchange differences	(1)
December 31, 2019	**582**

The value of the Aspire tranches that were fully earned at the end of 2019, resulting in payments at the beginning of 2020, was €132 million (2018: €0 million).

The net expense for all stock-based compensation programs was €303 million (2018: €21 million), including €5 million (2018: €5 million) for the BayShare stock participation program and income of €0 million (2018: €1 million) pertaining to grants of virtual Bayer shares. For information on the hedging of obligations under stock-based employee compensation programs see Note [27.3].

Long-term incentive program Aspire 2.0

Aspire 2.0 is based on a percentage of each employee's annual base salary, the percentage varying according to their position. This target value is multiplied by the employee's STI (short-term incentive) payment factor for the previous year to give the Aspire grant value. The STI payment factor reflects the business performance under the global short-term incentive program. The Aspire grant value is converted into virtual Bayer shares by dividing it by the share price at the start of the program. The program's performance is based on these virtual shares. For the Board of Management, there is an additional hurdle in the form of a comparison between the performance of Bayer stock and that of the EURO STOXX 50. Each tranche runs for four years.

The fair value of the obligations is determined from the price of Bayer stock at year-end and the dividends paid up to that time. The payment made at the end of each tranche is determined by multiplying the number of virtual shares by the Bayer share price at that time and adding an amount equivalent to the dividends paid during the period of the tranche. The maximum payment for Aspire 2.0 is 250% of the Aspire grant value.

At the start of 2020, a payment of 69% was made for the tranche issued in 2016. The payment for the Board of Management amounted to 39%.

BayShare 2019

All management levels and nonmanagerial employees are offered an annual stock participation program known as BayShare, under which Bayer subsidizes their personal investments in the company's stock. The discount under this program in 2019 was 20% (2018: 20%) of the subscription amount. Employees stated a fixed amount that they wished to invest in shares. The maximum subscription amount in Germany was set at €2,500 (2018: €2,500) or €5,000 (2018: €5,000), depending on the employee's position. The shares purchased must be retained until December 31, 2020.

In 2019, employees purchased a total of about 334,000 shares (2018: 358,000 shares purchased by employees of continuing operations) under the BayShare program.

Other

Miscellaneous provisions include those for **other liabilities**, contingent liabilities from business combinations, except where these are allocable to other provision categories, and asset retirement obligations other than those included in provisions for environmental protection.

A sensitivity analysis undertaken for certain provisions that examined the impact of a five percentage point change in the probabilities of occurrence in each case did not produce any material deviations from the amount of provisions established.

24. Financial liabilities

Financial liabilities were comprised as follows:

B 24/1

Financial Liabilities

	Dec. 31, 2018		Dec. 31, 2019	
€ million	Total	Of which current	Total	Of which current
Bonds and notes / promissory notes	35,402	2,302	33,569	1,001
Liabilities to banks	4,865	606	4,062	675
Lease liabilities	399	50	1,251	299
Liabilities from derivatives	172	172	123	122
Other financial liabilities	556	552	89	85
Total	**41,394**	**3,682**	**39,094**	**2,182**

A breakdown of financial liabilities by contractual maturity is given below:

B 24/2

Maturities of Financial Liabilities

€ million	Dec. 31, 2018	€ million	Dec. 31, 2019
2019	3,682	2020	2,182
2020	1,043	2021	8,513
2021	9,035	2022	2,205
2022	2,062	2023	3,715
2023	3,558	2024	2,274
2024 or later	22,014	2025 or later	20,205
Total	**41,394**	**Total**	**39,094**

In addition to promissory notes in the amount of €0 million (2018: €45 million), the Bayer Group has issued the following bonds and notes:

B 24/3

Bonds and Notes

	Nominal volume as of Dec. 31, 2018	Carrying amount as of Dec. 31, 2018 € million	Nominal volume as of Dec. 31, 2019	Carrying amount as of Dec. 31, 2019 € million
Hybrid bonds[1]				
Hybrid bond 2014/2024[2]/2074	EUR 1,500 million	1,496	EUR 1,500 million	1,497
Hybrid bond 2015/2022[2]/2075	EUR 1,300 million	1,293	EUR 1,300 million	1,295
Hybrid bond[3] 2014/2020[2]/2075	EUR 1,750 million	1,748	–	–
Hybrid bond 2019/2025[2]/2079	–	–	EUR 1,000 million	990
Hybrid bond 2019/2027[2]/2079	–	–	EUR 750 million	746
Mandatory convertible notes[1]/exchangeable bond[1]				
Mandatory convertible notes[4] 2016/2019	EUR 4,000 million	–	–	–
Exchangeable bond[5] 2017/2020	EUR 1,000 million	996	EUR 1,000 million	1,001
USD bonds[1, 6]				
Maturity < 1 year	USD 2,500 million	2,178	–	–
Maturity > 1 year < 5 years	USD 8,250 million	7,160	USD 10,750 million	9,510
Maturity > 5 years	USD 16,414 million	14,031	USD 13,914 million	12,144
EUR bonds[1, 6]				
Maturity < 1 year	–	–	–	–
Maturity > 1 year < 5 years	EUR 3,000 million	2,996	EUR 3,000 million	2,997
Maturity > 5 years	EUR 3,250 million	3,222	EUR 3,250 million	3,225
JPY bonds[1]				
Maturity < 1 year	JPY 10 billion	79	–	–
Maturity > 1 year < 5 years	JPY 20 billion	158	JPY 20 billion	164
Maturity > 5 years	–	–	–	–
Total		**35,357**		**33,569**

[1] The bonds are issued in the functional currency of the issuing entity and mainly have a fixed coupon.
[2] Date of first option to redeem the bond early at par
[3] The hybrid bond was repurchased before the first call date.
[4] The mandatory convertible notes were initially recognized in capital reserves and other financial liabilities.
[5] Bond can be redeemed in cash, Covestro shares or a combination thereof.
[6] Bonds with nominal volumes of USD2,500 million and €750 million bear variable rates of interest.

Hybrid bonds

The hybrid bonds issued by Bayer AG are subordinated, and 50% of their amount is treated by the rating agencies as equity. They therefore have a more limited effect on the Group's rating-specific debt indicators than senior borrowings.

In 2019, Bayer AG repurchased the €1.75 billion hybrid bond maturing in 2075 (callable on July 1, 2020) before the first call date. The repurchase was financed through the issuance of two hybrid bonds with nominal volumes of €1 billion and €750 million.

Mandatory convertible notes

On November 22, 2016, Bayer Capital Corporation B.V., Mijdrecht, Netherlands, placed subordinated mandatory convertible notes in the amount of €4 billion, which were converted into no-par shares of Bayer AG at maturity on November 22, 2019.

Exchangeable bond

On June 14, 2017, Bayer AG issued bonds with a nominal value of €1 billion which mature in 2020. These bonds can be settled in cash, by delivery of Covestro shares or by a combination thereof. They were designated as financial liabilities at fair value through profit or loss upon first-time recognition. As of December 31, 2019, the fair value was €1 billion, and Bayer AG held 11.7 million Covestro shares with a fair value of €0.5 billion. Assuming repayment is made in Covestro shares, Bayer AG would have to make an additional payment of €0.5 billion.

Other bonds

Three bonds with a total nominal volume of US$2.5 billion and a bond with a nominal volume of JPY 10 billion were redeemed at maturity in 2019.

Measures undertaken to finance the Monsanto acquisition included the issuance in June 2018 of US$15 billion and €5 billion in bonds via our subsidiaries Bayer U.S. Finance II LLC, Pittsburgh, United States, and Bayer Capital Corporation B.V., Mijdrecht, Netherlands, respectively.

As part of the acquisition, bonds with a nominal volume of US$6.9 billion were taken over from Monsanto. In July 2018, about 83% of these bonds were exchanged for Bayer bonds through a bond exchange program.

Liabilities to banks

The decrease in liabilities to banks mainly resulted from the continued repayment of the acquisition financing, which amounted to US$3.8 billion as of December 31, 2019 (December 31, 2018: US$4.9 billion).

Lease liabilities

The increase in lease liabilities in 2019 was mainly due to the change in lease accounting resulting from the first-time application of IFRS 16. Further information on lease liabilities is given in Note [28].

Other financial liabilities

The decrease in other financial liabilities was mainly due to the repayment of liabilities pertaining to the mandatory convertible notes.

Other information

A total of €4.5 billion in undrawn credit facilities remained available to the Bayer Group as of December 31, 2019 (December 31, 2018: €4.5 billion).

Further information on the accounting for liabilities from derivatives is given in Note [27].

The development of financial liabilities in 2019 is outlined in Note [31].

