B Consolidated Financial Statements

Bayer Group Consolidated Income Statements

B 1

€ million	Note	2017	2018
Net sales	**[6]**	**35,015**	**39,586**
Cost of goods sold		(11,382)	(17,010)
Gross profit		**23,633**	**22,576**
Selling expenses		(11,116)	(12,751)
Research and development expenses		(4,504)	(5,246)
General administration expenses		(2,026)	(2,728)
Other operating income	[7]	864	5,057
Other operating expenses	[8]	(948)	(2,994)
EBIT[1]		**5,903**	**3,914**
Equity-method income (loss)	[10.1]	20	68
Financial income		289	910
Financial expenses		(1,635)	(2,574)
Financial result	**[10]**	**(1,326)**	**(1,596)**
Income before income taxes		**4,577**	**2,318**
Income taxes	[11]	(1,329)	(607)
Income from continuing operations after income taxes		**3,248**	**1,711**
of which attributable to noncontrolling interest		(1)	16
of which attributable to Bayer AG stockholders		3,249	1,695
Income from discontinued operations after income taxes	**[5.3]**	**4,846**	**–**
of which attributable to noncontrolling interest		759	–
of which attributable to Bayer AG stockholders		4,087	–
Income after income taxes		**8,094**	**1,711**
of which attributable to noncontrolling interest	[12]	758	16
of which attributable to Bayer AG stockholders (net income)		**7,336**	**1,695**
€			
Earnings per share	**[13]**		
From continuing operations	**[13]**		
Basic		3.67	1.80
Diluted		3.67	1.80
From discontinued operations	**[13]**		
Basic		4.62	0.00
Diluted		4.62	0.00
From continuing and discontinued operations	**[13]**		
Basic		8.29	1.80
Diluted		8.29	1.80

2017 figures restated
[1] For definition see Combined Management Report, Chapter 2.4 "Alternative Performance Measures Used by the Bayer Group."

Bayer Group Consolidated Statements of Comprehensive Income

B 2

€ million	Note	2017	2018
Income after income taxes		**8,094**	**1,711**
of which attributable to noncontrolling interest	[12]	758	16
of which attributable to Bayer AG stockholders		7,336	1,695
Remeasurements of the net defined benefit liability for post-employment benefit plans	[22]	1,236	(612)
Income taxes	[11]	(515)	129
Other comprehensive income from remeasurements of the net defined benefit liability for post-employment benefit plans		**721**	**(483)**
Change in the fair value of own credit risk component of financial liabilities measured at fair value		–	(6)
Income taxes	[11]	–	2
Other comprehensive income relating to own credit risk component of financial liabilities measured at fair value		–	**(4)**
Other comprehensive income from equity instruments measured at fair value		–	**46**
Other comprehensive income relating to associates accounted for using the equity method		**(44)**	**19**
Other comprehensive income that will not be reclassified subsequently to profit or loss		**677**	**(422)**
Changes in fair values of derivatives designated as cash flow hedges	[27.3]	(144)	125
Reclassified to profit or loss		3	124
Income taxes	[11]	53	(80)
Other comprehensive income from cash flow hedges		**(88)**	**169**
Changes in fair values of available-for-sale financial assets	[17]	(3)	–
Reclassified to profit or loss		(2)	–
Income taxes	[11]	3	–
Other comprehensive income from available-for-sale financial assets		**(2)**	**–**
Changes in exchange differences recognized on translation of operations outside the eurozone		(2,152)	1,008
Reclassified to profit or loss		–	118
Other comprehensive income from exchange differences		**(2,152)**	**1,126**
Other comprehensive income relating to associates accounted for using the equity method		**101**	**1**
Other comprehensive income that may be reclassified subsequently to profit or loss		**(2,141)**	**1,296**
Total other comprehensive income[1]		**(1,464)**	**874**
of which attributable to noncontrolling interest		(106)	(8)
of which attributable to Bayer AG stockholders		(1,358)	882
Total comprehensive income		**6,630**	**2,585**
of which attributable to noncontrolling interest		652	8
of which attributable to Bayer AG stockholders		5,978	2,577

[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, 2017	Dec. 31, 2018
Noncurrent assets			
Goodwill	[14]	14,751	38,146
Other intangible assets	[14]	11,674	36,746
Property, plant and equipment	[15]	7,633	12,944
Investments accounted for using the equity method	[16]	4,007	515
Other financial assets	[17]	1,634	2,212
Other receivables	[20]	400	511
Deferred taxes	[11]	4,915	4,278
		45,014	**95,352**
Current assets			
Inventories	[18]	6,550	10,961
Trade accounts receivable	[19]	8,582	11,836
Other financial assets	[17]	3,529	1,166
Other receivables	[20]	1,276	1,875
Claims for income tax refunds		474	809
Cash and cash equivalents		7,581	4,052
Assets held for sale	[5.3]	2,081	234
		30,073	**30,933**
Total assets		**75,087**	**126,285**
Equity	**[21]**		
Capital stock		2,117	2,387
Capital reserves		9,658	18,388
Other reserves		25,026	25,202
Equity attributable to Bayer AG stockholders		**36,801**	**45,977**
Equity attributable to noncontrolling interest		60	171
		36,861	**46,148**
Noncurrent liabilities			
Provisions for pensions and other post-employment benefits	[22]	8,020	8,717
Other provisions	[23]	1,366	3,347
Refund liabilities	[6]	–	167
Contract liabilities	[6]	–	986
Financial liabilities	[24]	12,483	37,712
Income tax liabilities		495	1,415
Other liabilities	[26]	1,116	349
Deferred taxes	[11]	1,153	4,621
		24,633	**57,314**
Current liabilities			
Other provisions	[23]	4,344	3,686
Refund liabilities	[6]	–	3,622
Contract liabilities	[6]	–	3,235
Financial liabilities	[24]	1,935	3,682
Trade accounts payable	[25]	5,129	5,414
Income tax liabilities		422	1,050
Other liabilities	[26]	1,652	2,122
Liabilities directly related to assets held for sale	[5.3]	111	12
		13,593	**22,823**
Total equity and liabilities		**75,087**	**126,285**

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[1]
Dec. 31, 2016	**2,117**	**9,658**	**18,393**	**45**	**81**
Equity transactions with owners					
Capital increase					
Dividend payments			(2,233)		
Other changes			2,727		
Other comprehensive income			628	(1,915)	17
Income after income taxes			**7,336**		
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**

[1] 2017: fair-value measurement of securities

B 4 (continued)

€ million	Cash flow hedges	Other reserves[2]	Equity attributable to Bayer AG stockholders	Equity attributable to non-controlling interest	Equity
Dec. 31, 2016	**22**	**17**	**30,333**	**1,564**	**31,897**
Equity transactions with owners					
Capital increase					
Dividend payments			(2,233)	(131)	(2,364)
Other changes		(4)	2,723	(2,025)	698
Other comprehensive income	(88)		(1,358)	(106)	(1,464)
Income after income taxes			**7,336**	**758**	**8,094**
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**

[2] Other reserves comprise reserves for changes in the company's own credit risk (minus €4 million) and for remeasurements (€9 million; 2017: €13 million).

Bayer Group Consolidated Statements of Cash Flows

B 5

€ million	Note	2017	2018
Income from continuing operations after income taxes		3,248	1,711
Income taxes		1,329	607
Financial result		1,326	1,596
Income taxes paid		(1,821)	(2,143)
Depreciation, amortization and impairments		2,660	6,352
Change in pension provisions		(227)	(322)
(Gains) losses on retirements of noncurrent assets		(133)	(4,247)
Decrease (increase) in inventories		(293)	615
Decrease (increase) in trade accounts receivable		(18)	2,476
(Decrease) increase in trade accounts payable		265	(44)
Changes in other working capital, other noncash items		275	1,316
Net cash provided by (used in) operating activities from continuing operations		**6,611**	**7,917**
Net cash provided by (used in) operating activities from discontinued operations		1,523	–
Net cash provided by (used in) operating activities		**8,134**	**7,917**
Cash outflows for additions to property, plant, equipment and intangible assets		(2,366)	(2,593)
Cash inflows from sales of property, plant, equipment and other assets		241	230
Cash inflows from divestments		453	7,563
Cash inflows from (outflows for) noncurrent financial assets		(313)	2,879
Cash outflows for acquisitions less acquired cash		(158)	(45,316)
Interest and dividends received		168	247
Cash inflows from (outflows for) current financial assets		1,543	2,838
Net cash provided by (used in) investing activities		**(432)**	**(34,152)**
Capital contributions		–	8,986
Proceeds from shares of Covestro AG		3,717	–
Dividend payments		(2,364)	(2,407)
Issuances of debt		10,369	65,090
Retirements of debt		(12,848)	(47,271)
Interest paid including interest-rate swaps		(801)	(1,331)
Interest received from interest-rate swaps		69	412
Cash outflows for the purchase of additional interests in subsidiaries		(23)	(47)
Net cash provided by (used in) financing activities		**(1,881)**	**23,432**
Change in cash and cash equivalents due to business activities	[30]	**5,821**	**(2,803)**
Cash and cash equivalents at beginning of year		**1,899**	**7,435**
Change in cash and cash equivalents due to changes in scope of consolidation		–	1
Change in cash and cash equivalents due to exchange rate movements		(139)	(581)
Cash and cash equivalents at end of year		**7,581**	**4,052**

The difference in cash and cash equivalents at the beginning of 2018 and the end of 2017 is due to the first-time application of IFRS 9.

Notes to the Consolidated Financial Statements of the Bayer Group

1. General information

The consolidated financial statements of the Bayer Group as of December 31, 2018, were prepared by Bayer Aktiengesellschaft (Bayer AG) according to the International Financial Reporting Standards (IFRS) issued by the International Accounting Standards Board (IASB), London, United Kingdom, in effect at the end of the reporting period, 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.

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 health care and agriculture took place in the reporting period in the Pharmaceuticals, Consumer Health, Crop Science and Animal 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 declaration issued in December 2018 concerning the German Corporate Governance Code is published on the Bayer website along with previous declarations: www.bayer.com/en/corporate-governance.aspx

The Board of Management of Bayer AG prepared the consolidated financial statements of the Bayer Group on February 19, 2019. They were discussed by the Audit Committee of the Supervisory Board of Bayer AG at its meeting on February 25, 2019, and approved by the Supervisory Board at its plenary meeting on February 26, 2019.

The consolidated financial statements of the Bayer Group are 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.

2. Effects of new financial reporting standards

Financial reporting standards applied for the first time in 2018

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.

IFRS 9 (Financial Instruments) and IFRS 15 (Revenue from Contracts with Customers) were applied for the first time as of January 1, 2018. The effects resulting from their first-time application are described in this section.

IFRS 9 is the new standard for accounting for financial instruments. It replaces IAS 39 (Financial Instruments: Recognition and Measurement). Bayer applied IFRS 9 in modified form retrospectively for the first time as of January 1, 2018, without restating the prior-year figures, accounting for the aggregate amount of any transition effects by way of an adjustment to equity and presenting the comparative period in line with previous rules. It replaces the previous rules under IAS 39 (Financial Instruments: Recognition and Measurement).

The effects that the first-time application of IFRS 9 and IFRS 15 had on retained earnings and the fair value measurement of securities / equity instruments are detailed in the following tables:

B 2/1

Retained Earnings Reconciliation: IFRS 9 and IFRS 15

€ million	
Retained earnings incl. net income as of December 31, 2017	**26,851**
Effects of IFRS 9	(43)
Effects of IFRS 15	86
Retained earnings incl. net income as of January 1, 2018	**26,894**

B 2/2

Reconciliation of Fair-Value Measurement of Equity Instruments

€ million	
Fair-value measurement of securities as of December 31, 2017	**98**
Reclassifications to retained earnings	(37)
Remeasurement due to change in measurement category	11
Deferred taxes	9
Fair-value measurement of equity instruments as of January 1, 2018	**81**

IFRS 9 introduces new provisions for the classification and measurement of financial assets and replaces the current rules on the impairment of financial assets. The new standard requires a change in accounting methods for the effects resulting from a change in the company's own credit risk for financial liabilities classified at fair value and modifies the requirements for hedge accounting. The classification and measurement of financial liabilities are otherwise largely unchanged from the existing regulations.

Under IFRS 9, the classification and measurement of financial assets is determined by the company's business model and the characteristics of the cash flows of each financial asset. In the case of equity instruments held as of January 1, 2018, that are not held for trading, Bayer has uniformly opted to recognize future changes in their fair value through other comprehensive income in the statement of comprehensive income and to continue to classify these as equity upon the derecognition of the financial instrument. As for new instruments, Bayer can opt to make use of this option on an instrument-by-instrument basis upon recognition, but it must continue to do so thereafter. The 6.8% interest in Covestro acquired from Bayer Pension Trust at the beginning of May 2018 to service the exchangeable bond maturing in 2020 is recognized at fair value through profit or loss.

As of the date of first-time application, reclassifications primarily resulted from the characteristics of the cash flows from fund shares, investments in limited partnerships, and the loan capital and jouissance right capital (Genussrechtkapital) provided to Bayer Pensionskasse VVaG. These financial instruments were previously reported in the category "available for sale," with changes in their fair value recognized in other comprehensive income in the statement of comprehensive income. They are now classified as debt instruments, and changes in their fair values are recognized through profit or loss.

Changes in the classification and measurement of financial assets led to the following effects as of the date of first-time application:

B 2/3

Financial Assets Reconciliation from IAS 39 to IFRS 9

€ million

Measurement category (IAS 39)[1]	Carrying amount Dec. 31, 2017 (IAS 39)	Reclassi-fication	Effect due to change in measurement category	Effect of the expected loss model	Carrying amount Jan. 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[2]
Trade accounts receivable						
LaR	8,582			(93)	8,489	AC
Other financial assets						
LaR	1,731				1,731	AC
AfS – debt instruments	34				34	AC
HtM	57				57	AC
AfS – equity instruments at amortized cost	35		11		46	FVTOCI (no recycling)
AfS – equity instruments	191				191	FVTOCI (no recycling)
AfS – equity instruments	39				39	FVTPL (debt instruments)
AfS – debt instruments	2,429	145			2,574	FVTPL
Derivatives	647				647	Derivatives
Other receivables						
LaR	380			(4)	376	AC
AfS – debt instruments	46				46	FVTPL
Cash and cash equivalents						
LaR	7,581	(145)		(1)	7,435	AC
Total financial assets	**21,752**	**0**	**11**	**(98)**	**21,665**	

[1] AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost
[2] AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss

There were no effects on financial liabilities.

The following table shows the effects of the first-time application of IFRS 9 on retained earnings and other comprehensive income in the statement of comprehensive income, broken down by measurement category:

B 2/4

Effects of First-Time Application of IFRS 9 on Retained Earnings and Other Comprehensive Income

€ million

Measurement category (IAS 39)[1]	Measurement category (IFRS 9)[1]	Retained earnings effect as of Jan. 1, 2018	OCI effect as of Jan. 1, 2018
Trade accounts receivable			
LaR	AC	(93)	
Other financial assets			
AfS – equity instruments at amortized cost	FVTOCI (no recycling)		11
AfS – equity instruments	FVTPL (debt instruments)	10	(10)
AfS – debt instruments	FVTPL	36	(36)
Other receivables			
LaR	AC	(4)	
AfS – debt instruments	FVTPL	(9)	9
Cash and cash equivalents			
LaR	AC	(1)	
Total financial assets		**(61)**	**(26)**

[1] See table B 2/3 for definition of measurement categories.

The following table shows the effects of the first-time application of IFRS 9 on financial assets and liabilities measured at fair value using unobservable inputs (Level 3). The development of these assets and liabilities in 2018 is presented in Table B 27.1/2.

B 2/5

Reconciliation of Financial Assets Measured at Fair Value (Level 3) from IAS 39 to IFRS 9

€ million

Measurement category (IAS 39)[1]	Carrying amount Dec. 31, 2017 (IAS 39)	Reclassification due to change in fair value hierarchy	Remeasurement due to change in measurement category	Carrying amount Jan. 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[1]
Other financial assets					
AfS – equity instruments at amortized cost		35	11	46	FVTOCI (no recycling)
AfS – equity instruments	18	4		22	FVTOCI (no recycling)
AfS – equity instruments	18			18	FVTPL (debt instruments)
AfS – debt instruments	757			757	FVTPL
Derivatives	10			10	Derivatives
Other receivables					
AfS – debt instruments	46			46	FVTPL
Total financial assets	**849**	**39**	**11**	**899**	

[1] See table B 2/3 for definition of measurement categories.

The effects of the increase in loss allowances resulting from the first-time application of the new impairment model are presented in the following table[1]:

B 2/6

Reconciliation of Loss Allowances

€ million

Measurement category (IAS 39)[1]	Closing loss allowances Dec. 31, 2017 (IAS 39)	Effect of the expected credit loss model (IFRS 9)	Opening loss allowances Jan 1, 2018 (IFRS 9)	Measurement category (IFRS 9)[1]
Trade accounts receivable				
LaR	(425)	(93)	(518)	AC
Other receivables				
LaR	(3)	(4)	(7)	AC
Cash and cash equivalents				
LaR		(1)	(1)	AC
Total	**(428)**	**(98)**	**(526)**	

[1] See table B 2/3 for definition of measurement categories.

Changes in the fair values of financial liabilities measured at fair value through profit or loss resulting from Bayer's own credit risk are now recognized through other comprehensive income in the statement of comprehensive income rather than in the income statement. At Bayer, this change principally affects the debt instruments (exchangeable bonds) issued in June 2017, which also can be exchanged into Covestro shares. As of the transition date, this accounting change did not have any material effects.

For hedge accounting, Bayer has opted to prospectively apply IFRS 9 from January 1, 2018. If only the intrinsic value of an option is designated as a hedging instrument in a hedging relationship, IFRS 9 requires

[1] For the calculation of impairments see “Financial assets” in Chapter 3 “Basic principles, methods and critical accounting estimates.”

that changes in the fair value of the time value of options during the hedging period initially be recognized as other comprehensive income in the statement of comprehensive income. The release of the accumulated amounts, either in the form of a basis adjustment or directly through profit or loss, depends on the type of hedged transaction. In contrast to the other rules on hedge accounting, the revised accounting method is to be applied retrospectively. As of the transition date, these changes did not have any material impact on the presentation of the Group's financial position and results of operations.

In October 2017, the IASB published an amendment to IFRS 9 (Financial Instruments) under the title "Prepayment Features with Negative Compensation." It also published a clarification regarding the accounting for a modification of a financial liability that does not result in its derecognition. For these nonsubstantial modifications, modification gains or losses – including the costs of the modification – must be immediately recognized in profit or loss. This amendment to IFRS 9 is to be applied for annual periods beginning on or after January 1, 2018. As there were no past nonsubstantial modifications of liabilities, this amendment did not have any impact on the presentation of the Group's financial position and results of operations. A bond exchange program constituting a nonsubstantial modification was initiated in June 2018 for the Monsanto bonds acquired as part of the Monsanto acquisition. In this connection, expenses of €13 million were recognized in profit or loss in the second quarter of 2018.

IFRS 15 has led to the introduction of a five-step model for revenue recognition from contracts with customers. Under the standard, revenue is recognized at amounts that reflect the consideration that an entity expects to be entitled to in exchange for transferring goods or services to a customer. Revenue is recognized when (or as) control of goods or services has been transferred to a customer either over time or at a point in time. In addition, IFRS 15 clarifies the allocation of individual topics to (new) line items in the statement of financial position and to functional cost items in the income statement, and whether gross or net amounts are to be presented.

As of January 1, 2018, Bayer transitioned to IFRS 15 on the basis of the modified retrospective method, accounting for the aggregate amount of the transition effects by way of an adjustment to retained earnings as of January 1, 2018, and presenting the comparative period in line with previous rules. Bayer has elected to retrospectively apply the standard only to contracts that are not completed contracts at the date of first-time application and has opted to reflect the aggregate effect of all contract modifications that occurred prior to the date of first-time application in accordance with IFRS 15.C7A(b).

