The Group's effective tax rate can be reconciled to the Group's average expected tax rate as follows:

Reconciliation of the Group's effective tax rate

	2017	2016
Average expected tax rate	21.5%	24.7%
Tax effect of		
– Non-taxable income/non-deductible expenses	+4.8%	+1.3%
– Equity compensation plans	+0.2%	+0.8%
– Research and development tax credits and manufacturing deductions	–2.9%	–2.6%
– US state tax impacts	+0.5%	+0.7%
– Tax on unremitted earnings	+1.7%	+1.7%
– Utilisation of previously unrecognised tax losses	–	–0.3%
– Deferred tax on intra-group transfers	–	–2.3%
– Transitional effect of changes in US tax rates	+0.9%	–
– Prior year and other differences	+1.2%	+1.2%
Group's effective tax rate	**27.9%**	**25.2%**

The income tax benefit recorded in respect of equity compensation plans, which varies according to the price of the underlying equity, was CHF 87 million (2016: CHF 3 million). Had the income tax benefits been recorded solely on the basis of the IFRS 2 expense multiplied by the applicable tax rate, then a benefit of approximately CHF 118 million (2016: CHF 111 million) would have been recorded.

Tax effects of other comprehensive income in millions of CHF

	2017			2016		
	Pre-tax amount	Tax	After-tax amount	Pre-tax amount	Tax	After-tax amount
Remeasurements of defined benefit plans	732	(328)	404	192	(18)	174
Available-for-sale investments	(37)	15	(22)	13	7	20
Cash flow hedges	(31)	20	(11)	81	(26)	55
Currency translation of foreign operations	362	–	362	496	–	496
Other comprehensive income	**1,026**	**(293)**	**733**	**782**	**(37)**	**745**

Income tax assets (liabilities) in millions of CHF

	2017	2016	2015
Current income taxes			
– Assets	348	335	239
– Liabilities	(3,408)	(2,713)	(2,781)
Net current income tax assets (liabilities)	**(3,060)**	**(2,378)**	**(2,542)**
Deferred taxes			
– Assets	3,576	2,826	2,564
– Liabilities	(495)	(838)	(545)
Net deferred tax assets (liabilities)	**3,081**	**1,988**	**2,019**

Current income tax liabilities include accruals for uncertain tax positions.

Current income taxes: movements in recognised net assets (liabilities) in millions of CHF

	2017	2016
Net current income tax asset (liability) at 1 January	(2,378)	(2,542)
Income taxes paid	3,909	3,738
Business combinations	–	–
(Charged) credited to the income statement	(4,846)	(3,576)
(Charged) credited to equity from equity compensation plans and other transactions with shareholders	152	69
Currency translation effects and other movements	103	(67)
Net current income tax asset (liability) at 31 December	**(3,060)**	**(2,378)**

Deferred taxes: movements in recognised net assets (liabilities) in millions of CHF

	Property, plant and equipment	Intangible assets	Defined benefit plans	Other temporary differences	Total
Year ended 31 December 2016					
At 1 January 2016	(754)	(3,531)	1,622	4,682	2,019
(Charged) credited to the income statement	(88)	971	(50)	(531)	302
(Charged) credited to other comprehensive income [21]	–	–	(18)	(19)	(37)
(Charged) credited to equity from equity compensation plans and other transactions with shareholders	–	–	–	(322)	(322)
Currency translation effects and other movements	(20)	(88)	16	118	26
At 31 December 2016	**(862)**	**(2,648)**	**1,570**	**3,928**	**1,988**
Year ended 31 December 2017					
At 1 January 2017	(862)	(2,648)	1,570	3,928	1,988
Business combinations [5]	–	(28)	–	–	(28)
(Charged) credited to the income statement	198	1,812	(98)	(489)	1,423
(Charged) credited to other comprehensive income [21]	–	–	(328)	35	(293)
(Charged) credited to equity from equity compensation plans and other transactions with shareholders	–	–	–	(128)	(128)
Currency translation effects and other movements	6	119	37	(43)	119
At 31 December 2017	**(658)**	**(745)**	**1,181**	**3,303**	**3,081**

The deferred tax net assets for other temporary differences mainly relate to accrued and other liabilities, provisions and unrealised profit in inventory.

Deferred tax assets are recognised for tax losses carried forward only to the extent that realisation of the related tax benefit is probable. The Group has unrecognised tax losses, including valuation allowances, as follows:

Unrecognised tax losses: expiry

	2017		2016	
	Amount (CHF m)	Applicable tax rate	Amount (CHF m)	Applicable tax rate
Within one year	–	–	186	12%
Between one and five years	2,358	12%	2,095	12%
More than five years	9,103	5%	8,021	4%
Total unrecognised tax losses	**11,461**	**6%**	**10,302**	**6%**

The 'More than five years' category includes losses that cannot be used for US state income tax purposes in those states which only permit tax reporting on a separate entity basis.

Deferred tax liabilities have not been established for the withholding tax and other taxes that would be payable on the remittance of earnings of foreign subsidiaries, where such amounts are currently regarded as permanently reinvested for the purpose of these financial statements. The total unremitted earnings of the Group, regarded as permanently reinvested for the purpose of these financial statements, were CHF 29.1 billion at 31 December 2017 (2016: CHF 29.9 billion).

5. Business combinations

Acquisitions – 2017

mySugr GmbH. On 29 June 2017 the Group acquired a 100% controlling interest in mySugr GmbH ('mySugr'), a private company based in Vienna, Austria. mySugr has developed one of the leading mobile diabetes platforms in the market and will become part of the Group's new digital health services in diabetes care. The acquisition of mySugr expands the Group's leading position in the area of diabetes management. mySugr is reported in the Diagnostics operating segment as part of the Diabetes Care business. The total cash consideration was EUR 64 million.

Viewics, Inc. On 27 November 2017 the Group acquired a 100% controlling interest in Viewics, Inc. ('Viewics'), a US privately owned company based in San Jose, California. Viewics is a software company focused on a laboratory business analytics solution. The acquisition of Viewics expands the Group's leading position in the integrated core lab with business analytics capabilities, enabling laboratories to make faster data-driven informed decisions on their operations and processes. Viewics is reported in the Diagnostics operating segment. The total consideration was USD 81 million, of which USD 62 million was paid in cash, USD 9 million was deferred consideration which will be paid over the period from the date of control to 2021 and USD 10 million arose from a contingent consideration arrangement. The contingent payments are based on the achievement of performance-related milestones and the range of undiscounted outcomes is between zero and USD 10 million.

The identifiable assets acquired and liabilities assumed are set out in the table below. The amounts for mySugr and Viewics are provisional based on preliminary information and valuations of the assets and liabilities and subject to adjustment during 2018.

Acquisitions – 2017: net assets acquired in millions of CHF

	mySugr	Viewics	Total
Intangible assets			
– Product intangibles: in use	20	40	60
– Product intangibles: not available for use	–	–	–
– Marketing intangibles: in use	29	–	29
Cash and cash equivalents	1	4	5
Deferred tax liabilities	(12)	(16)	(28)
Other net assets (liabilities)	(2)	1	(1)
Net identifiable assets	**36**	**29**	**65**
Fair value of previously held interest	(11)	(8)	(19)
Goodwill	45	59	104
Total consideration	**70**	**80**	**150**
Cash	70	62	132
Deferred consideration [19]	–	8	8
Contingent consideration [19]	–	10	10
Total consideration	**70**	**80**	**150**

The fair value of the product intangible asset for mySugr is determined using a replacement cost method. The fair value of the other intangible assets is determined using an excess earning method that is based on management forecasts and observable market data for discount rates, tax rates and foreign exchange rates. The present value is calculated using a risk-adjusted discount rate of 13.0% for mySugr and 9.5% for Viewics. The valuations were performed by independent valuers.

The Viewics accounts receivable is comprised of gross contractual amounts due of CHF 2 million which were all expected to be collectable at the date of the acquisition.

Goodwill represents a control premium, the acquired work force and the synergies that can be expected from integrating the acquired companies into the Group's existing business. None of the goodwill is expected to be deductible for income tax purposes.

The Group recognised a financial gain of CHF 7 million and CHF 2 million respectively for fair valuing the 12% interest in mySugr and the 10% interest in Viewics held by the Group prior to the transaction. This gain is included in other financial income (expense) for 2017.

Directly attributable transaction costs of CHF 2 million were reported in the Diagnostics operating segment within general and administration expenses.

The impact of the mySugr and Viewics acquisitions on the 2017 results for the Diagnostics Division and the Group were not material.

Future acquisitions

Ignyta, Inc. On 22 December 2017 the Group announced that it had entered into a merger agreement with Ignyta, Inc. ('Ignyta') to fully acquire Ignyta at a price of USD 27.00 per share in an all-cash transaction. This corresponds to a total transaction value of USD 1.7 billion on a fully diluted basis. Ignyta is a publicly owned US company based in San Diego, California, and is listed on Nasdaq under the stock code 'RXDX'. The closing of the transaction is expected to take place in the first half of 2018 and will be subject to a majority of Ignyta's outstanding shares being tendered to the Group, to the expiration or termination of the waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976 and other customary conditions. Upon closing, Ignyta will be reported in the Pharmaceuticals Division.

Acquisitions – 2016

The Group did not complete any business combinations in 2016.

Cash flows from business combinations

Acquisitions: net cash outflow in millions of CHF

	Pharmaceuticals	Diagnostics	2017 Total	Pharmaceuticals	Diagnostics	2016 Total
Cash consideration paid	–	(132)	(132)	–	–	–
Deferred consideration paid	–	(5)	(5)	–	(5)	(5)
Contingent consideration paid [19]	(5)	(141)	(146)	–	(69)	(69)
Cash in acquired company	–	5	5	–	–	–
Transaction costs	–	(2)	(2)	–	–	–
Total net cash outflow	**(5)**	**(275)**	**(280)**	**–**	**(74)**	**(74)**

6. Global restructuring plans

During 2017 the Group initiated various resourcing flexibility plans in its Pharmaceuticals Division to address various future challenges including biosimilar competition. The areas of the plans include biologics manufacturing, commercial operations and product development/strategy. The Group also continued with the implementation of several major global restructuring plans initiated in prior years, notably the strategic realignment of the Pharmaceuticals Division's manufacturing network, and programmes to address long-term strategy in the Diagnostics Division.

Global restructuring plans: costs incurred in millions of CHF

	Diagnostics[1]	Site consolidation[2]	Other plans[3]	Total
Year ended 31 December 2017				
Global restructuring costs				
– Employee-related costs	152	13	258	423
– Site closure costs	48	245	2	295
– Divestment of products and businesses	–	166	–	166
– Other reorganisation expenses	92	160	72	324
Total global restructuring costs	**292**	**584**	**332**	**1,208**
Additional costs				
– Impairment of goodwill	–	–	–	–
– Impairment of intangible assets	–	–	–	–
– Legal and environmental cases	–	46	–	46
Total costs	**292**	**630**	**332**	**1,254**
Year ended 31 December 2016				
Global restructuring costs				
– Employee-related costs	90	86	127	303
– Site closure costs	33	367	3	403
– Other reorganisation expenses	189	271	67	527
Total global restructuring costs	**312**	**724**	**197**	**1,233**
Additional costs				
– Impairment of goodwill	–	–	–	–
– Impairment of intangible assets	–	–	–	–
– Legal and environmental cases	–	24	–	24
Total costs	**312**	**748**	**197**	**1,257**

1) Includes strategy plans in the Diagnostics Division and the Diabetes Care 'Autonomy and Speed' plan.
2) Includes the Pharmaceuticals Division's strategic realignment of its manufacturing network and resourcing flexibility in biologics manufacturing network.
3) Includes plans for resourcing flexibility in the Pharmaceuticals Division's commercial operations and global product development/strategy organisations and the Pharmaceuticals Division's research and development strategic realignment and outsourcing of IT and other functions.

Diagnostics Division

In 2017 strategy plans in the Diagnostics Division that were launched in 2016 incurred costs of CHF 212 million mainly for employee-related costs (2016: CHF 106 million related to site closures and employees). Spending on other smaller plans within the division was CHF 80 million (2016: CHF 206 million) and included costs related to the 'Autonomy and Speed' initiative in Diabetes Care and certain IT projects.

Site consolidation

On 12 November 2015 the Pharmaceuticals Division announced a strategic realignment of its manufacturing network including exiting from the manufacturing sites at Clarecastle, Ireland; Leganés, Spain; Segrate, Italy; and Florence, US. Costs from this plan in 2017 were CHF 480 million (2016: CHF 733 million), of which CHF 185 million were non-cash impairments and accelerated depreciation of property, plant and equipment (2016: CHF 337 million). Some employee-related provisions were reversed as the most likely scenario for the Segrate site was changed from closure to divestment. The divestment of the Florence, Segrate and Leganés sites have been completed in 2017 and result in total costs of CHF 201 million. This includes CHF 100 million of accumulated currency translation losses on consolidation that were transferred to the income statement (see Note 22). The expected costs of the environmental remediation at the Clarecastle site were reassessed and resulted in an increase in provisions for environmental remediation (see Note 19). Other plans include the resourcing flexibility in biologics manufacturing network which resulted in headcount reductions in the US and also at the Kaiseraugst site in Switzerland and the exit from the small molecules manufacturing site at Toluca, Mexico.

The divestment of the Nutley site in the US was completed in the second half of 2016 and resulted in an increase in provisions for environmental remediation.

Other global restructuring plans

In 2017 total costs were CHF 332 million, with the major item being CHF 247 million for resourcing flexibility in the Pharmaceuticals Division, including global field force reductions, notably in the US and Europe. The remaining CHF 85 million includes plans for the outsourcing of IT and other functions to shared service centres and external providers.

In 2016 total costs were CHF 197 million, with the major items being CHF 74 million from the Pharmaceuticals Division research and development strategic realignment and CHF 90 million in informatics mainly for the outsourcing of IT functions to shared service centres and external providers. The remaining minor plans totalled CHF 33 million.