25. Trade accounts payable

Trade accounts payable comprised €6,404 million (2018: €6,004 million) due within one year and €22 million (2018: €34 million) due after one year.

26. Other liabilities

Other liabilities comprised the following:

B 26/1

Other Liabilities

€ million	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current	Dec. 31, 2019 Total	Dec. 31, 2019 Of which current
Other tax liabilities	672	653	693	682
Deferred income	65	19	50	27
Liabilities to employees	252	231	230	215
Liabilities for social expenses	141	136	130	128
Accrued interest on liabilities	268	257	266	253
Liabilities from derivatives	327	165	219	166
Miscellaneous liabilities	762	660	1,334	1,012
Total	**2,487**	**2,121**	**2,922**	**2,483**

2018 figures restated

The deferred income included €20 million (2018: €30 million) in grants and subsidies received from governments, of which €3 million (2018: €3 million) was reversed through profit or loss.

Other miscellaneous liabilities included a commitment in the amount of €346 million for the settlement payment due in connection with the Xarelto™ litigation. The payment was made in January 2020. Upon the acquisition of the remaining interest in BlueRock Therapeutics L.P., Cambridge, Massachusetts, United States, a €185 million liability was recognized for potential future milestone payments that become due when predefined research-based milestones are achieved. Also included here are financial commitments of €116 million (2018: €175 million) for joint ventures and a €105 million payment obligation for acquired trademark rights in the Crop Science segment.

27. Financial instruments

The system used by the Bayer Group to manage credit risks, liquidity risks and the different types of market price risk (interest-rate, currency and commodity price risks), together with its objectives, methods and procedures, is outlined in the Opportunity and Risk Report, which forms part of the Combined Management Report.

27.1 Financial instruments by category

The following table shows the carrying amounts and fair values of financial assets and liabilities by category of financial instrument under IFRS 9 and a reconciliation to the corresponding line items in the statements of financial position. Since the line items “Trade accounts receivable,” “Other receivables” and “Other liabilities” contain both financial instruments and nonfinancial assets or liabilities (such as other tax receivables), the reconciliation is shown in the column headed “Nonfinancial assets / liabilities.”

B 27.1/1

Carrying Amounts and Fair Values of Financial Instruments

						Dec. 31, 2019
		Measured at fair value [fair value for information[5]]				
Measurement category (IFRS 9)[1]	Measured at amortized cost	Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobservable inputs (Level 3)	Nonfinancial assets/liabilities	
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Total**
Trade accounts receivable	11,430		80		168	11,678
AC	11,430					11,430
FVTPL, mandatory[2]			80			80
Nonfinancial assets					168	168
Other financial assets	809	1,692	195	1,166		3,862
AC	809		[809]			809
FVTPL, mandatory[2]		1,353	29	922		2,304
FVTOCI (no Recycling), designated[3]		336		232		568
Derivatives - hedge accounting			71			71
Derivatives - no hedge accounting		3	95	12		110
Other receivables	287			65	2,210	2,562
AC	287		[287]			287
FVTPL, mandatory[2]				65		65
Nonfinancial assets					2,210	2,210
Cash and cash equivalents	3,185					3,185
AC	3,185		[3,185]			3,185
Total financial assets	**15,711**	**1,692**	**275**	**1,231**		**18,909**
of which AC	15,711					15,711
of which FVTPL		1,353	109	987		2,449
Financial liabilities	37,896	1,001	123		74	39,094
AC	37,896	[33,285]	[6,774]			37,896
FVTPL (nonderivative), designated[4]		1,001				1,001
Derivatives – no hedge accounting			123			123
Nonfinancial liabilities					74	74
Trade accounts payable	6,426					6,426
AC	6,426					6,426
Other liabilities	1,156	3	211	198	1,354	2,922
AC	1,156		[1,156]			1,156
FVTPL (nonderivative), mandatory[2]				193		193
Derivatives – hedge accounting			177			177
Derivatives – no hedge accounting		3	34	5		42
Nonfinancial liabilities					1,354	1,354
Total financial liabilities	**45,478**	**1,004**	**334**	**198**		**47,014**
of which AC	45,478					45,478
of which FVTPL (nonderivative)		1,001		193		1,194
of which derivatives – hedge accounting			177			177
of which derivatives – no hedge accounting		3	157	5		165

[1] AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss
[2] Measured at fair value through profit or loss as required by IFRS 9
[3] Measured at fair value through other comprehensive income under IFRS 9, paragraph 5.7.5
[4] Designated as FVTPL upon first-time recognition under IFRS 9
[5] Fair value of the financial instruments at amortized cost under IFRS 7, paragraph 29(a)

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Carrying Amounts and Fair Values of Financial Instruments

Dec. 31, 2018

Measurement category (IFRS 9)[1]	Measured at amortized cost	Measured at fair value [fair value for information[5]] – Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobservable inputs (Level 3)	Nonfinancial assets/ liabilities	
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Total**
Trade accounts receivable	11,564				150	11,714
AC	11,564					11,564
Nonfinancial assets					150	150
Other financial assets	440	1,584	241	1,113		3,378
AC	440		[441]			440
FVTPL, mandatory[2]		1,432	28	895		2,355
FVTOCI (no Recycling), designated[3]		144		186		330
Derivatives – hedge accounting			101			101
Derivatives – no hedge accounting		8	112	32		152
Other receivables	614			42	1,828	2,484
AC	614		[614]			614
FVTPL, mandatory[2]				42		42
Nonfinancial assets					1,828	1,828
Cash and cash equivalents	4,052					4,052
AC	4,052		[4,052]			4,052
Total financial assets	**16,670**	**1,584**	**241**	**1,155**		**19,650**
of which AC	16,670					16,670
of which FVTPL		1,432	28	937		2,397
Financial liabilities	40,226	996	172			41,394
AC	40,226	[32,395]	[7,091]			40,226
FVTPL (nonderivative), designated[4]		996				996
Derivatives – hedge accounting			35			35
Derivatives – no hedge accounting			137			137
Trade accounts payable	6,038					6,038
AC	6,038					6,038
Other liabilities	1,136	7	320	20	1,004	2,487
AC	1,136		[1,136]			1,136
FVTPL (nonderivative), mandatory[2]				20		20
Derivatives – hedge accounting			297			297
Derivatives – no hedge accounting		7	23			30
Nonfinancial liabilities					1,004	1,004
Total financial liabilities	**47,400**	**1,003**	**492**	**20**		**48,915**
of which AC	47,400					47,400
of which FVTPL (nonderivative)		996		20		1,016
of which derivatives – hedge accounting			332			332
of which derivatives – no hedge accounting		7	160			167

2018 figures restated
[1] AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss
[2] Measured at fair value through profit or loss as required by IFRS 9
[3] Measured at fair value through other comprehensive income under IFRS 9, paragraph 5.7.5
[4] Designated as FVTPL upon first-time recognition under IFRS 9
[5] Fair value of the financial instruments at amortized cost under IFRS 7 paragraph 29(a)

The category “AC – measured at amortized cost” within other financial assets and in financial liabilities also includes finance lease receivables and lease liabilities in which Bayer is the lessor or lessee and which were therefore measured according to IFRS 16 (in 2019) or IAS 17 (in 2018).

Due to the short maturities of most trade accounts receivable and payable, other receivables and liabilities, and cash and cash equivalents, their carrying amounts at the closing date do not significantly differ from the fair values.

The fair values of financial assets and liabilities measured at amortized cost that are given for information are the present values of the respective future cash flows. The present values are determined by discounting the cash flows at a closing-date interest rate, taking into account the term of the assets or liabilities and also the creditworthiness of the counterparty in certain cases. Where a market price is available, however, this is deemed to be the fair value.

The fair values of financial assets measured at fair value correspond to quoted prices in active markets (Level 1), or are determined using valuation techniques based on observable market data as of the end of the reporting period (Level 2) or are the present values of the respective future cash flows, determined on the basis of unobservable inputs (Level 3).

The fair values of derivatives for which no publicly quoted prices exist in active markets (Level 1) are determined using valuation techniques based on observable market data as of the end of the reporting period (Level 2). In applying valuation techniques, credit or debt value adjustments are determined to account for the credit risk of the contractual party or Bayer.

Currency and commodity forward contracts are measured individually at their forward rates or forward prices on the closing date. These depend on spot rates or prices, including time spreads. The fair values of interest-rate hedging instruments and cross-currency interest-rate swaps were determined by discounting future cash flows over the remaining terms of the instruments at market rates of interest, taking into account any foreign currency translation as of the closing date in certain cases.