The adoption of IFRS 15 has led to the following effects:

Changes in the timing of recognition

- IFRS 15 requires catch-up adjustments to revenue when milestone payments for right-to-access licenses become unconstrained, leading to earlier revenue recognition. This change resulted in an increase in retained earnings by €64 million after deferred taxes and a decrease in contract liabilities (under IAS 18, amounts were presented as deferred income in other liabilities) by €86 million as of January 1, 2018. For the Pharmaceuticals segment, the introduction of IFRS 15 translates into a €10 million decrease in net sales in 2018, resulting in a €4 million decrease in deferred tax expense in 2018 compared with IAS 18.
- IFRS 15 in conjunction with IAS 38 (Intangible Assets) generally requires the recognition of the purchase price related to a brand divestment net of associated carrying amounts in other operating income or expenses upon transfer of control. Some cases were identified where the purchase price was deferred under former policy in line with IAS 18, but would have been recognized in income earlier under IFRS 15, leading to a €21 million increase in retained earnings after deferred taxes and a €27 million decrease in contract liabilities (under IAS 18, amounts were presented as deferred income in other liabilities) on the date of transition. For the Pharmaceuticals and Animal Health segments, the introduction of IFRS 15 translates into a combined €40 million decrease in net sales in 2018, resulting in a €7 million decrease in deferred tax expense in 2018 compared with IAS 18.

- Including the effects described individually, the change in the timing of revenue recognition led to a €28 million decrease in net income in 2018 as compared to revenue recognition under IAS 18. These earnings effects pertain to the Bayer Group prior to the first-time consolidation of the former Monsanto Group, whose financial information for the reference periods was prepared according to U.S. accounting standards and therefore does not permit an appropriate comparison with net sales as determined according to IAS 18.

Presentational changes

Bayer has also changed the presentation of certain items in the statement of financial position and the income statement to reflect the methodology of IFRS 15.

- IFRS 15 changes the presentation of expected product returns within the statement of financial position from net to gross in cases where returns are expected to be resalable and Bayer will refund the purchase price. The right-of-return asset is reflected in inventories at the former carrying amount less expected costs to recover and potential impairment. The refund liabilities resulting from the gross presentation include amounts expected to be refunded upon product return. Prior to the adoption of IFRS 15, Bayer presented the margin of expected returns on a net basis in “other provisions.” In the statement of cash flows, the increase in inventories to be recorded under IFRS 15 is set against a decline in “other working capital, other noncash items.”
- Amounts already received (or receivable) but expected to be refunded to the customer are presented as “refund liabilities” under IFRS 15. These amounts typically relate to expected volume rebates and expected product returns and were previously presented as “other provisions.”
- Advance payments received (or receivable) in connection with product deliveries were previously recognized in trade accounts payable. Advance payments received (or receivable) relating to right-to-access licenses and service contracts recognized over time were previously presented under “deferred income” in “other liabilities.” With the introduction of IFRS 15, both are presented as contract liabilities. Within the statement of cash flows, the decline in trade accounts payable resulting from the presentational change is set against a corresponding change in “other working capital, other noncash items.”

The effects of applying the modified retrospective method on the opening statement of financial position as of January 1, 2018, are shown in table B 2/7.

B 2/7

IFRS 15 Accounting Changes: Consolidated Statement of Financial Position as of January 1, 2018

	Dec. 31, 2017			Jan. 1, 2018
€ million	Before accounting changes	Presentational changes	Changes in timing of recognition	After accounting changes
Deferred taxes	4,915		(5)	4,910
Inventories	6,550	76		6,626
Other reserves	25,026		86	25,112
Other provisions (noncurrent)	1,366	(152)		1,214
Refund liabilities (noncurrent)	–	152		152
Contract liabilities (noncurrent)	–	905	(78)	827
Other liabilities (noncurrent)	1,116	(905)		211
Deferred taxes	1,153		24	1,177
Other provisions (current)	4,344	(2,197)		2,147
Refund liabilities (current)	–	2,275		2,275
Contract liabilities (current)	–	740	(37)	703
Trade accounts payable	5,129	(561)		4,568
Other liabilities (current)	1,652	(181)		1,471

The impact of the transition from IAS 18 to IFRS 15 on the consolidated statement of financial position as of December 31, 2018, which includes the former Monsanto Group, is presented in table B 2/8.

B 2/8

Reconciliation IFRS 15 to IAS 18 for Presentational Changes: Consolidated Statement of Financial Position as of December 31, 2018

€ million	IFRS 15 December 31, 2018	Presentational changes	IAS 18 December 31, 2018
Inventories	10,961	(85)	10,876
Other provisions (noncurrent)	3,347	167	3,514
Refund liabilities (noncurrent)	167	(167)	–
Contract liabilities (noncurrent)	986	(986)	–
Other liabilities (noncurrent)	349	852	1,201
Other provisions (current)	3,686	3,537	7,223
Refund liabilities (current)	3,622	(3,622)	–
Contract liabilities (current)	3,235	(3,235)	–
Trade accounts payable	5,414	3,159	8,573
Other liabilities (current)	2,122	210	2,332

In addition to IFRS 9 and IFRS 15, the following changes were applied as of January 1, 2018, but did not have any material impact on the Group's financial position and results of operations.

B 2/9

Amendments to standards with no material impact

Amendments to standards/interpretations		Mandatory application
IFRS 2	Amendment “Classification and Measurement of Share-based Payment Transactions”	Jan. 1, 2018
IFRS 9	Amendment “Applying IFRS 9 Financial Instruments with IFRS 4 Insurance Contracts”	Jan. 1, 2018
IAS 40	Amendment “Transfers of Investment Property”	Jan. 1, 2018
IFRIC 22	Foreign Currency Transactions and Advance Consideration	Jan. 1, 2018
	Annual Improvements to IFRS Standards 2014–2016 Cycle	Jan. 1, 2018

Published financial reporting standards that have not yet been applied

The IASB and the IFRS Interpretations Committee have issued the following standards, amendments to standards and interpretations whose application was not yet mandatory for the 2018 fiscal year or for which the European Union had not yet completed the endorsement process. The following IFRS and interpretations have not yet been applied by Bayer:

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Published financial reporting standards that have not yet been applied

Amendments to standards/interpretations		Mandatory application	Anticipated effects
IFRS 3	Amendment to IFRS 3 Business Combinations	Jan. 1, 2020	Effects currently being evaluated
IFRS 9	Prepayment Features with Negative Compensation	Jan. 1, 2019	No material effects expected
IFRS 16	Leases	Jan. 1, 2019	See following explanations
IFRS 17	Insurance Contracts	Jan. 1, 2021	Effects currently being evaluated
IAS 1, IAS 8	Amendments to IAS 1 and IAS 8: Definition of Material	Jan.1, 2020	Effects currently being evaluated
IAS 19	Amendments to IAS 19 (Employee Benefits): Plan Amendments, Curtailments or Settlements	Jan. 1, 2019	No material effects expected
IAS 28	Long-term Interests in Associates and Joint Ventures	Jan. 1, 2019	No material effects expected
IFRIC 23	Uncertainty over Income Tax Treatments	Jan. 1, 2019	No material effects expected
	Annual Improvements to IFRS Standards 2015–2017 Cycle	Jan. 1, 2019	No material effects expected
	Amendments to References to the Conceptual Framework in IFRS Standards	Jan. 1, 2020	Effects currently being evaluated

The information below pertains only to future amendments to accounting standards whose foreseeable effects – if any – could be material to the Bayer Group's financial position or results of operations.

In January 2016, the IASB published the new standard for lease accounting, IFRS 16 (Leases), which replaces the rules contained in IAS 17 (Leases) along with 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 previous 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 will apply 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 can be applied as of the transition date for lease agreements in which a Bayer company is the lessee. On the date of first-time application, no additional assessment will be undertaken with regard to whether a contract represents or contains a leasing relationship. For contracts previously classified as operating leases, Bayer will measure 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, the right-of-use asset will generally be 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 will not be taken into account in the measurement of the right-of-use asset as of the date of first-time application. The current state of knowledge as of the date of first-time application will be taken into account when discretionary decisions are made.

Bayer will exercise the option of exempting intangible assets from the scope of application of IFRS 16 and will apply the exemptions for short-term leases to certain leases ending in 2019. It will also apply this exemption for short-term leases beginning after December 31, 2018.

The first-time application of IFRS 16 as of January 1, 2019, is anticipated to result in the recognition of additional lease liabilities of approximately €900 million to €1,200 million. Net financial debt will increase accordingly as a result of the significant increase in lease liabilities. Right-of-use assets will increase in line with the lease liabilities, taking into account adjustments resulting from the first-time application of IFRS 16.

In the statement of comprehensive income, Bayer will cease recognizing expenses for operating leases in operating income and will instead recognize the depreciation of the right-of-use assets and the interest expense for the lease liabilities under IFRS 16. An analogous effect will occur in the statement of cash flows, where IFRS 16 will have 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 will be recognized in the financing cash flow.

Change in accounting methods

In connection with the planned acquisition of Monsanto and in preparation for the future combined business, the structure of the Crop Science segment was adjusted as of January 1, 2018, in line with the internal financial reporting system (management approach). In the new structure, all the strategic business entities are organizationally located directly below the operating and reportable Crop Science segment. Global impairment testing of goodwill will also be carried out at the Crop Science segment level each year in the future.

3. Basic principles, methods and critical accounting estimates

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 consolidated companies are prepared according to uniform accounting policies and measurement principles. The consolidated financial statements of the Group 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, the 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.

Changes in accounting policies or measurement principles in light of new or revised standards are generally applied in line with the options permitted within the respective standard. Depending on the option that Bayer makes use of, the income statement for the previous year and the opening statement of financial position for that year are adjusted where necessary. For detailed information on standards to be applied for the first time from January 1, 2018, please see Note [2].

Consolidation

The consolidated financial statements include subsidiaries, joint operations, joint ventures and associates. The financial statements of the individual consolidated companies 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.

Joint operations and joint ventures are based on joint arrangements. A joint arrangement is deemed to exist if the Bayer Group through a contractual agreement jointly controls an entity's activities with a third party. Joint control is only deemed to exist if decisions regarding the relevant activities require the unanimous consent of the parties sharing control. A joint operation is a joint arrangement whereby the parties that have joint control of the arrangement have rights to the assets, and obligations for the liabilities, relating to the arrangement. The Bayer Group recognizes the share of assets, liabilities, revenues and expenses relating to its interest in a joint operation in accordance with its rights and obligations. A joint venture is a joint arrangement whereby the parties that have joint control of the arrangement 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 amounts of a company accounted for using the equity method is adjusted annually by the percentage of any 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 financial statements of the individual companies for inclusion in the consolidated financial statements are prepared in their respective functional currencies. A company's functional currency is that of the economic environment in which it primarily generates and expends cash. The majority of consolidated companies carry out their activities autonomously from a financial, economic and organizational point of view, and their functional currencies are therefore the respective local currencies.

In the consolidated financial statements, the assets and liabilities of companies that do not use the euro as their functional currency at the start and end of the year 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	2017	3.98	1.51	7.81	0.89	135.01	69.41	1.20
	2018	4.44	1.56	7.87	0.89	125.87	79.76	1.15
Average rate	2017	3.59	1.46	7.61	0.88	126.39	65.71	1.13
	2018	4.29	1.53	7.80	0.88	130.38	73.87	1.18

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. Both the adjustment in equity and the effects of the ongoing application of IAS 29 have so far been immaterial for the Group.

In previous years and up until September 30, 2018, the rules of IAS 29 were also applied for Bayer S.A., Venezuela. This company was deconsolidated as of September 30, 2018, leading to a currency translation loss of €132 million in the financial result.

Foreign currency measurement

In the separate financial statements of the individual consolidated companies, monetary items, such as receivables and liabilities, that are denominated in currencies other than the respective functional currency are measured at closing rates. Related exchange differences are recognized as exchange gains or losses under other financial income or expenses.

Net sales and other operating income

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 presented separately for the purpose of revenue recognition. Other operational revenues are recognized as other operating income. Revenues are recognized through 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 future expectations of sales development. Amounts for rebates, which are reported separately as refund liabilities, amounted to 8.3% of total net sales in 2018 (2017: 6.1%). Furthermore, sales are reduced by the amount of the provisions 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. The refund liabilities for product returns in 2018 amounted to 1.2% of total net sales (2017: 0.6%). The right-of-return assets are reflected in inventories at the former carrying amount less any recovery and processing costs and potential impairment. 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 the right-to-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 licences 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.

Income may also arise from the exchange of assets. The amount recognized is generally based on the fair value of the asset received plus (less) any cash received (disbursed).

Research and development expenses

For accounting purposes, research expenses are defined as costs incurred for current or planned investigations undertaken with the prospect of gaining new scientific or technical knowledge and understanding. Development expenses are defined as costs incurred for the application of research findings or specialist knowledge to plans or designs for the production, provision or development of new or substantially improved products, services or processes, respectively, prior to the commencement of commercial production or use. Research and development (R&D) expenses are incurred in the Bayer Group for in-house R&D activities as well as numerous research and development collaborations and alliances with third parties. R&D expenses mainly comprise the costs for active ingredient discovery, clinical studies, research and development activities in the areas of application technology and engineering, field trials, regulatory approvals and approval extensions.

Research costs cannot be capitalized. The conditions for capitalization of development costs are closely defined: a key precondition for recognition of an intangible asset is that it is sufficiently certain that the development activity will generate future cash flows that will cover the associated development costs. 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 are not normally satisfied. In the case of R&D collaborations, a distinction is generally made between payments on contract signature, upfront payments, milestone payments and cost reimbursements for work performed. If an intangible asset (such as the right to the use of an active ingredient) is acquired in connection with any of these payment obligations, the respective payment is capitalized even if it is uncertain whether further development work will ultimately lead to the production of a saleable product. Reimbursements of the cost of R&D work are recognized in profit or loss, except where they are required to be capitalized.

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. The Group establishes provisions for taxes, based on reasonable estimates, for liabilities to the tax authorities of the respective countries that are uncertain as to their amount and the probability of their occurrence. The amount of such provisions is 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 sufficiently probable that taxable income 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. It is measured at its cost of acquisition, which is the excess of the acquisition price for shares in a company over the acquired net assets. The results of foreign currency cash flow hedges are taken into account in the acquisition price. The net assets are the balance of the fair values of the acquired identifiable assets and the assumed liabilities and contingent liabilities. Goodwill is not amortized but tested annually for impairment. Details of the annual impairment tests are given under “Procedure used in Group-wide impairment testing and its impact.” Once an impairment loss has been recognized on goodwill, it is not reversed in subsequent periods.

Other intangible assets

An “other intangible asset” is an identifiable nonmonetary asset without physical substance, other than goodwill (such as a patent, a trademark or a marketing right). It is capitalized if the future economic benefits attributable to the asset will probably flow to the company and the cost of acquisition or generation of the asset can be reliably measured.

Other intangible assets are recognized at the cost of acquisition or generation. Those with a determinable useful life are amortized accordingly on a straight-line basis over a period of up to 30 years, except where their actual depletion demands a different amortization pattern. Determination of the expected useful lives of such assets and the amortization patterns is based on estimates of the period for which they will generate cash flows. An impairment test is performed if there is an indication of possible impairment. Other intangible assets with an indefinite life (such as the Bayer Cross trademark) and intangible assets not yet available for use (such as R&D projects) are not amortized, but tested annually for impairment.

Property, plant and equipment

Property, plant and equipment is depreciated by the straight-line method over an asset's expected useful life, except where use-related depreciation is more appropriate. Following the acquisition of Monsanto, the depreciation periods given below are applied:

B 3/2

Useful Life 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

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.

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.

Financial assets

Financial assets comprise receivables, acquired equity and debt instruments, cash and cash equivalents, and derivatives with positive fair values.

Regular-way purchases and sales of financial assets are generally posted on the settlement date. The amount at which a financial asset is initially recognized comprises its fair value and in most cases the transaction costs.

The classification and measurement of financial assets is based in each case on the business model and the characteristics of the cash flows. The business models “hold” and “sell” are applied to divested trade accounts receivable depending on the structure of the respective sale agreements, resulting in measurement at amortized cost or fair value. The option of recognizing debt instruments at fair value through profit or loss under certain conditions is not exercised. In the case of equity instruments that are not held for trading, the option of recognizing future changes in their fair value through other comprehensive income in the statement of comprehensive income is generally exercised.

Loss allowances for expected credit losses are recognized for financial assets measured at amortized cost.

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. In individual cases, these default rates are adjusted during the year for the respective customer portfolio if a significant increase or decrease in defaults 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 substantial 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.

Expected credit losses are not calculated for contract assets or lease receivables due to insignificant carrying amounts.

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.

Inventories

Inventories encompass assets consumed in production or in the rendering of services (raw materials and supplies), assets in the production process for sale (work in process), goods held for sale in the ordinary course of business (finished goods and goods purchased for resale), advance payments on inventories, and expected product returns (right-of-return assets). 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. The net realizable value is the estimated selling price in the ordinary course of business less estimated cost to complete and selling expenses.

Cash and cash equivalents

Cash and cash equivalents comprise cash, checks received and balances with banks and companies. Cash equivalents are highly liquid short-term financial investments that are subject to an insignificant risk of changes in value, are easily convertible into a known amount of cash and have a maturity of three months or less from the date of acquisition or investment.

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 expenses for the year in which they are due and as such are included in the functional cost items and thus in EBIT. All other post-employment benefit systems are defined benefit plans, which may be either unfunded, i.e. financed by provisions, or funded, i.e. financed through pension funds.

The present value of provisions for defined benefit plans and the resulting expense are calculated in accordance with IAS 19 (Employee Benefits) by the projected unit credit method. The future benefit obligations are valued by actuarial methods and spread over the entire employment period on the basis of specific assumptions regarding beneficiary structure and the economic environment. These relate mainly to the discount rate, expected future salary and pension increases, variations in health care costs, and mortality rates. The discount rates used are calculated from the yields of high-quality corporate bond portfolios in specific currencies with cash flows approximately equivalent to the expected disbursements from the pension plans. The uniform discount rate derived from this interest-rate structure is thus based on the yields, at the closing date, of a portfolio of AA-rated corporate bonds whose weighted residual maturities approximately correspond to the duration necessary to cover the entire benefit obligation.

The fair value of plan assets is deducted from the present value of the defined benefit obligation for pensions and other post-employment benefits to determine the net defined benefit liability. The obligations and plan assets are valued at regular intervals. Plan assets included assets with a carrying amount of €4,240 million whose fair values are not determined based on quoted prices in active markets. These assets mainly include mortgage, land charge and annuity claims, registered bonds, notes, shares not listed on stock exchanges, and loans. The fair values of these assets were determined by applying the usual measurement methods and on the basis of freely accessible data such as interest rate curves and credit spreads. The fair value of bank deposits is the nominal value. Plan assets in excess of the benefit obligation are reflected in other receivables, subject to the asset ceiling specified in IAS 19 (Employee Benefits). The balance of all income and expenses, except the net interest on the net liability, is recognized in EBIT. 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. Deferred taxes relating to the effects of remeasurements are also recognized in other comprehensive income.

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.

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.

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.

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.

Estimating the future costs involves, in particular, uncertainties with regard to the applicable laws and regulations and to 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 experience gained to 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 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.

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.

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 [29]. 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.

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

Miscellaneous provisions include those for other liabilities, contingent liabilities from business combinations, and asset retirement obligations (other than those included in provisions for environmental protection).

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

These also include trade accounts payable and other liabilities that are settled in cash and cash equivalents or other financial instruments, as well as negative fair values of derivatives.

Financial liabilities are measured at amortized cost with the exception of those carried at fair value, such as derivatives with negative fair values, liabilities for contingent consideration in business combinations, or liabilities designated at fair value through profit or loss.

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.

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.

Other receivables and liabilities

Accrued items and other nonfinancial assets and liabilities are carried at amortized cost. They are amortized to income by the straight-line method or according to performance of the underlying transaction. 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.

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.

Contracts 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. This applies in particular to raw material supply contracts at Crop Science. Where embedded derivatives are identified that are required to be separated from the pending transactions, they are accounted for separately. To take advantage of market opportunities or cover possible peak demand, a nonmaterial volume of transactions may be entered into for which the possibility of immediate resale cannot be excluded. Such transactions are allocated to separate portfolios upon acquisition and accounted for as derivatives through profit or loss according to IFRS 9.

Derivatives are carried at fair value. Positive fair values at the end of the reporting period are reflected in financial assets, negative fair values in financial liabilities. Changes in the fair values of these derivatives are recognized directly in profit or loss except where hedge accounting is used.

Changes in the fair values of the effective portion of derivatives designated as cash flow hedges are initially recognized outside profit or loss in other comprehensive income. They are not reclassified to profit or loss until the underlying transaction is recognized through profit or loss. The ineffective portion of derivatives designated as cash flow hedges is recognized either in other operating income or expenses or in the financial result, depending on the type of underlying transaction. Changes in the fair values of derivatives designated as fair-value hedges and the adjustments in the carrying amounts of the underlying transactions are recognized in profit or loss.