Global restructuring plans: summary of costs incurred in millions of CHF

	2017	2016
Employee-related costs		
– Termination costs	378	231
– Defined benefit plans	(7)	11
– Other employee-related costs	52	61
Total employee-related costs	**423**	**303**
Site closure costs		
– Impairment of property, plant and equipment	192	258
– Accelerated depreciation of property, plant and equipment	48	128
– (Gains) losses on disposal of property, plant and equipment	–	(54)
– Other site closure costs	55	71
Total site closure costs	**295**	**403**
Divestment of products and businesses		
– (Gains) losses on divestment of subsidiaries [22]	126	–
– Other (gains) losses on divestment of products and businesses	40	–
Total costs on divestment of products and businesses	**166**	**–**
Other reorganisation expenses	324	527
Total global restructuring costs	**1,208**	**1,233**
Additional costs		
– Impairment of goodwill	–	–
– Impairment of intangible assets	–	–
– Legal and environmental cases	46	24
Total costs	**1,254**	**1,257**

Global restructuring plans: classification of costs in millions of CHF

	2017			2016		
	Depreciation, amortisation and impairment	Other costs	Total	Depreciation, amortisation and impairment	Other costs	Total
Cost of sales						
– Pharmaceuticals	203	174	377	351	386	737
– Diagnostics	32	75	107	27	73	100
Marketing and distribution						
– Pharmaceuticals	1	233	234	2	24	26
– Diagnostics	1	91	92	–	102	102
Research and development						
– Pharmaceuticals	–	21	21	2	88	90
– Diagnostics	–	66	66	3	40	43
General and administration						
– Pharmaceuticals	–	291	291	1	81	82
– Diagnostics	3	24	27	–	66	66
– Corporate	–	39	39	–	11	11
Total	**240**	**1,014**	**1,254**	**386**	**871**	**1,257**
Total by operating segment						
– Roche Pharmaceuticals	204	719	923	356	579	935
– Chugai	–	–	–	–	–	–
– Diagnostics	36	256	292	30	281	311
– Corporate	–	39	39	–	11	11
Total	**240**	**1,014**	**1,254**	**386**	**871**	**1,257**

7. Property, plant and equipment

Property, plant and equipment: movements in carrying value of assets in millions of CHF

	Land	Buildings and land improvements	Machinery and equipment	Construction in progress	Total
At 1 January 2016					
Cost	933	14,064	18,300	2,897	36,194
Accumulated depreciation and impairment	–	(5,877)	(11,806)	(38)	(17,721)
Net book value	**933**	**8,187**	**6,494**	**2,859**	**18,473**
Year ended 31 December 2016					
At 1 January 2016	933	8,187	6,494	2,859	18,473
Business combinations	–	–	–	–	–
Additions	22	242	1,103	2,423	3,790
Disposals	(8)	(41)	(70)	(1)	(120)
Transfers	8	740	900	(1,648)	–
Depreciation charge	–	(593)	(1,565)	–	(2,158)
Impairment charge	(3)	(107)	(165)	(16)	(291)
Other	–	(1)	(10)	(2)	(13)
Currency translation effects	26	133	90	27	276
At 31 December 2016	**978**	**8,560**	**6,777**	**3,642**	**19,957**
Cost	981	14,772	19,723	3,671	39,147
Accumulated depreciation and impairment	(3)	(6,212)	(12,946)	(29)	(19,190)
Net book value	**978**	**8,560**	**6,777**	**3,642**	**19,957**
Year ended 31 December 2017					
At 1 January 2017	978	8,560	6,777	3,642	19,957
Business combinations	–	–	–	–	–
Additions	–	272	1,135	2,070	3,477
Disposals	(3)	(26)	(73)	(4)	(106)
Divestment of subsidiaries [22]	(3)	–	–	–	(3)
Transfers	24	1,322	975	(2,321)	–
Depreciation charge	–	(645)	(1,551)	–	(2,196)
Impairment charge	(1)	(46)	(178)	(8)	(233)
Other	–	–	(57)	–	(57)
Currency translation effects	(15)	(28)	65	51	73
At 31 December 2017	**980**	**9,409**	**7,093**	**3,430**	**20,912**
Cost	980	15,602	19,982	3,445	40,009
Accumulated depreciation and impairment	–	(6,193)	(12,889)	(15)	(19,097)
Net book value	**980**	**9,409**	**7,093**	**3,430**	**20,912**

Classification of impairment of property, plant and equipment in millions of CHF

	2017	2016
Cost of sales	(210)	(280)
Marketing and distribution	(1)	–
Research and development	(1)	(11)
General and administration	(21)	–
Total impairment charge	**(233)**	**(291)**

Impairment charges for property, plant and equipment were mainly related to global restructuring plans (see Note 6).

In 2017 no reimbursements were received from insurance companies in respect of impairments to property, plant and equipment (2016: none). In 2017 no borrowing costs were capitalised as property, plant and equipment (2016: none).

Divestment of Nutley site in 2016

On 29 September 2016, the Group completed the divestment of the Nutley site. The total net consideration received in cash was CHF 96 million.

Genentech property purchase option exercise in 2015

In 2004 Genentech entered into a Master Lease Agreement ('MLA') with Slough SSF LLC ('Slough'), which was subsequently acquired by Health Care Properties, for the lease of property adjacent to Genentech's South San Francisco site, which was to be developed by Slough. The development included a total of eight buildings and construction was completed during 2008, at which time Genentech fully occupied the property. The property lease was until 2020 with extension options to 2030. On 1 November 2015 Genentech exercised a purchase option contained in the MLA to acquire the eight buildings and land. At 31 December 2015 the Group recorded an addition to 'land' and 'buildings and land improvements' and corresponding liabilities for the cash outflows in 2016 and 2018. The Group also reclassified the finance lease accounting balances that previously applied to these buildings. In November 2016 the first closing payment of USD 311 million was made. The final closing payment of USD 269 million is due in July 2018 and is recorded as a current liability (see Note 18).

Leasing arrangements where the Group is the lessee

Finance leases. At 31 December 2017 the capitalised cost of property, plant and equipment under finance leases was CHF 11 million (2016: CHF 18 million) and the net book value of these assets was CHF 5 million (2016: CHF 8 million). The carrying value of the leasing obligation was CHF 5 million (2016: CHF 5 million), which is reported as part of Debt (see Note 20).

Finance leases: future minimum lease payments under non-cancellable leases in millions of CHF

	Future minimum lease payments		Present value of minimum lease payments	
	2017	2016	2017	2016
Within one year	1	1	1	1
Between one and five years	4	4	4	4
More than five years	–	–	–	–
Total	**5**	**5**	**5**	**5**
Future finance charges	–	–	–	–
Total future minimum lease payments (undiscounted)	**5**	**5**	**5**	**5**

Operating leases. Group companies are party to a number of operating leases, mainly for property rentals and motor vehicles. The arrangements do not impose any significant restrictions on the Group. Total operating lease rental expense was CHF 461 million (2016: CHF 458 million).

Operating leases: future minimum lease payments under non-cancellable leases in millions of CHF

	2017	2016
Within one year	366	311
Between one and five years	752	664
More than five years	228	188
Total minimum payments	**1,346**	**1,163**

Leasing arrangements where the Group is the lessor

Finance leases. Certain assets, mainly Diagnostics instruments, are leased to third parties through finance lease arrangements. Such assets are reported as receivables at an amount equal to the net investment in the lease. Lease income from finance leases is recognised over the term of the lease based on the effective interest rate method.

Finance leases: future minimum lease receipts under non-cancellable leases in millions of CHF

	Gross investment in lease		Present value of minimum lease receipts	
	2017	2016	2017	2016
Within one year	40	39	36	34
Between one and five years	93	92	84	85
More than five years	5	4	5	3
Total	**138**	**135**	**125**	**122**
Unearned finance income	(12)	(12)	n/a	n/a
Unguaranteed residual value	n/a	n/a	1	1
Net investment in lease	**126**	**123**	**126**	**123**

The accumulated allowance for uncollectible minimum lease payments was CHF 1 million (2016: CHF 1 million).

Operating leases. Certain assets, mainly Diagnostics instruments, are leased to third parties through operating lease arrangements. Such assets are reported within property, plant and equipment. Lease income from operating leases is recognised over the lease term on a straight-line basis.

At 31 December 2017 machinery and equipment with an original cost of CHF 4.8 billion (2016: CHF 4.4 billion) and a net book value of CHF 1.7 billion (2016: CHF 1.5 billion) was being leased to third parties.

Operating leases: future minimum lease receipts under non-cancellable leases in millions of CHF

	2017	2016
Within one year	57	64
Between one and five years	94	86
More than five years	3	4
Total minimum receipts	**154**	**154**

Capital commitments

The Group has non-cancellable capital commitments for the purchase or construction of property, plant and equipment totalling CHF 1.2 billion (2016: CHF 1.4 billion).

8. Goodwill

Goodwill: movements in carrying value of assets in millions of CHF

	2017	2016
At 1 January		
Cost	12,655	12,342
Accumulated impairment	(1,373)	(1,260)
Net book value	**11,282**	**11,082**
Year ended 31 December		
At 1 January	11,282	11,082
Business combinations[5]	104	–
Impairment charge	(1,058)	(95)
Currency translation effects	(251)	295
At 31 December	**10,077**	**11,282**
Cost	12,461	12,655
Accumulated impairment	(2,384)	(1,373)
Net book value	**10,077**	**11,282**
Allocated to the following cash-generating units		
Roche Pharmaceuticals	4,677	5,241
Foundation Medicine	97	101
Chugai	96	97
Total Pharmaceuticals Division	**4,870**	**5,439**
Diabetes Care	880	827
Centralised and Point of Care Solutions	1,730	1,785
Molecular Diagnostics	379	396
Tissue Diagnostics	–	–
Sequencing	–	700
Divisional goodwill	2,218	2,135
Total Diagnostics Division	**5,207**	**5,843**

Impairment charge – 2017

During 2017 impairment charges totalling CHF 1,058 million which related to:

- A charge of CHF 674 million in the Diagnostics Division for the full write-off of the sequencing business goodwill. The factors leading to this impairment were: (i) a decrease in forecasted cash flows relative to the previous year's long-term forecast due to changed assumptions around market penetration, pricing and reimbursement; and (ii) a revised time to market of the single molecule sequencing technology. In addition impairment charges of CHF 120 million were recorded for sequencing business product intangibles in use acquired as part of the Ariosa acquisition (see Note 9).
- A charge of CHF 384 million in the Pharmaceuticals Division for the full write-off of the goodwill relating to the Seragon acquisition due to the decision to stop development of the back-up compound acquired.

Impairment charge – 2016

During 2016, a goodwill impairment charge of CHF 95 million was recorded in the Pharmaceuticals Division for the full write-off of goodwill from the Anadys Pharmaceuticals, Inc. acquisition in 2011 which is deemed to have been disposed of.

Impairment testing

Pharmaceuticals Division. The division's operating segments are the cash-generating units used for the testing of goodwill. Part of the goodwill arising from the Foundation Medicine acquisition is recorded and monitored at a Roche Pharmaceuticals level as it relates to the strategic development of Roche Pharmaceuticals. Therefore the cash-generating unit for this strategic goodwill is Roche Pharmaceuticals. The recoverable amount used in the impairment testing is the higher of value in use and fair value less costs of disposal. For Chugai and Foundation Medicine the fair value less costs of disposal is determined with reference to the publicly quoted share prices of Chugai and Foundation Medicine shares.

Diagnostics Division. The division's business areas are the cash-generating units used for the testing of goodwill. The goodwill arising from the Corange/Boehringer Mannheim acquisition and part of the goodwill from the Ventana acquisition is recorded and monitored at a divisional level as it relates to the strategic development of the whole division and cannot be meaningfully allocated to the division's business areas. Therefore the cash-generating unit for this goodwill is the entire division. The goodwill arising from the Viewics acquisition is monitored at the divisional level. The recoverable amount used in the impairment testing is based on value in use.

Value in use. This is calculated using a discounted expected cash flow approach, with a post-tax discount rate applied to the projected risk-adjusted post-tax cash flows and terminal value. The discount rate is the Group's weighted average cost of capital as the cash-generating units have integrated operations across large parts of the Group. It is derived from a capital asset pricing model using data from capital markets, including government twenty-year bonds. For assessing value in use, the cash flow projections are based on the most recent long-term forecasts approved by management. The long-term forecasts include management's latest estimates on sales volume and pricing, as well as production and other operating costs and assume no significant changes in the organisation. Other key assumptions used in the calculations are the period of cash flow projections included in the long-term forecasts, the terminal value growth rate and the discount rate.

Key assumptions used in value in use calculations

	2017			2016		
	Period of cash flow projections	Terminal value growth rate	Discount rate (after tax)	Period of cash flow projections	Terminal value growth rate	Discount rate (after tax)
Pharmaceuticals Division						
– Roche Pharmaceuticals	5 years	n/a	6.8%	5 years	n/a	6.5%
Diagnostics Division						
– Sequencing	10 years	1.5%	6.8%	10 years	1.5%	6.5%
– Other Diagnostics businesses	5 years	1.5%	6.8%	5 years	1.5%	6.5%

For cash-generating units with a terminal value growth, the respective rate does not exceed the long-term projected growth rate for the relevant market. The ten years period of cash flow projections reflects the long-term nature of the development of the sequencing business.

Sensitivity analysis

Management has performed sensitivity analyses for Roche Pharmaceuticals and the Diagnostics Division, which increased the discount rate by 1% combined with decreasing the forecast cash flows by 5%, and for Chugai and Foundation Medicine, which decreased the publicly quoted share prices by 5%. The results of the sensitivity analyses demonstrated that the above changes in the key assumptions would not cause the carrying values of goodwill to exceed the recoverable amounts at 31 December 2017.

9. Intangible assets

Intangible assets: movements in carrying value of assets in millions of CHF

	Product intangibles: in use	Product intangibles: not available for use	Marketing intangibles: in use	Technology intangibles: in use	Total
At 1 January 2016					
Cost	22,746	5,025	56	1,013	28,840
Accumulated amortisation and impairment	(13,093)	(1,128)	(33)	(725)	(14,979)
Net book value	**9,653**	**3,897**	**23**	**288**	**13,861**
Year ended 31 December 2016					
At 1 January 2016	9,653	3,897	23	288	13,861
Additions	105	926	18	16	1,065
Disposal	–	–	–	–	–
Transfers	252	(252)	–	–	–
Amortisation charge	(1,700)	–	(5)	(78)	(1,783)
Impairment charge	(70)	(1,343)	–	–	(1,413)
Currency translation effects	220	91	1	4	316
At 31 December 2016	**8,460**	**3,319**	**37**	**230**	**12,046**
Cost	23,579	5,795	66	1,057	30,497
Accumulated amortisation and impairment	(15,119)	(2,476)	(29)	(827)	(18,451)
Net book value	**8,460**	**3,319**	**37**	**230**	**12,046**
Allocated by operating segment					
Roche Pharmaceuticals	7,089	2,045	3	182	9,319
Chugai	26	64	21	–	111
Diagnostics	1,345	1,210	13	48	2,616
Total Group	**8,460**	**3,319**	**37**	**230**	**12,046**
Year ended 31 December 2017					
At 1 January 2017	8,460	3,319	37	230	12,046
Business combinations[5]	60	–	29	–	89
Additions	75	644	12	38	769
Disposal	–	–	–	–	–
Transfers	467	(501)	–	34	–
Amortisation charge	(1,592)	–	(9)	(90)	(1,691)
Impairment charge	(1,784)	(676)	–	–	(2,460)
Currency translation effects	(267)	(114)	1	(5)	(385)
At 31 December 2017	**5,419**	**2,672**	**70**	**207**	**8,368**
Cost	22,425	5,626	109	1,094	29,254
Accumulated amortisation and impairment	(17,006)	(2,954)	(39)	(887)	(20,886)
Net book value	**5,419**	**2,672**	**70**	**207**	**8,368**
Allocated by operating segment					
Roche Pharmaceuticals	4,047	2,025	2	140	6,214
Chugai	27	58	27	–	112
Diagnostics	1,345	589	41	67	2,042
Total Group	**5,419**	**2,672**	**70**	**207**	**8,368**

Significant intangible assets at 31 December 2017 in millions of CHF

	Operating segment	Net book value	Remaining amortisation period
Product intangibles in use			
InterMune acquisition	Roche Pharmaceuticals	2,878	4 years
Foundation Medicine acquisition	Roche Pharmaceuticals	386	7 years
Ariosa acquisition	Diagnostics	312	17 years
Kapa acquisition	Diagnostics	264	13 years
CMI acquisition	Diagnostics	259	14 years
IQuum acquisition	Diagnostics	190	16 years
Product intangibles not available for use			
BioNTech licence transaction	Roche Pharmaceuticals	303	n/a
GeneWeave acquisition	Diagnostics	268	n/a
Genia acquisition	Diagnostics	248	n/a
Technology intangibles in use			
Dutalys acquisition	Roche Pharmaceuticals	65	3 years

Classification of intangible asset amortisation and impairment expenses in millions of CHF

	Amortisation		Impairment	
	2017	2016	2017	2016
Cost of sales				
– Pharmaceuticals	(1,230)	(1,314)	(1,664)	–
– Diagnostics	(315)	(323)	(120)	(70)
Marketing and distribution				
– Pharmaceuticals	(6)	(3)	–	–
– Diagnostics	(3)	(2)	–	–
Research and development				
– Pharmaceuticals	(123)	(135)	(524)	(1,343)
– Diagnostics	(14)	(6)	(152)	–
Total	**(1,691)**	**(1,783)**	**(2,460)**	**(1,413)**

Internally generated intangible assets

The Group currently has no internally generated intangible assets from development as the criteria for the recognition as an asset are not met.

Intangible assets with indefinite useful lives

The Group currently has no intangible assets with indefinite useful lives.

Intangible assets not available for use

These mostly represent in-process research and development assets acquired either through in-licensing arrangements, business combinations or separate purchases. At 31 December 2017 approximately 68% (2016: 70%) of the projects in the Pharmaceuticals Division have known decision points within the next twelve months which in certain circumstances could lead to impairment. Due to the inherent uncertainties in the research and development processes, intangible assets not available for use are particularly at risk of impairment if the project is not expected to result in a commercialised product.

Intangible asset impairment

Impairment charges arise from changes in the estimates of the future cash flows expected to result from the use of the asset and its eventual disposal. Factors such as the presence or absence of competition, technical obsolescence or lower-than-anticipated sales for products with capitalised rights could result in shortened useful lives or impairment.