Fair values measured using unobservable inputs are categorized within Level 3 of the fair value hierarchy. This applies to certain debt or equity instruments, in some cases to the fair values of embedded derivatives, and to obligations for contingent consideration in business combinations. Credit risk is frequently the principal unobservable input used to determine the fair values of debt instruments classified as “FVTPL – at fair value through profit or loss” by the discounted cash flow method. Here the credit spreads of comparable issuers are applied. A significant increase in credit risk could result in a lower fair value, whereas a significant decrease could result in a higher fair value. However, a relative change of 10% in the credit spread does not materially affect the fair value.

Embedded derivatives are separated from their respective host contracts, provided these are not financial instruments. Such host contracts are generally sale or purchase agreements relating to the operational business. The embedded derivatives cause the cash flows from the contracts to vary with exchange-rate or price fluctuations, for example. The internal measurement of embedded derivatives is mainly performed using the discounted cash flow method, which is based on unobservable inputs. These include planned sales and purchase volumes, and prices derived from market data. Regular monitoring is carried out based on these fair values as part of quarterly reporting.

The maximum default risk from financial assets that are measured at amortized cost and are subject to the impairment model is €15,711 million (2018: €16,670 million).

The maximum default risk from existing loan commitments that are subject to the impairment model is €1,165 million (2018: €965 million).

The maximum default risk from financial assets not subject to the impairment model is €3,198 million (2018: €2,980 million).

The exchangeable bond issued in June 2017 that can be converted into Covestro shares are measured at fair value through profit or loss. This bond is a hybrid financial instrument containing a debt instrument as a nonderivative host contract and multiple embedded derivatives.

Until May 2018, the interest in Covestro was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. Various share disposals led to the loss of significant influence on the financial and business policy decisions of Covestro. This in turn resulted in a change in the accounting method. Since May 2018, Bayer has reported its interest in Covestro as an equity instrument. Changes in fair value are recognized through profit or loss.

The changes in the amount of financial assets and liabilities recognized at fair value based on unobservable inputs (Level 3) for each financial instrument category were as follows:

B 27.1/3

Development of Financial Assets and Liabilities (Level 3)

€ million	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives (net)	Liabilities – FVTPL[1] (non-derivative)	Total
Carrying amounts (net), January 1, 2019	**937**	**186**	**32**	**(20)**	**1,135**
Gains (losses) recognized in profit or loss	44	–	(1)	4	47
of which related to assets / liabilities recognized in the statement of financial position	44	–	(1)	4	47
Gains (losses) recognized outside profit or loss	–	2	–	–	2
Additions of assets / (liabilities)	5	37	–	(187)	(145)
Settlements of (assets) / liabilities	–	–	(26)	6	(20)
Changes in scope of consolidation	–	6	–	–	6
Exchange differences	1	1	2	4	8
Carrying amounts (net), December 31, 2019	**987**	**232**	**7**	**(193)**	**1,033**

[1] See table B 27.1/1 for definition of measurement categories.

B 27.1/4

Development of Financial Assets and Liabilities (Level 3)

€ million	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives (net)	Liabilities – FVTPL[1] (non-derivative)	Total
Carrying amounts (net), January 1, 2018	**821**	**68**	**10**	**(7)**	**892**
Gains (losses) recognized in profit or loss	28	–	5	(5)	28
of which related to assets / liabilities recognized in the statement of financial position	28	–	–	(5)	23
Gains (losses) recognized outside profit or loss	–	13	–	–	13
Additions of assets / (liabilities)	102	116	17	(10)	225
Settlements of (assets) / liabilities	(14)	(7)	–	1	(20)
Disposals from divestments	–	–	–	1	1
Changes in scope of consolidation	–	(4)	–	–	(4)
Carrying amounts (net), December 31, 2018	**937**	**186**	**32**	**(20)**	**1,135**

[1] See table B 27.1/2 for definition of measurement categories.

The changes recognized in profit or loss were included in other operating income / expenses, as well as in the financial result in interest income, exchange gains or losses and in other financial income and expenses.

Income, expense, gains and losses on financial instruments can be assigned to the following categories:

B 27.1/5

Income, Expense, Gains and Losses on Financial Instruments

€ million	Assets – AC[1]	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives – no hedge accounting	Liabilities – AC[1]	Liabilities – FVTPL[1] (non-derivative)	Total
							2019
Interest income	147	39	–	–	52	–	238
Interest expense	(56)	–	–	(10)	(1,490)	(1)	(1,557)
Income / expenses from investments in affiliated companies	–	31	–	–	–	–	31
Changes in fair value	–	52	–	11	–	(1)	62
Impairment losses[2]	(214)	–	–	–	–	–	(214)
Impairment loss reversals	148	–	–	–	–	–	148
Exchange gains / losses	125	–	–	83	(290)	–	(82)
Other financial income / expenses	(3)	(12)	–	–	(33)	–	(48)
Net result	**147**	**110**	**–**	**84**	**(1,761)**	**(2)**	**(1,422)**

[1] See table B 27.1/1 for definitions of measurement categories.
[2] Also including expected credit losses from loan commitments

B 27.1/6

Income, Expense, Gains and Losses on Financial Instruments

€ million	Assets – AC[1]	Assets – FVTPL[1]	FVTOCI[1] (no Recycling)	Derivatives – no hedge accounting	Liabilities – AC[1]	Liabilities – FVTPL[1] (non-derivative)	Total
							2018
Interest income	109	95	–	–	50	–	254
Interest expense	(65)	–	–	(2)	(1,224)	(1)	(1,292)
Income / expenses from investments in affiliated companies	–	–	1	–	–	–	1
Changes in fair value	–	(444)	–	41	–	230	(173)
Impairment losses	(197)	–	–	–	–	–	(197)
Impairment loss reversals	184	–	–	–	–	–	184
Exchange gains / losses	247	–	–	89	(496)	–	(160)
Other financial income / expenses	(11)	–	–	–	(15)	(2)	(28)
Net result	**267**	**(349)**	**1**	**128**	**(1,685)**	**227**	**(1,411)**

2018 figures restated
[1] See table B 27.1/2 for definitions of measurement categories.

The interest income and expense from assets and liabilities within the AC category also included income and expenses from interest-rate derivatives that qualified for hedge accounting.

The changes in the fair value of assets within the FVTPL category also included changes in the fair value of the Covestro interest, which has been presented as an equity instrument since May 2018. The changes in the fair value of derivatives that do not qualify for hedge accounting related mainly to forward commodity contracts and embedded derivatives.

In 2018, changes in the fair value of (nonderivative) liabilities within the FVTPL category mainly comprised the fair value adjustments for the exchangeable bond issued in June 2017. The changes in fair value relating to credit risks were not material.

Derivatives that form part of a master netting arrangement, constitute a financial asset or liability and can only be netted in the event of breach of contract by, or insolvency of, one of the contracting parties do not satisfy, or only partially satisfy, the criteria for offsetting in the statement of financial position according to IAS 32. The volume of such derivatives with positive fair values was €109 million (2018: €166 million), and the volume with negative fair values was €298 million (2018: €455 million). Included here is an amount of €74 million (2018: €104 million) in positive and negative fair values of derivatives concluded with the same contracting party.

27.2 Maturity analysis

The liquidity risks to which the Bayer Group was exposed from its financial instruments at the end of the reporting period comprised obligations for future interest and repayment installments on financial liabilities and the liquidity risk arising from derivatives.

There were also loan commitments under an as yet unpaid €965 million (2018: €965 million) and €200 million (2018: €0 million) portion of the effective initial funds of Bayer-Pensionskasse VVaG and Rheinische Pensionskasse VVag, respectively, which may result in further payments by Bayer AG in subsequent years.