Changes in the fair values of forward exchange contracts and currency options serving as hedges of items in the statement of financial position are reflected in other financial income and expenses as exchange gains or losses, while changes in the values of interest-rate swaps and interest-rate options are recognized in interest income or expense. Changes in the fair values of commodity futures and options are initially recognized in other comprehensive income and subsequently reclassified to cost of goods sold. Effects from cash flow hedges of forward exchange contracts used to hedge forecasted sales transactions in foreign currencies are initially recognized outside profit or loss and then reclassified to other operating income or expenses at the time the sales are recognized. Changes in the fair values of stock options or forward stock transactions used to hedge stock-based employee compensation are initially recognized outside profit or loss and subsequently reclassified to profit or loss in the functional costs over the periods of the Aspire programs.

Acquisition accounting

Acquired businesses are accounted for using the acquisition method, which requires that the assets acquired and liabilities assumed be recorded at their respective fair values on the date Bayer obtains control. 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 nonpatented 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.)

In step acquisitions, the fair values of the acquired entity’s assets and liabilities are measured in accordance with IFRS 3 (Business Combinations) at the date on which control is obtained. Any resulting adjustments to the fair value of the existing interest are recognized in profit or loss. The carrying amount of the assets and liabilities already recognized in the statement of financial position is then adjusted accordingly.

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 stockholders. After the loss of control, the interest remaining at the time of the loss of control is carried at fair value. If Bayer AG still retains significant influence after selling shares, the remaining interest is recognized as an interest in an associate and is accounted for using the equity method. Once Bayer can no longer exert significant influence on the company, the remaining interest held is carried at fair value as an equity instrument. The remaining shares in Covestro AG are recognized through profit or loss.

Procedure used in Group-wide impairment testing and its impact

Impairment tests are performed not only on individual items of intangible assets, property, plant and equipment, but also at the level of cash-generating units or groups of cash-generating units. A cash-generating unit is the smallest identifiable group of assets that generates cash inflows that are largely independent of the cash inflows from other assets or groups of assets. The Bayer Group regards product families, among other things, as cash-generating units and subjects them to global impairment testing. Goodwill is tested at segment level.

Cash-generating units and unit groups are globally tested if there is an indication of possible impairment. Those to which goodwill is allocated are tested at least annually.

Impairment testing involves comparing the carrying amount of each cash-generating unit, unit group or item of intangible assets, property, plant or 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. The resulting expense is reflected in the functional item of the income statement in which the depreciation or amortization of the respective assets is recognized. The same applies to income from impairment loss reversals.

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 normally being three to five 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.

The growth rates applied for impairment testing in 2017 and 2018 and the capital cost factors are shown in the following table:

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Impairment Testing Parameters

	Growth rate		After-tax cost of capital	
%	2017	2018	2017	2018
Pharmaceuticals	0.0	0.0	5.6	7.6
Consumer Health	1.0	1.0	4.8	7.9
Crop Science	2.0	2.0	5.4	7.8
Animal Health	1.0	1.0	5.0	8.6

An impairment loss of €1,547 million was recognized on the goodwill of the Consumer Health segment on the basis of the annual Group-wide impairment testing of the cash-generating units and unit groups (2017: €0 million). This impairment loss was included in other operating expenses. Impairment losses on intangible assets, property, plant and equipment – net of €0 million (2017: €13 million) in impairment loss reversals – totaled €3,353 million (2017: €506 million). Details are provided in Notes [14] and [15].

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.

A sensitivity analysis undertaken for the impairment testing of goodwill 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 an impairment loss of €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. A one percentage point reduction in Consumer Health’s long-term growth rate would result in an impairment loss of €0.6 billion.

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, 2018, the Bayer Group comprises the four reportable segments Pharmaceuticals, Consumer Health, Crop Science and Animal Health. Their activities are as follows:

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Activities of the Segments

Segment	Activities
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 dermatology, nutritional supplements, pain, digestive health, allergy, cough and cold, foot care and sun protection categories
Crop Science	Development, production and marketing of a broad portfolio of products in seeds and plant traits, crop protection and nonagricultural pest control
Animal Health	Development, production and marketing of prescription and nonprescription veterinary products

In connection with the acquisition of Monsanto, the reporting structure of the Crop Science segment was adjusted to reflect the future relative sizes of the various strategic business entities.

Business activities that cannot be allocated to any other segment are reported under "All Other Segments." These primarily include the services provided by the service areas: Business Services and Currenta.

The items in "Corporate Functions and Consolidation" mainly comprise the Bayer holding companies and Leaps by Bayer, which focuses on the development of crucial, cross-species innovations. Also recognized are gains and losses incurred upon the ongoing revaluation of nonmonetary assets and liabilities and of equity according to IAS 29 (Financial Reporting in Hyperinflationary Economies) for Bayer S.A. in Argentina. They also include the increase or decrease in expenses for Group-wide long-term stock-based compensation arising from fluctuations in the performance of Bayer stock, and the consolidation of intersegment sales (2018: €2.8 billion; 2017: €2.4 billion), along with expenses, income, assets, liabilities and certain contingent liabilities of comparable central functions of the acquired Monsanto Group.

The segment data are 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).
- The segment assets comprise all assets serving the respective segment, stated as of December 31, including material participating interests of direct relevance to business operations.
- The equity items reflect the earnings and carrying amounts of investments accounted for using the equity method.

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Key Data by Segment

	Pharmaceuticals		Consumer Health		Crop Science		Animal Health	
€ million	2017	2018	2017	2018	2017	2018	2017	2018
Net sales (external)	16,847	16,746	5,862	5,450	9,577	14,266	1,571	1,501
Currency-adjusted change [1]	+ 4.3%	+ 3.1%	− 1.7%	− 1.3%	− 2.2%	+ 53.3%	+ 4.1%	+ 0.5%
Intersegment sales	38	37	14	3	33	39	8	9
Net sales (total)	16,885	16,783	5,876	5,453	9,610	14,305	1,579	1,510
EBIT [1]	4,325	3,213	518	(2,077)	1,235	3,138	307	312
EBITDA before special items [1]	5,711	5,598	1,231	1,096	2,043	2,651	381	358
ROCE [1]	21.0%	16.6%	2.7%	(12.9)%	9.6%	6.3%	47.1%	38.0%
Net cash provided by operating activities	3,867	4,376	1,059	727	1,884	3,743	209	271
Equity-method income (loss)	1	16	1	1	(1)	1	–	–
Equity-method carrying amounts	3	–	11	11	35	140	–	–
Assets	21,753	20,687	14,896	12,224	13,106	76,809	935	1,001
Capital expenditures	1,126	888	181	228	670	1,030	41	55
Depreciation, amortization and impairments	1,251	1,584	627	3,112	481	1,362	45	39
of which impairment losses/ loss reversals	217	603	213	2,732	71	13	9	–
Research and development expenses	2,888	2,893	240	226	1,166	1,950	155	143

[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

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Key Data by Segment

	All Other Segments		Reconciliation: Corporate Functions and Consolidation		Group	
€ million	2017	2018	2017	2018	2017	2018
Net sales (external)	1,142	1,605	16	18	35,015	39,586
Currency-adjusted change [1]	+ 10.5%	+ 40.4%	–	–	+ 1.6%	+ 17.2%
Intersegment sales	2,324	2,682	(2,417)	(2,770)	–	–
Net sales (total)	3,466	4,287	(2,401)	(2,752)	35,015	39,586
EBIT [1]	4	397	(486)	(1,069)	5,903	3,914
EBITDA before special items [1]	358	735	(436)	(891)	9,288	9,547
ROCE [1]	–	–	–	–	10.8%	4.4%
Net cash provided by operating activities	256	324	(664)	(1,524)	6,611	7,917
Equity-method income (loss)	–	–	19	50	20	68
Equity-method carry amounts	–	–	3,958	364	4,007	515
Assets	2,206	2,977	22,191	12,587	75,087	126,285
Capital expenditures	359	354	41	9	2,418	2,564
Depreciation, amortization and impairments	243	240	13	15	2,660	6,352
of which impairment losses/loss reversals	2	5	–	–	512	3,353
Research and development expenses	3	1	52	33	4,504	5,246

[1] For definition see Combined Management Report, Chapter 2.4 “Alternative Performance Measures Used by the Bayer Group.”

Reconciliations

The reconciliations of the segments' assets to Group assets and of EBITDA before special items, EBIT before special items and EBIT to Group income before income taxes are given in the following tables:

B 4/3

Reconciliation of Segments' Assets to Group Assets

€ million	2017	2018
Operating segments' assets	52,896	113,698
Corporate Functions and Consolidation assets	4,207	613
Nonallocated assets	17,984	11,974
Group assets	**75,087**	**126,285**

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

€ million	2017	2018
EBITDA before special items of segments	9,724	10,438
EBITDA before special items of Corporate Functions and Consolidation	(436)	(891)
EBITDA before special items[1]	**9,288**	**9,547**
Depreciation, amortization and impairment losses/loss reversals before special items of segments	(2,145)	(3,052)
Depreciation, amortization and impairment losses/loss reversals before special items of Corporate Functions and Consolidation	**(13)**	(15)
Depreciation, amortization and impairment losses/loss reversals before special items	**(2,158)**	**(3,067)**
EBIT before special items of segments	7,579	7,386
EBIT before special items of Corporate Functions and Consolidation	(449)	(906)
EBIT before special items[1]	**7,130**	**6,480**
Special items of segments	(1,190)	(2,403)
Special items of Corporate Functions and Consolidation	(37)	(163)
Special items[1]	**(1,227)**	**(2,566)**
EBIT of segments	6,389	4,983
EBIT of Corporate Functions and Consolidation	(486)	(1,069)
EBIT[1]	**5,903**	**3,914**
Financial result	(1,326)	(1,596)
Income before income taxes	**4,577**	**2,318**

[1] For definition see Combined Management Report, Chapter 2.4 "Alternative Performance Measures Used by the Bayer Group."

Information on geographical areas

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

B 4/5

Information on Geographical Areas

	Net sales (external) – by market		Intangible assets and property, plant and equipment	
€ million	2017	2018	2017	2018
Europe/Middle East/Africa	**13,388**	**14,143**	**21,356**	**26,478**
of which Germany	3,392	3,819	10,856	16,167
of which Switzerland	485	449	5,190	5,469
North America	**10,143**	**11,569**	**10,354**	**55,644**
of which United States	8,561	9,793	10,056	54,073
Asia/Pacific	**7,637**	**8,115**	**1,771**	**1,997**
of which China	2,594	2,927	853	529
Latin America	**3,847**	**5,759**	**577**	**3,717**
of which Brazil	1,647	2,869	209	2,573
Total	**35,015**	**39,586**	**34,058**	**87,836**

Information on major customers

Revenues from transactions with a single customer in no case exceeded 10% of Bayer Group sales in 2018 or 2017.

5. Scope of consolidation; subsidiaries and affiliates

5.1 Changes in the scope of consolidation

Changes in the scope of consolidation in 2018 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, 2017	50	187	237
Changes in scope of consolidation	+ 4	+ 2	+ 6
Additions	+ 2	+ 194	+ 196
Retirements	– 1	– 18	– 19
December 31, 2018	**55**	**365**	**420**

The increase in the total number of consolidated companies in 2018 was primarily due to the acquisition of the Monsanto Group.

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.

Five (2017: four) associates and ten (2017: eight) 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 67 (2017: 76) subsidiaries, including one (2017: one) structured entity and 17 (2017: 12) 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 0.2% of Group sales, less than 0.2% of equity and less than 0.1% of total assets.

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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 2018 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/shareownership2018.

5.2 Business combinations and other acquisitions

Business combinations and other acquisitions in 2018

The purchase price of the acquisitions made in 2018 was €48,066 million (2017: €158 million). The purchase price of the acquired businesses was settled mainly in cash. Goodwill amounted to €24,503 million (2017: €51 million).

Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States (Monsanto), on June 7, 2018. The acquisition of Monsanto brings 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. Among the production sites maintained by Monsanto are facilities in 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 between 5 and 20 years) and digital platforms (useful lives of 15 years), as well as for research and development projects, brands (useful lives of between 10 and 30 years), customer relationships (useful lives of between 20 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.

Sales of €5,328 million and an after-tax loss of €1,341 million were recorded for the acquired businesses since the date of first-time consolidation.

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 of the Monsanto acquisition was adjusted as of December 31, 2018, resulting in a €1,457 million net reduction in acquired assets/increase in assumed liabilities and a corresponding increase in goodwill in the statement of financial position as compared with the amounts recognized in June 2018.

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.

The effects of these transactions and the adjustment of the purchase price allocation of the Monsanto acquisition on the Group's assets and liabilities are shown in the table. Net of acquired cash and cash equivalents, they resulted in the following cash outflow:

B 5.2/2

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

€ million	2017	2018	Of which Zydus	Of which Monsanto June 30, 2018	Adjustment of purchase price allocation	Of which Monsanto December 31, 2018
Goodwill	51	24,503	48	22,998	1,457	24,455
Patents and technologies	–	17,152	–	17,350	(198)	17,152
Trademarks	85	3,941	–	4,195	(254)	3,941
Marketing and distribution rights	–	845	–	821	24	845
R&D projects	–	4,637	–	4,300	337	4,637
Production rights	4	11	–	–	11	11
Other rights	–	360	–	394	(34)	360
Property, plant and equipment	–	5,655	–	6,293	(638)	5,655
Investments accounted for using the equity method	–	52	–	52	–	52
Other financial assets	–	201	3	250	(52)	198
Inventories	18	4,821	3	4,882	(64)	4,818
Receivables	–	7,281	2	7,201	78	7,279
Other current assets	–	27	–	27	–	27
Cash and cash equivalents	–	2,659	2	2,657	–	2,657
Deferred tax assets	–	1,799	2	1,548	249	1,797
Provisions for pensions and other post-employment benefits	–	(389)	–	(367)	(22)	(389)
Other provisions	–	(2,597)	(1)	(1,529)	(1,067)	(2,596)
Refund liabilities	–	(3,322)	(1)	(3,321)	–	(3,321)
Financial liabilities	–	(8,657)	(1)	(8,656)	–	(8,656)
Other liabilities	–	(2,860)	(2)	(2,870)	12	(2,858)
Deferred tax liabilities	–	(7,858)	–	(8,019)	161	(7,858)
Net assets	**158**	**48,261**	**55**	**48,206**	**–**	**48,206**
Changes in noncontrolling interest	–	(177)	–	(177)	–	(177)
Remeasurement of previously held equity interest	–	(18)	(18)	–	–	–
Consideration transferred	**158**	**48,066**	**37**	**48,029**	**–**	**48,029**
Acquired cash and cash equivalents	–	(2,659)	(2)	(2,657)	–	(2,657)
Noncash components	–	(91)	(9)	(82)	–	(82)
Net cash (inflow from) outflow for acquisitions	**158**	**45,316**	**26**	**45,290**	**–**	**45,290**

The fair value of the acquired receivables in the amount of €7.3 billion primarily comprises trade accounts receivable. As of the date of the acquisition, the gross amount of the contractual receivables amounted to €7.7 billion, with €0.3 billion of this figure assessed as irrecoverable.

If the aforementioned acquisitions had already been made as of January 1, 2018, the Bayer Group would have had total sales of €46,289 million. Income after income taxes would have been €2,093 million, and earnings per share €2.22. This takes into account significant effects relating to financing costs and purchase price allocations for 2018. In particular, the remeasurement of inventories at fair value and their subsequent utilization as well as planned amortization had a negative impact. No adjustment was made for special items.

The purchase price allocation for Monsanto currently remains incomplete pending compilation and review of the relevant financial information. It is therefore possible that changes will be made in the allocation of the purchase price to the individual assets and liabilities.

Acquisitions in 2017

On January 3, 2017, Bayer Animal Health acquired the Cydectin™ portfolio in the United States from Boehringer Ingelheim Vetmedica, Inc., St. Joseph, Missouri, United States. The acquisition comprises the Cydectin™ Pour-On, Cydectin™ Injectable and Cydectin™ Oral Drench endectocides for cattle and sheep. The acquisition is intended to strengthen the antiparasitics portfolio in the United States through the addition of endectocides. A purchase price of €158 million was agreed. The purchase price pertained mainly to trademarks and goodwill, which, as expected, is fully tax-deductible.

On September 13, 2017, Bayer and Gingko Bioworks, Inc., Boston, Massachusetts, United States, founded the joint venture Joyn Bio LLC, Boston, Massachusetts, United States. The joint venture will focus on technologies to improve plant-associated microbes with a major focus on nitrogen fixation, which is important in agriculture.

5.3 Divestments, material sale transactions and discontinued operations

Divestments in 2018

In connection with the acquisition of Monsanto, Bayer signed an agreement with BASF on October 13, 2017, concerning the sale of selected Crop Science businesses. All of the transactions closed on August 1, 2018, apart from the divestment 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 provisionally amounts to approximately €7.4 billion, and income before taxes to €4.1 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 September 4, 2018, the U.S. activities of the prescription dermatology business within the Consumer Health segment were transferred to the acquirer LEO Pharma A/S, Ballerup, Denmark. The base purchase price amounted to €58 million. The global prescription dermatology business outside the United States is recognized as held for sale.

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.

Divestments in 2017

In October 2015, Bayer successfully floated the former MaterialScience subgroup on the stock market under the name “Covestro”. In view of the remaining majority interest, Covestro was fully consolidated in the Bayer Group until the end of September 2017. Bayer ceded de facto control of Covestro on September 30, 2017. Accordingly, the Covestro Group was deconsolidated at the end of the third quarter and, in view of Bayer’s remaining significant influence, was recognized for the first time as an associate.

As of September 30, 2017, the fair value of the remaining interest, €3.6 billion, was determined on the basis of the share price. The deconsolidation and remeasurement of the remaining interest in Covestro resulted in overall income before taxes of €3.1 billion, which is included in income from discontinued operations. This figure reflects a gain of €2.4 billion from the remeasurement of the remaining interest, a gain of €0.5 billion from the deconsolidation, and a gain of €0.2 billion from the performance of the shares sold on September 29, 2017, in the fourth quarter of 2017. The overall gain after taxes amounted to €3.0 billion. A deferred tax expense of €32 million was accounted for as part of the remeasurement of the remaining interest. In addition, an amount of minus €0.6 billion recognized in other comprehensive income was reclassified to retained earnings attributable to Bayer AG stockholders.

Discontinued operations

Bayer ceded de facto control of Covestro and deconsolidated the company at the end of September 2017. As of the loss of control, Covestro fulfills 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 exchange gains of €8 million through the second quarter of 2018.

The income statements for the discontinued operations are given below:

B 5.3/1

Income Statements for Discontinued Operations

	Covestro		Diabetes Care		Total	
€ million	2017	2018	2017	2018	2017	2018
Net sales	**10,556**	**–**	**501**	**–**	**11,057**	**–**
Cost of goods sold	(6,973)	–	(28)	–	(7,001)	–
Gross profit	**3,583**	**–**	**473**	**–**	**4,056**	**–**
Selling expenses	(1,016)	–	(4)	–	(1,020)	–
Research and development expenses	(200)	–	–	–	(200)	–
General administration expenses	(345)	–	(8)	–	(353)	–
Other operating income/expenses	3,150	8	(3)	–	3,147	8
EBIT[1]	**5,172**	**8**	**458**	**–**	**5,630**	**8**
Financial result	**(124)**	**–**	**–**	**–**	**(124)**	**–**
Income before income taxes	**5,048**	**8**	**458**	**–**	**5,506**	**8**
Income taxes	(580)	(8)	(80)	–	(660)	(8)
Income after income taxes	**4,468**	**–**	**378**	**–**	**4,846**	**–**
of which attributable to noncontrolling interest	759	–	–	–	759	–
of which attributable to Bayer AG stockholders (net income)	3,709	–	378	–	4,087	–

[1] For definition see Combined Management Report, Chapter 2.4 “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

	Covestro		Diabetes Care		Total	
€ million	2017	2018	2017	2018	2017	2018
Net cash provided by (used in) operating activities	1,473	–	50	–	1,523	–
Net cash provided by (used in) investing activities	(742)	–	–	–	(742)	–
Net cash provided by (used in) financing activities	(224)	–	(50)	–	(274)	–
Change in cash and cash equivalents	**507**	**–**	**–**	**–**	**507**	**–**

Assets held for sale

Bayer signed an agreement on July 27, 2018, to divest the Consumer Health prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark. The global prescription dermatology business excluding the U.S. activities is expected to be transferred to LEO Pharma A/S in the second half of 2019 subject to the fulfillment of the closing conditions. The portfolio being divested comprises prescription brands including Advantan™, Skinoren™ and Travocort™. The base purchase price amounts to €555 million and is subject to customary purchase price adjustments.