Impairment charges – 2017

Pharmaceuticals Division. Impairment charges totalling CHF 2,188 million were recorded which related to:

- A charge of CHF 1,664 million for the partial impairment of the Esbriet product intangible in use acquired as part of the InterMune acquisition. The asset concerned was written down to its estimated recoverable value of CHF 2,878 million. The main factor leading to this was a decrease in forecasted cash flows relative to the previous year's long-term forecast due to a reduction in sales expectations. The intangible asset continues to be amortised over its remaining estimated useful life of four years.
- A charge of CHF 195 million due to the launch of a competitor product for the compound acquired as part of the Trophos acquisition. The asset concerned, which was not yet being amortised, was written down to its estimated recoverable value of CHF 101 million.
- A charge of CHF 149 million due to the decision to stop development of one compound with an alliance partner following an assessment of clinical and non-clinical data. The asset concerned, which was not yet being amortised, was fully written down.
- A charge of CHF 74 million due to the decision to stop development of one compound acquired as part of the Dutalys acquisition. The asset concerned, which was not yet being amortised, was fully written down.
- A charge of CHF 47 million due to the decision to stop development of one compound acquired as part of the Santaris acquisition following a clinical data assessment. The asset concerned, which was not yet being amortised, was fully written down.
- A charge of CHF 39 million due to the decision to stop development of two compounds with two different alliance partners. The assets concerned, which were not yet being amortised, were fully written down.
- A charge of CHF 20 million following clinical data assessments. The assets concerned, which were not yet being amortised, were fully written down.

Diagnostics Division. Impairment charges totalling CHF 272 million were recorded which related to:

- A charge of CHF 152 million for the partial impairment of Molecular Diagnostics product intangibles not available for use acquired as part of the GeneWeave acquisition. The factor leading to this partial impairment was a decrease in forecasted cash flows following a change in the timelines for future product development, pricing and penetration rate due to updated market size assumptions. The asset concerned, which was not yet being amortised, was written down to its estimated recoverable value of CHF 268 million.
- A charge of CHF 120 million for the partial impairment of sequencing business product intangibles in use acquired as part of the Ariosa acquisition. The factor leading to this impairment was a decrease in forecasted cash flows following revised assumptions on pricing and penetration rate due to market dynamics. The asset concerned, which was being amortised, was written down to its estimated recoverable value of CHF 312 million.

Impairment charges – 2016

Pharmaceuticals Division. Impairment charges totalling CHF 1,343 million were recorded which related to:

- A decision to stop development of one compound acquired as part of the Seragon acquisition following a clinical data assessment (CHF 885 million). The asset concerned, which was not yet being amortised, was fully written down.
- A delay in the development of the compound acquired as part of the Trophos acquisition following regulatory feedback (CHF 187 million). The asset concerned, which was not yet being amortised, was written down to its estimated recoverable value of CHF 301 million.
- A portfolio reassessment of one compound (CHF 162 million). The asset concerned, which was not yet being amortised, was fully written down.
- A clinical data assessment of two development projects with two different alliance partners (CHF 67 million). The assets concerned, which were not yet being amortised, were fully written down.
- A decision to stop development of three compounds (CHF 42 million). The assets concerned, which were not yet being amortised, were fully written down.

Diagnostics Division. Impairment charges totalling CHF 70 million were recorded which related to:

- Sequencing product intangibles in use (CHF 63 million) as a result of a decision to stop the product development, commercialisation and licence agreement with an alliance partner. The asset concerned, which was being amortised, was fully written down.
- Tissue Diagnostics product intangibles in use (CHF 7 million) as a result of a strategic portfolio reassessment. The asset concerned, which was being amortised, was fully written down.

Potential commitments from alliance collaborations and purchase agreements within the next three years

The Group is party to in-licensing and similar arrangements with its alliance partners and intangible asset purchase agreements from third parties. These arrangements and purchase agreements may require the Group to make certain milestone or other similar payments dependent upon the achievement of agreed objectives or performance targets as defined in the collaboration and purchase agreements.

The Group's current estimate of future third-party commitments for such payments within the next three years is set out in the table below. These figures are undiscounted and are not risk-adjusted, meaning that they include all such potential payments that can arise assuming all projects currently in development are successful. The timing is based on the Group's current best estimate. These figures do not include any potential commitments within the Group, such as may arise between the Roche and Chugai businesses.

Potential future third-party collaboration and purchase payments at 31 December 2017 in millions of CHF

	Pharmaceuticals	Diagnostics	Group
Within one year	815	22	837
Between one and two years	430	3	433
Between two and three years	708	3	711
Total	**1,953**	**28**	**1,981**

10. Inventories

Inventories in millions of CHF

	2017	2016	2015
Raw materials and supplies	1,182	1,194	1,091
Work in process	101	114	133
Intermediates	4,660	5,372	5,458
Finished goods	2,052	1,880	1,485
Provision for slow-moving and obsolete inventory	(588)	(632)	(519)
Total inventories	**7,407**	**7,928**	**7,648**

Inventories expensed through cost of sales totalled CHF 11.3 billion (2016: CHF 11.1 billion). Inventory write-downs during the year resulted in an expense of CHF 663 million (2016: CHF 772 million).

11. Accounts receivable

Accounts receivable in millions of CHF

	2017	2016	2015
Trade receivables	10,371	9,416	9,011
Notes receivable	102	83	90
Other receivables	36	34	37
Allowances for doubtful accounts	(517)	(538)	(567)
Chargebacks and other allowances to be withheld upon settlement [2]	(415)	(235)	(242)
Total accounts receivable	**9,577**	**8,760**	**8,329**

Allowances for doubtful accounts: movements in recognised liability in millions of CHF

	2017	2016
At 1 January	(538)	(567)
Additional allowances created	(91)	(196)
Unused amounts reversed	77	151
Utilised during the year	43	72
Currency translation effects	(8)	2
At 31 December	**(517)**	**(538)**

Bad debt expenses recorded as marketing and distribution costs totalled CHF 12 million (2016: expense of CHF 10 million).

12. Marketable securities

Marketable securities in millions of CHF

	2017	2016	2015
Available-for-sale financial assets			
Equity securities	10	69	105
Debt securities	1,161	1,509	1,390
Money market instruments and time accounts over three months	6,107	3,366	3,945
Other investments	–	–	–
Total marketable securities	**7,278**	**4,944**	**5,440**

Marketable securities are held for fund management purposes and are primarily denominated in Swiss francs, US dollars and euros. Money market instruments are contracted to mature within one year of 31 December 2017.

Debt securities – contracted maturity in millions of CHF

	2017	2016	2015
Within one year	217	364	302
Between one and five years	867	906	959
More than five years	77	239	129
Total debt securities	**1,161**	**1,509**	**1,390**

13. Cash and cash equivalents

Cash and cash equivalents in millions of CHF

	2017	2016	2015
Cash – cash in hand and in current or call accounts	3,419	3,304	2,826
Cash equivalents – time accounts with a maturity of three months or less	1,300	859	905
Total cash and cash equivalents	**4,719**	**4,163**	**3,731**

14. Other non-current assets

Other non-current assets in millions of CHF

	2017	2016	2015
Available-for-sale investments – held at fair value [29]	294	249	219
Available-for-sale investments – held at cost	252	279	90
Loans receivable	8	7	11
Long-term trade receivables	38	27	16
Restricted cash	2	2	2
Other receivables	91	88	76
Total financial non-current assets	**685**	**652**	**414**
Long-term employee benefits	249	254	243
Other assets	400	394	302
Total non-financial non-current assets	**649**	**648**	**545**
Associates [22]	36	–	–
Total other non-current assets	**1,370**	**1,300**	**959**

The available-for-sale investments are mainly equity investments in private biotechnology companies, which are kept as part of the Group's strategic alliance efforts. Some unquoted equity investments classified as available-for-sale are measured at cost, as their fair value cannot be measured reliably.

15. Other current assets

Other current assets in millions of CHF

	2017	2016	2015
Accrued interest income	45	51	52
Derivative financial instruments [29]	97	185	169
Restricted cash	–	8	–
Cash collateral receivables	50	337	579
Other receivables	801	768	728
Total financial current assets	**993**	**1,349**	**1,528**
Prepaid expenses and accrued income	559	544	508
Other taxes recoverable	516	482	529
Other assets	175	165	230
Total non-financial current assets	**1,250**	**1,191**	**1,267**
Total other current assets	**2,243**	**2,540**	**2,795**

Other receivables are mainly related to royalty and licensing income receivables.

16. Accounts payable

Accounts payable in millions of CHF

	2017	2016	2015
Trade payables	2,786	2,689	2,449
Other taxes payable	418	402	405
Dividends payable	2	2	2
Other payables	248	282	351
Total accounts payable	**3,454**	**3,375**	**3,207**

17. Other non-current liabilities

Other non-current liabilities in millions of CHF

	2017	2016	2015
Deferred income	86	91	78
Other long-term liabilities	120	441	427
Total other non-current liabilities	**206**	**532**	**505**

Other long-term liabilities are mainly related to accrued employee benefits and included (in 2016 and 2015) the Genentech property purchase option exercise obligation due in July 2018 (see Note 7).

18. Other current liabilities

Other current liabilities in millions of CHF

	2017	2016	2015
Deferred income	372	184	171
Accrued payroll and related items	2,853	2,356	2,402
Interest payable	218	289	445
Derivative financial instruments[29]	119	447	639
Cash collateral payables	11	35	125
Accrued chargebacks and other allowances separately payable[2]	2,242	1,704	1,458
Accrued royalties and commissions	1,148	974	1,073
Other accrued liabilities	3,172	2,889	2,884
Total other current liabilities	**10,135**	**8,878**	**9,197**

At 31 December 2017 other accrued liabilities included CHF 261 million for the short-term Genentech property purchase option exercise obligation, which is due in July 2018 (see Note 7).

19. Provisions and contingent liabilities

Provisions: movements in recognised liabilities in millions of CHF

	Legal provisions	Environmental provisions	Restructuring provisions	Contingent consideration provisions	Other provisions	Total
Year ended 31 December 2016						
At 1 January 2016	700	585	621	1,492	1,238	4,636
Additional provisions created	59	38	405	39	428	969
Unused amounts reversed	(23)	–	(110)	(447)	(269)	(849)
Utilised	(53)	(119)	(240)	(69)	(355)	(836)
Discount unwind [3]	–	10	–	53	2	65
Business combinations						
– Acquired companies [5]	–	–	–	–	–	–
– Deferred consideration [5]	–	–	–	–	–	–
– Contingent consideration [5]	–	–	–	–	–	–
Currency translation effects	22	4	(2)	21	18	63
At 31 December 2016	**705**	**518**	**674**	**1,089**	**1,062**	**4,048**
Current	677	111	376	330	777	2,271
Non-current	28	407	298	759	285	1,777
At 31 December 2016	**705**	**518**	**674**	**1,089**	**1,062**	**4,048**
Year ended 31 December 2017						
At 1 January 2017	705	518	674	1,089	1,062	4,048
Additional provisions created	60	68	543	13	523	1,207
Unused amounts reversed	(219)	(4)	(167)	(366)	(181)	(937)
Utilised	(37)	(81)	(259)	(146)	(249)	(772)
Discount unwind [3]	–	4	–	14	2	20
Business combinations						
– Acquired companies [5]	–	–	–	–	–	–
– Deferred consideration [5]	–	–	–	–	8	8
– Contingent consideration [5]	–	–	–	10	–	10
Currency translation effects	(24)	18	31	(23)	4	6
At 31 December 2017	**485**	**523**	**822**	**591**	**1,169**	**3,590**
Current	471	119	450	182	820	2,042
Non-current	14	404	372	409	349	1,548
At 31 December 2017	**485**	**523**	**822**	**591**	**1,169**	**3,590**
Expected outflow of resources						
Within one year	471	119	450	182	820	2,042
Between one and two years	8	164	193	103	56	524
Between two and three years	1	138	98	94	67	398
More than three years	5	102	81	212	226	626
At 31 December 2017	**485**	**523**	**822**	**591**	**1,169**	**3,590**

The Group has revised the presentation of provisions. Contingent consideration provisions are now presented separately and employee provisions are now included as part of 'Other provisions'. The comparative period information has been restated accordingly.

In 2017 CHF 772 million of provisions were utilised (2016: CHF 836 million), of which CHF 621 million (2016: CHF 762 million) are included in the cash flows from operating activities and CHF 151 million (2016: CHF 74 million) are included in the cash flows from business combinations for payments made from deferred and contingent consideration arrangements (see Note 5).

Legal provisions

Legal provisions consist of a number of separate legal matters, including claims arising from trade, in various Group companies. By their nature the amounts and timings of any outflows are difficult to predict.

As part of the regular review of litigation matters, management has reassessed the provisions recorded for certain litigation matters. Based on the development of the various litigations, notably the Accutane case, some of the provisions previously held were released, resulting in income of CHF 219 million in 2017. This was a major element in the 2017 legal expenses, which show a net income of CHF 142 million (2016: net expense of CHF 39 million). Details of the major legal cases outstanding are disclosed below.

Environmental provisions

Provisions for environmental matters include various separate environmental issues in a number of countries. By their nature the amounts and timings of any outflows are difficult to predict. Significant provisions are discounted by between 2% and 4% where the time value of money is material. The significant provisions relate to the US site in Nutley, New Jersey, which was divested in September 2016, the estimated remediation costs for a landfill site near Grenzach, Germany, that was used by manufacturing operations that were closed some years ago and the estimated remediation costs for the manufacturing site at Clarecastle, Ireland. In 2017 the expected costs of environmental remediation at the Clarecastle site were reassessed and accordingly the environmental provisions were increased by CHF 46 million. This was a major element in the 2017 environmental expenses, which show a net expense of CHF 62 million (2016: net expense of CHF 38 million).

The Group's procedures on environmental protection are included in the Annual Report on pages 74 to 85. These include the actions taken by the Group with regard to climate change, notably the Group's commitment to reduce greenhouse gas emissions.

Restructuring provisions

These arise from planned programmes that materially change the scope of business undertaken by the Group or the manner in which business is conducted. Such provisions include only the costs necessarily entailed by the restructuring which are not associated with the recurring activities of the Group. The timings of these cash outflows are reasonably certain. These provisions are not discounted as the time value of money is not material in these matters.

In the Pharmaceuticals Division the significant provisions relate to the strategic realignment of the manufacturing network including exiting from four manufacturing sites, the resourcing flexibility plans to address various future challenges including biosimilar competition, the research and development strategic alignment and the outsourcing of IT functions to shared service centres and external providers (see Note 6).

Contingent consideration provisions

The Group is party to certain contingent consideration arrangements arising from business combinations. Significant provisions are discounted using an average discount rate of 3.1% (2016: 3.2%) where the time value of money is material. Additional details on measurement, on main movements of the provisions and on the total potential payments under these arrangements are provided in Note 29.

Other provisions

Other provisions relate to the items shown in the table below. With the exception of employee provisions, the timing of cash outflows is by its nature uncertain.

Other provisions in millions of CHF

	2017	2016	2015
Employee provisions	362	345	313
Sales returns	366	436	616
Other items	441	281	309
Total other provisions	**1,169**	**1,062**	**1,238**

Contingent liabilities

The operations and earnings of the Group continue, from time to time and in varying degrees, to be affected by political, legislative, fiscal and regulatory developments, including those relating to environmental protection, in the countries in which it operates. The industries in which the Group operates are also subject to other risks of various kinds. The nature and frequency of these developments and events, not all of which are covered by insurance, as well as their effect on future operations and earnings, are not predictable.

The Group has entered into strategic alliances with various companies in order to gain access to potential new products or to utilise other companies to help develop the Group's own potential new products. Potential future payments may become due to certain collaboration partners achieving certain milestones as defined in the collaboration agreements. The Group's best estimates of future commitments for such payments are given in Note 9.

Pharmaceuticals legal cases

At 31 December 2017 provisions for legal cases in the Pharmaceuticals Division were CHF 369 million (2016: CHF 592 million). Provisions have been recorded, and in some cases settled, mainly relating to the matters listed below.