B 27.2/1

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2019 Carrying amount	2020	2021	2022	2023	2024	after 2024 Interest and repayment
Refund liabilities	4,239	4,134	103	2	–	–	–
Financial liabilities							
Bonds and notes / promissory notes	33,569	1,900	5,895	3,010	4,528	3,025	27,171
Liabilities to banks	3,988	672	3,455	–	–	–	–
Remaining liabilities	1,340	443	335	193	137	98	377
Trade accounts payable	6,426	6,404	11	2	1	1	7
Other liabilities							
Accrued interest on liabilities	266	253	2	2	1	1	7
Remaining liabilities	1,083	788	87	150	31	1	26
Liabilities from derivatives							
Derivatives – hedge accounting	177	127	49	–	1	–	–
Derivatives – no hedge accounting	165	165	2	1	–	–	–
Receivables from derivatives							
Derivatives – hedge accounting	71	10	8	28	2	1	–
Derivatives – no hedge accounting	110	66	17	1	–	–	–
Loan commitments	–	1,165	–	–	–	–	–
Financial guarantees	–	–	–	–	–	–	1

B 27.2/2

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2018 Carrying amount	2019	2020	2021	2022	2023	after 2023
		Interest and repayment					
Refund liabilities	3,782	3,622	145	15	–	–	–
Financial liabilities							
Bonds and notes/promissory notes	35,402	3,235	2,094	5,762	2,951	4,414	29,610
Liabilities to banks	4,865	751	158	4,345	–	–	3
Remaining liabilities	955	627	60	53	43	32	303
Trade accounts payable	6,038	6,004	32	1	1	–	–
Other liabilities							
Accrued interest on liabilities	268	257	1	1	1	1	7
Remaining liabilities	888	791	56	17	8	3	13
Liabilities from derivatives							
Derivatives – hedge accounting	332	172	66	70	26	–	–
Derivatives – no hedge accounting	167	167	–	–	–	–	–
Receivables from derivatives							
Derivatives – hedge accounting	101	42	9	3	–	–	–
Derivatives – no hedge accounting	152	121	(1)	(10)	–	–	–
Loan commitments	–	965	–	–	–	–	–
Financial guarantees	–	–	–	–	–	–	–

2018 figures restated

27.3 Information on derivatives

Asset and liability fair values and future cash flows are exposed to currency, interest-rate and commodity price risks. Derivatives are used to reduce this risk. In some cases they are designated as hedging instruments in a hedge accounting relationship.

Currency risks

Foreign currency receivables and liabilities are hedged using foreign exchange derivatives without the existence of a hedge accounting relationship. In addition, cross-currency interest-rate swaps are concluded to hedge intra-Group loans. Some of these swaps are designated as cash flow hedges in hedge accounting.

Fluctuations in future cash flows resulting from forecasted foreign currency transactions and procurement activities are avoided partly through derivatives contracts, most of which are designated as cash flow hedges.

Interest-rate risk

The interest-rate risks from fixed-interest borrowings are managed in part using interest-rate swaps. Two interest-rate swaps in the total amount of €200 million were designated as fair value hedges for the €750 million bond issued in 2014 and maturing in 2021. In addition, two interest-rate swaps totaling US$500 million were designated as a fair value hedge for the US$2.5 billion bond issued in 2018 and maturing in 2025. The carrying amounts of these bonds as of December 31, 2019, were €748 million and €2,216 million, respectively. Hedge-related fair value adjustments of €4 million and €9 million increased the carrying amounts to €752 million and €2,225 million, respectively. No material ineffective portions of these hedges required recognition through profit or loss.

Interest-rate risks in connection with the financing of the Monsanto acquisition were partially hedged through interest-rate derivatives designated as cash flow hedges. The fair values of these derivatives as of the acquisition date will be amortized from reserves for cash flow hedges into interest income and expense over the term of the bonds issued to finance the acquisition.

Commodity price risks

Hedging contracts are also used to partly reduce exposure to fluctuations in future cash outflows and inflows resulting from price changes on procurement and selling markets. Some of these contracts are designated as cash flow hedges or fair value hedges.

Hedging of obligations under stock-based employee compensation programs

A portion of the obligations to make variable payments to employees under stock-based compensation programs (Aspire) is hedged against share price fluctuations using derivatives contracts that are settled in cash at maturity. These derivatives are designated as cash flow hedges.

Further information on cash flow hedges

Other comprehensive income from cash flow hedges decreased in 2019 by €115 million (2018: increased by €125 million) due to changes in the fair values of derivatives. Total changes of €107 million in the fair values of derivatives were recognized through profit or loss in 2019 (2018: €124 million).

The following table shows changes in reserves for cash flow hedges (before taxes), broken down by risk category:

B 27.3/1

Changes in Reserves for Cash Flow Hedges (before taxes)

€ million	Currency hedging of recorded transactions	Currency hedging of forecasted transactions	Interest-rate hedging of forecasted transactions	Commodity price hedging	Hedging of stock-based employee compensation programs	Total
December 31, 2017	**21**	**(95)**	**(19)**	**–**	**(4)**	**(97)**
Changes in fair values	(10)	100	283	(17)	(231)	125
Reclassified to profit or loss	–	(3)	(19)	–	146	124
Reclassified to goodwill	–	(37)	–	–	–	(37)
December 31, 2018	**11**	**(35)**	**245**	**(17)**	**(89)**	**115**
Changes in fair values	–	(236)	–	(1)	122	(115)
Reclassified to profit or loss	(11)	196	(36)	–	(42)	107
Reclassified to inventories	–	–	–	17	–	17
December 31, 2019	**0**	**(75)**	**209**	**(1)**	**(9)**	**124**

No material ineffective portions of these hedges required recognition through profit or loss in 2019.

The fair values of the derivatives in the major categories as of year-end are indicated in the following table together with the included volumes of hedges.

B 27.3/2

Fair Values of Derivatives

	Dec. 31, 2018			Dec. 31, 2019		
€ million	Notional amount[1]	Positive fair value[3]	Negative fair value[4]	Notional amount[1]	Positive fair value[3]	Negative fair value[4]
Currency hedging of recorded transactions[2, 3]	**18,165**	**129**	**(172)**	**15,895**	**60**	**(123)**
Forward exchange contracts	16,942	83	(137)	15,711	59	(122)
Cross-currency interest-rate swaps	1,223	46	(35)	184	1	(1)
of which cash flow hedges	1,198	45	(35)	–	–	–
Currency hedging of forecasted transactions[2, 4]	**4,233**	**35**	**(70)**	**5,395**	**17**	**(91)**
Forward exchange contracts	4,169	35	(69)	5,279	16	(91)
of which cash flow hedges	3,941	34	(64)	5,121	14	(85)
Currency options	64	–	(1)	116	1	–
of which cash flow hedges	64	–	(1)	116	1	–
Interest-rate hedging of recorded transactions[2, 3]	**200**	**8**	**–**	**645**	**16**	**–**
Interest-rate swaps	200	8	–	645	16	–
of which fair value hedges	200	8	–	645	16	–
Commodity price hedging[2, 4]	**936**	**32**	**(14)**	**823**	**23**	**(22)**
Forward commodity contracts	934	31	(14)	797	21	(22)
of which fair value hedges	87	–	(3)	–	–	–
of which cash flow hedges	464	14	(3)	426	14	(5)
Commodity option contracts	2	1	–	26	2	–
Hedging of stock-based employee compensation programs[2, 4]	**731**	**–**	**(226)**	**706**	**26**	**(87)**
Forward share transactions	731	–	(226)	706	26	(87)
of which cash flow hedges	731	–	(226)	706	26	(87)
Total	**24,265**	**204**	**(482)**	**23,464**	**142**	**(323)**
of which derivatives with maturities of 12 months or less	23,169	171	(320)	21,793	86	(272)
for currency hedging	22,253	145	(242)	20,913	65	(213)
for interest-rate hedging[5]	–	–	–	–	2	–
for commodity price hedging	746	26	(14)	690	19	(22)
for hedging of stock-based employee compensation programs	170	–	(64)	190	–	(37)

[1] The notional amount is reported as gross volume, which also contains economically closed hedges.
[2] Derivatives with positive fair values are recognized under “Other financial assets” in the statement of financial position.
[3] Derivatives with negative fair values are recognized under “Financial liabilities” in the statement of financial position.
[4] Derivatives with negative fair values are recognized under “Other liabilities” in the statement of financial position.
[5] Including the portion of the fair value of long-term interest-rate swaps that relates to interest payments within one year.

The following table provides an overview of the hedging rates for the material derivatives existing at year end that qualified for hedge accounting:

B 27.3/3

Hedging Rates of Derivatives – Hedge Accounting

	Dec. 31, 2018				Dec. 31, 2019			
	Derivatives with maturities of 12 months or less		Derivatives with maturities of over 12 months		Derivatives with maturities of 12 months or less		Derivatives with maturities of over 12 months	
	Nominal value (million)	**Average hedging rate**	**Nominal value (million)**	**Average hedging rate**	**Nominal value (million)**	**Average hedging rate**	**Nominal value (million)**	**Average hedging rate**
Currency hedging of recorded transactions								
Cross-currency interest-rate swaps – cash flow hedges								
	Sell							
EUR/TRY	120 TRY	3.23						
EUR/USD	1,350 USD	1.15						
Currency hedging of forecasted transactions								
Forward exchange contracts – cash flow hedges								
	Sell				Sell		Sell	
EUR/AUD	243 AUD	1.62			248 AUD	1.64		
EUR/BRL	1,685 BRL	4.54			2,294 BRL	4.62		
EUR/CAD	499 CAD	1.58			654 CAD	1.52		
EUR/CNH	5,900 CNH	8.12			8,785 CNH	7.99		
EUR/GBP	326 GBP	0.89			254 GBP	0.89		
EUR/JPY	51,690 JPY	130.19			52,020 JPY	121.88		
EUR/KRW	122,670 KRW	1,322.75			107,650 KRW	1,324.68		
EUR/MXN	2,629 MXN	24.76			2,462 MXN	23.28		
EUR/RUB	16,835 RUB	78.89			16,415 RUB	77.92		
EUR/TWD	1,929 TWD	35.51			1,575 TWD	34.78		
EUR/USD	883 USD	1.20			1,507 USD	1.14	113 USD	1.14
EUR/ZAR	1,236 ZAR	16.99			1,221 ZAR	17.35		
USD/CAD	151 CAD	1.31			105 CAD	1.32		
	Buy	–			Buy			
EUR/USD	150 USD	1.18			67 USD	1.12		
EUR/AUD					9 AUD	1.64		
EUR/CAD					22 CAD	1.48		
EUR/GBP					9 GBP	0.89		
AUD/USD	14 USD	0.71						
Hedging of stock-based employee compensation programs	**Number of shares (thousands)**	**Average hedging rate (€)**	**Number of shares (thousands)**	**Average hedging rate (€)**	**Number of shares (thousands)**	**Average hedging rate (€)**	**Number of shares (thousands)**	**Average hedging rate (€)**
Forward share transactions – cash flow hedges								
	Buy		Buy		Buy		Buy	
Bayer shares	1,517	104.29	6,971	82.42	2,156	90.07	6,799	74.08

28. Leases

The transition effects resulting from the change in the accounting method for leases as of the date of first-time application of IFRS 16 and the options chosen are described in Note [2] under “Financial reporting standards applied for the first time in 2019.”

Lease contracts in which Bayer is the lessee mainly pertain to real estate, machinery, equipment or vehicles. Lease contracts are negotiated individually and each contain different arrangements on extension, termination or purchase options, for example.

Land and building leases in which Bayer is the lessee have average terms of 6.5 years. In many cases the payments agreed under these leases are adjusted annually based on the development of the consumer price index for the respective country. Building leases generally contain clauses that prohibit subleasing except with the consent of the lessor. Leases of assets other than land or buildings have average terms of 4.2 years.

Approximately half of all contracts (excluding vehicle leases) contain an option for Bayer as lessee to terminate the lease on a date specified in the contract, while roughly one-third of all contracts with a fixed minimum term (excluding vehicle leases) grant Bayer as lessee an extension option. Vehicle leases generally contain a right of early return and an extension option.

The following right-of-use assets are recognized under property, plant and equipment:

B 28/1

Right-of-Use Assets

€ million	Dec. 31, 2019
Land and buildings	765
Investment property	4
Plant installations and machinery	165
Furniture, fixtures and other equipment	243
Construction in progress and advance payments	96
Total	**1,273**

Additions to right-of-use assets recognized in 2019 amounted to €333 million.

The maturities of the outstanding lease payments were as follows:

B 28/2

Maturities of Lease Payments

€ million	2020	2021	2022	2023	2024	2025 or later	Total
Lease payments	358	332	192	137	98	377	1,494

Further details of lease liabilities are given in Note [24].

The depreciation of right-of-use assets in 2019 pertained to the following asset groups:

B 28/3

Depreciation of Right-of-Use Assets

€ million	2019
Land and buildings	236
Plant installations and machinery	29
Furniture, fixtures and other equipment	119
Total	**384**

In addition, the following amounts were recognized in the income statement in 2019 in connection with lease contracts in which Bayer was the lessee:

B 28/4

Income Statement Impact of Leases

€ million	2019
Interest expense for the unwinding of discount on lease liabilities	(65)
Expenses for short-term leases with terms longer than one month and up to 12 months	(275)
Expenses low-value asset leases (excluding short-term leases)	(8)
Expenses for variable lease payments not included in the measurement of the lease liability	(10)
Income from subleasing of right-of-use assets	5
Gains or losses on sale and leaseback transactions	1
Total	**(352)**

Cash outflows related to lessee activities in 2019 amounted to €793 million. Unrecognized liabilities of €15 million existed as of December 31, 2019, for short-term leases that had not yet commenced. Leases signed but not yet commenced (other than short-term leases) amounted to €31 million as of December 31, 2019.

29. Contingent liabilities and other financial commitments

Contingent liabilities

The following warranty contracts, guarantees and other contingent liabilities existed at the end of the reporting period:

B 29/1

Contingent Liabilities

€ million	Dec. 31, 2018	Dec. 31, 2019
Warranties	88	98
Guarantees	82	–
Other contingent liabilities	816	3,099
Total	**986**	**3,197**

The guarantees mainly comprise a declaration issued by Bayer AG to the trustees of the U.K. pension plans guaranteeing the pension obligations of Bayer Public Limited Company, Reading, United Kingdom, and Bayer CropScience Limited, Cambridge, United Kingdom. Under the declaration, Bayer AG – in addition to the two companies – undertakes to make further payments into the plans upon receipt of a payment request from the trustees. The net liability with respect to these defined benefit plans as of December 31, 2019, declined to €0 million (December 31, 2018: €82 million).

Other contingent liabilities as of December 31, 2019, amounted to approximately €3.1 billion (December 31, 2018: €0.8 billion) and primarily related to tax, labor or tort law and other matters in countries including Germany, the United States, Brazil, India, Greece and Italy.

Other financial commitments

The other financial commitments were as follows:

B 29/2

Other Financial Commitments

€ million	Dec. 31, 2018	Dec. 31, 2019
Commitments under purchase agreements for property, plant and equipment	811	841
Contractual obligation to acquire intangible assets	224	227
Capital contribution commitments	464	413
Unpaid portion of the effective initial fund	965	1,165
Potential payment obligations under collaboration agreements	2,121	2,620
Revenue-based milestone payment commitments	2,187	3,084
Total	**6,772**	**8,350**

2018 figures restated

The maturities of the other financial commitments are as follows:

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Maturities of Other Financial Liabilities

	Payment obligations under collaboration agreements		Revenue-based milestone payment commitments	
€ million	2018	2019	2018	2019
Maturing within 1 year	315	215	87	75
Maturing in 1–5 years	715	661	65	1
Maturing after 5 years	1,091	1,744	2,035	3,008
Total	**2,121**	**2,620**	**2,187**	**3,084**

The Bayer Group has entered into cooperation agreements with third parties under which it has agreed to fund various projects or has assumed other payment obligations based on the achievement of certain milestones or other specific conditions. The amounts shown represent the maximum payments to be made, and it is unlikely that they will all fall due. Since the achievement of the conditions for payment is highly uncertain, both the amounts and the dates of the actual payments may vary considerably from those stated in the table. The increase in 2019 in potential payment obligations under collaboration agreements and in commitments to make revenue-based milestone payments was largely due to the full acquisition of BlueRock Therapeutics L.P., Cambridge, Massachusetts, United States, and to collaboration and licensing agreements with Arvinas Operations, Inc., New Haven, United States, and Broad Institute, Inc., Cambridge, United States.

30. Legal risks

As a global company with a diverse business portfolio, the Bayer Group is exposed to numerous legal risks, particularly in the areas of product liability, competition and antitrust law, anticorruption, patent disputes, tax assessments and environmental matters. The outcome of any current or future proceedings cannot normally be predicted. It is therefore possible that legal or regulatory judgments or future settlements could give rise to expenses that are not covered, or not fully covered, by insurers' compensation payments and could significantly affect our sales and earnings.

Legal proceedings we currently consider to be material are outlined below. The legal proceedings referred to do not represent an exhaustive list.

Product-related litigation

Mirena™: As of February 6, 2020, lawsuits from approximately 730 users of Mirena™, a levonorgestrel-releasing intrauterine system providing long-term contraception, had been served upon Bayer in the United States (excluding lawsuits no longer pending or subject to pending dismissal motions). Plaintiffs allege personal injuries resulting from the use of Mirena™, including intracranial hypertension, and seek compensatory and punitive damages. Plaintiffs claim, inter alia, that Mirena™ is defective and that Bayer knew or should have known of the risks associated with its use and failed to adequately warn its users. In 2017, most of the cases pending in U.S. federal courts in which plaintiffs allege idiopathic intracranial hypertension were consolidated in a multidistrict litigation ("MDL") proceeding for common pre-trial management. In June 2019, the MDL court granted summary judgment dismissing all of the approximately 730 cases pending before that court. Plaintiffs are appealing the decision. Another MDL proceeding concerning perforation cases has been dismissed. Cases in which plaintiffs allege perforation have been settled for a total amount of US$12 million. The settlement was funded in November 2019. All served cases alleging injuries other than idiopathic intracranial hypertension have been dismissed or have dismissals pending.