The assets and liabilities held for sale are presented below:

B 5.3/3

Assets and Liabilities Held for Sale

€ million	Dec. 31, 2017	Dec. 31, 2018
Goodwill	479	156
Other intangible assets	287	32
Property, plant and equipment	1,062	42
Other assets	41	4
Deferred taxes	63	–
Inventories	149	–
Assets held for sale	**2,081**	**234**
Provisions for pensions and other post-employment benefits	11	5
Other provisions	79	–
Financial liabilities	14	–
Other liabilities	4	–
Deferred taxes	3	7
Liabilities directly related to assets held for sale	**111**	**12**

Assets and liabilities held for sale in 2017 mainly comprised the businesses sold to BASF.

Notes to the Income Statements

6. Net sales

Total reported net sales for 2018 amounted to €39,586 million, rising by €4,571 million, or 13.1%, compared with 2017. They were derived primarily from product deliveries. Breakdowns of net sales by segment and geographical area are given in the overview provided in Note [4].

Sales of €667 million were recognized in 2018 from performance obligations already satisfied in previous years. These sales primarily resulted from adjustments to refund liabilities for expected product returns, from rebates to be granted and from right-to-use licenses granted against sales-based royalties. Contractually agreed sales volumes pertaining to performance obligations not yet satisfied as of December 31, 2018, 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	
Transaction price outstanding as of Dec. 31, 2018	**2,107**
of which to be recognized within 1 year	281
of which to be recognized between 1 and 2 years	266
of which to be recognized between 2 and 3 years	220
of which to be recognized between 3 and 4 years	163
of which to be recognized between 4 and 5 years	155
of which to be recognized after more than 5 years	1,022

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

The change in contract liabilities between January 1, 2018, and December 31, 2018, was due to the following factors:

B 6/2

Roll Forward of Contract Liabilities

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

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 comprised milestone payments already received for right-to-access licenses. The contract liabilities relating to these two factors will be recognized as sales over a period of more than five years.

7. Other operating income

Other operating income was comprised as follows:

B 7/1

Other Operating Income

€ million	2017	2018
Gains on retirements of noncurrent assets	173	4,310
Reversal of impairment losses on receivables	23	184
Reversals of unutilized provisions	26	12
Gains from derivatives	291	217
Miscellaneous operating income	351	334
Total	**864**	**5,057**

Gains on retirements of noncurrent assets included proceeds of €4.1 billion from the sale of certain Crop Science businesses to BASF in connection with the acquisition of Monsanto (Crop Science segment). Furthermore, the divestment of several noncore brands at Consumer Health resulted in a gain of €49 million. The sale of a property in Berlin resulted in a gain of €41 million (Pharmaceuticals segment). The sale of the U.S. prescription dermatology business to LEO Pharma A/S, Ballerup, Denmark, generated a further gain of €25 million (Consumer Health segment).

Income from the reversal of impairment losses on receivables primarily resulted from the reversal of impairment losses under IFRS 9 and from improved receivables management in Brazil.

Within miscellaneous operating income, the proportionate assumption of costs by Janssen Research & Development, LLC, United States, a subsidiary of Johnson & Johnson, in connection with a development collaboration resulted in income of €189 million (Pharmaceuticals segment).

In the previous year, gains on retirements of noncurrent assets included a gain of €81 million from the sale of trademark rights (Consumer Health segment). Furthermore, the sale of capitalized transfer rights by Bayer 04 Leverkusen Fußball GmbH, Germany, resulted in a gain of €49 million (All Other Segments).

8. Other operating expenses

Other operating expenses were comprised as follows:

B 8/1

Other Operating Expenses

€ million	2017	2018
Losses on retirements of noncurrent assets	(39)	(35)
Impairment losses on receivables	(139)	(199)
Expenses related to significant legal risks	(258)	(677)
Losses from derivatives	(258)	(209)
Miscellaneous operating expenses	(254)	(1,874)
Total	**(948)**	**(2,994)**

Of the impairment losses on receivables, €75 million (2017: €74 million) pertained to past-due receivables in Brazil.

Miscellaneous operating expenses included €1,547 million in impairment losses recognized on the goodwill of Consumer Health, along with donations to charitable causes (all segments) and subsidies for patient assistance programs with government agencies and partners of health care systems (Pharmaceuticals segment) in the amount of €123 million (2017: €52 million).

Information on the legal risks can be found in Note [29].

9. Personnel expenses and employee numbers

Personnel expenses for continuing operations rose by €2,020 million to €11,548 million in 2018 (2017: €9,528 million). The change was mainly due to the higher headcount in connection with the acquisition of Monsanto.

B 9/1

Personnel Expenses

€ million	2017	2018
Salaries	7,567	9,192
Social expenses and expenses for pensions and other benefits	1,961	2,356
of which for defined contribution pension plans	488	495
of which for defined benefit and other pension plans	445	429
Total	**9,528**	**11,548**

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 corporate function, were as shown in the table below:

B 9/2

Employees

	2017	2018
Production	39,298	44,734
Marketing and distribution	37,147	40,295
Research and development	13,958	16,538
General administration	9,359	9,271
Total	**99,762**	**110,838**
Apprentices	1,918	1,823

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 2018 was minus €1,596 million (2017: minus €1,326 million), comprising equity-method income of €68 million (2017: €20 million), financial expenses of €2,574 million (2017: €1,635 million) and financial income of €910 million (2017: €289 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	2017	2018
Net income (loss) from investments accounted for using the equity method (equity-method income/loss)	20	68
Expenses		
Losses from the sale of investments in affiliated companies	(1)	–
Miscellaneous expenses from investments in affiliated companies	(1)	(459)
Income		
Gains from the sale of investments in affiliated companies	5	304
Miscellaneous income from investments in affiliated companies	7	–
Total	**30**	**(87)**

Income from investments in affiliated companies accounted for using the equity method primarily comprised equity-method income of €103 million (2017: €51 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. The other main components of this item were equity-method losses of €26 million (2017: €15 million) from the BlueRock joint ventures and €22 million (2017: €16 million) from the Casebia Group.

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

Gains from the sale of investments in affiliated companies included the income from the sale of our interest in Covestro AG, which was accounted for using the equity method.

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	2017	2018
Interest and similar expenses	**(685)**	**(1,386)**
of which interest expense relating to nonfinancial liabilities	(54)	(92)
Interest and similar income	**272**	**321**
of which interest income relating to nonfinancial assets	96	65
Total	**(413)**	**(1,065)**

The change in the liability of a redeemable noncontrolling interest (IAS 32) is reflected in interest income or expense. In 2018, a €3 million (2017: €49 million) increase in this liability was recognized as interest expense.

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	2017	2018
Expenses		
Interest portion of interest-bearing provisions	(189)	(202)
Exchange gain (loss)	(326)	(271)
Miscellaneous financial expenses	(433)	(256)
Income		
Miscellaneous financial income	5	285
Total	**(943)**	**(444)**

The interest portion of noncurrent provisions comprised €168 million (2017: €191 million) in interest expense for pension and other post-employment benefit provisions and minus €34 million (2017: €2 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 €584 million (2017: €539 million) for the unwinding of discount on the present value of the defined benefit obligation and €416 million (2017: €348 million) in interest income from plan assets.

The miscellaneous financial expenses included €124 million (2017: €210 million) in commitment fees and other fees related to the syndicated bank financing for the acquisition of Monsanto. The €230 million in positive fair value changes (2017: €172 million in negative fair value changes) of the debt instruments (exchangeable bond) issued in June 2017 was recognized in miscellaneous financial income.

11. Taxes

The breakdown of tax expenses by origin was as follows:

B 11/1

Tax Expense by Origin

	2017		2018	
€ million		**Of which income taxes**		**Of which income taxes**
Taxes paid or accrued				
Current income taxes				
Germany	(794)	(794)	(1,210)	(1,210)
Other countries	(737)	(737)	(1,329)	(1,329)
Other taxes				
Germany	(87)		(75)	
Other countries	(118)		(162)	
	(1,736)	**(1,531)**	**(2,776)**	**(2,539)**
Deferred taxes				
from temporary differences	70	70	2,058	2,058
from tax loss and interest carryforwards and tax credits	132	132	(126)	(126)
	202	**202**	**1,932**	**1,932**
Total	**(1,534)**	**(1,329)**	**(844)**	**(607)**

Other taxes mainly included land, vehicle and other indirect taxes and are reflected in the respective functional cost 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

	Dec. 31, 2017		Dec. 31, 2018	
€ million	Deferred tax assets	Deferred tax liabilities	Deferred tax assets	Deferred tax liabilities
Intangible assets	799	1,469	860	6,995
Property, plant and equipment	79	323	451	882
Financial assets	204	81	158	193
Inventories	1,117	15	1,405	214
Receivables	60	464	154	568
Other assets	39	2	177	176
Provisions for pensions and other post-employment benefits	2,520	367	2,792	408
Other provisions	610	64	1,580	54
Liabilities	534	101	831	285
Tax loss and interest carryforwards	486	–	540	–
Tax credits	200	–	483	–
	6,648	**2,886**	**9,431**	**9,775**
of which noncurrent	5,194	2,214	7,159	8,715
Set-off	(1,733)	(1,733)	(5,154)	(5,154)
Total	**4,915**	**1,153**	**4,278**	**4,621**

The use of tax loss carryforwards reduced current income taxes in 2018 by €157 million (2017: €47 million). The use of tax credits reduced current income taxes by €78 million (2017: €16 million).

Of the total tax loss and interest carryforwards of €8,677 million, including interest carryforwards of €174 million (2017: €6,443 million, including interest carryforwards of €148 million), an amount of €4,254 million, including interest carryforwards of €0 million (2017: €2,890 million, including interest carry-forwards of €1 million) is expected to be usable within a reasonable period. The increase in tax loss and interest carryforwards mainly resulted from the transfer of tax loss carryforwards from Monsanto, and from impairments. Deferred tax assets of €540 million (2017: €486 million) were recognized for the amount of tax loss and interest carryforwards expected to be usable.

The use of €4,442 million of tax loss and interest carryforwards, including interest carryforwards of €174 million (2017: €3,553 million, including interest carryforwards of €147 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 €378 million (2017: €351 million) would have been recognized.

Tax credits of €509 million were recognized in 2018 (2017: €200 million) as deferred tax assets. The increase in tax credits was mainly due to the acquisition of Monsanto. The use of €32 million (2017: €28 million) of tax credits was subject to legal or economic restrictions. Consequently, no deferred tax assets were recognized for this amount.

B 11/3

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

€ million	Tax credits Dec. 31, 2017	Tax credits Dec. 31, 2018	Tax loss and interest carryforwards Dec. 31, 2017	Tax loss and interest carryforwards Dec. 31, 2018
Within one year	4	1	17	22
Within two years	–	1	15	105
Within three years	–	2	114	222
Within four years	1	2	28	91
Within five years	19	–	70	69
Thereafter	4	26	3,309	3,913
Total	**28**	**32**	**3,553**	**4,422**

In 2018, subsidiaries that reported losses for 2018 or 2017 recognized net deferred tax assets totaling €1,487 million (2017: €2,303 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.

Deferred tax liabilities of €44 million were recognized in 2018 (2017: €22 million) for planned dividend payments by subsidiaries. Deferred tax liabilities were not recognized for differences on €15,827 million (2017: €18,272 million) of retained earnings of subsidiaries because these earnings are to be reinvested for an indefinite period.

The reconciliation of expected to reported income tax expense (2018: €52 million; 2017: €246 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

	2017 € million	2017 %	2018 € million	2018 %
Expected income tax expense[1] and expected tax rate	**1,083**	**23.7**	**555**	**23.9**
Reduction in taxes due to tax-free income				
Income related to the operating business	(135)	(3.0)	(216)	(9.3)
Income from affiliated companies and divestment proceeds	(16)	(0.3)	(164)	(7.1)
First-time recognition of previously unrecognized deferred tax assets on tax loss and interest carryforwards	(31)	(0.7)	(58)	(2.5)
Use of tax loss and interest carryforwards on which deferred tax assets were not previously recognized	(4)	(0.1)	(11)	(0.5)
Increase in taxes due to non-tax-deductible expenses				
Expenses related to the operating business	168	3.7	215	9.3
Impairment losses on investments in affiliated companies	–	–	14	0.6
New tax loss and interest carryforwards unlikely to be usable	69	1.5	64	2.8
Existing tax loss and interest carryforwards on which deferred tax assets were previously recognized but which are unlikely to be usable	1	–	76	3.3
Tax income (–) and expenses (+) relating to other periods	(128)	(2.8)	(42)	(1.8)
Tax effects of changes in tax rates	384	8.4	(208)	(9.0)
Other tax effects	(62)	(1.4)	382	16.5
Actual income tax expense and effective tax rate	**1,329**	**29.0**	**607**	**26.2**

[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.

The reported tax expense contains a one-time effect in the amount of €175 million that is due 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. The reported tax expense for 2017 contained one-time effects of €455 million in connection with the tax reform in the United States (€409 million from changes in the tax rate and €46 million due to prior-period tax expense).

12. Income/losses attributable to noncontrolling interest

Income attributable to noncontrolling interest amounted to €16 million (2017: €791 million). Losses attributable to noncontrolling interest amounted to €0 million (2017: €33 million). This income primarily related to BCS Limited, India. The income and losses in the prior year were mainly attributable to Covestro.

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 April 2018, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary, for total gross proceeds of €3 billion. The subscription rights of existing stockholders were excluded from this capital increase. In June 2018, a capital increase with subscription rights for existing stockholders was implemented, raising around €6 billion in net proceeds. Approximately 74.6 million new shares were issued.

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 currently applicable minimum conversion price of €83.99. In accordance with the terms, the minimum conversion price had to be adjusted following the payment of the dividend and the capital increase with subscription rights. 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.

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

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Earnings per Share

	€ million		Earnings per share (€)	
	2017	**2018**	**2017**	**2018**
Income after income taxes (attributable to Bayer AG stockholders)	**7,336**	**1,695**	**8.29**	**1.80**
of which income after income taxes from continuing operations (attributable to Bayer AG stockholders)	3,249	1,695	3.67	1.80
of which income after income taxes from discontinued operations (attributable to Bayer AG stockholders)	4,087	–	4.62	–
Weighted average number of shares[1]	**885,186,889**	**940,754,504**		

[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 2018 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, 2017	**14,751**	**12,861**	**10,453**	**1,911**	**1,923**	**1,044**	**1,564**	**44,507**
Acquisitions	24,503	17,152	3,941	845	11	4,637	360	51,449
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	737	498	299	50	(1)	126	24	1,733
December 31, 2018	**39,693**	**30,267**	**14,642**	**3,427**	**1,857**	**5,322**	**2,075**	**97,283**
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	**38,146**	**19,529**	**9,104**	**2,009**	**75**	**5,243**	**786**	**74,892**
Carrying amounts, December 31, 2017	**14,751**	**3,223**	**6,412**	**628**	**87**	**927**	**397**	**26,425**

In the Consumer Health segment, an impairment loss of €1,547 million was recognized on goodwill due especially to a further increase in competition, challenges posed by the transformation of the Consumer Health business as a result of changes in consumer behavior, and a higher cost of capital. Against this backdrop, impairment losses were also recognized on other intangible assets, primarily allergy brands (Claritin™ €584 million, Aerius™ €37 million) and cold medicines (Afrin™ €292 million) acquired in 2014 from Merck & Co. We also recognized impairment losses on skincare brands (Kang Wang™ €78 million and Pi Kang Wang™ €43 million) acquired in 2014 from Dihon Pharmaceutical Group Co. Ltd.

In the Pharmaceuticals segment, impairment losses were recognized in connection with the termination of research and development projects, primarily in the field of ophthalmology (€43 million), oncology (€10 million) and pulmonology/anti-infectives (€8 million).

Details of acquisitions and divestments are provided in Notes [5.2] and [5.3]. The impairment testing procedure for goodwill and other intangible assets is explained in Note [3].

Changes in intangible assets in 2017 were as follows:

B 14/2

Changes in Intangible Assets (Previous Year)

€ 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, 2016	**16,312**	**13,162**	**11,045**	**2,044**	**2,138**	**887**	**2,666**	**48,254**
Acquisitions	51	–	85	–	4	–	–	140
Capital expenditures	–	78	–	54	–	458	167	757
Retirements	–	(61)	(31)	(4)	–	(220)	(365)	(681)
Transfers	–	–	1	45	–	17	(63)	–
Transfers (IFRS 5)	(481)	(123)	(40)	(14)	(118)	(43)	(403)	(1,222)
Divestments/Changes in scope of consolidation	(254)	(31)	(5)	(105)	(96)	–	(322)	(813)
Inflation adjustment (IAS 29)	5	–	–	–	–	–	–	5
Exchange differences	(882)	(164)	(602)	(109)	(5)	(55)	(116)	(1,933)
December 31, 2017	**14,751**	**12,861**	**10,453**	**1,911**	**1,923**	**1,044**	**1,564**	**44,507**
Accumulated amortization and impairments, December 31, 2016	**–**	**9,312**	**3,673**	**1,268**	**2,027**	**235**	**1,860**	**18,375**
Retirements	–	(36)	(20)	(4)	–	(201)	(356)	(617)
Amortization and impairment losses	–	596	580	170	21	98	228	1,693
Amortization	–	596	369	133	21	–	118	1,237
Impairment losses	–	–	211	37	–	98	110	456
Impairment loss reversals	–	–	–	–	–	–	–	–
Transfers	–	–	–	1	–	–	(1)	–
Transfers (IFRS 5)	–	(86)	(39)	(9)	(118)	(2)	(199)	(453)
Divestments/Changes in scope of consolidation	–	(13)	(5)	(77)	(90)	–	(295)	(480)
Exchange differences	–	(135)	(148)	(66)	(4)	(13)	(70)	(436)
December 31, 2017	**–**	**9,638**	**4,041**	**1,283**	**1,836**	**117**	**1,167**	**18,082**
Carrying amounts, December 31, 2017	**14,751**	**3,223**	**6,412**	**628**	**87**	**927**	**397**	**26,425**
Carrying amounts, December 31, 2016	**16,312**	**3,850**	**7,372**	**776**	**111**	**652**	**806**	**29,879**

Goodwill and other intangible assets with an indefinite useful life that are of material significance for the Bayer Group are allocated to the following cash-generating units or unit groups as of the end of the reporting period:

B 14/3

Intangible Assets with an Indefinite Useful Life

Reporting segment	Cash-generating unit/unit group	Goodwill (€ million)	Material intangible assets with indefinite useful life (€ million)
Pharmaceuticals	Pharmaceuticals	7,247	510
Consumer Health	Consumer Care	4,274	32
Crop Science	Crop Science	26,528	4,788
Animal Health	Animal Health	97	21

In the case of research and development projects, the point in time from which a capitalized asset can be expected to generate an economic benefit for the company cannot be determined. Such assets are therefore classified as having an indefinite useful life. Research and development projects were capitalized at a total amount of €5,243 million as of the end of 2018 (2017: €927 million).

Another intangible asset classified as having an indefinite useful life 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.

15. Property, plant and equipment

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

B 15/1

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, 2017	**6,706**	**8,646**	**1,721**	**1,763**	**18,836**
Acquisitions	2,209	2,167	318	961	5,655
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**	**11,333**	**2,036**	**2,895**	**25,459**
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**	**4,639**	**745**	**2,410**	**12,944**
Carrying amounts, December 31, 2017	**3,045**	**2,379**	**465**	**1,744**	**7,633**

Impairment losses on property, plant and equipment amounted to €680 million, including in particular €519 million resulting from the decision regarding Factor VIII facilities in Wuppertal and Berkeley in the Pharmaceuticals segment, along with €132 million pertaining to a Chinese production facility in the Consumer Health segment.

In 2018, borrowing costs of €56 million (2017: €31 million) were capitalized as components of the cost of acquisition or construction of qualifying assets, applying an average interest rate of 3.5% (2017: 2.5%).

Capitalized property, plant and equipment included assets with a total net value of €353 million (2017: €231 million) held under finance leases. The cost of acquisition or construction of these assets as of the closing date totaled €511 million (2017: €368 million). They comprised buildings with a carrying amount of €136 million (2017: €98 million), plant installations and machinery with a carrying amount of €151 million (2017: €75 million), and other property, plant and equipment with a carrying amount of €66 million (2017: €58 million). For information on the liabilities arising from finance leases, see Note [24].

In 2018, rental payments of €565 million (2017: €385 million) were made for assets leased under operating leases as defined in IAS 17 (Leases).