Accutane. Hoffmann-La Roche Inc. ('HLR') and various other Roche affiliates have been named as defendants in numerous legal actions in the US and elsewhere relating to the acne medication Accutane. The litigation alleges that Accutane caused certain serious conditions, including, but not limited to, inflammatory bowel disease ('IBD'), birth defects and psychiatric disorders. In 2009 HLR announced that, following a re-evaluation of its portfolio of medicines that are now available from generic manufacturers, rapidly declining brand sales in the US and high costs from personal-injury lawsuits that it continues to defend vigorously, it had decided to immediately discontinue the manufacture and distribution of the product in the US.

All of the actions pending in federal court alleging IBD were consolidated for pre-trial proceedings in a Multi-District Litigation ('MDL') in the US District Court for the Middle District of Florida, Tampa Division. In August 2015 the MDL was closed. During the pendency of the MDL the District Court granted summary judgment in favour of HLR for all of the federal IBD cases that had proceeded and all were affirmed by the US Court of Appeals for the Eleventh Circuit. All of the actions pending in state court in New Jersey alleging IBD were consolidated for pre-trial proceedings in the Superior Court of New Jersey, Law Division, Atlantic County.

At 31 December 2016 there was one case on appeal (USD 25 million) where a jury in the New Jersey Superior Court had ruled in favour of the plaintiff and subsequently had its verdict reversed in favour of HLR. In January 2017 the New Jersey Supreme Court reinstated the case and remanded it to the Appellate Division for consideration of other issues. In May 2017 the Appellate Division again ruled in favour of HLR, reversed the verdict and remanded for a new trial. The plaintiff filed a petition for review to the Supreme Court, which remains pending.

In February 2015 the Superior Court of New Jersey, Law Division, Atlantic County, held an eight-day evidentiary hearing on whether plaintiffs' experts can testify that Accutane causes Crohn's disease. On 20 February 2015 the Superior Court barred plaintiffs' experts because their methods did not meet the requirements for scientific reliability. On 8 May 2015 the Superior Court entered an order dismissing with prejudice an agreed-upon list of 2,076 Crohn's disease cases that were subject to the Superior Court's February 2015 order. On 28 July 2017 the New Jersey Appellate Division reversed the order excluding plaintiff's experts from testifying that Accutane causes Crohn's disease and reinstated the dismissed cases finding that the trial court wrongfully barred plaintiffs' expert witnesses. HLR filed a petition for review to the New Jersey Supreme Court, which was granted on 8 December 2017. Oral argument is expected in 2018.

On 12 May 2015 the Superior Court entered an order granting summary judgment and dismissing 18 cases filed by New Jersey residents on the basis that the drug label was adequate as a matter of law since 2002. In July 2015 the Superior Court granted HLR's motion for summary judgment as to the adequacy of the label for post-2002 ingestion cases in 44 other jurisdictions. The Superior Court applied New Jersey law to all of the jurisdictions and granted HLR's motion dismissing approximately 511 cases. In the alternative, the Superior Court applied the home state law and granted summary judgment in 24 jurisdictions and denied it in 20 jurisdictions; this would have resulted in 389 cases being dismissed. On 25 July 2017 the New Jersey Appellate Division affirmed the dismissal of 197 cases and reinstated judgments in 335 cases based on the strength of HLR's warnings after 2002. HLR and the dismissed plaintiffs filed petitions for review to the New Jersey Supreme Court, which was granted on 8 December 2017. Oral argument is expected in 2018.

In January and October 2016 the Superior Court entered orders granting summary judgment and dismissing 191 cases for failure to prove Accutane proximately caused their ulcerative colitis. The plaintiffs have appealed all of these decisions. During February and March 2017 the Superior Court of New Jersey, Law Division, Atlantic County, held an evidentiary hearing on whether plaintiffs' experts can testify that Accutane causes ulcerative colitis. In April 2017 the Superior Court barred plaintiffs' experts because their methods did not meet the requirements for scientific reliability. In May 2017 the Superior Court entered an order dismissing 3,231 ulcerative colitis cases that were subject to the Superior Court's April 2017 order. The plaintiffs have appealed these decisions.

At 31 December 2017 HLR was defending approximately 2,500 actions involving approximately 2,500 plaintiffs brought in various state courts throughout the US for personal injuries allegedly resulting from their use of Accutane. There are approximately 3,619 cases on appeal. If any cases survive the appeals, additional trials may be scheduled. Individual trial results depend on a variety of factors, including many that are unique to the particular case and therefore the trial results to date may not be predictive of future trial results. The Group continues to defend vigorously the remaining personal injury cases and claims. Based on the development of the litigation some of the provisions previously held were released in 2017.

Avastin/Lucentis investigations. On 14 February 2013 the Italian Antitrust Authority ('AGCM') announced an investigation to determine whether Roche, Genentech and Novartis had entered into an agreement to restrict competition in the Italian market for drugs, with reference in particular to Avastin (marketed by Roche) and Lucentis (marketed by Novartis). Avastin and Lucentis are two different drugs that were developed and approved for different therapeutic purposes and contain different active pharmaceutical ingredients. On 5 March 2014 the AGCM issued a verdict that alleges that Roche and Novartis colluded to artificially differentiate Avastin and Lucentis in order to foster the sales of Lucentis in Italy. The AGCM fined Roche EUR 90.5 million and Novartis EUR 92 million. Roche appealed the AGCM verdict to the Tribunale Amministrativo Regionale del Lazio ('TAR'). On 2 December 2014 the TAR upheld the decision by the AGCM. Roche strongly disagrees with the verdict of the TAR and has appealed to the Consiglio di Stato. On 30 May 2014 the Italian Ministry of Health notified Roche S.p.A. of its intention to seek damages related to this matter. In July 2014 Roche paid the EUR 90.5 million fine under protest to avoid additional penalty fees and recorded an expense within general and administration. The fine and related interest will be reimbursed if Roche wins the case. On 23 January 2018 the European Court of Justice rendered its decision on five questions which were referred to the European Court of Justice by the Consiglio di Stato. The principles defined in this decision will be used by the Consiglio di Stato to render their final verdict on the case. The outcome of these matters cannot be determined at this time.

PDL-1 inhibitor litigation. On 26 July 2017 Bristol-Myers Squibb Co. ('BMS') filed a lawsuit against Genentech in Delaware. BMS alleges that Genentech's sale of Tecentriq infringes their US Patent No. 9,402,899. BMS is seeking judgment in its favour, a finding of wilfulness and monetary damages. On 4 October 2017 Genentech filed its answer and counterclaims, seeking a declaratory judgment of invalidity of the 9,402,899 patent. The outcome of this matter cannot be determined at this time.

Average Wholesale Prices litigation. HLR and Roche Laboratories Inc. ('RLI'), along with approximately 50 other brand and generic pharmaceutical companies, have been named as defendants in several legal actions in the US relating to the pricing of pharmaceutical drugs and State Medicaid reimbursement. The primary allegation in these litigations is that the pharmaceutical companies misrepresented or otherwise reported inaccurate Average Wholesale Prices ('AWP') and/or Wholesale Acquisition Costs ('WAC') for their drugs, which prices were allegedly relied upon by the States in calculating Medicaid reimbursements to entities such as retail pharmacies. The states, through their respective Attorney General, are seeking repayment of the amounts they claim were over-reimbursed. The time period associated with these cases is 1991 through 2005. At 31 December 2017 HLR and RLI are defending one AWP action filed in the state of New Jersey. HLR and RLI are vigorously defending themselves and no trial date has been set. The outcome of this matter cannot be determined at this time.

Rituxan arbitration. In October 2008 Genentech and Biogen Idec Inc. filed a complaint in California against Sanofi-Aventis Deutschland GmbH, Sanofi-Aventis US LLC and Sanofi-Aventis US Inc. ('Sanofi') seeking a declaratory judgment that certain Genentech products, including Rituxan, do not infringe Sanofi's US Patent Nos. 5,849,522 and 6,218,140 and that the '522 and '140 patents are invalid. Sanofi alleged that Rituxan and another Genentech product infringe certain claims of the '522 and '140 patents. In March 2011 the district court ruled as a matter of law that Genentech and Biogen Idec do not infringe the asserted patent claims. In May 2011 Sanofi appealed the court's non-infringement ruling. The appellate court affirmed the district court's judgment of no patent infringement.

In addition, in October 2008 Sanofi affiliate Hoechst GmbH ('Hoechst') filed with the ICC International Court of Arbitration (Paris) a request for arbitration with Genentech, relating to a terminated patent-licence agreement between one of Hoechst's predecessors and Genentech that pertained to the above-mentioned patents and related patents outside the US. Hoechst sought payment of patent-licence royalties on sales of certain Genentech products, including Rituxan, damages for breach of contract, and other relief. In various arbitral awards in September 2012 and February 2013, the arbitrator found Genentech liable to Hoechst for patent-licence royalties on Rituxan, and he awarded the royalties and interest that Hoechst had sought. In February 2013 the Group recorded a back royalty expense of CHF 42 million, net of the assumed reimbursement of a portion of the Group's obligation by its co-promotion partner in the US.

Hoechst initiated proceedings in the US, France and Germany seeking to enforce the arbitral awards. In October 2013 Genentech paid the awarded royalties and interest to Hoechst under protest. Genentech is seeking annulment of the arbitral awards through proceedings it initiated in the Court of Appeal of Paris. There was a hearing in those proceedings in June 2014. In September 2014 the Paris Court of Appeal stayed the annulment proceedings to seek guidance from the EU Court of Justice on a specific legal question that had been raised by Genentech relating to the arbitral award's non-compliance under EU competition laws. In November 2014 Hoechst filed notices of appeal to the French Supreme Court seeking to review the Paris Court of Appeal's decision to seek guidance from the EU Court of Justice. On 18 November 2015 the French Supreme Court denied Hoechst's challenge to the decision of the Paris Court of Appeal to refer the specific legal question to the EU Court of Justice. On 7 July 2016 the EU Court of Justice issued its opinion in the case, finding that where a licensee may freely terminate a licence, the licence is not anti-competitive. On 26 September 2017 the Paris Court of Appeal issued a decision dismissing the appeal and ruling in favour of Hoechst. It is expected that the matter will be finally concluded in the first quarter of 2018.

In addition, the matters listed below do not currently have provisions recorded, but there are potential future obligations which will be confirmed only by the occurrence or non-occurrence of uncertain future events or where the obligation cannot be measured with sufficient reliability.

Boniva litigation. HLR, Genentech and various other Roche affiliates (collectively 'Roche') have been named as defendants in numerous legal actions in the US and one now dismissed case in Canada relating to the post-menopausal osteoporosis medication Boniva. In these litigations, the plaintiffs allege that Boniva caused either osteonecrosis of the jaw or atypical femoral fractures. At 31 December 2017 Roche is defending approximately 284 actions involving approximately 329 plaintiffs brought in federal and state courts throughout the US for personal injuries allegedly resulting from the use of Boniva. All of these cases are in the early discovery stages of litigation. Individual trial results depend on a variety of factors, including many that are unique to the particular case. Roche is vigorously defending itself in these matters. The outcome of these matters cannot be determined at this time.

EMA investigation. On 23 October 2012 the European Medicines Agency ('EMA') announced that it would start an infringement procedure to investigate allegations regarding an alleged breach of medicines safety reporting obligations in relation to 19 centrally authorised medicines. On 19 November 2013 the EMA announced the results of the Pharmacovigilance Risk Assessment Committee assessment of Roche's medicines. The EMA found no impact regarding the benefit-risk balance of any of Roche's medicines and confirmed the benefit-risk profiles based on available safety information. The EMA and other health authorities have confirmed all medicines remain authorised without changes to the treatment advice for patients and healthcare professionals. All corrective and preventative actions resulting from the inspections were implemented. A re-inspection by authorities in November 2013 led to certain findings which Roche addressed accordingly. On 14 April 2014 the EMA issued its report to the European Commission that summarises the EMA's findings in relation to the investigation. On 6 July 2015 the European Commission issued a notification to the EMA, returning the case file to the EMA for a new period of inquiry. On 4 July 2016 the EMA announced that it had concluded its second inquiry and sent, on 1 July 2016, the final updated report to the European Commission. On 15 December 2017 the European Commission announced that it has closed the infringement procedure without imposing any penalty. The matter is now concluded.

Hemlibra (emicizumab) litigation. On 4 May 2017 Baxalta Inc. ('Baxalta'), a subsidiary of Shire plc., filed a patent infringement and declaratory judgment of patent infringement suit in the US District Court for the District of Delaware, alleging that Genentech, Inc. and Chugai Pharmaceutical Co., Ltd. currently or imminently would manufacture, use, sell, offer for sale, or import into the US Hemlibra (emicizumab), which would infringe Baxalta's US Patent No. 7,033,590. Baxalta is seeking a judgment of infringement, injunctive and monetary relief, attorneys' fees, costs and expenses. On 11 May 2017 Genentech was served with the complaint. Genentech's response and counterclaims to the complaint were filed on 30 June 2017. On 19 June 2017 Chugai waived service. On 13 September 2017 Chugai filed a motion to dismiss the complaint for lack of personal jurisdiction. On 16 November 2017 the Food and Drug Administration ('FDA') approved Hemlibra (emicizumab) for haemophilia A with inhibitors for use in the US. On 14 December 2017 Baxalta filed a motion for a preliminary injunction seeking to prevent Genentech from marketing or selling Hemlibra to patients in the US, but excluding inhibitor patients who are already being treated with it and excluding inhibitor patients who are less well served by existing bypass treatments or cannot receive prophylactic bypass treatments. The outcome of this matter cannot be determined at this time.

Securities litigation. On 6 June 2017 a class action was filed in the United States District Court for the District of New Jersey against Roche Holding Ltd and two of its current officers. The lawsuit brings claims under the federal securities laws in connection with the Group's public disclosures, in particular with respect to matters relating to two of Roche's drugs, Herceptin and Perjeta. Other substantially similar lawsuits may follow. The Group will vigorously defend itself in this matter. The outcome of this matter cannot be determined at this time.

Arbitration against Chugai. In May 2017 Medical Research Council and LifeArc (formerly Medical Research Council Technology) ('Claimants') requested arbitration against Chugai Pharmaceutical Co., Ltd. with an arbitrator being appointed on 9 August 2017. Sums are sought from Chugai for alleged breach of obligations under a collaboration agreement dated 15 August 1990 in connection with the development of the humanised anti-human IL-6 receptor monoclonal antibody, Actemra. It is claimed that Chugai is obliged to pay royalties to the Claimants pursuant to the collaboration agreement. Chugai considers that the claims are without merit and Chugai will vigorously defend itself in the arbitration. The outcome of this matter cannot be determined at this time.

20. Debt

Debt: movements in carrying value of recognised liabilities in millions of CHF

	2017	2016
At 1 January	**22,355**	**23,251**
Proceeds from issue of bonds and notes	1,502	3,158
Redemption and repurchase of bonds and notes	(3,068)	(3,985)
Increase (decrease) in commercial paper	(1,258)	(454)
Increase (decrease) in other debt	(385)	(133)
Changes from financing cash flows	**(3,209)**	**(1,414)**
Net (gains) losses on redemption and repurchase of bonds and notes	84	142
Amortisation of debt discount [3]	13	19
Financing costs	**97**	**161**
Business combinations	**1**	**–**
Net foreign currency transaction (gains) losses	174	(93)
Currency translation effects	(430)	462
Changes in foreign exchanges rates	**(256)**	**369**
Changes in fair values of hedging instruments	(28)	(17)
Other changes	–	5
At 31 December	**18,960**	**22,355**
Bonds and notes	17,986	19,644
Commercial paper	774	2,116
Amounts due to banks and other financial institutions	176	570
Finance lease obligations [7]	5	5
Other borrowings	19	20
Total debt	**18,960**	**22,355**
Long-term debt	15,839	16,992
Short-term debt	3,121	5,363
Total debt	**18,960**	**22,355**

There are no pledges on the Group's assets in connection with debt.