As of February 6, 2020, five Canadian lawsuits relating to Mirena™ seeking class action certification had been served upon Bayer. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Bayer believes the risks remaining in this litigation are no longer material.

Xarelto™: As of February 6, 2020, U.S. lawsuits from approximately 27,200 recipients of Xarelto™, an oral anticoagulant for the treatment and prevention of blood clots, had been served upon Bayer and Janssen Pharmaceuticals, Inc., the company distributing Xarelto™ in the United States. Plaintiffs allege personal injuries from the use of Xarelto™, including cerebral, gastrointestinal or other bleeding and death, and seek compensatory and punitive damages. They claim, among other things, that Xarelto™ is defective and that Bayer knew or should have known of these risks associated with the use of Xarelto™ and failed to adequately warn its users. Additional lawsuits are anticipated. In March 2019, after prevailing in all six cases that went to trial, Bayer and Janssen reached a global agreement to settle virtually all pending US cases for US$ 775 million. In January 2020, the settlement – split equally between the two companies – was fully funded and all pending appeals have been dismissed. The claims administrator has begun the process of fund allocation and dismissals of the settled cases will follow. Any remaining cases will need to satisfy requirements or be subject to dismissal.

As of February 6, 2020, ten Canadian lawsuits relating to Xarelto™ seeking class action certification had been served upon Bayer. One of the proposed class actions has been certified. Bayer has filed a motion for leave to appeal. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Essure™: As of February 6, 2020, U.S. lawsuits from approximately 33,100 users of Essure™, a medical device offering permanent birth control with a nonsurgical procedure, had been served upon Bayer. Plaintiffs allege personal injuries from the use of Essure™, including hysterectomy, perforation, pain, bleeding, weight gain, nickel sensitivity, depression and unwanted pregnancy, and seek compensatory and punitive damages. Additional lawsuits are anticipated.

As of February 6, 2020, two Canadian lawsuits relating to Essure™ seeking class action certification had been served upon Bayer. One of the proposed class actions was certified. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Class actions over neonicotinoids in Canada: Proposed class actions against Bayer were filed in Quebec and Ontario (Canada) concerning crop protection products containing the active substances imidacloprid and clothianidin (neonicotinoids). The plaintiffs are honey producers, who have filed a proposed nationwide class action in Ontario and a Quebec-only class action in Quebec. Plaintiffs claim for compensatory damages and punitive damages and allege Bayer and another crop protection company were negligent in the design, development, marketing and sale of neonicotinoid pesticides. The proposed Ontario class action is in a very early procedural phase. In Quebec, a court certified a class proposed by plaintiffs in 2018. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Roundup™ (Glyphosate): As of February 6, 2020, lawsuits from approximately 48,600 plaintiffs claiming to have been exposed to glyphosate-based products manufactured by Bayer's subsidiary Monsanto had been served upon Monsanto in the United States. Glyphosate is the active ingredient contained in a number of Monsanto's herbicides, including Roundup™-branded products. Plaintiffs allege personal injuries resulting from exposure to those products, including non-Hodgkin lymphoma (NHL) and multiple myeloma, and seek compensatory and punitive damages. Plaintiffs claim, inter alia, that the glyphosate-based herbicide products are defective and that Monsanto knew, or should have known, of the risks allegedly associated with such products and failed to adequately warn its users. Additional lawsuits are anticipated. The majority of plaintiffs have brought actions in state courts in Missouri and California. Cases pending in U.S. federal courts have been consolidated in an MDL in the Northern District of California for common pre-trial management.

The first three cases that went to trial before state courts and a federal court in California resulted in jury verdicts in favor of the plaintiffs. Our post-trial motions subsequently filed with the trial courts only resulted in a reduction of the damages and punitive damages awards, respectively. We filed appeals in all three cases. In one of the appeals, the briefing is concluded and oral argument will likely be scheduled in March or April 2020. In the two other appeals, the briefing is still ongoing. We believe that the verdicts are not supported by the evidence at trial and the law and therefore intend to pursue the appeals vigorously. More than 800 scientific studies and regulatory authorities all over the world confirm that glyphosate is safe for use when used according to label instructions. Significantly, the largest and most recent epidemiology studies, which are the most relevant research for assessing exposure effects in the human population, each found that there was no association between glyphosate-based herbicides and NHL overall in real-world use when adjusted for the use of other pesticides. In addition, the U.S. Environmental Protection Agency's 2017 risk assessment examined more than 100 studies and concluded that glyphosate is "not likely to be carcinogenic to humans." Against this backdrop, the U.S. Department of Justice and the U.S. Environmental Protection Agency have filed an amicus brief in the appeal of the federal court case, supporting some of the key arguments which are at the center of Monsanto's appeal.

A number of trials that were originally scheduled to begin in 2019 and early 2020 have been continued. This continuance is intended to provide room for the parties to continue the court-ordered mediation process in good faith and explore whether a settlement can be reached on reasonable terms that includes a process to bring reasonable resolution to the overall litigation. The next trial is scheduled to begin in late March 2020 in Missouri state court. However, the trial schedule remains fluid and subject to change.

As of February 6, 2020, eleven Canadian lawsuits relating to Roundup™ seeking class action certification had been served upon Bayer.

Bayer believes it has meritorious defenses and intends to defend the safety of glyphosate and our glyphosate-based formulations vigorously.

Dicamba: As of February 6, 2020, lawsuits from approximately 170 plaintiffs have been served upon Bayer's subsidiary Monsanto and codefendant BASF in both state and federal court in the United States alleging that Monsanto's Xtendimax™ herbicide as well as other products containing dicamba caused crop damage from off-target movement. Plaintiffs claim, inter alia, that Monsanto and BASF knew or should have known that the application of dicamba would cause such damage and failed to prevent it. Additional lawsuits are anticipated. In 2018, 35 separate cases were coordinated in an MDL before a federal court in Missouri. Plaintiffs are seeking class action certification. In February 2020, the first trial in the MDL proceeding (Bader Farms) resulted in a US$ 265 million award to the plaintiff, consisting of compensatory damages of US$15 million and punitive damages of US$ 250 million. Monsanto and codefendant BASF are jointly and severally liable for the total US$ 265 million award. We disagree with the decision and plan to swiftly appeal. In the case of Bader Farms there was no competent evidence presented which showed that Monsanto's products were present on the farm and were responsible for the alleged losses. We believe that we have meritorious defenses and intend to defend ourselves vigorously in these matters.

Insurance against statutory product liability claims

In connection with the above-mentioned product-related litigations, Bayer is insured against statutory product liability claims to the extent customary in the respective industries and has, based on the information currently available, taken appropriate accounting measures for anticipated defense costs. However, the accounting measures relating to Essure™ and Roundup™ (glyphosate) claims exceed the available insurance coverage.

Patent disputes

Adempas™: In 2018, Bayer filed patent infringement lawsuits in a U.S. federal court against Alembic Pharmaceuticals Limited, Alembic Global Holding SA, Alembic Pharmaceuticals, Inc. and INC Research, LLC (together "Alembic"), against MSN Laboratories Private Limited and MSN Pharmaceuticals Inc. (together "MSN") and against Teva Pharmaceuticals USA, Inc. and Teva Pharmaceutical Industries Ltd. (together "Teva"). In 2017, Bayer had received notices of an Abbreviated New Drug Application with a paragraph IV certification ("ANDA IV") pursuant to which Alembic, MSN and Teva each seek approval of a generic version of Bayer's pulmonary hypertension drug Adempas™ in the United States. In 2018, the court decided, upon a joint request by Bayer and Teva, that Bayer's patent is valid and infringed by Teva. This terminated the patent dispute with Teva. In 2019, the lawsuit against Alembic was dismissed after the expiry of the only patent at issue in the dispute with Alembic. The patent upheld in the proceeding against Teva continues to be in force and at issue in the dispute with MSN.

Betaferon™ / Betaseron™: In 2010, Bayer filed a complaint against Biogen Idec MA Inc. in a U.S. federal court seeking a declaration by the court that a patent issued to Biogen in 2009 is invalid and not infringed by Bayer's production and distribution of Betaseron™, Bayer's drug product for the treatment of multiple sclerosis. Biogen is alleging patent infringement by Bayer through Bayer's production and distribution of Betaseron™ and Extavia™ and has sued Bayer accordingly. Bayer manufactures Betaseron™ and distributes the product in the United States. Extavia™ is also a drug product for the treatment of multiple sclerosis; it is manufactured by Bayer, but distributed in the United States by Novartis Pharmaceuticals Corporation, another defendant in the lawsuit. In 2016, the U.S. federal court decided a disputed issue regarding the scope of the patent in Biogen's favor. Bayer disagrees with the decision, which may be appealed at the conclusion of the proceedings in the U.S. federal court. In 2018, a jury decided that Biogen's patent is invalid at the end of a trial regarding Biogen's claims against EMD Serono, Inc. ("Serono") and Pfizer Inc. ("Pfizer") for infringement of the same patent. In the same year, the court overturned the jury decision and granted judgment in favor of Biogen. Serono and Pfizer appealed. The trial of Biogen's claim against Bayer has not yet been scheduled.