Sublease agreements exist primarily for company cars and accommodation for employees on overseas assignments. Minimum lease payments expected to be received under these subleases in the future amount to €30 million, while the rental expenses thereunder in 2018 amounted to €26 million.

Through its acquisition of Monsanto, Bayer acquired a property that was transferred to the County of St. Louis, Missouri, United States, in 2013 in return for industrial revenue bonds. This property was then leased back to Monsanto through December 31, 2026. A buyback option exists at the end of the rental period. In view of the economic substance of the agreement, the rental payment obligations are netted against the right to receive payment from the industrial revenue bonds in the statement of financial position.

Bayer leases buildings under operating leases, some of which Bayer can extend when the original term of the lease expires. Of these leases, some contain an early termination option that in certain cases involves a compensation payment. Some leases are subject to price adjustments based on the market rates prevailing at the time or due to changes in the value of regional price indices.

Changes in property, plant and equipment in 2017 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, 2016	**10,346**	**20,335**	**2,297**	**2,551**	**35,529**
Acquisitions	–	–	–	–	–
Capital expenditures	286	460	193	1,022	1,961
Retirements	(82)	(304)	(143)	–	(529)
Transfers	282	699	52	(1,033)	–
Transfers (IFRS 5)	(498)	(601)	(66)	(240)	(1,405)
Divestments/Changes in the scope of consolidation	(3,167)	(11,059)	(500)	(455)	(15,181)
Inflation adjustment (IAS 29)	5	–	–	–	5
Exchange differences	(466)	(884)	(112)	(82)	(1,544)
December 31, 2017	**6,706**	**8,646**	**1,721**	**1,763**	**18,836**
Accumulated depreciation and impairments, December 31, 2016	**5,592**	**15,111**	**1,685**	**27**	**22,415**
Retirements	(60)	(280)	(125)	–	(465)
Depreciation and impairment losses	334	893	223	5	1,455
Depreciation	310	860	222	–	1,392
Impairment losses	24	33	1	5	63
Impairment loss reversals	(7)	(6)	–	–	(13)
Transfers	6	4	(1)	(9)	–
Transfers (IFRS 5)	(82)	(214)	(31)	–	(327)
Divestments/Changes in the scope of consolidation	(1,923)	(8,631)	(420)	(1)	(10,975)
Exchange differences	(199)	(610)	(75)	(3)	(887)
December 31, 2017	**3,661**	**6,267**	**1,256**	**19**	**11,203**
Carrying amounts, December 31, 2017	**3,045**	**2,379**	**465**	**1,744**	**7,633**
Carrying amounts, December 31, 2016	**4,754**	**5,224**	**612**	**2,524**	**13,114**

Investment property

The total carrying amount of investment property as of December 31, 2018, was €96 million (December 31, 2017: €97 million). The fair value of this property was €383 million (2017: €336 million). The rental income from investment property was €14 million (2017: €14 million), and the operating expenses directly allocable to this property amounted to €5 million (2017: €4 million).

16. Investments accounted for using the equity method

Five (2017: four) associates and 10 (2017: eight) 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/shareownership2018.

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	2017	2018	2017	2018
Income after income taxes	7	(2)	(48)	(75)
Other comprehensive income after income taxes	28	30	–	–
Total comprehensive income after income taxes	35	28	(48)	(75)
Share of income after income taxes	**1**	**(1)**	**(32)**	**(34)**
Share of total comprehensive income after income taxes	29	17	(32)	(34)
Carrying amount as of December 31	**37**	**95**	**343**	**420**

Information on the Covestro Group

The Covestro Group was deconsolidated at the end of the third quarter of 2017, and, in view of Bayer's remaining significant influence, was then recognized for the first time as an associate and accounted for using the equity method. The equity-method carrying amount recognized at that time was €3.6 billion.

In the first quarter of 2018, Bayer sold 21.0 million shares of Covestro AG to institutional investors at a price of €86.25 per share. In the second quarter of 2018, Bayer sold a further 28.81 million shares of Covestro AG to institutional investors at a price of €75.50. In addition, 13.79 million shares of Covestro AG were acquired from Bayer Pension Trust e. V., which no longer holds any Covestro shares. Bayer AG now holds a 7.5% interest in Covestro to service the exchangeable bond issued in 2017 that matures in 2020. The total gain from the disposals in 2018 amounted to €304 million.

Through May 2018, the Covestro interest was accounted for in the Bayer Group consolidated financial statements as an associate using the equity method. The share disposals outlined in the previous paragraph 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 applied. Since May 2018, Bayer has reported the Covestro interest as an equity instrument, with changes in its fair value recognized through profit and loss.

In 2018, the equity-method income of the Covestro Group amounted to €103 million (2017: €51 million), while its carrying amount was €0 (2017: €3,627 million).

17. Other financial assets

The other financial assets were comprised as follows:

B 17/1

Other Financial Assets

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
LaR[1]	1,718	1,501	–	–
AfS[1]	2,728	1,502	–	–
of which debt instruments	2,463	1,499	–	–
of which equity instruments	265	3	–	–
HtM[1]	57	15	–	–
AC[2]	–	–	430	285
FVTPL[2]	–	–	2,355	665
of which debt instruments	–	–	1,759	665
of which equity instruments	–	–	596	–
FVTOCI[2]	–	–	330	–
of which equity instruments (no recycling)	–	–	330	–
Receivables from derivatives	647	509	253	216
Receivables under lease agreements	13	2	10	–
Total	**5,163**	**3,529**	**3,378**	**1,166**

[1] Measurement category in accordance with IAS 39; applicable until December 31, 2017
AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost
[2] Measurement category in accordance with IFRS 9; applicable as of January 1, 2018
AC: at amortized cost
FVTOCI: at fair value through other comprehensive income
FVTPL: at fair value through profit or loss

The AC category included €270 million (2017, LaR category: €1,390 million) in bank deposits. No material impairment losses were recognized for expected credit losses in 2018.

The debt instruments in the FVTPL category included capital of €643 million (2017, AfS category: €605 million) provided to Bayer-Pensionskasse VVaG (Bayer-Pensionskasse) for its effective initial fund, and jouissance right capital (Genussrechtskapital) of €152 million (2017, AfS category: €152 million), also provided to Bayer-Pensionskasse. Also reported in this category were investments of €598 million (2017, AfS category: €1,497 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:

B 17/2

Equity Instruments Measured at Fair Value Through Other Comprehensive Income

Company name	Fair value as of Dec. 31, 2017[1]	Fair value as of Dec. 31, 2018
CRISPR Therapeutics AG, Switzerland	101	143
Innovative Seed Solutions LLC, U.S.A.	–	41
Flagship Ventures Fund V, L.P., U.S.A.	12	20
Medopad Ltd., U.K.	–	13
Hokusan Co. Ltd., Japan	6	12
Other investments	146	101
Total	**265**	**330**

[1] In 2017, equity instruments were recognized in the AfS category in accordance with IAS 39.

No material equity investments were deconsolidated in 2018 and no material dividends were received.

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

18. Inventories

Inventories were comprised as follows:

B 18/1

Inventories

€ million	Dec. 31, 2017	Dec. 31, 2018
Raw materials and supplies	1,761	2,541
Work in process, finished goods and goods purchased for resale	4,776	7,205
Rights of return	–	85
Advance payments	13	1,130
Total	**6,550**	**10,961**

Inventories increased by €4,411 million, mainly due to the acquisition of Monsanto.

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	2017	2018
Accumulated impairment losses, January 1	**(416)**	**(331)**
Divestments/changes in the scope of consolidation	13	–
Impairment losses in the reporting period	(235)	(240)
Impairment loss reversals or utilization	261	321
Exchange differences	45	24
Transfers (IFRS 5)	1	95
Accumulated impairment losses, December 31	**(331)**	**(131)**

19. Trade accounts receivable

Trade accounts receivable less impairment losses amounted to €11,836 million (2017: €8,582 million) on the closing date and were comprised as follows: This increase was attributable to the acquired Monsanto business. There are significant concentrations in the following regions and countries:

B 19/1

Trade Accounts Receivable

€ million	2017	2018
North America	1,379	3,248
of which U.S.A.	1,291	3,066
Europe/Middle East/Africa	3,488	3,764
of which Germany	1,365	1,202
Asia/Pacific	1,648	2,054
Latin America	2,492	3,413
of which Brazil	1,668	1,952
Trade accounts receivable (before impairments)	**9,007**	**12,479**
Accumulated impairment losses	(425)	(643)
Carrying amount, December 31	8,582	11,836
of which noncurrent	97	665

Noncurrent trade accounts receivable comprised receivables of €540 million in connection with rights to use technologies that were outlicensed to a customer acquired through the acquisition of Monsanto. Beyond this, there are no material concentrations of individual customers.

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

B 19/2

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 receivable 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	6,015	16	6,031
From exchange differences	(276)	(34)	(310)
Gross carrying amounts as of December 31, 2018	**11,867**	**612**	**12,479**

Credit losses on trade accounts receivable were as follows:

B 19/3

Trade Accounts Receivable – Loss Allowances

€ million	Lifetime expected credit losses (collectively assessed)	Trade accounts receivable that are credit-impaired	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
Changes due to write-offs		(27)	(27)
Transfer to loss allowances for credit-impaired trade accounts receivable	(106)	106	–
Other changes:			
From changes in the scope of consolidation	101	16	117
From exchange differences	(19)	(47)	(66)
Loss allowances as of December 31, 2018	**112**	**531**	**643**

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 2018 or 2017, 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 2018 totaled €103 million (2017: €102 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 (2017: €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 (2017: €300 million). Local credit insurance contracts are in place in certain countries for the newly acquired Monsanto business.

A further €992 million (2017: €696 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:

B 20/1

Other Receivables

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
Other tax receivables	554	541	794	734
Deferred charges	298	192	390	344
Reimbursement claims	85	71	84	80
Net defined benefit asset	36	–	84	–
Receivables from employees	47	46	46	46
Miscellaneous receivables	656	426	988	671
Total	**1,676**	**1,276**	**2,386**	**1,875**

Other receivables are stated net of impairment losses of €71 million (2017: €70 million), of which €66 million related to tax reimbursement claims that were impaired in 2018. The prior-year figure included an impairment loss recognized on a receivable in the amount of €67 million from the Venezuelan exchange control authority reflecting the right to receive U.S. dollars at a preferential rate.

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.

Due to the acquisition of Monsanto, the contracted rating agencies have adjusted their ratings and now assess Bayer as follows: S & P Global gives Bayer a long-term rating of BBB and a short-term rating of A-2 with stable outlook. Moody's gives a Baa1 / P-2 with negative outlook and Fitch an A- / F2 with stable 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. Our stated aim is to also achieve the single "A" rating category in the long term from S & P Global Ratings and Moody's.

Apart from utilizing cash inflows from our operating 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 and April 2015, the mandatory convertible notes issued in November 2016, the authorized and conditional capital, and a potential share buyback program.

On April 16, 2018, the Republic of Singapore subscribed to 31 million new Bayer shares through a subsidiary, at an issue price close to market prices (for total gross proceeds of €3.0 billion). This corresponded to around 3.6% of the capital stock as of the acquisition date. The transaction increased Temasek's interest in Bayer AG to approximately 4%. This capital increase against cash contributions excluded the subscription rights of existing shareholders.

On June 3, 2018, with the consent of the Supervisory Board, the Board of Management of Bayer AG resolved to execute a capital increase out of authorized capital against cash contributions and with subscription rights for existing Bayer stockholders. For this purpose, Bayer issued 74,604,156 new registered (no-par value) shares with an entitlement to dividends as of January 1, 2018.

For every 23 Bayer shares they held, stockholders were able to acquire two new shares at a subscription price of €81.00 per new share by way of indirect subscription rights. This option was exercised for 73,343,177 shares. The 1,261,039 shares not subscribed to were purchased by institutional investors at an average placement price of €96.6437 per share under a private placement. After deducting transaction costs, net proceeds totaled €6 billion.

Together with the mandatory convertible notes issued in November 2016, the two capital increases completed the equity component, announced in September 2016, to finance the acquisition of Monsanto.

Capital stock

The capital stock of Bayer AG on December 31, 2018, amounted to €2,387 million (2017: €2,117 million), divided into 932,551,964 (2017: 826,947,808) registered no-par shares, and was fully paid in. Each no-par share confers one voting right.

Authorized and conditional capital

The authorized and conditional capital was comprised as follows:

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Authorized and Conditional Capital

Capital	Resolution	Amount / shares	Expires	Purpose
Authorized capital I	April 29, 2014	€530 million	April 28, 2019	Increase the capital stock by issuing new no-par shares against cash contributions and / or contributions in kind, the latter not to exceed €423 million
Authorized capital II	April 29, 2014	€212 million	April 28, 2019	Increase the capital stock by issuing new no-par shares against cash contributions
Conditional capital	April 29, 2014	€212 million/ up to 82,694,750 no-par shares	April 28, 2019	Increase the capital stock by granting no-par shares to the holders of bonds with warrants or convertible notes, profit participation certificates or income bonds; the authorizations to issue such instruments are limited to a total nominal amount of €6 billion.

Capital increases are effected by issuing new, registered no-par shares. Stockholders must normally be granted subscription rights. However, subscription rights may be excluded under certain conditions stated in the authorization resolution. Absent a further resolution by the Annual Stockholders' Meeting on the exclusion of stockholders' subscription rights, the Board of Management will only use the existing authorizations to increase the capital stock out of the authorized capital or the conditional capital – while excluding stockholders' subscription rights – up to a total amount of 20% of the capital stock that existed when the respective resolutions were adopted by the Annual Stockholders' Meeting on April 29, 2014. All issuances or sales of no-par shares or of bonds with warrants or conversion rights or obligations that are effected while excluding stockholders' subscription rights also count toward this 20% limit. Details of the authorized and conditional capital are provided in the Notice of the Annual Stockholders' Meeting of April 29, 2014, and on the Bayer website.

The capital increase resolved on June 3, 2018, and implemented thereafter entailed the utilization of €191 million out of authorized capital I. The amount of authorized capital I still available as of December 31, 2018, was therefore €339 million.

The capital increase implemented on April 16, 2018, resulted in the utilization of €79 million out of authorized capital II. The amount of authorized capital II still available as of December 31, 2018, was therefore €133 million.

On November 22, 2016, Bayer 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., Netherlands, under the subordinated guarantee of Bayer AG. At maturity, the outstanding amount of the notes will be mandatorily converted into registered no-par shares of Bayer AG. The proceeds were the subject of an intra-Group transfer to Bayer AG. The mandatory convertible notes are reflected in payables to subsidiaries until maturity. The issuance of the mandatory convertible notes constituted a utilization of conditional capital.

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 (until 2017: changes in fair values of available-for-sale financial assets), the revaluation surplus and reserves for the change in the company's own credit risk. In 2018, an amount of €4 million (2017: €4 million) corresponding to the annual amortization / depreciation of the respective assets was transferred from the revaluation surplus to retained earnings.

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 2017. The proposed dividend for the 2018 fiscal year is €2.80 per share, which – based on the current number of shares – would result in a total dividend payment of €2,611 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 2017 and 2018 are shown in the following table:

B 21/2

Changes in Noncontrolling Interest in Equity

€ million	2017	2018
January 1	**1,564**	**60**
Changes in equity not recognized in profit or loss		
Remeasurements of the net liability under defined benefit pension plans	49	(1)
Changes in fair value of cash flow hedges	–	–
Changes in fair value of securities	–	–
Exchange differences on translation of operations outside the eurozone	(155)	(7)
Other changes in equity	(2,025)	108
Dividend payments	(131)	(5)
Income after income taxes	**758**	**16**
December 31	**60**	**171**

As of December 31, 2018, there were two principal subsidiaries with third-party noncontrolling interest holders: Bayer CropScience Limited, India, where the interest and share of voting rights attributable to noncontrolling interest amounted to 31.3% as of December 31, 2018 (December 31, 2017: 31.3%), and the equity attributable to this noncontrolling interest stood at €42 million (2017: €52 million); and Monsanto India Ltd, India, where the interest and share of voting rights attributable to noncontrolling interest amounted to 20.6% as of December 31, 2018, and the equity attributable to this noncontrolling interest stood at €121 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

	Pensions		Other post-employment benefits		Total	
€ million	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018	Dec. 31, 2017	Dec. 31, 2018
Provisions for pensions and other post-employment benefits (net liability)	**7,798**	**8,445**	**222**	**272**	**8,020**	**8,717**
of which Germany	6,778	7,215	–	–	6,778	7,215
of which other countries	1,020	1,230	222	272	1,242	1,502
Net defined benefit asset	**36**	**83**	**–**	**1**	**36**	**84**
of which Germany	22	23	–	–	22	23
of which other countries	14	60	–	1	14	61
Net defined benefit liability	**7,762**	**8,362**	**222**	**271**	**7,984**	**8,633**
of which Germany	6,756	7,192	–	–	6,756	7,192
of which other countries	1,006	1,170	222	271	1,228	1,441

Provisions for pensions and other post-employment benefits in the amount of €389 million were assumed in connection with the acquisition of Monsanto.

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

	Pension plans						Other post-employment benefit plans	
	Germany		Other countries		Total		Other countries	
€ million	2017	2018	2017	2018	2017	2018	2017	2018
Current service cost	312	295	93	132	405	427	13	13
Past service cost	20	11	(3)	(22)	17	(11)	(2)	(6)
of which plan curtailments	–	–	(2)	(48)	(2)	(48)	(2)	(6)
Plan settlements	–	–	8	–	8	–	–	–
Plan administration cost paid out of plan assets	3	3	1	3	4	6	–	–
Net interest	135	124	43	30	178	154	13	14
Total	**470**	**433**	**142**	**143**	**612**	**576**	**24**	**21**

In addition, a total of minus €612 million (2017: €1,236 million) in effects of remeasurements of the net defined benefit liability was recognized in 2018 outside profit or loss. Of this amount, minus €654 million (2017: €1,223 million) related to pension obligations, €34 million (2017: €1 million) to other post-employment benefit obligations, and €8 million (2017: €12 million) to the effects of the asset ceiling. The plan curtailments totaling €54 million (2017: €2 million) were primarily effected in the United States, where they mainly pertained to a former Monsanto plan.

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, 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 due to 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 from 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 due to 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)**

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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, 2017	**(20,962)**	**11,809**	**–**	**(9,153)**
Acquisitions	–	–	–	–
Divestments/changes in the scope of consolidation	3,021	(2,075)	–	946
Current service cost	(368)			(368)
Past service cost	(32)			(32)
Net interest	(358)	208	–	(150)
Net actuarial gain/(loss)	206			206
of which due to changes in financial parameters	180			180
of which due to changes in demographic parameters	(1)			(1)
of which due to experience adjustments	27			27
Return on plan assets excluding amounts recognized as interest income		755		755
Employer contributions		593		593
Employee contributions	(39)	39		–
Payments due to plan settlements	–	–		–
Benefits paid out of plan assets	216	(216)		–
Benefits paid by the company	441			441
Plan administration cost paid from plan assets		(3)		(3)
Reclassification to current assets/liabilities held for sale	38	(29)		9
December 31, 2017	**(17,837)**	**11,081**	**–**	**(6,756)**
Other countries				
January 1, 2017	**(8,033)**	**6,127**	**(49)**	**(1,955)**
Acquisitions	–	–	–	–
Divestments/changes in the scope of consolidation	840	(589)	3	254
Current service cost	(109)			(109)
Past service cost	8			8
Gains/(losses) from plan settlements	(8)			(8)
Net interest	(244)	183	(3)	(64)
Net actuarial gain/(loss)	(166)			(166)
of which due to changes in financial parameters	(191)			(191)
of which due to changes in demographic parameters	21			21
of which due to experience adjustments	4			4
Return on plan assets excluding amounts recognized as interest income		429		429
Remeasurement of asset ceiling			12	12
Employer contributions		125		125
Employee contributions	(14)	14		–
Payments due to plan settlements	32	(41)		(9)
Benefits paid out of plan assets	300	(300)		–
Benefits paid by the company	94			94
Plan administration costs paid out of plan assets		(1)		(1)
Reclassification to current assets/liabilities held for sale	10	(8)	–	2
Exchange differences	635	(481)	6	160
December 31, 2017	**(6,655)**	**5,458**	**(31)**	**(1,228)**
of which other post-employment benefits	(671)	449		(222)
Total, December 31, 2017	**(24,492)**	**16,539**	**(31)**	**(7,984)**

Covestro is included in the net defined benefit liability.