Bonds and notes

Recognised liabilities and effective interest rates of bonds and notes in millions of CHF

	Effective interest rate Underlying instrument	Effective interest rate Including hedging	2017	2016	2015
US dollar notes – fixed rate					
1.35% notes due 29 September 2017, principal USD 0.85 billion (ISIN: US771196BC54)	1.41%	0.78%	–	869	842
6.0% notes due 1 March 2019, principal USD 4.5 billion (ISIN: USU75000AM82 and US771196AS16)	6.37%	6.03%	–	–	1,499
2.25% notes due 30 September 2019, principal USD 1.5 billion (ISIN: US771196BA98)	2.34%	1.44%	1,466	1,545	1,501
2.875% notes due 29 September 2021, principal USD 1.3 billion (ISIN: US771196BB71)	2.98%	n/a	1,269	1,325	1,280
1.75% notes due 28 January 2022, principal USD 0.65 billion (ISIN: US771196BM37)	1.87%	1.79%	630	660	–
3.35% notes due 30 September 2024, principal USD 1.65 billion (ISIN: US771196BE11)	3.40%	n/a	1,612	1,685	1,629
3.0% notes due 10 November 2025, principal USD 1.0 billion (ISIN: US771196BJ08)	3.14%	n/a	971	1,014	979
2.625% notes due 15 May 2026, principal USD 1.0 billion (ISIN: US771196BK70)	2.78%	n/a	969	1,011	–
2.375% notes due 28 January 2027, principal USD 0.85 billion (ISIN: US771196BL53)	2.54%	n/a	822	858	–
7.0% notes due 1 March 2039, principal USD 2.5 billion, outstanding USD 1.19 billion (ISIN: USU75000AN65 and US771196AU61)	7.43%	7.38%	1,120	1,167	1,213
4.0% notes due 28 November 2044, principal USD 0.65 billion (ISIN: US771196BH42)	4.16%	n/a	624	652	630
US dollar notes – floating rate					
Notes due 29 September 2017, principal USD 0.3 billion (ISIN: US771196BD38)	0.77%	n/a	–	307	296
Notes due 30 September 2019, principal USD 0.5 billion (ISIN: US771196AZ58)	1.42%	n/a	489	511	494
Euro Medium Term Note programme – fixed rate					
5.625% notes due 4 March 2016, principal EUR 2.75 billion (ISIN: XS0415624120)	5.70%	6.36%	–	–	2,270
2.0% notes due 25 June 2018, principal EUR 1.0 billion (ISIN: XS0760139773)	2.07%	n/a	1,168	1,072	1,079
2.0% notes due 13 March 2020, principal USD 0.6 billion (ISIN: XS1197832089)	2.12%	1.50%	581	613	595
6.5% notes due 4 March 2021, principal EUR 1.75 billion, outstanding EUR 1.14 billion (ISIN: XS0415624716)	6.66%	6.96%	1,328	1,408	1,415
0.5% notes due 27 February 2023, principal EUR 0.65 billion (ISIN: XS1371715118)	0.63%	n/a	755	692	–
5.375% notes due 29 August 2023, principal GBP 0.25 billion, outstanding GBP 0.08 billion (ISIN: XS0175478873)	5.46%	n/a	100	249	291
0.875% notes due 25 February 2025, principal EUR 1.0 billion (ISIN: XS1195056079)	0.93%	n/a	1,165	1,069	1,076
Swiss franc bonds – fixed rate					
4.5% bonds due 23 March 2017, principal CHF 1.5 billion (ISIN: CH0039139263)	4.77%	n/a	–	1,499	1,495
1.0% bonds due 21 September 2018, principal CHF 0.6 billion (ISIN: CH0180513068)	1.04%	0.88%	598	602	603
0.0% bonds due 23 September 2018, principal CHF 0.4 billion (ISIN: CH0358654967)	–0.45%	n/a	401	–	–
1.625% bonds due 23 September 2022, principal CHF 0.5 billion (ISIN: CH0180513183)	1.64%	1.38%	502	504	499
0.1% bonds due 23 September 2024, principal CHF 0.75 billion (ISIN: CH0358654975)	0.11%	–0.09%	748	–	–
0.45% bonds due 23 March 2029, principal CHF 0.35 billion (ISIN: CH0359915409)	0.46%	n/a	350	–	–
Genentech Senior Notes					
5.25% Senior Notes due 15 July 2035, principal USD 0.5 billion, outstanding USD 0.325 billion (ISIN: US368710AC32)	5.39%	n/a	318	332	321
Total bonds and notes			**17,986**	**19,644**	**20,007**

Bonds and notes maturity in millions of CHF

	2017	2016	2015
Within one year	2,167	2,675	2,931
Between one and two years	1,955	1,674	2,634
Between two and three years	581	2,055	1,682
Between three and four years	2,597	613	2,832
Between four and five years	1,132	2,733	595
More than five years	9,554	9,894	9,333
Total bonds and notes	**17,986**	**19,644**	**20,007**

Unamortised discount included in carrying value of bonds and notes in millions of CHF

	2017	2016	2015
US dollar notes	88	102	85
Euro notes	14	17	15
Swiss franc bonds	–	2	9
Pound sterling notes	1	2	2
Total unamortised discount	**103**	**123**	**111**

Issuance of bonds and notes – 2017

On 23 March 2017 the Group completed an offering of CHF 1.5 billion fixed rate bonds issued in three tranches, of which CHF 400 million for bonds with a zero coupon which will mature on 23 September 2018, CHF 750 million for bonds with a 0.10% coupon which will mature on 23 September 2024, and CHF 350 million for bonds with a 0.45% coupon which will mature on 23 March 2029. These bonds are listed at the SIX Swiss Exchange. The Group received CHF 1,502 million aggregate net proceeds from the issuance and sale of these fixed rate bonds.

Issuance of bonds and notes – 2016

On 26 February 2016 the Group issued EUR 650 million fixed rate notes with a coupon of 0.5% under the Euro Medium Term Note programme. The notes will mature on 27 February 2023 and are listed on the Luxembourg Stock Exchange. The Group received CHF 703 million aggregate net proceeds from the issuance and sale of these fixed notes.

On 1 March 2016 the Group completed an offering of USD 1.0 billion fixed rate notes with a coupon of 2.625%. The notes will mature on 15 May 2026. The Group received CHF 987 million aggregate net proceeds from the issuance and sale of these fixed notes.

On 31 October 2016 the Group completed an offering of USD 650 million and USD 850 million fixed rate notes with a coupon of 1.75% and 2.375%, respectively. The notes will mature on 28 January 2022 and 28 January 2027, respectively. The Group received CHF 1,468 million aggregate net proceeds from the issuance and sale of these fixed notes.

Redemption and repurchase of bonds and notes – 2017

Redemption of Swiss franc bonds. On the due date of 23 March 2017 the Group redeemed the 4.5% fixed rate bonds with a principal amount of CHF 1.5 billion. The cash outflow was CHF 1,500 million, plus accrued interest. The effective interest rate of these bonds was 4.77%.

Redemption of US dollar notes. On the due date of 29 September 2017 the Group redeemed the 1.35% fixed rate notes with a principal amount of USD 0.85 billion. The cash outflow was CHF 825 million, plus accrued interest. The effective interest rate of these notes was 1.41%.

On the due date of 29 September 2017 the Group redeemed floating rate notes with a principal amount of USD 0.3 billion. The cash outflow was CHF 291 million, plus accrued interest. The effective interest rate of these notes was 0.77%.

Redemption of pound sterling notes. On 17 November 2017 the Group completed a tender offer to repurchase GBP 123 million of the 5.375% fixed rate notes due 29 August 2023. The cash outflow was CHF 200 million, plus accrued interest and there was a loss on repurchase of CHF 37 million. The effective interest rate of these notes was 5.46%.

Redemption of euro notes. On 17 November 2017 the Group completed a tender offer to repurchase EUR 176 million of the 6.5% fixed rate notes due 4 March 2021. The cash outflow was CHF 252 million, plus accrued interest and there was a loss on repurchase of CHF 47 million. The effective interest rate of these notes was 6.66%.

There was an additional CHF 10 million gain recognised as part of net (gains) losses on redemption and repurchase of bonds and notes coming from a termination of a cross-currency swap used to hedge the tendered portion of the euro notes.

Redemption and repurchase of bonds and notes – 2016

Redemption of US dollar notes. On 30 December 2015 the Group resolved to exercise its option to call for early partial redemption of the 6.0% fixed rate notes due 1 March 2019. On 24 March 2016 the Group redeemed an outstanding principal of USD 600 million at an amount equal to the sum of the present values of the remaining scheduled payments of these notes discounted to the redemption date at the US Treasury rate plus 0.50%, together with accrued and unpaid interest on the principal. The cash outflow was CHF 660 million, plus accrued interest. At 31 December 2015 the Group revised the carrying value of these notes to take into account the changes to the amounts and timings of the estimated cash flows which resulted in an increase in carrying value of USD 74 million (CHF 72 million) which was recorded within financing costs as a loss on redemption in 2015. In 2016 there was an additional CHF 4 million loss recorded on redemption. The effective interest rate of these notes was 6.37%.

On 22 June 2016 the Group resolved to exercise its option to call for early partial redemption of the 6.0% fixed rate notes due 1 March 2019. On 25 August 2016 the Group redeemed an outstanding principal of USD 857 million at an amount equal to the sum of the present values of the remaining scheduled payments of these notes discounted to the redemption date at the US Treasury rate plus 0.50%, together with accrued and unpaid interest on the principal. The cash outflow was CHF 924 million, plus accrued interest and there was a loss on redemption of CHF 99 million. The effective interest rate of these notes was 6.37%.

On 19 December 2016 the Group completed a tender offer to repurchase USD 80 million of the 7.0% fixed rate notes due 1 March 2039. The cash outflow was CHF 118 million, plus accrued interest and there was a loss on repurchase of CHF 39 million. The effective interest rate of these notes was 7.43%.

Redemption of euro notes. On the due date of 4 March 2016 the Group redeemed the 5.625% fixed rate notes with a principal of EUR 2.1 billion. The cash outflow was CHF 2,283 million, plus accrued interest. The effective interest rate of these notes was 5.70%.

Cash flows from issuance, redemption and repurchase of bonds and notes

Cash inflows from issuance of bonds and notes in millions of CHF

	2017	2016
Euro Medium Term Note programme – Euro notes	–	703
US dollar notes	–	2,455
Swiss franc bonds	1,502	–
Total cash inflows from issuance of bonds and notes	**1,502**	**3,158**

Cash outflows from redemption and repurchase of bonds and notes in millions of CHF

	2017	2016
Euro Medium Term Note programme – Pound sterling notes	(200)	–
Euro Medium Term Note programme – Euro notes	(252)	(2,283)
US dollar notes	(1,116)	(1,702)
Swiss franc bonds	(1,500)	–
Total cash outflows from redemption and repurchase of bonds and notes	**(3,068)**	**(3,985)**

Commercial paper

Roche Holdings, Inc. commercial paper program. Roche Holdings, Inc. has an established commercial paper program under which it can issue up to USD 7.5 billion of unsecured commercial paper notes guaranteed by Roche Holding Ltd. The total committed credit lines that are available as a back-stop supporting the commercial paper program are USD 7.5 billion at 31 December 2017. The maturity of the notes under the program cannot exceed 365 days from the date of issuance. At 31 December 2017 unsecured commercial paper notes with a principal amount of USD 0.8 billion and an average interest rate of 1.40% were outstanding.

Movements in commercial paper obligations in millions of CHF

	2017	2016
At 1 January	2,116	2,501
Net cash proceeds (payments)	(1,258)	(454)
Currency translation effects	(84)	69
At 31 December	**774**	**2,116**

Amounts due to banks and other financial institutions

These amounts are denominated in various currencies and the average interest rate was 6.98% (2016: 4.12%). At 31 December 2017 the amounts outstanding of CHF 176 million (2016: CHF 570 million) are due within one year.

21. Equity attributable to Roche shareholders

Changes in equity attributable to Roche shareholders in millions of CHF

	Share capital	Retained earnings	Reserves			Total
			Fair value	Hedging	Translation	
Year ended 31 December 2016						
At 1 January 2016	160	28,591	155	27	(7,954)	20,979
Net income recognised in income statement	–	9,576	–	–	–	9,576
Available-for-sale investments						
– Fair value gains (losses) taken to equity	–	–	110	–	–	110
– Transferred to income statement	–	–	(97)	–	–	(97)
– Income taxes [4]	–	–	7	–	–	7
– Non-controlling interests	–	–	6	–	–	6
Cash flow hedges						
– Gains (losses) taken to equity	–	–	–	29	–	29
– Transferred to income statement [a]	–	–	–	52	–	52
– Income taxes [4]	–	–	–	(26)	–	(26)
– Non-controlling interests	–	–	–	(18)	–	(18)
Currency translation of foreign operations						
– Exchange differences	–	–	4	(1)	493	496
– Non-controlling interests	–	–	–	–	(128)	(128)
Defined benefit plans						
– Remeasurement gains (losses) [25]	–	178	–	–	–	178
– Limit on asset recognition [25]	–	14	–	–	–	14
– Income taxes [4]	–	(18)	–	–	–	(18)
– Non-controlling interests	–	12	–	–	–	12
Other comprehensive income, net of tax	**–**	**186**	**30**	**36**	**365**	**617**
Total comprehensive income	**–**	**9,762**	**30**	**36**	**365**	**10,193**
Dividends	–	(6,909)	–	–	–	(6,909)
Equity compensation plans, net of transactions in own equity	–	(344)	–	–	–	(344)
Changes in non-controlling interests	–	(8)	–	–	–	(8)
At 31 December 2016	**160**	**31,092**	**185**	**63**	**(7,589)**	**23,911**

a) The entire amount transferred to the income statement was reported in 'Other financial income (expense)'.

Changes in equity attributable to Roche shareholders in millions of CHF

	Share capital	Retained earnings	Reserves			Total
			Fair value	Hedging	Translation	
Year ended 31 December 2017						
At 1 January 2017	160	31,092	185	63	(7,589)	23,911
Net income recognised in income statement	–	8,633	–	–	–	8,633
Available-for-sale investments						
– Fair value gains (losses) taken to equity	–	–	68	–	–	68
– Transferred to income statement	–	–	(105)	–	–	(105)
– Income taxes [4]	–	–	15	–	–	15
– Non-controlling interests	–	–	(4)	–	–	(4)
Cash flow hedges						
– Gains (losses) taken to equity	–	–	–	129	–	129
– Transferred to income statement [a]	–	–	–	(160)	–	(160)
– Income taxes [4]	–	–	–	20	–	20
– Non-controlling interests	–	–	–	11	–	11
Currency translation of foreign operations						
– Exchange differences	–	–	(1)	(2)	265	262
– Accumulated differences transferred to income statement on divestment of subsidiaries [22]	–	–	–	–	100	100
– Non-controlling interests	–	–	–	–	20	20
Defined benefit plans						
– Remeasurement gains (losses) [25]	–	732	–	–	–	732
– Limit on asset recognition [25]	–	–	–	–	–	–
– Income taxes [4]	–	(328)	–	–	–	(328)
– Non-controlling interests	–	(3)	–	–	–	(3)
Other comprehensive income, net of tax	**–**	**401**	**(27)**	**(2)**	**385**	**757**
Total comprehensive income	**–**	**9,034**	**(27)**	**(2)**	**385**	**9,390**
Dividends	–	(6,998)	–	–	–	(6,998)
Equity compensation plans, net of transactions in own equity	–	146	–	–	–	146
Changes in non-controlling interests	–	(8)	–	–	–	(8)
At 31 December 2017	**160**	**33,266**	**158**	**61**	**(7,204)**	**26,441**

a) The entire amount transferred to the income statement was reported in 'Other financial income (expense)'.

Genentech transaction

The Group completed the purchase of the non-controlling interests in Genentech effective 26 March 2009. Based on the International Accounting Standard 27 'Separate Financial Statements' (IAS 27) and consistent with the International Financial Reporting Standard 10 'Consolidated Financial Statements' (IFRS 10), which was adopted by the Group in 2013, this transaction was accounted for in full as an equity transaction. As a consequence, the carrying amount of the consolidated equity of the Group at that time was reduced by CHF 52.2 billion, of which CHF 8.5 billion was allocated to eliminate the book value of Genentech non-controlling interests. This accounting effect significantly impacted the Group's net equity, but has no effect on the Group's business or its dividend policy.