Jivi™ (BAY94-9027): In 2018, Nektar Therapeutics ("Nektar"), Baxalta Incorporated and Baxalta U.S., Inc. (together "Baxalta") filed another complaint in a U.S. federal court against Bayer alleging that BAY94-9027, approved as Jivi™ in the United States for the treatment of hemophilia, infringes five patents by Nektar. The five patents are part of a patent family registered in the name of Nektar and further comprising a European patent application with the title "Branched polymers and their conjugates." This patent family is different from the one at issue in the earlier patent disputes still pending in the United States and Germany. In 2018, Bayer filed a lawsuit in the administrative court of Munich, Germany, claiming rights to the European patent application based on a past collaboration between Bayer and Nektar in the field of hemophilia. In 2017, Baxalta and Nektar had already filed a complaint in the same U.S. federal court against Bayer alleging that BAY94-9027 infringes seven other patents by Nektar. The seven patents are part of a patent family registered in the name of Nektar and further comprising European patent applications with the title "Polymer-factor VIII moiety conjugates" which are at issue in a lawsuit Bayer had filed against Nektar in 2013 in the district court of Munich, Germany. In this proceeding, Bayer claims rights to the European patent applications based on a past collaboration between Bayer and Nektar in the field of hemophilia. However, Bayer believes that the patent families do not include any valid patent claim relevant for Jivi™. In parallel proceedings before the same U.S. district court over infringement of a Bayer patent by Baxalta's hemophilia treatment Adynovate™, the court ordered Baxalta in September 2019 to pay USD 181 million to Bayer following a jury trial in February 2019; the order is subject to an appeal filed by Baxalta.

Stivarga™: In 2016, Bayer filed a patent infringement lawsuit in a U.S. federal court against Apotex, Inc. and Apotex Corp. (together "Apotex"). Bayer had received a notice of an ANDA IV application pursuant to which Apotex seeks approval of a generic version of Bayer's cancer drug Stivarga™ in the United States.

Bollgard II RR Flex™ / Intacta™: In July 2019, the Cotton Producers Association of the State of Mato Grosso (AMPA) in Brazil filed a patent invalidity action in federal court seeking to invalidate four of Bayer's patents covering Bollgard II RR Flex™, a cotton technology owned by Bayer. In January 2020, the Brazilian patent office, in the court proceedings, acknowledged the validity of all four challenged patents. Two of the patents are also being challenged in administrative nullity proceedings before the Brazilian patent office. One of the patents, the promoter patent, is also at issue in a patent invalidation action filed in Brazilian federal court by the Soybean Growers Association from the State of Mato Grosso (Aprosoja/MT) in 2017 regarding the Intacta™ soybean technology. In addition to the patent invalidity claims, both lawsuits seek a refund of twice the amount of the paid royalties. Both lawsuits were filed as collective actions and are proceeding before the same federal judge. Bayer's Intacta™ soybean technology is further protected by two other patents one of which has been challenged in administrative nullity proceedings before the Brazilian patent office by the Soybean Growers Association from the State of Rio Grande do Sul (Aprosoja/RS).

Bayer believes it has meritorious defenses in the above ongoing patent disputes and intends to defend itself vigorously.

Further legal proceedings

Trasylol™ / Avelox™: A qui tam complaint relating to marketing practices for Trasylol™ (aprotinin) and Avelox™ (moxifloxacin) filed by a former Bayer employee is pending in the United States District Court in New Jersey. The case is proceeding with discovery. The U.S. government has declined to intervene at the present time.

Baycol™: A qui tam complaint (filed by the same relator as in the Trasylol™ / Avelox™ complaint) asserting Bayer fraudulently induced a contract with the Department of Defense is pending in the United States District Court in Minnesota. The case is proceeding with discovery.

BASF arbitration: In September 2019, Bayer was served with a request for arbitration by BASF SE. BASF alleges to have indemnification claims under the asset purchase agreements signed in 2017 and 2018 related to the divestment of certain CropScience businesses to BASF. BASF alleges that particular cost items, including certain personnel costs, had not been appropriately disclosed and allocated to some of the divested businesses. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Newark Bay environmental matters: In the United States, Bayer is one of numerous parties involved in a series of claims brought by federal and state environmental protection agencies. The claims arise from operations by entities which historically were conducted near Newark Bay or surrounding bodies of water, or which allegedly discharged hazardous waste into these waterways or onto nearby land. Bayer and the other potentially responsible parties are being asked to remediate and contribute to the payment of past and future remediation or restoration costs and damages. In 2016, Bayer learned that two major potentially responsible parties had filed for protection under Chapter 11 of the U.S. Bankruptcy Code. While Bayer remains unable to determine the extent of its liability for these matters, this development is likely to adversely affect the share of costs potentially allocated to Bayer.

In the Lower Passaic River matter, a group of more than 60 companies including Bayer is investigating contaminated sediments in the riverbed under the supervision of the United States Environmental Protection Agency (EPA) and other governmental authorities. Future remediation will involve some form of dredging, the nature and scope of which are not yet defined, and potentially other tasks. Occidental Chemical Company (“OCC”), one of the parties potentially liable for cleanup costs in the Lower Passaic River, is performing the remedial design under a consent order with EPA. Bayer will ultimately be asked to share in the cost of the investigation and the remediation work, which may be substantial if the final remedy involves extensive dredging and disposal of impacted sediments. In 2018, OCC filed a lawsuit in New Jersey federal court seeking contribution and cost recovery from dozens of other potentially responsible parties, including a Bayer subsidiary, for past and future response costs. Discovery is proceeding and Bayer is currently unable to determine the extent of its liability in this matter. In the Newark Bay matter, an unaffiliated party is currently conducting an investigation of sediments in Newark Bay under EPA supervision. The investigation is in a preliminary stage. Bayer has contributed to certain investigation costs in the past and may incur costs for future response activities in Newark Bay.

Bayer has also been notified by governmental authorities acting as natural resource trustees that it may have liability for natural resource damages arising from the contamination of the Lower Passaic River, Newark Bay and surrounding water bodies. Bayer is currently unable to determine the extent of its liability.

Asbestos: In many cases, plaintiffs allege that Bayer and co-defendants employed third parties on their sites in past decades without providing them with sufficient warnings or protection against the known dangers of asbestos. Additionally, a Bayer affiliate in the United States is the legal successor to companies that sold asbestos products until 1976. Union Carbide has agreed to indemnify Bayer for this liability. Similarly, Bayer's subsidiary Monsanto faces numerous claims based on exposure to asbestos at Monsanto premises without adequate warnings or protection and based on the manufacture and sale of asbestos-containing products. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

PCB: Bayer's subsidiary Monsanto has been named in lawsuits brought by various governmental entities in the United States claiming that Monsanto, Pharmacia and Solutia, collectively as a manufacturer of PCBs, should be responsible for a variety of damages due to PCBs in bodies of water, regardless of how PCBs came to be located there. Monsanto also faces numerous lawsuits claiming personal injury and / or property damage due to use of and exposure to PCB products. PCBs are man-made chemicals that were widely used for various purposes until the manufacture of PCBs was prohibited by the Environmental Protection Agency (EPA) in the United States in 1979. We believe that we have meritorious defenses and intend to defend ourselves vigorously.

Tax proceedings

Stamp taxes in Greece: In 2014, 2016 and 2017, a Greek administrative court of first instance dismissed Bayer's lawsuits against the assessment of stamp taxes and contingent penalties in a total amount of approximately €130 million on certain intra-Group loans to a Greek subsidiary. Bayer is convinced that the decisions are wrong and either has appealed the relevant decisions. Bayer believes it has meritorious arguments to support its legal position and intends to defend itself vigorously.

Notes to the Statements of Cash Flows

The statement of cash flows shows how cash inflows and outflows during the fiscal year affected the cash and cash equivalents of the Bayer Group.

Of the cash and cash equivalents, an amount of €19 million (2018: €14 million) had limited availability due to foreign exchange restrictions. Past experience has shown such restrictions to be of short duration.

The cash flows reported by consolidated companies outside the eurozone are translated at average monthly exchange rates. Cash and cash equivalents are translated at closing rates. The “Change in cash and cash equivalents due to exchange rate movements” is reported in a separate line item.