The benefit obligations pertained mainly to Germany (68%; 2017: 73%), the United States (19%; 2017: 12%) and the United Kingdom (7%; 2017: 8%). In Germany, current employees accounted for about 43% (2017: 43%), retirees or their surviving dependents for about 50% (2017: 50%) and former employees with vested pension rights for about 7% (2017: 7%) of entitlements under defined benefit plans. In the United

States, current employees accounted for about 30% (2017: 21%), retirees or their surviving dependents for about 56% (2017: 65%) and former employees with vested pension rights for about 14% (2017: 14%) of entitlements under defined benefit plans.

The actual return on the assets of defined benefit plans for pensions or other post-employment benefits amounted to minus €537 million (2017: €1,517 million) and minus €24 million (2017: €58 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.

B 22/5

Defined Benefit Obligation and Funded Status

	Pension obligation		Other post-employment benefit obligation		Total	
€ million	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Defined benefit obligation	**23,821**	**25,869**	**671**	**700**	**24,492**	**26,569**
of which unfunded	1,117	1,244	64	136	1,181	1,380
of which funded	22,704	24,625	607	564	23,311	25,189
Funded status of funded obligations						
Overfunding	67	106	–	1	67	107
Underfunding	6,681	7,196	158	136	6,839	7,332

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. 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 within master trusts 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 benefit obligations	
	Germany		Other countries		Other countries	
€ million	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Plan assets based on quoted prices in active markets						
Real estate and special real estate funds	–	–	181	214	16	15
Equities and equity funds	3,617	1,988	1,739	2,443	158	146
Callable debt instruments	–	–	27	27	–	–
Noncallable debt instruments	–	–	602	565	127	124
Bond funds	3,737	4,777	1,631	2,592	94	93
Derivatives	11	10	–	3	–	–
Cash and cash equivalents	164	611	74	77	13	9
Other	–	–	–	25	–	–
	7,529	**7,386**	**4,254**	**5,946**	**408**	**387**
Plan assets for which quoted prices in active markets are not available						
Real estate and special real estate funds	496	514	179	296	–	–
Equities and equity funds	121	143	71	69	–	–
Callable debt instruments	1,399	1,241	–	–	–	–
Noncallable debt instruments	1,394	1,366	–	–	–	–
Bond funds	–	–	74	73	–	–
Derivatives	–	–	–	–	–	–
Other	142	106	431	390	41	42
	3,552	**3,370**	**755**	**828**	**41**	**42**
Total plan assets	**11,081**	**10,756**	**5,009**	**6,774**	**449**	**429**

The fair value of plan assets in Germany included real estate leased by Group companies, recognized at a fair value of €82 million (2017: €82 million), and Bayer AG shares and bonds held through investment funds, recognized at their fair values of €21 million (2017: €37 million) and €6 million (2017: €3 million), respectively.

In May 2018, Bayer AG acquired 6.8% of Covestro shares from Bayer Pension Trust e. V. (BPT) at market value for a total amount of €1.1 billion to service the exchangeable bond that matures in 2020.

In 2018, Bayer AG did not deposit any additional shares it held in Covestro AG with BPT (2017: 8 million). The market value of BPT's total shareholding in Covestro AG amounted to €0 million as of December 31, 2018 (2017: €1,549 million).

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, 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	
%	2017	2018	2017	2018	2017	2018
Pension obligations						
Discount rate	1.90	1.90	2.95	3.55	2.15	2.40
of which U.S.A.			3.40	4.20	3.40	4.20
of which U.K.			2.50	2.80	2.50	2.80
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

In Germany the Heubeck RT 2018 G mortality tables were used, in the United States the RP-2014 Mortality Tables, and in the United Kingdom 95% of S1NXA.

In Germany, the RT 2005 G tables had been used in previous years. However, we switched to the new RT 2018 G tables when they were published as we believe that the resulting measurement reflects the economic impact on the respective closing date more accurately than measurement based on the RT 2005 G tables. If we had not switched to the RT 2018 G tables, provisions would have been €232 million lower.

Until May 2018, we applied the Macaulay Duration method when determining the discount rate for measuring pension obligations. However, Bayer decided to switch to the uniform discount rate method in June 2018 because it is used more frequently in the market and is mathematically superior. As of December 31, 2018, both methods resulted in a discount rate of 1.90%.

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	
%	2017	2018	2017	2018	2017	2018
Pension obligations						
Discount rate	1.80	1.90	3.25	2.95	2.15	2.15
Projected future salary increases	2.75	2.75	3.50	3.60	2.95	2.95
Projected future benefit increases	1.50	1.70	3.35	3.25	1.95	2.10
Other post-employment benefit obligations						
Discount rate	–	–	4.35	4.25	4.35	4.25

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 (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 2018 as follows:

B 22/9

Sensitivity of Benefit Obligations

	Germany		Other countries		Total	
€ million	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

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Sensitivity of Benefit Obligations (prior year)

	Germany		Other countries		Total	
€ million	Increase	Decrease	Increase	Decrease	Increase	Decrease
Pension obligations						
0.5%-pt. change in discount rate	(1,417)	1,620	(414)	468	(1,831)	2,088
0.5%-pt. change in projected future salary increases	87	(82)	50	(47)	137	(129)
0.5%-pt. change in projected future benefit increases	921	(841)	146	(110)	1,067	(951)
10% change in mortality	(587)	660	(172)	176	(759)	836
Other post-employment benefit obligations						
0.5%-pt. change in discount rate	–	–	(36)	39	(36)	39
10% change in mortality	–	–	(20)	22	(20)	22

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 6.3% (2017: 6.5%), which should gradually decline to 5.0% by 2023 (assumption in 2017: 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 one percentage point		Decrease of one percentage point	
	2017	**2018**	**2017**	**2018**
Impact on other post-employment benefit obligations	55	47	(47)	(41)
Impact on benefit expense	3	3	(3)	(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			Other countries		
	2017	**2018**	**2019 expected**	**2017**	**2018**	**2019 expected**
Pension obligations	593	141	132	146	90	79
Other post-employment benefit obligations	–	–	–	(21)	(15)	2
Total	**593**	**141**	**132**	**125**	**75**	**81**

Bayer has currently committed to make deficit contributions for its U.K. pension plans of approximately GBP27 million annually through 2023. For its U.S. pension plans, Bayer made payments of US$50 million in 2018 and expects to make zero or only minor payments in 2019 as most 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				Payments by the company			
	Pensions		Other post-employment benefits		Pensions		Other post-employment benefits	
	Germany	**Other countries**	**Other countries**	**Total**	**Germany**	**Other countries**	**Other countries**	**Total**
2019	206	418	24	648	443	140	28	611
2020	209	423	23	655	444	109	27	580
2021	213	433	25	671	450	93	26	569
2022	217	439	26	682	456	96	25	577
2023	222	436	26	684	460	97	26	583
2024–2028	1,172	2,184	139	3,495	2,340	502	140	2,982

The weighted average term of the pension obligations is 17.0 years (2017: 17.0 years) in Germany and 12.8 years (2017: 13.8 years) in other countries. The weighted average term of the obligations for other post-employment benefits in other countries is 10.5 years (2017: 11.5 years).

23. Other provisions

Changes in the various provision categories in 2018 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, 2017	**29**	**243**	**171**	**2,481**	**393**	**2,038**	**355**	**5,710**
Reclassification to refund liabilities	–	–	–	(2,427)	–	–	–	(2,427)
Reclassification to inventories	–	–	–	76	–	–	–	76
Acquisitions	–	480	33	275	596	258	339	1,981
Additions	21	57	720	732	661	2,553	626	5,370
Utilization	(7)	(41)	(122)	(524)	(228)	(1,803)	(168)	(2,893)
Reversal	(6)	(6)	(30)	(108)	(25)	(551)	(108)	(834)
Reclassification to current liabilities	–	–	(1)	–	–	(14)	–	(15)
Interest cost	–	6	–	–	4	3	3	16
Exchange differences	(2)	15	2	6	13	13	2	49
December 31, 2018	**35**	**754**	**773**	**511**	**1,414**	**2,497**	**1,049**	**7,033**
of which current	15	88	230	499	445	1,765	644	3,686

The provisions were partly offset by claims for refunds in the amount of €74 million (2017: €74 million), which were recognized as receivables. These claims predominantly related to product liability.

Restructuring

Provisions for restructuring included €691 million (2017: €116 million) for severance payments and €82 million (2017: €55 million) for other restructuring expenses, which mainly comprised other costs related to the closure of research or production facilities. The breakdown of provisions by segment was as follows: €351 million at Pharmaceuticals (2017: €45 million), €57 million at Consumer Health (2017: €33 million), €240 million at Crop Science (2017: €73 million), €6 million at Animal Health (2017: €6 million) and €119 million at Corporate Functions / All Other Segments (2017: €14 million).

In connection with an extensive restructuring program, provisions were established in almost all segments in 2018. The aim of this program is to strengthen Bayer's core businesses, adjust structures and enhance productivity and profitability by implementing a series of measures through 2022. Provisions were established in 2018 for programs that have been communicated in sufficient detail. Further provisions are anticipated for 2019.

In the Pharmaceuticals segment, provisions were primarily established in view of the planned reorganization of R&D. By integrating research and development into a joint organization, Bayer is looking to enhance value and productivity within the Pharmaceuticals portfolio.

Provisions were also established for the hemophilia business. Due to a significant increase in competition, the factor VIII facility in Wuppertal will not be utilized and the production of all recombinant factor VIII products will in the future be focused in Berkeley, California, United States, where work has already begun on the corresponding restructuring measures for our biotechnology products to enhance production process efficiency.

At Consumer Health, a comprehensive restructuring program called "Fit to Win" was launched to make 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.

In the Crop Science segment, provisions were established in connection with the restructuring of the distribution organization and the crop protection business in France. In Germany, the focus was on organizational adjustments due to the integration of Monsanto. The restructuring measures implemented in previous years at the Institute site in West Virginia, United States, in connection with the termination of thiodicarb production have for the most part been completed.

Appropriate accounting measures were also taken in the Corporate Functions segment in connection with planned restructuring as part of the integration of Monsanto.

Litigations

The legal risks currently considered to be material, and their development, are described in Note [29].

Personnel commitments

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 vis-à-vis the respective employee group. 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 I	Aspire II	Aspire 2.0	Total
December 31, 2017	**6**	**35**	**263**	**304**
Acquisitions/divestments	–	–	–	–
Additions	20	42	279	341
Utilization	(5)	(29)	(8)	(42)
Reversal	(22)	(48)	(254)	(324)
Exchange differences	1	–	9	10
December 31, 2018	**–**	**–**	**289**	**289**

The value of the Aspire tranches that were fully earned at the end of 2018 amounted to €0 million (2017: €34 million). As such, no payment was made in January 2019.

The net expense for all stock-based compensation programs was €21 million (2017: €194 million), including €5 million (2017: €5 million) for the BayShare stock participation program and income of €1 million (2017: expense of €1 million) pertaining to grants of virtual Bayer shares. See Note [27.3] for information on the hedging of obligations under stock-based employee compensation programs.

The fair value of the obligations under the Aspire I and Aspire II programs was calculated using the Monte Carlo simulation method based on the following key parameters:

B 23/3

Parameters for Monte Carlo Simulation

	2017	2018
Dividend yield	2.46%	3.60%
Risk-free interest rate	(0.35)%	(0.46)%
Volatility of Bayer stock	15.49%	33.26%
Volatility of EURO STOXX 50	9.27%	16.94%
Correlation between Bayer stock price and the EURO STOXX 50	0.71	0.76

Long-term incentive program for members of the Board of Management and other senior executives (Aspire I)

Between 2005 and 2015, members of the Board of Management and other senior executives were entitled to participate in Aspire I on the condition that they purchased a certain number of Bayer shares – determined for each individual according to specific guidelines – and retained them for the full term of the program. A percentage of the executive's annual base salary – according to their position – was defined as a target for variable payments (Aspire target opportunity). Depending on the performance of Bayer stock, both in absolute terms and relative to the EURO STOXX 50 index over a four-year performance period, participants receive a payment of up to 300% of their individual Aspire target opportunity at the end of the period. At the start of 2018, a payment of 20% was made for the tranche issued in 2014. No payment was made for the final tranche issued in 2015.

Long-term incentive program for middle management (Aspire II)

From 2005 through 2015, other senior managers were offered Aspire II, which was similar to Aspire I but did not require a personal investment in Bayer shares. The amount of the payment is based entirely on the absolute performance of Bayer stock over a four-year period. The maximum payment is 250% of each manager's Aspire target opportunity. At the start of 2018, a payment of 40% was made for the tranche issued in 2014. No payment was made for the final tranche issued in 2015.

Long-term incentive program Aspire 2.0

Since 2016, Aspire has been offered to all eligible employees in a new, standardized format named Aspire 2.0. 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. Aspire 2.0 is also 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 payment factor for the previous year to give the Aspire grant value. The STI payment factor reflects the employee's individual performance and the business performance under the global short-term incentive program (STI). 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. 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.

BayShare 2018

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 2018 was 20% (2017: 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 (2017: €2,500) or €5,000 (2017: €5,000), depending on the employee's position. These shares must be retained until December 31, 2019.

In 2018, employees purchased a total of about 369,000 shares (2017: 229,000 shares) under the BayShare program.

24. Financial liabilities

Financial liabilities were comprised as follows:

B 24/1

Financial Liabilities

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
Bonds and notes/promissory notes	12,436	505	35,402	2,302
Liabilities to banks	534	513	4,865	606
Liabilities under finance leases	238	32	399	50
Liabilities from derivatives	240	221	172	172
Other financial liabilities	970	664	556	552
Total	**14,418**	**1,935**	**41,394**	**3,682**

The financial liabilities of the Bayer Group increased by €27 billion in 2018, mainly due to the acquisition of Monsanto.

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

B 24/2

Maturities of Financial Liabilities

€ million	Dec. 31, 2017	€ million	Dec. 31, 2018
2018	1,935	2019	3,682
2019	2,155	2020	1,043
2020	1,248	2021	9,035
2021	2,096	2022	2,062
2022	89	2023	3,558
2023 or later	6,895	2024 or later	22,014
Total	**14,418**	**Total**	**41,394**

In addition to promissory notes in the amount of €45 million (2017: €45 million), the Bayer Group has issued the following bonds and notes:

B 24/3

Bonds and Notes

	Nominal volume as of Dec. 31, 2017	Carrying amount as of Dec. 31, 2017 € million	Nominal volume as of Dec. 31, 2018	Carrying amount as of Dec. 31, 2018 € million
Hybrid bonds[1]				
Hybrid bond 2014/2024[2]/2074	EUR 1,500 million	1,495	EUR 1,500 million	1,496
Hybrid bond 2015/2022[2]/2075	EUR 1,300 million	1,292	EUR 1,300 million	1,293
Hybrid bond 2014/2020[2]/2075	EUR 1,750 million	1,746	EUR 1,750 million	1,748
Mandatory convertible notes[1]/exchangeable bond[1]				
Mandatory convertible notes[3] 2016/2019	EUR 4,000 million	–	EUR 4,000 million	–
Exchangeable bond[4] 2017/2020	EUR 1,000 million	1,220	EUR 1,000 million	996
USD bonds[1, 5]				
Maturity < 1 year	–	–	USD 2,500 million	2,178
Maturity > 1 year < 5 years	USD 3,500 million	2,909	USD 8,250 million	7,160
Maturity > 5 years	USD 2,100 million	1,751	USD 16,414 million	14,031
EUR bonds[1, 5]				
Maturity < 1 year	–	–	–	–
Maturity > 1 year < 5 years	EUR 750 million	753	EUR 3,000 million	2,996
Maturity > 5 years	EUR 500 million	498	EUR 3,250 million	3,222
JPY bonds[1]				
Maturity < 1 year	JPY 15 billion	111	JPY 10 billion	79
Maturity > 1 year < 5 years	JPY 30 billion	222	JPY 20 billion	158
Maturity > 5 years	–	–	–	–
GBP bonds[1]				
Maturity < 1 year	GBP 350 million	394	GBP 350 million	–
Total		**12,391**		**35,357**

[1] The bonds are issued in the functional currency of the issuing entity (except GBP bonds) and mainly have a fixed coupon.
[2] Date of first option to early redeem the bond at par
[3] The mandatory convertible notes were allocated to capital reserves and to other financial liabilities.
[4] Bond can be redeemed in cash, Covestro shares or a combination thereof
[5] Bonds with a nominal volume of USD2,500 million and €750 million have a variable rate.

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.

Mandatory convertible notes

On November 22, 2016, Bayer Capital Corporation B.V. placed subordinated mandatory convertible notes in the amount of €4,000 million, which will be converted into no-par shares of Bayer AG at maturity. The mandatory convertible notes were recognized in capital reserves and other financial liabilities.

Exchangeable bond

On June 14, 2017, Bayer AG issued bonds with a nominal value of €1 billion which mature in 2020. The issue price was 105.25% of the principal amount and the initial exchange price was fixed at €80.93. These bonds can be settled in cash, by delivery of Covestro shares or by a combination thereof at or prior to maturity. The debt instruments were designated as financial liabilities at fair value through profit or loss upon first-time recognition. As of December 31, 2018, the fair value was €1 billion, and Bayer AG held 13.8 million Covestro shares with a fair value of €0.6 billion. Assuming repayment is made in Covestro shares, Bayer AG would have to make an additional payment of €0.4 billion.

Other bonds

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 under finance leases

Lease payments totaling €557 million (2017: €365 million), including €158 million (2017: €127 million) in interest, are to be made under finance leases to the respective lessors in future years.

The liabilities under finance leases mature as follows:

B 24/4

Lease Liabilities

€ million			Dec. 31, 2017	€ million			Dec. 31, 2018
Maturity	**Lease payments**	**Interest component**	**Liabilities under finance leases**	Maturity	**Lease payments**	**Interest component**	**Liabilities under finance leases**
2018	49	17	32	2019	71	21	50
2019	44	13	31	2020	59	16	43
2020	39	12	27	2021	51	14	37
2021	31	11	20	2022	43	13	30
2022	25	10	15	2023	32	12	20
2023 or later	177	64	113	2024 or later	301	82	219
Total	**365**	**127**	**238**	**Total**	**557**	**158**	**399**

Other financial liabilities

Other financial liabilities as of December 31, 2018, included €309 million (2017: €525 million) relating to the mandatory convertible notes issued in November 2016. Other financial liabilities as of December 31, 2017, included commercial paper in the amount of €292 million.

Other information

The increase in liabilities to banks mainly resulted from the utilization of the bridge financing for the acquisition of Monsanto. The outstanding acquisition financing as of December 31, 2018, amounted to US$4.9 billion.

As of December 31, 2018, the Group had undrawn credit facilities at its disposal totaling €4.5 billion (2017: €47 billion, of which €43 billion comprised bridge financing for the Monsanto acquisition).

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

The development of financial liabilities is outlined in Note [30].

25. Trade accounts payable

Trade accounts payable comprised €5,380 million (2017: €5,116 million) due within one year and €34 million (2017: €13 million) due after one year.

26. Other liabilities

Other liabilities comprised the following:

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Other Liabilities

€ million	Dec. 31, 2017 Total	Dec. 31, 2017 Of which current	Dec. 31, 2018 Total	Dec. 31, 2018 Of which current
Other tax liabilities	420	418	654	653
Deferred income	1,156	195	65	19
Liabilities to employees	181	164	252	231
Liabilities for social expenses	138	130	141	136
Accrued interest on liabilities	149	139	268	257
Liabilities from derivatives	321	306	327	165
Miscellaneous liabilities	403	300	764	661
Total	**2,768**	**1,652**	**2,471**	**2,122**

The deferred income included €30 million (2017: €48 million) in grants and subsidies received from governments, of which €3 million (2017: €17 million) was reversed through profit or loss.

Other miscellaneous liabilities included financing commitments of US$141 million (2017: US$195 million) for the joint venture Casebia Therapeutics LLP, United Kingdom, established in December 2015 with CRISPR Therapeutics AG, Switzerland, and a further financing commitment of US$60 million (2017: US$70 million) for the joint venture Joyn Bio LLC, United States, established in September 2017 with Ginkgo Bioworks, Inc., United States, which will operate in the area of the plant microbiome.

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.”

The transition effects from the reclassification and remeasurement of financial assets upon the first-time application of IFRS 9 are detailed in Note [2] “Effects of new financial reporting standards.”