Share capital

At 31 December 2017 the authorised and issued share capital of Roche Holding Ltd, which is the Group's parent company, consisted of 160 million shares with a nominal value of CHF 1.00 each, as in the preceding year. The shares are bearer shares and the Group does not maintain a register of shareholders. Based on information supplied to the Group, a shareholder group with pooled voting rights owns 45.01% (2016: 45.01%) of the issued shares. On 24 March 2011 the shareholder group announced that it would continue the shareholder pooling agreement existing since 1948 with a modified shareholder composition. The shareholder group with pooled voting rights now holds 72,018,000 shares, corresponding to 45.01% of the shares issued. This figure does not include any shares without pooled voting rights that are held outside this group by individual members of the group. Ms Maja Oeri, formerly a member of the pool, now holds 8,091,900 shares representing 5.057% of the voting rights independently of the pool. This is further described in Note 30. Based on information supplied to the Group, Novartis Holding AG, Basel, owns 33.333% (participation below 33⅓%) of the issued shares (2016: 33.333%).

Non-voting equity securities *(Genussscheine)*

At 31 December 2017 702,562,700 non-voting equity securities have been authorised and were in issue as in the preceding year. Under Swiss company law these non-voting equity securities have no nominal value, are not part of the share capital and cannot be issued against a contribution which would be shown as an asset in the balance sheet of Roche Holding Ltd. Each non-voting equity security confers the same rights as any of the shares to participate in the net profit and any remaining proceeds from liquidation following repayment of the nominal value of the shares and, if any, participation certificates. In accordance with the law and the Articles of Incorporation of Roche Holding Ltd, the Company is entitled at all times to exchange all or some of the non-voting equity securities into shares or participation certificates.

Dividends

On 14 March 2017 the shareholders approved the distribution of a dividend of CHF 8.20 per share and non-voting equity security (2016: CHF 8.10) in respect of the 2016 business year. The distribution to holders of outstanding shares and non-voting equity securities totalled CHF 6,998 million (2016: CHF 6,909 million) and has been recorded against retained earnings in 2017. The Board of Directors has proposed dividends for the 2017 business year of CHF 8.30 per share and non-voting equity security which, if approved, would result in a total distribution to shareholders of CHF 7,159 million. This is subject to approval at the Annual General Meeting on 13 March 2018.

Own equity instruments

Holdings of own equity instruments in equivalent number of non-voting equity securities

	2017 (millions)	2016 (millions)
Shares	0.1	0.1
Non-voting equity securities	8.6	10.5
Total	**8.7**	**10.6**

Own equity instruments are recorded within equity at original purchase cost. At 31 December 2017 the fair value of shares was CHF 5 million and the fair value of non-voting equity securities was CHF 2.1 billion. Own equity instruments are held for the Group's potential conversion obligations that may arise from the Group's equity compensation plans (see Note 26).

Reserves

Fair value reserve. The fair value reserve represents the cumulative net change in the fair value of available-for-sale financial assets until the asset is sold, impaired or otherwise disposed of.

Hedging reserve. The hedging reserve represents the effective portion of the cumulative net change in the fair value of cash flow hedging instruments related to hedged transactions that have not yet occurred.

Translation reserve. The translation reserve represents the cumulative currency translation differences relating to the consolidation of Group companies that use functional currencies other than Swiss francs.

22. Subsidiaries and associates

Chugai

Effective 1 October 2002 the Roche Group and Chugai completed an alliance to create a leading research-driven Japanese pharmaceutical company, which was formed by the merger of Chugai and Roche's Japanese pharmaceuticals subsidiary, Nippon Roche. The merged company is known as Chugai.

Consolidated subsidiary. Chugai is a fully consolidated subsidiary of the Group. This is based on the Group's interest in Chugai at 31 December 2017 of 61.3% (2016: 61.4%) and the Roche relationship with Chugai that is founded on the Basic Alliance, Licensing and Research Collaboration Agreements.

The common stock of Chugai is publicly traded and is listed on the Tokyo Stock Exchange under the stock code 'TSE:4519'. Chugai prepares financial statements in accordance with International Financial Reporting Standards (IFRS) that are filed on a quarterly basis with the Tokyo Stock Exchange. Due to certain consolidation entries there are minor differences between Chugai's stand-alone IFRS results and the results of Chugai as consolidated by the Roche Group in accordance with IFRS.

Chugai summarised financial information in millions of CHF

	2017	2016
Income statement		
Sales[2]	4,383	4,279
Royalties and other operating income[2]	310	173
Total revenues	**4,693**	**4,452**
Operating profit[2]	856	682
Balance sheet		
Non-current assets	2,272	2,083
Current assets	5,182	5,068
Non-current liabilities	(280)	(285)
Current liabilities	(1,060)	(1,079)
Total net assets	**6,114**	**5,787**
Cash flows		
Cash flows from operating activities	945	351
Cash flows from investing activities	(322)	(91)
Cash flows from financing activities	(260)	(303)

Dividends. The dividends distributed to third parties holding Chugai shares during 2017 totalled CHF 102 million (2016: CHF 110 million) and have been recorded against non-controlling interests (see Note 23). Dividends paid by Chugai to Roche are eliminated on consolidation as intercompany items.

Roche's relationship with Chugai. Chugai has entered into certain agreements with Roche, which are discussed below:

(1) Basic Alliance Agreement – As part of the Basic Alliance Agreement signed in December 2001, Roche and Chugai entered into certain arrangements covering the future operation and governance of Chugai. Amongst other matters these cover the following areas:

- The structuring of the alliance.
- Roche's rights as a shareholder.
- Roche's rights to nominate members of Chugai's Board of Directors.
- Certain limitations to Roche's ability to buy or sell Chugai's common stock.

Chugai issues additional shares of common stock in connection with its convertible debt and equity compensation plans, and may issue additional shares for other purposes, which affects Roche's percentage ownership interest. The Basic Alliance Agreement provides, amongst other matters, that Chugai will guarantee Roche's right to maintain its shareholding percentage in Chugai at not less than 50.1%.

(2) Licensing Agreements – Under the Japan Umbrella Rights Agreement signed in December 2001, Chugai has exclusive rights to market Roche's pharmaceutical products in Japan. Chugai also has the right of first refusal on the development and marketing in Japan of all development compounds advanced by Roche.

The Rest of the World Umbrella Rights Agreement (excluding Japan and South Korea) signed in May 2002 was revised and the Amended and Restated Rest of the World Umbrella Rights Agreement (excluding Japan, South Korea and Taiwan) was signed in August 2014. Under this Agreement Roche has the right of first refusal on the development and marketing of Chugai's development compounds in markets outside Japan, excluding South Korea and Taiwan.

Further to these agreements, Roche and Chugai have signed a series of separate agreements for certain specific products. Depending on the specific circumstances and the terms of the agreement, this may result in payments on an arm's length basis between Roche and Chugai, for any or all of the following matters:
- Upfront payments, if a right of first refusal to license a product is exercised.
- Milestone payments, dependent upon the achievement of agreed performance targets.
- Royalties on future product sales.

These specific product agreements may also cover the manufacture and supply of the respective products to meet the other party's clinical and/or commercial requirements on an arm's length basis.

(3) Research Collaboration Agreements – Roche and Chugai have entered into research collaboration agreements in the areas of small-molecule synthetic drug research and biotechnology-based drug discovery.

Foundation Medicine

On 7 April 2015 the Group acquired a controlling interest in Foundation Medicine, Inc. ('FMI'), a publicly owned US company based in Cambridge, Massachusetts, and entered into an Investor Rights Agreement, a Research and Development Collaboration Agreement and several Commercial Collaboration Agreements.

FMI is a fully consolidated subsidiary of the Group. This is based on the Group's interest in FMI at 31 December 2017 of 57.5% (2016: 59.6%) and the Roche relationship with FMI that is founded on the above agreements. The common stock of FMI is publicly traded and is listed on the Nasdaq under the stock code 'FMI'. FMI prepares financial statements in accordance with US GAAP that are filed on a quarterly basis with the SEC. Due to certain consolidation entries there are differences between FMI's stand-alone US GAAP results and the results of FMI as consolidated by the Roche Group in accordance with IFRS.

Dividends. There were no dividends distributed to third parties holding FMI shares during 2017 and 2016.

Associates

On 1 June 2017 the Group acquired an interest in Senseonics Holding, Inc. ('Senseonics'), a publicly owned US company based in Germantown, Maryland, which resulted in the Group having a 23.0% interest in Senseonics. This investment has been assessed and is treated as an associate of the Group. The Group's interest in Senseonics at 31 December 2017 was 20.7%. The common stock of Senseonics is publicly traded and is listed on the New York Stock Exchange (NYSE-MKT) under the stock code 'SENS'. Senseonics prepares financial statements in accordance with US GAAP that are filed on a quarterly basis with the SEC. The Group accounts for Senseonics using the equity method based on Senseonics' financial statements that are publicly available. The Group's share of Senseonics' results, a loss of CHF 2 million, is included in other financial income (expenses) (see Note 3) and the carrying value of the Group's share of Senseonics' net assets at 31 December 2017, an asset of CHF 36 million, is included in other non-current assets (see Note 14).

Divestment of subsidiaries

On 1 February 2017 the Group sold its wholly owned subsidiary Roche Carolina Inc. in Florence, US, to a third party as part of the previously announced Pharmaceuticals Division's strategic realignment of its manufacturing network. The total consideration received was USD 8 million in cash. A total loss on divestment of CHF 95 million was reported as global restructuring costs in the Roche Pharmaceuticals operating segment and included in general and administration.

On 1 September 2017 the Group sold its wholly owned subsidiary at the Segrate site, Italy, to a third party as part of the previously announced Pharmaceuticals Division's strategic realignment of its manufacturing network. The total consideration was EUR 9 million of which EUR 2 million were received in 2017 and the remaining EUR 7 million will be received in 2018 and 2019. A total loss on divestment of CHF 31 million was reported as global restructuring costs in the Roche Pharmaceuticals operating segment and included in general and administration.

The total gains (losses) on these divestments are shown in the table below.

Gains (losses) on divestment of subsidiaries – 2017 in millions of CHF

Consideration	**11**
Property, plant and equipment	3
Other net assets (liabilities)	9
Currency translation of foreign operations transferred to income statement	100
Total net assets disposed	**112**
Provisions and accruals for residual obligations retained by the Group	(25)
Gains (losses) on divestment of subsidiaries [8]	**(126)**

23. Non-controlling interests

Changes in equity attributable to non-controlling interests in millions of CHF

	2017	2016
At 1 January	2,491	2,321
Net income recognised in income statement		
– Chugai	244	186
– Other non-controlling interests	(52)	(29)
Total net income recognised in income statement	**192**	**157**
Available-for-sale investments	4	(6)
Cash flow hedges	(11)	18
Currency translation of foreign operations	(20)	128
Remeasurements of defined benefit plans	3	(12)
Other comprehensive income, net of tax	**(24)**	**128**
Total comprehensive income	**168**	**285**
Business combinations	–	–
Dividends to non-controlling shareholders		
– Chugai [22]	(102)	(110)
– Other non-controlling interests	(19)	(22)
Equity compensation plans, net of transactions in own equity	15	9
Changes in non-controlling interests	8	8
Equity contribution by non-controlling interests	5	–
At 31 December	**2,566**	**2,491**
Chugai	2,302	2,170
Other non-controlling interests	264	321
Total non-controlling interests	**2,566**	**2,491**

24. Employee benefits

Employee remuneration in millions of CHF

	2017	2016
Wages and salaries	10,629	9,949
Social security costs	1,075	1,000
Defined contribution plans [25]	482	473
Operating expenses for defined benefit plans [25]	511	106
Equity compensation plans [26]	495	473
Termination costs [6]	378	231
Other employee benefits	817	837
Employee remuneration included in operating results	**14,387**	**13,069**
Net interest cost of defined benefit plans [25]	147	186
Total employee remuneration	**14,534**	**13,255**

Other employee benefits consist mainly of life insurance schemes and certain other insurance schemes providing medical coverage and other long-term and short-term disability benefits.

25. Pensions and other post-employment benefits

The Group's objective is to provide attractive and competitive post-employment benefits to employees, while at the same time ensuring that the various plans are appropriately financed and managing any potential impacts on the Group's long-term financial position. Most employees are covered by pension plans sponsored by Group companies. The nature of such plans varies according to legal regulations, fiscal requirements and market practice in the countries in which the employees are employed. Post-employment benefit plans are classified for IFRS as 'defined contribution plans' if the Group pays fixed contributions into a separate fund or to a third-party financial institution and will have no further legal or constructive obligation to pay further contributions. All other plans are classified as 'defined benefit plans'.

Defined contribution plans

Defined contribution plans are funded through payments by employees and by the Group to funds administered by third parties. The Group's expenses for these plans were CHF 482 million (2016: CHF 473 million). No assets or liabilities are recognised in the Group's balance sheet in respect of such plans, apart from regular prepayments and accruals of the contributions withheld from employees' wages and salaries and of the Group's contributions. The Group's major defined contribution plan is the US Roche 401(k) Savings Plan.

Defined benefit plans

Plans are usually established as trusts independent of the Group and are funded by payments from Group companies and by employees. In some cases, notably for the major defined benefit plans in Germany, the plans are unfunded and the Group pays pensions to retired employees directly from its own financial resources. Plans are usually governed by a senior governing body, such as a Board of Trustees, which is typically composed of both employee and employer representatives. Funding of these plans is determined by local regulations using independent actuarial valuations. Separate independent actuarial valuations are prepared in accordance with the requirements of IAS 19 for use in the Group's financial statements. The Group's major pension plans are located in Switzerland, the US and Germany, which in total account for 82% of the Group's defined benefit obligation (2016: 81%).

Pension plans in Switzerland. Current pension arrangements for employees in Switzerland are made through plans governed by the Swiss Federal Occupational Old Age, Survivors and Disability Pension Act ('BVG'). The Group's pension plans are administered by separate legal foundations, which are funded by regular employee and company contributions. The final benefit is contribution-based with certain minimum guarantees. Due to these minimum guarantees, the Swiss plans are treated as defined benefit plans for the purposes of these IFRS financial statements, although they have many of the characteristics of defined contribution plans. Where there is an under-funding, this may be remedied by various measures such as increasing employee and company contributions, lowering the interest rate on retirement account balances, reducing prospective benefits and a suspension of the early withdrawal facility.

In 2016 operating income of CHF 426 million was recorded for past service costs from changes to the Group's pension plans in Switzerland that were announced in June 2016. This represents the impact of the adjustment of the pension liability for plan changes. Of this amount, CHF 310 million was recorded in the Pharmaceuticals Division, CHF 77 million in the Diagnostics Division and CHF 39 million in Corporate. The past service income was recorded within general and administration. As part of the adjustments to the pension plans in Switzerland, the Group made payments of CHF 165 million to the pension funds.

Pension plans in the US. The Group's major defined benefit plans in the US have been closed to new members since 2007. New employees in the US now join the defined contribution plan. The largest of the remaining defined benefit plans are funded pension plans together with smaller unfunded supplementary retirement plans. The benefits are based on the highest average annual rate of earnings during a specified period and length of employment. The plans are non-contributory for employees, with the Group making periodic payments to the plans. Where there is an under-funding, this would normally be remedied by additional company contributions. In 2017 payments made by the Group were USD 80 million (2016: USD 233 million). The decrease in payments compared to 2016 is due to additional contributions made in 2016 to benefit from a lower insurance fee to Pension Benefit Guaranty Corporation, a US government agency overseeing occupational pension schemes in the US. In 2017 the Group entered into an annuity buyout agreement with an insurance company and paid USD 330 million from plan assets to settle the defined benefit obligation for some retired employees. This led to a settlement loss of USD 10 million in 2017.

Pension plans in Germany. The Group's major pension arrangements in Germany are governed by the Occupational Pensions Act ('BetrAVG'). These plans are unfunded and the Group pays pensions to retired employees directly from its own financial resources. These plans are non-contributory for employees. The benefits are based on final salary and length of employment. These plans have been closed to new members since 2007. They have been replaced by a new plan which is funded by regular employee and company contributions and administered through a contractual trust agreement. The final benefit is contribution-based with a minimum guarantee. Due to this minimum guarantee, this plan is treated as a defined benefit plan for the purposes of these IFRS financial statements, although it has many of the characteristics of a defined contribution plan.