31. Net cash provided by (used in) operating, investing and financing activities

The operating cash flow (total) rose by 3.7% in 2019, to €8,207 million. The operating cash flow from continuing operations was up 6.2% from the previous year. The improvement mainly resulted from the growth in operating income, though this was partly offset by a smaller decline in cash tied up in working capital. The first-time application of IFRS 16 had a positive effect on operating cash flow because lease expenses were no longer recognized in operating income.

Net cash used in investing activities in 2019 amounted to €671 million. Included here are €2,650 million (2018: €2,593 million) in cash outflows for additions to property, plant and equipment and intangible assets. Cash inflows from divestments, less divested cash, amounted to €2,546 million (2018: €7,563 million) and mainly arose from the sale of the interest in Currenta and the divestments at Consumer Health. Cash outflows for acquisitions, less acquired cash, amounted to €410 million (2018: €45,316 million) and partly related to the acquisition of the remaining shares in BlueRock Therapeutics L.P., Cambridge, Massachusetts, United States. In the previous year, this item primarily included cash outflows for the acquisition of the agriculture business. Net cash outflows for current and noncurrent financial assets totaled €575 million (2018: €5,717 million net inflows).

Net cash used in financing activities amounted to €8,389 million, including €4,296 million in net loan repayments (2018: €17,819 million in net borrowings). Net interest payments came to €1,478 million (2018: €919 million). Dividend payments totaled €2,615 million (2018: €2,407 million). The cash outflow increased as a result of the first-time application of IFRS 16 because the repayment component of lease payments and the interest expense were recognized in the financing cash flow.

The changes in financial liabilities in 2019 are presented in the following table:

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Financial Liabilities

€ million	Dec. 31, 2018	Cash flows	Noncash changes: Acquisition Divestment	Currency effects	New contracts IFRS 16[2]	Fair value changes[1]	Dec. 31, 2019
Bonds and notes/ promissory notes	35,402	(2,518)	–	637	–	48	33,569
Liabilities to banks	4,865	(789)	(4)	(10)	–	–	4,062
Lease liabilities	399	(442)	(30)	10	1,309	5	1,251
Liabilities from derivatives	172	(70)	–	68	–	(47)	123
Other financial liabilities	556	(477)	–	5	–	5	89
Total	**41,394**	**(4,296)**	**(34)**	**710**	**1,309**	**11**	**39,094**

[1] Including effects of unwinding of discount
[2] Lease liabilities increased by €1.0 billion as of January 1, 2019 due to the first-time application of IFRS 16.

The changes in financial liabilities in 2018 were as follows:

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Financial Liabilities

€ million	Dec. 31, 2017	Cash flows	Noncash changes: Acquisition	Currency effects	New contracts	Fair value changes[1]	Dec. 31, 2018
Bonds and notes/ promissory notes	12,436	16,803	5,596	648	–	(81)	35,402
Liabilities to banks	534	3,352	1,072	(93)	–	–	4,865
Liabilities under finance leases	238	(43)	133	9	62	–	399
Liabilities from derivatives	240	(1)	1	(1)	–	(67)	172
Other financial liabilities	970	(2,292)	1,855	14	–	9	556
Total	**14,418**	**17,819**	**8,657**	**577**	**62**	**(139)**	**41,394**

[1] Including effects of unwinding of discount

Other Information

32. Audit fees

Prof. Frank Beine signed the Independent Auditor’s Report for the first time for the year ended December 31, 2017, and Michael Mehren for the first time for the year ended December 31, 2019. Prof. Frank Beine is the responsible audit partner.

The following fees for the services of the worldwide network of Deloitte or Deloitte GmbH Wirtschaftsprüfungsgesellschaft (Deloitte GmbH WPG) were recognized as expenses:

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Audit Fees

	Deloitte		of which Deloitte GmbH WPG	
€ million	**2018**	**2019**	**2018**	**2019**
Financial statements auditing	15	14	6	5
Audit-related services and other audit work	3	8	3	7
Tax consultancy	3	4	–	–
Other services	4	3	2	–
Total	**25**	**29**	**11**	**12**

The fees for the financial statements audit services of Deloitte GmbH Wirtschaftsprüfungsgesellschaft primarily comprised those for the audits of the consolidated financial statements of the Bayer Group and of the financial statements of Bayer AG and its subsidiaries. The audit-related services and other audit work performed by Deloitte GmbH Wirtschaftsprüfungsgesellschaft in 2019 mainly concerned the sale of Animal Health and largely consisted of voluntary financial statements audits and audit reviews. In addition, other Deloitte companies performed financial statements audit services for subsidiaries of Bayer AG, compliance-related tax consultancy services that do not materially or directly impact the consolidated financial statements of the Bayer Group or the financial statements of Bayer AG, and other services in connection with the sale of Animal Health.

33. Related parties

Related parties as defined in IAS 24 are those legal entities and natural persons that are able to exert influence on Bayer AG and its subsidiaries or over which Bayer AG or its subsidiaries exercise control or joint control or have a significant influence. They include, in particular, nonconsolidated subsidiaries accounted for at fair value, joint ventures and associates accounted for at fair value or using the equity method, and post-employment benefit plans. Related parties also include the corporate officers of Bayer AG whose compensation is reported in Note [34] and in the Compensation Report, which forms part of the Combined Management Report.

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Related Parties

€ million	Sales of goods and services 2018	Sales of goods and services 2019	Purchase of goods and services 2018	Purchase of goods and services 2019	Receivables 2018	Receivables 2019	Liabilities 2018	Liabilities 2019
Nonconsolidated subsidiaries	8	3	5	3	8	14	26	33
Joint ventures	1	3	–	–	4	5	178	58
Associates	219	5	36	–	2	–	3	63
Post-employment benefit plans	–	–	–	–	837	871	215	156

Intercompany profits and losses for companies accounted for in the consolidated financial statements using the equity method were immaterial in 2019 and 2018.

Covestro ceased to be an associate in May 2018. The services provided to associates therefore declined significantly. Casebia Therapeutics ceased to be a joint venture in 2019, resulting in a decrease in liabilities to joint ventures.

Bayer AG has undertaken to provide jouissance right capital *(Genussrechtskapital)* in the form of an interest-bearing loan with a nominal volume of €150 million (2018: €150 million) for Bayer-Pensionskasse VVaG. The entire amount remained drawn as of December 31, 2019. The carrying amount was €154 million (2018: €152 million). The loan capital provided to Bayer-Pensionskasse VVaG for its effective initial fund had a nominal volume of €635 million as of December 31, 2019 (2018: €635 million). The carrying amount was €652 million (2018: €643 million). The outstanding receivables, comprised of different tranches, are each subject to a five-year interest-rate adjustment mechanism. Interest income of €12 million was recognized in 2019 (2018: €16 million) along with income of €22 million (2018: expenses of €8 million) due to fair value changes.

No material impairment losses on receivables from related parties were recognized in 2019 or 2018.

34. Total compensation of the Board of Management and the Supervisory Board, advances and loans

In 2019, the compensation of the Board of Management and the Supervisory Board totaled €39,035 thousand (2018: €24,449 thousand), with the compensation of the Supervisory Board amounting to €3,938 thousand (2018: €3,897 thousand) and that of the Board of Management to €35,097 thousand (2018: €20,552 thousand). The compensation of the Supervisory Board was comprised entirely of short-term components. The total compensation of the Board of Management comprised a short-term component of €15,211 thousand (2018: €15,149 thousand) and a long-term component of €11,172 thousand (2018: €5,403 thousand). The long-term component included stock-based compensation of €7,733 thousand (2018: €1,914 thousand). In addition, severance payments of €8,714 thousand (2018: €0 thousand) were granted in connection with the termination of a service contract.

Pension payments to former members of the Board of Management and their surviving dependents in 2019 amounted to €12,078 thousand (2018: €17,183 thousand). The defined benefit obligation for former members of the Board of Management and their surviving dependents amounted to €199,454 thousand (2018: €185,736 thousand). There were no advances or loans to members of the Board of Management or the Supervisory Board outstanding as of December 31, 2019, or at any time during 2019 or 2018.

Further details of the compensation of the Board of Management and Supervisory Board are given in the Compensation Report, which forms part of the Management Report.

35. Events after the end of the reporting period

On February 11, 2020, Bayer announced that it had entered into a definitive agreement to transfer a large part of its Berlin-based small molecule research unit to Nuvisan ICB GmbH, a subsidiary of Nuvisan GmbH. Based in Neu-Ulm, Germany, the Nuvisan group is an international service provider for clinical studies, laboratory services and contract manufacturing for the pharmaceuticals industry.

Leverkusen, February 18, 2020

Bayer Aktiengesellschaft

The Board of Management