B 27.1/1

Carrying Amounts and Fair Values of Financial Instruments

						Dec. 31, 2018
	Carried at amortized cost	Carried at fair value [fair value for information[5]]			Nonfinancial assets/ liabilities	
Measurement category (IFRS 9)[1]		Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobservable inputs (Level 3)		
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount in the statement of financial position**
Trade accounts receivable	11,686				150	11,836
AC	11,686					11,686
Nonfinancial assets					150	150
Other financial assets	440	1,584	241	1,113		3,378
AC	440		[441]			440
FVTPL[2]		1,432	28	895		2,355
FVTOCI (no recycling)[3]		144		186		330
Derivatives that qualify for hedge accounting			101			101
Derivatives that do not qualify for hedge accounting		8	112	32		152
Other receivables	516			42	1,828	2,386
AC	516		[516]			516
FVTPL[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	**16,694**	**1,584**	**241**	**1,155**		**19,674**
of which AC	16,694					16,694
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)[4]		996				996
Derivatives that qualify for hedge accounting			35			35
Derivatives that do not qualify for hedge accounting			137			137
Trade accounts payable	5,414					5,414
AC	5,414					5,414
Other liabilities	1,136	7	320	20	988	2,471
AC	1,136		[1,136]			1,136
FVTPL (nonderivative)[4]				20		20
Derivatives that qualify for hedge accounting			297			297
Derivatives that do not qualify for hedge accounting		7	23			30
Nonfinancial liabilities					988	988
Total financial liabilities	**46,776**	**1,003**	**492**	**20**		**48,291**
of which AC	46,776					46,776
of which FVTPL (nonderivative)		996		20		1,016
of which derivatives that qualify for hedge accounting			332			332
of which derivatives that do not qualify for hedge accounting		7	160			167

[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 in accordance with paragraph 5.7.5 of IFRS 9
[4] Designated as FVTPL upon first-time recognition in accordance with 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 financial liabilities also include receivables and liabilities under finance leases in which Bayer is the lessor or lessee and which are therefore measured in accordance with IAS 17.

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 the creditworthiness of the counterparty. 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 value adjustments are determined to allow for the contracting party's credit risk.

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.

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. 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 financial liabilities arising from the debt instruments (exchangeable bond) issued in June 2017 that can be converted into Covestro shares are measured at fair value through profit or loss. This exchangeable 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 the Covestro interest as an equity instrument. Changes in its 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 27.1/2

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 statements 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/changes in scope of consolidation	–	(4)	–	1	(3)
Carrying amounts (net), December 31, 2018	**937**	**186**	**32**	**(20)**	**1,135**

[1] See table B 27.1/1 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 27.1/3

Income, Expense, Gains and Losses on Financial Instruments

2018

€ million	Assets – AC[1]	Assets – FVTPL[1]	FVTOCI[1] (no recycling)	Derivatives that do not qualify for hedge accounting	Liabilities – AC[1]	Liabilities – FVTPL[1] (non-derivative)	Total
Interest income	111	95	–	–	50	–	256
Interest expense	(65)	–	–	(2)	(1,226)	(1)	(1,294)
Income/expenses from affiliated companies	–	–	–	–	–	–	–
Changes in fair value	–	(444)	–	41	–	230	(173)
Impairment losses	(200)	–	–	–	–	–	(200)
Impairment loss reversals	185	–	–	–	–	–	185
Exchange gains/losses	249	–	–	87	(497)	–	(161)
Gains/losses from retirements	–	–	–	–	–	–	–
Other financial income/expenses	(17)	6	–	–	(15)	(2)	(28)
Net result	**263**	**(343)**	**–**	**126**	**(1,688)**	**227**	**(1,415)**

[1] See table B 27.1/1 for definition 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 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.

The changes of €230 million (2017: negative changes of €172 million) in the fair value of (nonderivative) liabilities within the FVTPL category contain fair value adjustments pertaining to the debt instruments (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 €166 million (2017: €654 million), and the volume with negative fair values was €455 million (2017: €520 million). Included here is an amount of €104 million (2017: €312 million) in positive and negative fair values of derivatives concluded with the same contracting party.

The following table shows the carrying amounts and fair values of financial assets and liabilities by category of financial instrument for the comparative period under IAS 39.

B 27.1/4

Carrying Amounts and Fair Values of Financial Instruments

	Dec. 31, 2017					
	Carried at amortized cost	Carried at fair value [fair value for information[2]]			Nonfinancial assets/liabilities	
Measurement category (IAS 39)[1]		Based on quoted prices in active markets (Level 1)	Based on observable market data (Level 2)	Based on unobservable inputs (Level 3)		
€ million	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount**	**Carrying amount in the statement of financial position**
Trade accounts receivable	8,582					8,582
LaR	8,582					8,582
Other financial assets	1,823	452	2,085	803		5,163
LaR	1,731		[1,731]			1,731
AfS	35	448	1,452	793		2,728
HtM	57		[58]			57
Derivatives that qualify for hedge accounting			296			296
Derivatives that do not qualify for hedge accounting		4	337	10		351
Other receivables	380			46	1,250	1,676
LaR	380		[380]			380
AfS				46		46
Nonfinancial assets					1,250	1,250
Cash and cash equivalents	7,581					7,581
LaR	7,581		[7,581]			7,581
Total financial assets	**18,366**	**452**	**2,085**	**849**		**21,752**
of which LaR	18,274					18,274
of which AfS	35	448	1,452	839		2,774
Financial liabilities	12,958	1,220	240			14,418
Carried at amortized cost	12,958	[11,327]	[2,183]			12,958
Carried at fair value (nonderivative)		1,220				1,220
Derivatives that qualify for hedge accounting			187			187
Derivatives that do not qualify for hedge accounting			53			53
Trade accounts payable	4,568				561	5,129
Carried at amortized cost	4,568					4,568
Nonfinancial liabilities					561	561
Other liabilities	681	2	319	7	1,759	2,768
Carried at amortized cost	681		[681]			681
Carried at fair value (nonderivative)				7		7
Derivatives that qualify for hedge accounting			288			288
Derivatives that do not qualify for hedge accounting		2	31			33
Nonfinancial liabilities					1,759	1,759
Total financial liabilities	**18,207**	**1,222**	**559**	**7**		**19,995**
of which at amortized cost	18,207					18,207
of which derivatives that qualify for hedge accounting			475			475
of which derivatives that do not qualify for hedge accounting		2	84			86

[1] AfS: available for sale; at fair value through other comprehensive income
HtM: held to maturity; at amortized cost
LaR: loans and receivables; at amortized cost

[2] Fair value of the financial instruments at amortized cost under IFRS 7. Paragraph 29(a)

The following table shows the changes in the financial assets and liabilities recognized at fair value based on unobservable inputs (Level 3) for each financial instrument category for the comparative period under IAS 39:

B 27.1/5

Development of Financial Assets and Liabilities (Level 3)

€ million	AfS[1]	Derivatives (net)	Liabilities – at fair value (nonderivative)	Total
Carrying amounts (net), January 1, 2017	**851**	**(8)**	**(8)**	**835**
Gains (losses) recognized in profit or loss	15	21	–	36
of which related to assets/liabilities recognized in the statements of financial position	15	21	–	36
Gains (losses) recognized outside profit or loss	(16)	–	–	(16)
Additions of assets/(liabilities)	6	–	–	6
Settlements of (assets)/liabilities	(17)	–	1	(16)
Disposals from divestments/changes in scope of consolidation	–	(3)	–	(3)
Carrying amounts (net), December 31, 2017	**839**	**10**	**(7)**	**842**

[1] See table 27.1/4 for definition of measurement category.

The following table shows the income, expense, gains and losses on financial instruments for the comparative period under IAS 39:

B 27.1/6

Income, Expense, Gains and Losses on Financial Instruments

	2017						
€ million	LaR[1]	HtM[1]	AfS[1]	Held for trading	Liabilities – at amortized cost	Liabilities – at fair value (non-derivative)	Total
Interest income	61	–	37	–	78	–	176
Interest expense	–	–	–	(3)	(628)	–	(631)
Income/expenses from affiliated companies	–	–	2	–	–	–	2
Changes in fair value	–	–	–	17	–	(172)	(155)
Impairment losses	(139)	–	(1)	–	–	–	(140)
Impairment loss reversals	23	–	5	–	–	–	28
Exchange gains/losses	(733)	–	–	(232)	620	–	(345)
Gains/losses from retirements	–	–	5	–	–	–	5
Other financial income/expenses	(14)	–	(7)	–	–	–	(21)
Net result	**(802)**	**–**	**41**	**(218)**	**70**	**(172)**	**(1,081)**

[1]See table 27.1/4 for definition of measurement categories.

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 (2017: €1,005 million) portion of the effective initial fund of Bayer-Pensionskasse VVaG, which may result in further payments by Bayer AG in subsequent years.

B 27.2/1

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2018 Carrying amount	2019	2020	2021	2022	2023	after 2023
		Interest and repayment					
Refund liabilities	3,789	3,622	152	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	5,414	5,380	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 that qualify for hedge accounting	332	172	66	70	26	–	–
Derivatives that do not qualify for hedge accounting	167	167	–	–	–	–	–
Receivables from derivatives							
Derivatives that qualify for hedge accounting	101	42	9	3	–	–	–
Derivatives that do not qualify for hedge accounting	152	121	(1)	(10)	–	–	–
Loan commitments	–	965	–	–	–	–	–
Financial guarantees	–	–	–	–	–	–	–

B 27.2/2

Maturity Analysis of Financial Instruments

€ million	Dec. 31, 2017 Carrying amount	2018	2019	2020	2021	2022	after 2022
		Interest and repayment					
Financial liabilities							
Bonds and notes/promissory notes	12,436	719	2,096	1,487	2,288	236	7,125
Liabilities to banks	534	527	20	–	–	–	–
Remaining liabilities	1,208	716	359	40	32	26	177
Trade accounts payable	4,568	4,555	11	2	–	–	–
Other liabilities							
Accrued interest on liabilities	149	140	1	1	1	1	5
Remaining liabilities	539	455	66	3	2	2	11
Liabilities from derivatives							
Derivatives that qualify for hedge accounting	475	443	34	–	6	–	–
Derivatives that do not qualify for hedge accounting	86	88	1	2	–	–	–
Receivables from derivatives							
Derivatives that qualify for hedge accounting	296	144	62	17	2	–	–
Derivatives that do not qualify for hedge accounting	351	331	4	1	1	–	–
Loan commitments	–	1,005	–	–	–	–	–
Financial guarantees	–	12	–	–	–	–	–

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. A bond of Bayer AG denominated in British pounds was swapped on the issuance date into a fixed-rate euro bond by means of a cross-currency interest-rate swap, which was designated as a cash flow hedge. Cross-currency interest-rate swaps used to hedge intra-Group loans were also designated as cash flow hedges.

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.

Foreign currency risks related to the acquisition of Monsanto Company were partially hedged with currency derivatives designated as cash flow hedges. The fair value of these derivatives was reclassified from other comprehensive income to goodwill in the statement financial position as of the acquisition date.

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. The carrying amount of this bond as of December 31, 2018, was €747 million. A hedge-related fair value adjustment of €6 million resulted in the carrying amount increasing to €753 million. No material ineffective portions of hedges required recognition through profit or loss in 2018 or 2017.

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.

The carrying amount of inventories designated as the hedged item in fair value hedges was €63 million as of December 31, 2018. A hedge-related fair value adjustment of minus €11 million reduced the carrying amount to €52 million. No material ineffective portions of hedges required recognition through profit or loss in 2018.

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 increased by €125 million in 2018 (2017: decreased by €144 million) due to changes in the fair values of derivatives. Total changes of €124 million in the fair values of derivatives were expensed in 2018 (2017: €3 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 compen-sation 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**

No material ineffective portions of hedges required recognition through profit or loss in 2018.

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

€ million	Dec. 31, 2017 Notional amount[1]	Positive fair value	Negative fair value	Dec. 31, 2018 Notional amount[1]	Positive fair value	Negative fair value
Currency hedging of recorded transactions[2,3]	**12,321**	**233**	**(240)**	**18,165**	**129**	**(172)**
Forward exchange contracts	10,399	144	(53)	16,942	83	(137)
Cross-currency interest-rate swaps	1,922	89	(187)	1,223	46	(35)
of which cash flow hedges	1,880	87	(187)	1,198	45	(35)
Currency hedging of forecasted transactions[2,4]	**9,475**	**116**	**(194)**	**4,233**	**35**	**(70)**
Forward exchange contracts	9,292	105	(194)	4,169	35	(69)
of which cash flow hedges	9,205	103	(192)	3,941	34	(64)
Currency options	183	11	–	64	–	(1)
of which cash flow hedges	183	11	–	64	–	(1)
Interest-rate hedging of recorded transactions[2,3]	**200**	**11**	**–**	**200**	**8**	**–**
Interest-rate swaps	200	11	–	200	8	–
of which fair value hedges	200	11	–	200	8	–
	–	–	–	–	–	–
Interest-rate hedging of forecasted transactions[2,4]	**9,086**	**64**	**(81)**	**–**	**–**	**–**
Interest-rate swaps	9,086	64	(81)	–	–	–
of which cash flow hedges	9,086	64	(81)	–	–	–
Commodity price hedging[2,4]	**420**	**6**	**(3)**	**936**	**32**	**(14)**
Forward commodity contracts	414	6	(3)	934	31	(14)
of which fair value hedges	–	–	–	87	–	(3)
of which cash flow hedges	–	–	–	464	14	(3)
Commodity option contracts	6	–	–	2	1	–
of which fair value hedges	–	–	–	–	–	–
of which cash flow hedges	–	–	–	–	–	–
Hedging of stock-based employee compensation programs[2,4]	**544**	**20**	**(15)**	**731**	**–**	**(226)**
Share price options	75	5	–	–	–	–
of which cash flow hedges	75	5	–	–	–	–
Forward share transactions	469	15	(15)	731	–	(226)
of which cash flow hedges	469	15	(15)	731	–	(226)
Total	**32,046**	**450**	**(533)**	**24,265**	**204**	**(482)**
of which current derivatives	30,259	317	(499)	23,169	171	(320)
for currency hedging	20,678	242	(415)	22,253	145	(242)
for interest-rate hedging[5]	9,086	64	(81)	–	–	–
for commodity price hedging	420	6	(3)	746	26	(14)
for hedging of stock-based employee compensation programs	75	5	–	170	–	(64)

[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] The portion of the fair value of long-term interest-rate swaps that relates to current interest payments was classified as current.

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

B 27.3/3

Hedging Rates of Derivatives that Qualify for Hedge Accounting

	Dec. 31, 2018			
	Short-term derivatives		Long-term derivatives	
	Nominal value (million)	**Ø hedging rate**	**Nominal value (million)**	**Ø hedging rate**
Currency hedging of recorded transactions				
Cross-currency interest-rate swaps – cash flow hedges				
	Sell			
EUR/TRY	120 TRY	3.2287	–	–
EUR/USD	1,350 USD	1.1544	–	–
Currency hedging of forecasted transactions				
Forward exchange contracts – cash flow hedges				
	Sell			
EUR/AUD	243 AUD	1.6242	–	–
EUR/BRL	1,685 BRL	4.5360	–	–
EUR/CAD	499 CAD	1.5765	–	–
EUR/CNH	5,900 CNH	8.1207	–	–
EUR/GBP	326 GBP	0.8918	–	–
EUR/JPY	51,690 JPY	130.1871	–	–
EUR/KRW	122,670 KRW	1,322.7477	–	–
EUR/MXN	2,629 MXN	24.7583	–	–
EUR/RUB	16,835 RUB	78.8858	–	–
EUR/TWD	1,929 TWD	35.5132	–	–
EUR/USD	883 USD	1.1998	–	–
EUR/ZAR	1,236 ZAR	16.9930	–	–
USD/CAD	151 CAD	1.3050	–	–
	Buy			
EUR/USD	150 USD	1.1813	–	–
AUD/USD	14 USD	0.7145	–	–
Hedging of stock-based employee compensation programs	**Number of shares (thousands)**	**Ø hedging rate (€)**	**Number of shares (thousands)**	**Ø hedging rate (€)**
Forward share transactions – cash flow hedges				
	Buy		Buy	
Bayer shares	1,517	104.29	6,971	82.42

28. 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 28/1

Contingent Liabilities

€ million	Dec. 31, 2017	Dec. 31, 2018
Warranties	88	88
Guarantees	148	82
Other contingent liabilities	614	816
Total	**850**	**986**

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, 2018, declined to €82 million (December 31, 2017: €148 million).

Other financial commitments

The other financial commitments were as follows:

B 28/2

Other Financial Commitments

€ million	Dec. 31, 2017	Dec. 31, 2018
Operating leases	801	1,271
Commitments under purchase agreements for property, plant and equipment	493	811
Contractual obligation to acquire intangible assets	83	224
Capital contribution commitments	149	464
Binding acquisition agreement with Monsanto Company, St. Louis, Missouri, U.S.A.[1]	47,000	–
Unpaid portion of the effective initial fund	1,005	965
Potential payment obligations under collaboration agreements	2,349	2,121
Revenue-based milestone payment commitments	1,923	2,187
Total	**53,803**	**8,043**

[1] The contingent financial commitment of approximately US$56 billion was translated at the closing rate and rounded.

On June 7, 2018, Bayer acquired 100% of the outstanding shares of Monsanto Company, St. Louis, Missouri, United States, against a cash payment of US$128 per share. Further details of the acquisition of the Monsanto Company, St. Louis, Missouri, United States, are given in Note [5.2].

The maturities of the other financial commitments are as follows:

B 28/3

Maturities of Other Financial Liabilities

	Operating leases		Payment obligations under collaboration agreements		Revenue-based milestone payment commitments	
€ million	2017	2018	2017	2018	2017	2018
Maturing within 1 year	166	356	157	315	21	87
Maturing in 1–5 years	433	626	850	715	138	65
Maturing after 5 years	202	289	1,342	1,091	1,764	2,035
Total	**801**	**1,271**	**2,349**	**2,121**	**1,923**	**2,187**

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.

29. 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 revenues and earnings.

Legal proceedings currently considered to involve material risks are outlined below. The legal proceedings referred to do not represent an exhaustive list.

Product-related litigation

Mirena™: As of January 28, 2019, lawsuits from approximately 2,360 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). Plaintiffs allege personal injuries resulting from the use of Mirena™, including perforation of the uterus, ectopic pregnancy or idiopathic 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 it and failed to adequately warn its users. Additional lawsuits are anticipated. 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. As of January 28, 2019, lawsuits from approximately 700 users of Mirena™ alleging idiopathic intracranial hypertension had been served upon Bayer in the United States. Another MDL proceeding concerning perforation cases has been dismissed. The Second Circuit Court of Appeals affirmed the perforation MDL district court's summary judgment order of 2016 dismissing approximately 1,230 cases pending before that court. In April 2018, a master settlement agreement regarding the global settlement of the perforation cases for a total amount of US$12.2 million was executed. Plaintiffs did not reach the 98% participation threshold as required under the settlement agreement, and therefore a US$200,000 reduction in the total settlement amount was negotiated. Upon completion of the settlement, the vast majority of filed cases nationwide have been (or will be) dismissed with 15 claimants affirmatively opting out of the settlement. Almost all the other non-participating claimants (approximately 200) have not filed cases and are presently unreachable by plaintiffs' attorneys. As of January 28, 2019, a total of approximately 3,800 cases would be included in the settlement.

As of January 28, 2019, 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.

Xarelto™: As of January 28, 2019, U.S. lawsuits from approximately 24,900 recipients of Xarelto™, an oral anticoagulant for the treatment and prevention of blood clots, had been served upon Bayer. 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. Cases pending in U.S. federal courts have been consolidated in an MDL for common pre-trial management. In 2017, the first three MDL trials resulted in complete defense verdicts. In January 2018, after the first trial to proceed in Pennsylvania state court had initially resulted in a judgment in favor of the plaintiff, the trial judge vacated the jury's verdict and granted judgment in favor of Bayer. In April and August 2018, the second and third Pennsylvania state court trials also resulted in complete defense verdicts. Appeals are pending in all of the six cases. Additional Pennsylvania state court trials are currently scheduled for May and September 2019 and into the second quarter of 2020. Bayer anticipates that additional trials will be scheduled.

As of January 28, 2019, 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 January 28, 2019, U.S. lawsuits from approximately 29,400 users of Essure™, a medical device offering permanent birth control with a nonsurgical procedure, had been served upon Bayer. The significant increase in filings was triggered by the statutes of limitations in some states. 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 January 28, 2019, two Canadian lawsuits relating to Essure™ seeking class action certification had been served upon Bayer. 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). 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 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 February 2018. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

Roundup™ (Glyphosate): As of January 28, 2019, lawsuits from approximately 11,200 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.