Pension plans in the Rest of the World. These represent approximately 12% of the Group's defined benefit obligation (2016: 12%) and consist of a number of smaller plans in various countries. Of these the largest are the pension plans at Chugai, which are independently managed by Chugai, and the main pension plan in the United Kingdom. The Chugai plans are fully described in Chugai's own IFRS financial statements. The UK pension plan is funded by regular employee and company contributions, with benefits based on final salary and length of employment. This plan has been closed to new members since 2003 and has been replaced with a defined contribution plan. In 2016 the Group made payments of EUR 66 million to the pension funds in Ireland in relation to the restructuring of the manufacturing site at Clarecastle, Ireland. In 2017 further measures were taken. The Group entered into an annuity buyout agreement with an insurance company and paid EUR 97 million from plan assets to settle the defined benefit obligation for all retired employees. In addition transfer value payments of EUR 14 million from plan assets were made to deferred employees to settle the defined benefit obligation. The Group recorded a settlement loss of EUR 11 million from these transactions in 2017.

Other post-employment benefit ('OPEB') plans. These represent approximately 6% of the Group's defined benefit obligation (2016: 7%) and consist of post-employment healthcare and life insurance schemes, mainly in the US. These plans are mainly unfunded and/or are contributory for employees, with the Group reimbursing retired employees directly from its own financial resources. The Group's major OPEB plans in the US have been closed to new members since 2011. Part of the costs of these plans is reimbursable under the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. There is no statutory funding requirement for these plans. The Group is funding these plans to the extent that it is tax efficient. In 2017 there were no payments made by the Group to these plans (2016: none). At 31 December 2017 the IFRS funding status was 43% (2016: 44%), including reimbursement rights, for the funded OPEB plans in the US.

Defined benefit plans: income statement in millions of CHF

	2017			2016		
	Pension plans	Other post-employment benefit plans	Total expense	Pension plans	Other post-employment benefit plans	Total expense
Current service cost	516	16	532	523	14	537
Past service (income) cost	(43)	–	(43)	(415)	–	(415)
Settlement (gain) loss	22	–	22	(16)	–	(16)
Total operating expenses	**495**	**16**	**511**	**92**	**14**	**106**
Net interest cost of defined benefit plans	113	34	147	153	33	186
Total expense recognised in income statement	**608**	**50**	**658**	**245**	**47**	**292**

Funding status

The funding of the Group's various defined benefit plans is the responsibility of a senior governing body, such as a Board of Trustees, and the sponsoring employer, and is managed based on local statutory valuations, which follow the legislation and requirements of the respective jurisdiction in which the plan is established. Qualified independent actuaries carry out statutory actuarial valuations on a regular basis. The actuarial assumptions determining the funding status on the statutory basis are regularly assessed by the local senior governing body. The funding status is closely monitored at a corporate level. The unfunded plans are mainly those in the Group's German affiliates, where the fully reserved pension obligations are invested in the local affiliate's operations.

In 2017 the IFRS funding status of the funded defined benefit plans improved to 91% (2016: 86%).

Reimbursement rights are linked to the post-employment medical plans in the US and represent the expected reimbursement of the medical expenditure provided under the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.

Defined benefit plans: funding status in millions of CHF

	2017			2016		
	Pension plans	Other post-employment benefit plans	Total	Pension plans	Other post-employment benefit plans	Total
Funded plans						
– Fair value of plan assets	14,040	316	14,356	13,257	314	13,571
– Defined benefit obligation	(14,652)	(1,053)	(15,705)	(14,672)	(1,062)	(15,734)
Over (under) funding	**(612)**	**(737)**	**(1,349)**	**(1,415)**	**(748)**	**(2,163)**
Unfunded plans						
– Defined benefit obligation	(5,109)	(302)	(5,411)	(4,625)	(306)	(4,931)
Total funding status	**(5,721)**	**(1,039)**	**(6,760)**	**(6,040)**	**(1,054)**	**(7,094)**
Limit on asset recognition	–	–	–	–	–	–
Reimbursement rights	–	140	140	–	154	154
Net recognised asset (liability)	**(5,721)**	**(899)**	**(6,620)**	**(6,040)**	**(900)**	**(6,940)**
Reported in balance sheet						
– Defined benefit plan assets	661	140	801	584	154	738
– Defined benefit plan liabilities	(6,382)	(1,039)	(7,421)	(6,624)	(1,054)	(7,678)

Plan assets

The responsibility for the investment strategies of funded plans is with the senior governance body such as the Board of Trustees. Asset-liability studies are performed regularly for all major pension plans. These studies examine the obligations from post-employment benefit plans, and evaluate various investment strategies with respect to key financial measures such as expected returns, expected risks, expected contributions, and expected funded status of the plan in an interdependent way. The goal of an asset-liability study is to select an appropriate asset allocation for the funds held within the plan. The investment strategy is developed to optimise expected returns, to manage risks and to contain fluctuations in the statutory funded status. Asset-liability studies include strategies to match the cash flows of the assets with the plan obligations. The Group currently does not use longevity swaps to manage longevity risk.

Plan assets are managed using internal and external asset managers. The actual performance is continually monitored by the pension fund governance bodies as well as being closely monitored at a corporate level. In these financial statements the difference between the interest income and actual return on plan assets is a remeasurement that is recorded directly to other comprehensive income. During 2017 the actual return on plan assets was a gain of CHF 1,381 million (2016: gain of CHF 986 million).

The recognition of plan assets is limited to the present value of any economic benefits available from refunds from the plans or reductions in future contributions to the plans.

Defined benefit plans: fair value of plan assets and reimbursement rights in millions of CHF

	2017			2016		
	Pension plans	Other post-employment benefit plans	Total	Pension plans	Other post-employment benefit plans	Total
At 1 January	13,257	468	13,725	12,056	432	12,488
Interest income on plan assets	209	17	226	240	18	258
Remeasurements on plan assets	1,119	32	1,151	707	55	762
Currency translation effects	(58)	(19)	(77)	(7)	9	2
Employer contributions	392	–	392	736	(4)	732
Employee contributions	137	10	147	114	9	123
Benefits paid – funded plans	(562)	(50)	(612)	(517)	(49)	(566)
Benefits paid – settlements	(449)	–	(449)	(69)	–	(69)
Administration costs	(5)	(2)	(7)	(3)	(2)	(5)
At 31 December	**14,040**	**456**	**14,496**	**13,257**	**468**	**13,725**

Defined benefit plans: composition of plan assets in millions of CHF

	2017	2016
Equity securities	4,921	4,621
Debt securities	5,391	5,315
Property	1,896	1,660
Cash and money market instruments	216	227
Other investments	1,932	1,748
At 31 December	**14,356**	**13,571**

Assets are invested in a variety of different classes in order to maintain a balance between risk and return as follows:

- Equity and debt securities which mainly have quoted market prices (Level 1 fair value hierarchy).
- Property which is mainly in private and commercial property funds which mainly have other observable inputs (Level 2 fair value hierarchy).
- Cash and money market instruments which are mainly invested with financial institutions with a credit rating no lower than A.
- Other investments which mainly consist of alternatives, mortgages, commodities and insurance contracts. These are used for risk management purposes and mainly have other observable inputs (Level 2 fair value hierarchy) and unobservable inputs (Level 3 fair value hierarchy).

Included within the fair value of plan assets are the Group's shares and non-voting securities with a fair value of CHF 121 million (2016: CHF 120 million) and debt instruments issued by the Group with a fair value of CHF 9 million (2016: CHF 18 million).

Defined benefit obligation

The defined benefit obligation is calculated using the projected unit credit method. This reflects service rendered by employees to the dates of valuation and incorporates actuarial assumptions primarily regarding discount rates used in determining the present value of benefits, projected rates of remuneration growth and mortality rates. The present value of the defined benefit obligation is determined by discounting the estimated future cash outflows using interest rates of high-quality corporate bonds or government bonds in countries where there is not a deep market in corporate bonds. The corporate or government bonds are denominated in the currency in which the benefits will be paid, and have maturity terms approximating to the terms of the related pension obligation.

The Group's final salary-based defined benefit pension plans in the US, Germany and the United Kingdom have been closed to new participants. Active employees that had been members of these pension plans at the time these were closed to new participants continue to accrue benefits in the final salary-based defined benefit pension plans. New employees in the US and UK now join the Group's defined contribution plans, while new employees in Germany join the contribution-based plan with a minimum guarantee. As a result, the proportion of the defined benefit obligation which relates to these closed plans is expected to decrease in the future. The defined benefit pension plans in Switzerland, where the final benefit is contribution-based with a minimum guarantee, remain open to new employees.

Defined benefit plans: defined benefit obligation in millions of CHF

	2017			2016		
	Pension plans	Other post-employment benefit plans	Total	Pension plans	Other post-employment benefit plans	Total
At 1 January	19,297	1,368	20,665	18,941	1,232	20,173
Current service cost	516	16	532	523	14	537
Interest cost	322	51	373	393	51	444
Remeasurements:						
– demographic assumptions	62	(4)	58	(334)	–	(334)
– financial assumptions	120	44	164	749	104	853
– experience adjustments	213	(16)	197	65	(14)	51
Currency translation effects	263	(55)	208	(9)	41	32
Employee contributions	137	10	147	114	9	123
Benefits paid – funded plans	(562)	(50)	(612)	(517)	(49)	(566)
Benefits paid – unfunded plans	(137)	(9)	(146)	(128)	(20)	(148)
Benefits paid – settlements	(449)	–	(449)	(69)	–	(69)
Past service (income) cost	(43)	–	(43)	(415)	–	(415)
Settlement (gain) loss	22	–	22	(16)	–	(16)
At 31 December	**19,761**	**1,355**	**21,116**	**19,297**	**1,368**	**20,665**
Composition of plan						
Active members	9,545	365	9,910	9,297	369	9,666
Deferred vested members	1,770	15	1,785	1,664	15	1,679
Retired members	8,446	975	9,421	8,336	984	9,320
At 31 December	**19,761**	**1,355**	**21,116**	**19,297**	**1,368**	**20,665**
Plans by geography						
Switzerland	8,554	–	8,554	8,342	–	8,342
United States	4,028	1,318	5,346	4,280	1,329	5,609
Germany	4,661	–	4,661	4,080	–	4,080
Rest of the World	2,518	37	2,555	2,595	39	2,634
At 31 December	**19,761**	**1,355**	**21,116**	**19,297**	**1,368**	**20,665**
Duration in years	15.3	12.9	15.2	16.0	13.3	15.8

Actuarial assumptions

The actuarial assumptions used in these financial statements are based on the requirements set out in IAS 19 'Employee Benefits'. They are unbiased and mutually compatible estimates of variables that determine the ultimate cost of providing post-employment benefits. They are set on an annual basis by local management, based on advice from actuaries, and are subject to approval by corporate management and the Group's actuaries. Actuarial assumptions consist of demographic assumptions on matters such as mortality and employee turnover, and financial assumptions on matters such as interest rates, salary and benefit levels, inflation rates and costs of medical benefits. The actuarial assumptions vary based upon local economic and social conditions. The actuarial assumptions used in the various statutory valuations may differ from these based on local legal and regulatory requirements.

Demographic assumptions. The most significant demographic assumptions relate to mortality rates. The Group's actuaries use mortality tables which take into account historic patterns and expected changes, such as further increases in longevity. Rates of employee turnover, disability and early retirement are based on historical behaviour. The average life expectancy assumed now for an individual at the age of 65 is as follows:

Defined benefit plans: average life expectancy at the age of 65 for major schemes in years

		Male		Female	
Country	Mortality table	2017	2016	2017	2016
Switzerland	BVG 2015 projected with CMI model	21.5	21.2	23.4	23.0
United States	RP-2014 projected with MP-2014	22.3	22.2	23.9	23.8
Germany	Heubeck tables 2005G	19.3	19.1	23.3	23.2

The mortality assumptions used for the pension plans in Switzerland were based on BVG 2015 applying the Continuous Mortality Investigation ('CMI') model. A long-term rate of 1.25% (2016: 1.25%) was used for longevity improvements.

Financial assumptions. These are based on market expectations for the period over which the obligations are to be settled. The assumptions used in the actuarial valuations are shown below.

Defined benefit plans: financial actuarial assumptions

	2017		2016	
	Weighted average	Range	Weighted average	Range
Discount rates	1.80%	0.60%–6.80%	1.88%	0.10%–5.80%
Expected rates of salary increases	2.52%	0.00%–4.50%	2.56%	0.00%–4.50%
Expected rates of pension increases	0.67%	0.00%–3.00%	0.59%	0.00%–3.00%
Expected inflation rates	2.14%	1.50%–3.50%	1.92%	0.00%–3.50%
Immediate medical cost trend rate	6.50%	6.30%–6.50%	6.78%	5.90%–6.80%
Ultimate medical cost trend rate (in 2038)	4.50%	4.50%	4.50%	4.50%

Discount rates are determined with reference to interest rates on high-quality corporate bonds or government bonds in countries where there is not a deep market in corporate bonds. Expected rates of salary increases are based on expected inflation rates with an adjustment to reflect the Group's latest expectation of long-term real salary increases. Expected rates of pension increases are generally linked to the expected inflation rate or the funding status of the plan. Expected inflation rates are derived by looking at the level of inflation implied by the financial markets in conjunction with the economists' price inflation forecasts, historic price inflation as well as other economic variables and circumstances. Medical cost trend rates take into account the benefits set out in the plan terms and expected future changes in medical costs. Since the Group's major post-employment medical plans are for US employees, these rates are driven by developments in the US.

Sensitivity analysis. The measurement of the net defined benefit obligation is particularly sensitive to changes in the discount rate, inflation rate, expected mortality and medical cost trend rate assumptions. The following table summarises the impact of a change in those assumptions on the present value of the defined benefit obligation.

Defined benefit plans: sensitivity of defined benefit obligation to actuarial assumptions in millions of CHF

	2017	2016
Increase (decrease) in defined benefit obligation		
1 year increase in life expectancy	635	723
Discount rates		
0.25% increase	(767)	(825)
0.25% decrease	816	878
Expected inflation rates		
0.25% increase	255	374
0.25% decrease	(242)	(335)
Immediate medical cost trend rate		
1.00% increase	156	177
1.00% decrease	(129)	(146)

Each sensitivity analysis considers the change in one assumption at a time leaving the other assumptions unchanged. This approach shows the isolated effect of changing one individual assumption but does not take into account that some assumptions are related. The method used to carry out the sensitivity analysis is the same as in the prior year.

Cash flows

The Group incurred cash flows from its defined benefit plans as shown in the table below.

Defined benefit plans: cash flows in millions of CHF

	2017	2016
Employer contributions, net of reimbursements – funded plans	(392)	(732)
Benefits paid – unfunded plans	(146)	(148)
Total cash inflow (outflow)	**(538)**	**(880)**

Based on the most recent actuarial valuations, the Group expects that employer contributions for funded plans in 2018 will be approximately CHF 434 million, which includes an estimated CHF 154 million of additional contributions, mostly related to the US defined benefit plans. Benefits paid for unfunded plans in 2018 are estimated to be approximately CHF 167 million, which mostly relate to the German defined benefit plans.

26. Equity compensation plans

The Group operates several equity compensation plans, including separate plans at Chugai and Foundation Medicine. IFRS 2 'Share-based Payment' requires that the fair value of all equity compensation plan awards granted to employees be estimated at grant date and recorded as an expense over the vesting period.

Expenses for equity compensation plans in millions of CHF

	2017	2016
Cost of sales	90	87
Marketing and distribution	112	108
Research and development	183	168
General and administration	110	110
Total operating expenses	**495**	**473**
Equity compensation plans		
Roche Stock-settled Stock Appreciation Rights	186	198
Roche Restricted Stock Unit Plan	240	209
Roche Performance Share Plan	11	13
Roche Connect	23	20
Roche Option Plan	3	3
Bonus Stock Awards	6	6
Chugai and Foundation Medicine plans	26	24
Total operating expenses	**495**	**473**
of which		
– Equity-settled	495	473
– Cash-settled	–	–

Cash inflow (outflow) from equity compensation plans in millions of CHF

	2017	2016
Roche Option Plan exercises	36	16
Chugai and Foundation Medicine plans' exercises	14	7
Roche Connect costs	(23)	(20)
Transactions in own equity	(385)	(560)
Total cash inflow (outflow) from equity-settled equity compensation plans, net of transactions in own equity	**(358)**	**(557)**

The net cash outflow from transactions in own equity mainly arises from sales and purchases of equity instruments which are held for the Group's potential conversion obligations that may arise from the Group's equity compensation plans (see Note 21).