In August 2018, a state court jury in San Francisco, California, awarded roughly US$39 million in compensatory and US$250 million in punitive damages to a plaintiff who claimed that a Monsanto product caused his NHL. While the punitive damages were subsequently reduced by the trial court to roughly US$39 million, we still disagree with the verdict and have filed an appeal with the California Court of Appeal. 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. This includes an independent study which followed more than 50,000 licensed pesticide applicators for more than 20 years which found no association between glyphosate-based herbicides and cancer, and the U.S. Environmental Protection Agency's 2017 risk assessment which examined more than 100 studies and concluded that glyphosate is "not likely to be carcinogenic to humans." We continue to believe, therefore, that we have meritorious defenses and we intend to defend ourselves vigorously in all of these lawsuits. The next two trials are currently scheduled for February and March 2019 before a federal court in San Francisco and a state court in California, respectively. Another five trials are currently scheduled in California and Missouri for the remainder of 2019. However, trial dates in all venues remain subject to change depending on court schedules and rulings.

As of January 28, 2019, one Canadian lawsuit relating to Roundup™ seeking class action certification had been served upon Bayer. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

In connection with the above-mentioned product-related litigation, Bayer is insured against statutory product liability claims against Bayer 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™ claims exceed the available insurance coverage.

Patent disputes

Adempas™: In January 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 October 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.

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 February 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 September 2018, 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 August 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 October 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™.

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.

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. Bayer's motion for summary judgment related to the relator's Trasylol claims is pending. The U.S. government has declined to intervene at the present time.

Baycol™: A qui tam complaint (filed by the same relator as in Trasylol™/Avelox™) asserting Bayer fraudulently induced a contract with the Department of Defense is pending in the United States District Court in Minnesota. In October 2018, the District Court judge issued a brief decision denying Bayer's renewed motion to dismiss. The case will now proceed with discovery.

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 sixty 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. The cost of the investigation and the remediation work may be substantial if the final remedy involves extensive dredging and disposal of impacted sediments. In July 2018, Occidental Chemical Company, one of the parties potentially liable for cleanup costs in the Lower Passaic River, 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 cleanup costs. 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 investigation and remediation 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 protections and based on manufacture and sale of asbestos-containing products. Bayer believes it has meritorious defenses and intends to defend itself vigorously.

One A Day™ vitamins: Bayer has been named in a class action lawsuit in the United States alleging Bayer's claims on its One A Day™ vitamins regarding the support of heart health, immunity and physical energy are false and misleading. The class is defined as California, Florida and New York residents who purchased One A Day™ products with the claims at issue. In September 2018, plaintiffs asserted through the filing of an expert report their alleged potential damages. Bayer's challenge of the class certification is currently pending in the Court of Appeals for the Ninth Circuit. 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 or plans to do so in due course. 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 €14 million (2017: €17 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, with the exception of cash and cash equivalents, which are translated at closing rates. The “Change in cash and cash equivalents due to exchange rate movements” is reported in a separate line item.

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

The operating cash flow (total) declined by 2.7% in 2018, to €7,917 million. Covestro was still included in the prior-year period. The operating cash flow from continuing operations was up 19.8% from the previous year.

The net cash outflow for investing activities in 2018 amounted to €34,152 million (2017: €432 million). There was an outflow of €45,290 million for the acquisition of Monsanto, net of €2,657 million in cash acquired from Monsanto. There was a net inflow of €7,291 million from the divestments to BASF. Additions to property, plant and equipment and intangible assets in 2018 resulted in a cash outflow of €2,593 million (2017: €2,366 million). Cash inflows from sales of property, plant and equipment and intangible assets amounted to €230 million (2017: €241 million). The net cash inflow from noncurrent and current financial assets amounted to €5,717 million (2017: €1,230 million), and included net inflows of €2,909 million from the sale and repurchase of Covestro shares.

There was a net cash inflow of €23,432 million (2017: net cash outflow of €1,881 million) for financing activities. Net borrowings amounted to €17,819 million (2017: net loan repayments of €2,479 million). Cash outflows for dividend payments amounted to €2,407 million (2017: €2,364 million). Net interest payments – including payments for and receipts from interest-rate swaps – increased to €919 million (2017: €732 million). Capital increases resulted in an inflow of €8,986 million.

The change in financial liabilities is presented in the following table:

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Financial Liabilities

€ million	Dec. 31, 2017	Cash flows	Noncash changes				Dec. 31, 2018
			Acquisition	Currency effects	New contracts	Fair value changes[1]	
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 discount effects

Other Information

31. Audit fees

Deloitte has been Bayer's auditor since 2017. The Independent Auditor's Report on the consolidated financial statements for fiscal 2018 was signed by Heiner Kompenhans and Prof. Frank Beine. Both signed the Independent Auditor's Report for the first time for the year ended December 31, 2017, and are the responsible audit partners.

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

B 31/1

Audit Fees

	Deloitte		of which Deloitte GmbH WPG	
€ million	**2017**	**2018**	**2017**	**2018**
Financial statements auditing	9	15	3	6
Audit-related services and other audit work	2	3	2	3
Tax consultancy	1	3	–	–
Other services	5	4	4	2
Total	**17**	**25**	**9**	**11**

The fees for the auditing of financial statements mainly comprised those for the audits of the consolidated financial statements of the Bayer Group and the financial statements of Bayer AG and its subsidiaries. The non-audit-related services primarily related to due diligence services concerning business entities considered for divestment (Other services), the assessment of financial and nonfinancial information outside of financial statement auditing (Audit-related services and other audit work), and compliance-related tax consultancy services that had neither a material or direct impact on the annual financial statements or consolidated financial statements.

32. 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, joint ventures and associates included in the consolidated financial statements 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 [33] and in the Compensation Report, which forms part of the Combined Management Report.

B 32/1

Related Parties

€ million	Sales of goods and services 2017	Sales of goods and services 2018	Purchase of goods and services 2017	Purchase of goods and services 2018	Receivables 2017	Receivables 2018	Liabilities 2017	Liabilities 2018
Nonconsolidated subsidiaries	5	8	6	5	6	8	16	26
Joint ventures	25	1	–	–	3	4	164	178
Associates	84	219	84	36	119	2	87	3
Post-employment benefit plans	–	–	–	–	974	837	70	215

Intercompany profits and losses for companies accounted for in the consolidated financial statements using the equity method were immaterial in 2018 and 2017.

Covestro ceased to be recognized as an associate in May 2018. Receivables and liabilities from associates therefore declined.

In May 2018, Bayer AG acquired 6.8% of Covestro shares from Bayer Pension Trust e. V. at market value for a total amount of €1.1 billion to service the exchangeable bond that matures in 2020. As a result of the stock buyback program implemented by Covestro AG, we held 7.5% of shares in that company as of December 31, 2018.

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 (2017: €150 million) for Bayer-Pensionskasse VVaG. The entire amount remained drawn as of December 31, 2018. The carrying amount was €152 million (2017: €152 million). Loan capital was first provided to Bayer-Pensionskasse VVaG in 2008 for its effective initial fund. This capital had a nominal volume of €635 million as of December 31, 2018 (2017: €595 million). The carrying amount was €643 million (2017: €605 million). The outstanding receivables, comprised of different tranches, are each subject to a five-year interest-rate adjustment mechanism. Interest income of €16 million (2017: €15 million) and expenses of €8 million due to fair value changes were recognized for 2018.

As in the prior year, we did not recognize any material impairment losses on receivables from associates in 2018.

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

In 2018, the compensation of the Supervisory Board amounted to €3,897 thousand (2017: €3,703 thousand), and the compensation of the Board of Management totaled €20,552 thousand (2017: €26,168 thousand). The total compensation of the Board of Management included a short-term component of €15,149 thousand (2017: €11,304 thousand) and a long-term component of €5,403 thousand (2017: €12,886 thousand), with stock-based compensation accounting for €1,914 thousand (2017: €8,979 thousand) of this figure.

Pension payments to former members of the Board of Management and their surviving dependents in 2018 amounted to €17,138 thousand (2017: €12,758 thousand). The defined benefit obligation for former members of the Board of Management and their surviving dependents amounted to €185,736 thousand (2017: €184,479 thousand). In addition, severance payments of €0 thousand (2017: €1,978 thousand) were made in connection with the termination of a service contract. There were no advances or loans to members of the Board of Management or the Supervisory Board outstanding as of December 31, 2018, nor at any time during 2018 or 2017.

Further details of the compensation of the Board of Management and Supervisory Board are given in the Compensation Report within the Management Report.

34. Events after the end of the reporting period

Repayment of financial liabilities

The syndicated credit facility drawn in June 2018 to finance the acquisition of Monsanto was reduced by a further US$1.1 billion to US$3.8 billion in February 2019.

PEGylated factor VIII:

In February 2019, a federal court jury awarded US$155 million in damages to Bayer at the end of a trial regarding Bayer's claims against Baxalta Incorporated and Baxalta US Inc. (Baxalta) for infringement of a Bayer patent. In 2016, Bayer had filed a complaint in a U.S. federal court against Baxalta, a subsidiary of Takeda Pharmaceutical Company Limited, for infringement of the patent by Adynovate™ (PEGylated recombinant factor VIII), approved in the United States for the treatment of hemophilia. Baxalta may appeal.

Leverkusen, February 19, 2019

Bayer Aktiengesellschaft

The Board of Management

Responsibility Statement

To the best of our knowledge, and in accordance with the applicable reporting principles for financial reporting, the consolidated financial statements give a true and fair view of the assets, liabilities, financial position and profit or loss of the Bayer Group, and the combined management report includes a fair review of the development and performance of the business and the position of the Bayer Group and Bayer AG, together with a description of the principal opportunities and risks associated with the expected development of the Bayer Group and Bayer AG.

Leverkusen, February 19, 2019
Bayer Aktiengesellschaft

The Board of Management

Werner Baumann
Chairman

Liam Condon

Dr. Hartmut Klusik

Kemal Malik

Wolfgang Nickl

Stefan Oelrich

Heiko Schipper

C Further Information

Governance Bodies

Supervisory Board

Members of the Supervisory Board held offices as members of the supervisory board or a comparable supervising body of the corporations listed (as at December 31, 2018, or the date on which they ceased to be members of the Supervisory Board of Bayer AG) and as shown attended the meetings of the Supervisory Board and committees to which he or she belonged.

Werner Wenning
Leverkusen, Germany
(born October 21, 1946)

Chairman of the Supervisory Board effective October 2012

Chairman of the Supervisory Board of Bayer AG

Memberships on other supervisory boards:

- Henkel Management AG
- Siemens AG (Vice Chairman)

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee)

Attendance at Supervisory Board and committee meetings: 17 of 17

Oliver Zühlke
Solingen, Germany
(born December 11, 1968)

Vice Chairman of the Supervisory Board effective July 2015

Member of the Supervisory Board effective April 2007

Chairman of the Bayer Central Works Council

Attendance at Supervisory Board and committee meetings: 13 of 14

Dr. Paul Achleitner
Munich, Germany
(born September 28, 1956)

Member of the Supervisory Board effective April 2002

Chairman of the Supervisory Board of Deutsche Bank AG

Memberships on other supervisory boards:

- Daimler AG
- Deutsche Bank AG (Chairman)

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee)

Attendance at Supervisory Board and committee meetings: 12 of 12

Dr. rer. nat. Simone Bagel-Trah
Düsseldorf, Germany
(born January 10, 1969)

Member of the Supervisory Board effective April 2014

Chairwoman of the Supervisory Board of Henkel AG & Co. KGaA and Henkel Management AG and of the Shareholders' Committee of Henkel AG & Co. KGaA

Memberships on other supervisory boards:

- Henkel AG & Co. KGaA (Chairwoman)
- Henkel Management AG (Chairwoman)
- Heraeus Holding GmbH

Memberships in comparable supervising bodies of German or foreign corporations:

- Henkel AG & Co. KGaA (Shareholders' Committee, Chairwoman)

Attendance at Supervisory Board meetings: 6 of 7

Dr. Norbert W. Bischofberger
Hillsborough, U.S.A.
(born January 10, 1956)

Member of the Supervisory Board effective April 2017

Executive Vice President Research & Development and Chief Scientific Officer of Gilead Sciences, Inc. (until April 2018)

President and Chief Executive Officer of Kronos Bio, Inc. (effective May 2018)

Memberships in comparable supervising bodies of German or foreign corporations:

- InCarda Therapeutics, Inc. (Board of Directors)
- Kronos Bio, Inc. (Board of Directors) (effective May 2018)

Attendance at Supervisory Board and committee meetings: 8 of 8

André van Broich
Dormagen, Germany
(born June 19, 1970)

Member of the Supervisory Board effective April 2012

Chairman of the Bayer Group Works Council

Chairman of the Works Council of the Dormagen site

Attendance at Supervisory Board and committee meetings: 11 of 11

Thomas Ebeling
Muri bei Bern, Switzerland
(born February 9, 1959)

Member of the Supervisory Board effective April 2012

Chief Executive Officer of ProSiebenSat.1 Media SE (until February 2018)

Independent consultant (effective March 2018)

Memberships on other supervisory boards:

- Apleona GmbH (effective June 2018) (Chairman effective August 2018)
- GfK SE
- ClearVat AG

Memberships in comparable supervising bodies of German or foreign corporations:

- Cullinan Oncology, LLC (Board of Directors)
- Heilpflanzenwohl AG (Board of Directors)
- Ocean Outdoor Ltd. (Board of Directors) (effective October 2018)

Attendance at Supervisory Board meetings: 6 of 7

Dr. Thomas Elsner
Düsseldorf, Germany
(born April 24, 1958)

Member of the Supervisory Board effective April 2017

Chairman of the Bayer Group Managerial Employees' Committee

Chairman of the Managerial Employees' Committee of Bayer AG Leverkusen

Attendance at Supervisory Board and committee meetings: 11 of 11

Johanna W. (Hanneke) Faber
Amstelveen, Netherlands
(born April 19, 1969)

Member of the Supervisory Board effective April 2016

President Europe at Unilever N.V./plc

Attendance at Supervisory Board meetings: 6 of 7

Colleen A. Goggins
Princeton, U.S.A.
(born September 9, 1954)

Member of the Supervisory Board effective April 2017

Independent consultant

Memberships in comparable supervising bodies of German or foreign corporations:

- The Toronto-Dominion Bank (Board of Directors)
- IQVIA Holdings Inc. (Board of Directors)
- SIG Combibloc Services AG (Board of Directors) (effective September 2018)

Attendance at Supervisory Board meetings: 7 of 7

Heike Hausfeld
Leverkusen, Germany
(born September 19, 1965)

Member of the Supervisory Board effective April 2017

Chairwoman of the Works Council of the Leverkusen site

Memberships on other supervisory boards:

- Bayer Business Services GmbH (Vice Chairwoman)

Attendance at Supervisory Board and committee meetings: 9 of 10

Reiner Hoffmann
Wuppertal, Germany
(born May 30, 1955)

Member of the Supervisory Board effective October 2006

Chairman of the German Trade Union Confederation

Attendance at Supervisory Board meetings: 7 of 7

Frank Löllgen
Cologne, Germany
(born June 14, 1961)

Member of the Supervisory Board effective November 2015

North Rhine District Secretary of the German Mining, Chemical and Energy Industrial Union

Memberships on other supervisory boards:

- Evonik Industries AG
- IRR-Innovationsregion Rheinisches Revier GmbH

Attendance at Supervisory Board and committee meetings: 11 of 11

Prof. Dr. Wolfgang Plischke
Aschau im Chiemgau, Germany
(born September 15, 1951)

Member of the Supervisory Board effective April 2016

Independent consultant

Memberships on other supervisory boards:

- Evotec AG (Chairman)

Attendance at Supervisory Board and committee meetings: 12 of 12

Petra Reinbold-Knape
Gladbeck, Germany
(born April 16, 1959)

Member of the Supervisory Board effective April 2012

Member of the Executive Committee of the German Mining, Chemical and Energy Industrial Union

Memberships on other supervisory boards:

- Lausitz Energie Bergbau AG (Vice Chairwoman)
- Lausitz Energie Kraftwerk AG (Vice Chairwoman)

Memberships in comparable supervising bodies of German or foreign corporations:

- DGB Rechtsschutz GmbH (effective February 2018)

Attendance at Supervisory Board and committee meetings: 9 of 9

Detlef Rennings
Krefeld, Germany
(born April 29, 1965)

Member of the Supervisory Board effective June 2017

Chairman of the Central Works Council of CURRENTA

Chairman of the Works Council of CURRENTA of the Uerdingen site

Memberships on other supervisory boards:

- Currenta Geschäftsführungs-GmbH

Attendance at Supervisory Board meetings: 7 of 7

Sabine Schaab
Wuppertal, Germany
(born June 25, 1966)

Member of the Supervisory Board effective October 2017

Vice Chairwoman of the Works Council of the Elberfeld site

Attendance at Supervisory Board and committee meetings: 8 of 8

Michael Schmidt-Kießling
Schwelm, Germany
(born March 24, 1959)

Member of the Supervisory Board effective April 2012

Chairman of the Works Council of the Elberfeld site

Attendance at Supervisory Board meetings: 7 of 7

Dr. Klaus Sturany*
Ascona, Switzerland
(born October 23, 1946)

Member of the Supervisory Board until May 2018

Member of various supervisory boards

Memberships on other supervisory boards:

- Hannover Rück SE (Vice Chairman)

Attendance at Supervisory Board and committee meetings: 5 of 5

Prof. Dr. Dr. h.c. Otmar D. Wiestler
Berlin, Germany
(born November 6, 1956)

Member of the Supervisory Board effective October 2014

President of the Helmholtz Association of German Research Centres

Attendance at Supervisory Board and committee meetings: 8 of 8

Prof. Dr. Norbert Winkeljohann*
Osnabrück, Germany
(born November 5, 1957)

Member of the Supervisory Board effective May 2018

Chairman of the Board of Management of PricewaterhouseCoopers GmbH Wirtschaftsprüfungsgesellschaft (until June 2018)

Chief Executive Officer of PwC Europe SE (until June 2018)

Independent management consultant (effective July 2018)

Memberships on other supervisory boards:

- Deutsche Bank AG (effective August 2018)
- heristo aktiengesellschaft (Chairman) (effective July 2018)

Attendance at Supervisory Board and committee meetings: 6 of 6

* Expert member pursuant to Section 100, Paragraph 5 of the German Stock Corporation Act (AktG)

Standing committees of the Supervisory Board of Bayer AG (as at December 31, 2018)

Presidial Committee / Mediation Committee
Wenning (Chairman), Achleitner, Reinbold-Knape, Zühlke

Audit Committee
Winkeljohann* (Chairman), Elsner, Löllgen, Plischke, Wenning, Zühlke

Human Resources Committee
Wenning (Chairman), Achleitner, Hausfeld, van Broich

Nominations Committee
Wenning (Chairman), Achleitner

Innovation Committee
Plischke (Chairman), Bischofberger, van Broich, Reinbold-Knape, Schaab, Wenning, Wiestler, Zühlke

Board of Management

Members of the Board of Management held offices as members of the supervisory board or a comparable supervising body of the corporations listed (as at December 31, 2018, or the date on which they ceased to be members of the Board of Management of Bayer AG):

Werner Baumann
(born October 6, 1962)

Chairman

Member of the Board of Management effective January 1, 2010, appointed until April 30, 2021

Liam Condon
(born February 27, 1968)

Member of the Board of Management effective January 1, 2016, appointed until December 31, 2023

Dr. Hartmut Klusik
(born July 30, 1956)

Member of the Board of Management effective January 1, 2016, appointed until December 31, 2019

Labor Director

- Currenta Geschäftsführungs-GmbH (Chairman)

Kemal Malik
(born September 29, 1962)

Member of the Board of Management effective February 1, 2014, appointed until January 31, 2022

Wolfgang Nickl
(born May 9, 1969)

Member of the Board of Management effective April 26, 2018, appointed until April 25, 2021

- Bayer Business Services GmbH (Chairman) (effective June 2018)

Stefan Oelrich
(born June 1, 1968)

Member of the Board of Management effective November 1, 2018, appointed until October 31, 2021

Heiko Schipper
(born August 21, 1969)

Member of the Board of Management effective March 1, 2018, appointed until February 28, 2021

Member of the Board of Management until May 31, 2018

Johannes Dietsch
(born January 2, 1962)

- Bayer Business Services GmbH (Chairman)
- Covestro AG
- Covestro Deutschland AG

Member of the Board of Management until March 31, 2018

Erica Mann
(born October 11, 1958)

Member of the Board of Management until October 31, 2018

Dieter Weinand
(born August 16, 1960)

- HealthPrize Technologies LLC (Board of Directors) (until March 2018)
- Replimune Inc. (Board of Directors) (effective June 2018)