Equity compensation plans

Roche Stock-settled Stock Appreciation Rights. The Group issues Stock-settled Stock Appreciation Rights (S-SARs) to certain directors, management and employees selected at the discretion of the Group. The S-SARs give employees the right to receive non-voting equity securities reflecting the value of any appreciation in the market price of the non-voting equity securities between the grant date and the exercise date. Under the Roche S-SAR Plan 180 million S-SARs will be available for issuance over a ten-year period. The rights, which are non-tradable equity-settled awards, have a seven-year duration and vest on a phased basis over three years.

Roche S-SARs – movement in number of rights outstanding

	2017		2016	
	Number of rights (thousands)	Weighted average exercise price (CHF)	Number of rights (thousands)	Weighted average exercise price (CHF)
Outstanding at 1 January	42,178	220.22	35,814	206.02
Granted	11,412	251.42	11,356	250.82
Forfeited	(1,848)	252.73	(1,122)	253.57
Exercised	(8,168)	176.27	(3,829)	169.02
Expired	(29)	151.92	(41)	160.35
Outstanding at 31 December	**43,545**	**235.31**	**42,178**	**220.22**
– of which exercisable	23,524	221.24	24,074	194.87

Roche S-SARs – terms of rights outstanding at 31 December 2017

			Rights outstanding		Rights exercisable
Year of grant	Number outstanding (thousands)	Weighted average years remaining contractual life	Weighted average exercise price (CHF)	Number exercisable (thousands)	Weighted average exercise price (CHF)
2011	1,403	0.19	140.23	1,403	140.23
2012	5,183	1.26	157.94	5,183	157.94
2013	4,189	2.26	214.81	4,189	214.81
2014	5,213	3.26	263.49	5,213	263.49
2015	6,687	4.27	256.76	4,286	256.79
2016	9,959	5.27	250.81	3,166	250.78
2017	10,911	6.27	251.40	84	251.92
Total	**43,545**	**4.20**	**235.31**	**23,524**	**221.24**

Roche Restricted Stock Unit Plan. The Group issues Restricted Stock Units (RSUs) awards to certain directors, management and employees selected at the discretion of the Group. The RSUs, which are non-tradable, represent the right to receive non-voting equity securities which vest only after a three-year period, subject to performance conditions, if any. There are currently no performance conditions on outstanding RSUs at 31 December 2017. Under the Roche RSU Plan 20 million non-voting equity securities will be available for issuance over a ten-year period. The Roche RSU Plan also includes a value adjustment which will be an amount equivalent to the sum of shareholder distributions made by the Group during the vesting period attributable to the number of non-voting equity securities for which an individual award has been granted.

Roche RSUs – movement in number of awards outstanding

	2017	2016
	Number of awards (thousands)	Number of awards (thousands)
Outstanding at 1 January	2,343	1,952
Granted	1,373	1,308
Forfeited	(209)	(127)
Transferred to participants	(694)	(790)
Outstanding at 31 December	**2,813**	**2,343**
– of which vested and transferable	1	–

Roche Performance Share Plan. The Group offers future share and non-voting equity security awards (or, at the discretion of the Board of Directors, their cash equivalent) to certain directors and key senior managers. These are non-tradable equity-settled awards. The programme currently operates in annual three-year cycles. The Roche Performance Share Plan (PSP) includes a value adjustment which will be an amount equivalent to the sum of shareholder distributions made by the Group during the vesting period attributable to the number of shares or non-voting equity securities for which an individual award has been granted. The amount of shares or non-voting equity securities allocated will depend upon the individual's salary level, the achievement of performance targets linked to the Group's Total Shareholder Return (shares and non-voting equity securities combined) relative to the Group's peers during the three-year period from the date of the grant, and the discretion of the Board of Directors. Each award will result in between zero and two shares or non-voting equity securities (before value adjustment), depending upon the achievement of the performance targets.

Roche Performance Share Plan – terms of outstanding awards at 31 December 2017

	2015–2017	2016–2018	2017–2019
Number of awards outstanding (thousands)	64	41	47
Vesting period	3 years	3 years	3 years
Allocated to recipients in	Feb. 2018	Feb. 2019	Feb. 2020
Fair value per unit at grant (CHF)	217.45	264.36	226.66
Total fair value at grant (CHF millions)	**17**	**11**	**11**

Roche Connect. This programme enables all employees worldwide, except for those in the US and certain other countries, to make regular deductions from their salaries to purchase non-voting equity securities. It is administered by independent third parties. The Group contributes to the programme, which allows the employees to purchase non-voting equity securities at a discount (usually 20%). The administrator purchases the necessary non-voting equity securities directly from the market. At 31 December 2017 the administrator held 2.8 million non-voting equity securities (2016: 2.6 million). In 2017 the cost of the plan was CHF 23 million (2016: CHF 20 million).

Roche Option Plan. This programme is used in countries where S-SARs are not used. Awards under this plan give employees the right to purchase non-voting equity securities at an exercise price specified at the grant date. The options, which are non-tradable equity-settled awards, have a seven-year duration and vest on a phased basis over three years.

Roche Option Plan – movement in number of options outstanding

	2017		2016	
	Number of options (thousands)	Weighted average exercise price (CHF)	Number of options (thousands)	Weighted average exercise price (CHF)
Outstanding at 1 January	834	216.02	794	203.49
Granted	156	250.90	160	250.44
Forfeited	(31)	256.52	(20)	250.14
Exercised	(205)	178.25	(100)	164.90
Expired	–	–	–	–
Outstanding at 31 December	**754**	**231.82**	**834**	**216.02**
– of which exercisable	459	219.10	537	194.88

Roche Option Plan – terms of options outstanding at 31 December 2017

			Options outstanding		Options exercisable
Year of grant	Number outstanding (thousands)	Weighted average years remaining contractual life	Weighted average exercise price (CHF)	Number exercisable (thousands)	Weighted average exercise price (CHF)
2011	28	0.17	140.10	28	140.10
2012	106	1.25	157.63	106	157.63
2013	89	2.25	214.00	89	214.00
2014	99	3.25	263.21	99	263.21
2015	136	4.26	256.80	89	256.82
2016	145	5.26	250.40	47	250.38
2017	151	6.28	250.87	1	251.90
Total	**754**	**3.91**	**231.82**	**459**	**219.10**

The weighted average share price of Roche non-voting equity securities during the year was CHF 247.10 (2016: CHF 244.39).

Bonus Stock Awards. The Chairman of the Board of Directors and the Chief Executive Officer will be granted Bonus Stock Awards in lieu of their cash-settled bonus for the financial year 2017. These will be issued by the end of April 2018. The number of awards and fair value per award will be calculated at the grant date.

Fair value measurement

The inputs used in the measurement of the fair values at grant date of the equity compensation plans were as follows:

Fair value measurement in 2017

	Roche Stock-settled Stock Appreciation Rights	Roche Restricted Stock Unit Plan	Roche Performance Share Plan	Roche Option Plan
Vesting period	Progressively over 3 years	Cliff vesting after 3 years	Cliff vesting after 3 years	Progressively over 3 years
Contractual life	7 years	n/a	n/a	7 years
Number granted during year (thousands)	11,412	1,373	47	156
Weighted average fair value (CHF)	19	251	227	19
Model used	Binomial	Market price[a]	Monte Carlo[b]	Binomial
Inputs to option pricing model				
– Share price at grant date (CHF)	251	251	233	251
– Exercise price (CHF)	251	–	–	251
– Expected volatility[c]	19.3%	n/a	n/a	19.3%
– Expected dividend yield	4.9%	n/a	n/a	4.9%
– Early exercise factor[d]	1.33	n/a	n/a	1.33
– Expected exit rate	8.2%	n/a	n/a	8.2%

a) The fair value of the Roche RSUs is equivalent to the share price on the date of grant.
b) The input parameters were the covariance matrix between Roche and the other individual companies of the peer group based on a three-year history and a risk-free interest rate of minus 0.956%. The valuation takes into account the defined rank and performance structure which determines the pay-out of the plan.
c) Volatility was determined primarily by reference to historically observed prices of the underlying equity. Risk-free interest rates are derived from zero coupon swap rates at the grant date taken from Datastream.
d) The early exercise factor describes the ratio between the expected market price at the exercise date and the exercise price at which early exercises can be expected, based on historically observed behaviour.

27. Earnings per share and non-voting equity security

Basic earnings per share and non-voting equity security

	2017	2016
Net income attributable to Roche shareholders (CHF millions)	**8,633**	**9,576**
Number of shares (millions) [21]	160	160
Number of non-voting equity securities (millions) [21]	703	703
Weighted average number of own shares and non-voting equity securities held (millions)	(10)	(11)
Weighted average number of shares and non-voting equity securities in issue (millions)	**853**	**852**
Basic earnings per share and non-voting equity security (CHF)	**10.12**	**11.24**

Diluted earnings per share and non-voting equity security

	2017	2016
Net income attributable to Roche shareholders (CHF millions)	8,633	9,576
Increase in non-controlling interests' share of Group net income, assuming all outstanding Chugai stock options exercised (CHF millions)	(1)	(1)
Net income used to calculate diluted earnings per share (CHF millions)	**8,632**	**9,575**
Weighted average number of shares and non-voting equity securities in issue (millions)	853	852
Adjustment for assumed exercise of equity compensation plans, where dilutive (millions)	7	8
Weighted average number of shares and non-voting equity securities in issue used to calculate diluted earnings per share (millions)	**860**	**860**
Diluted earnings per share and non-voting equity security (CHF)	**10.04**	**11.13**

28. Statement of cash flows

Cash flows from operating activities

Cash flows from operating activities arise from the Group's primary activities in the Pharmaceuticals and Diagnostics Divisions. These are calculated by the indirect method by adjusting the Group's operating profit for any operating income and expenses that are not cash flows (for example depreciation, amortisation and impairment) in order to derive the cash generated from operations. This and other operating cash flows are shown in the statement of cash flows. Operating cash flows also include income taxes paid on all activities.

Cash generated from operations in millions of CHF

	2017	2016
Net income	8,825	9,733
Add back non-operating (income) expense		
– Financing costs [3]	839	1,099
– Other financial income (expense) [3]	(84)	(37)
– Income taxes [4]	3,423	3,274
Operating profit	**13,003**	**14,069**
Depreciation of property, plant and equipment [7]	2,196	2,158
Amortisation of intangible assets [9]	1,691	1,783
Impairment of goodwill [8]	1,058	95
Impairment of intangible assets [9]	2,460	1,413
Impairment (reversal) of property, plant and equipment [7]	233	291
Operating (income) expense for defined benefit plans [25]	511	106
Operating expense for equity-settled equity compensation plans [26]	495	473
Net (income) expense for provisions [19]	270	120
Bad debt (reversal) expense	12	10
Inventory write-downs	663	772
Inventory fair value adjustment	–	167
Net (gain) loss on disposal of products	(410)	(179)
Other adjustments	74	(53)
Cash generated from operations	**22,256**	**21,225**

Cash flows from investing activities

Cash flows from investing activities are principally those arising from the Group's investments in property, plant and equipment and intangible assets, and from the acquisition and divestment of subsidiaries, associates and businesses. Cash flows connected with the Group's portfolio of marketable securities and other investments are also included, as are any interest and dividend payments received in respect of these securities and investments. These cash flows indicate the Group's net reinvestment in its operating assets and the cash flow effects of business combinations and divestments, as well as the cash generated by the Group's other investments.

Interest and dividends received in millions of CHF

	2017	2016
Interest received	28	22
Dividends received	2	2
Total	**30**	**24**

Cash flows from financing activities

Cash flows from financing activities are primarily the proceeds from the issue and repayment of the Group's equity and debt instruments. They also include interest payments and dividend payments on these instruments. Cash flows from short-term financing, including finance leases, are also included. These cash flows indicate the Group's transactions with the providers of its equity and debt financing. Cash flows from short-term borrowings are shown as a net movement, as these consist of a large number of transactions with short maturity.

Dividends paid in millions of CHF

	2017	2016
Dividends to Roche Group shareholders	(6,998)	(6,909)
Dividends to non-controlling shareholders – Chugai	(102)	(110)
Dividends to non-controlling shareholders – Other	(19)	(22)
Increase (decrease) in dividends payable	–	–
Dividend withholding tax	(21)	1
Total	**(7,140)**	**(7,040)**

Liabilities arising from financing activities

Movements in carrying value of recognised assets (liabilities) in millions of CHF

		Cash flows			Non-cash changes		
	At 1 January	Outflow (Inflow)	Financing costs	Business combinations	Fair value and other	Foreign exchange rates	At 31 December
2017							
Debt [20]	(22,355)	3,209	(97)	(1)	28	256	(18,960)
Interest payable [18]	(289)	648	(585)	–	3	5	(218)
Derivative financial instruments, net [15, 18, 29]	(262)	17	10	–	213	–	(22)
Cash collateral receivables (payables), net [15, 18, 29]	302	(252)	–	–	1	(12)	39
Total	**(22,604)**	**3,622**	**(672)**	**(1)**	**245**	**249**	**(19,161)**
2016							
Debt [20]	(23,251)	1,414	(161)	–	12	(369)	(22,355)
Interest payable [18]	(445)	849	(687)	–	(1)	(5)	(289)
Derivative financial instruments, net [15, 18, 29]	(470)	363	–	–	(152)	(3)	(262)
Cash collateral receivables (payables), net [15, 18, 29]	454	(152)	–	–	–	–	302
Total	**(23,712)**	**2,474**	**(848)**	**–**	**(141)**	**(377)**	**(22,604)**

Significant non-cash transactions

In 2017 there were no significant non-cash transactions (2016: none), except for contingent consideration arrangements arising from business combinations (see Notes 5 and 29).

29. Risk management

Group risk management

Risk management is a fundamental element of the Group's business practice on all levels and encompasses different types of risks. At Group level, risk management is an integral part of the long-term forecasting and controlling processes. Material risks are monitored and regularly discussed with the Corporate Executive Committee and the Audit Committee of the Board of Directors.

Financial risk management

The Group is exposed to various financial risks arising from its underlying operations and corporate finance activities. The Group's financial risk exposures are predominantly related to changes in foreign exchange rates, interest rates and equity prices as well as the creditworthiness and the solvency of the Group's counterparties.

Financial risk management within the Group is governed by policies reviewed by the boards of directors of Roche, Chugai and Foundation Medicine as appropriate to their areas of statutory responsibility. These policies cover credit risk, liquidity risk and market risk. The policies provide guidance on risk limits, type of authorised financial instruments and monitoring procedures. As a general principle, the policies prohibit the use of derivative financial instruments for speculative trading purposes. Policy implementation and day-to-day risk management are carried out by the relevant treasury functions and regular reporting on these risks is performed by the relevant accounting and controlling functions within Roche, Chugai and Foundation Medicine.

Credit risk

Credit risk arises from the possibility that counterparties to transactions may default on their obligations, causing financial losses for the Group. The objective of managing counterparty credit risk is to prevent losses of liquid funds deposited with or invested in such counterparties. The maximum exposure to credit risk resulting from financial activities, without considering netting agreements and without taking account of any collateral held or other credit enhancements, is equal to the carrying value of the Group's financial assets.

Accounts receivable. At 31 December 2017 the Group has trade receivables of CHF 10.4 billion (2016: CHF 9.4 billion). These are subject to a policy of active credit risk management which focuses on the assessment of country risk, credit availability, ongoing credit evaluation and account monitoring procedures. The objective of trade receivables management is to maximise the collection of unpaid amounts.

At 31 December 2017 the Group's combined trade receivables balance with three US national wholesale distributors, McKesson Corp., AmerisourceBergen Corp. and Cardinal Health, Inc., was equivalent to CHF 2.4 billion representing 23% of the Group's consolidated trade receivables (2016: CHF 1.7 billion representing 18%). There is no other significant concentration of counterparty credit risk due to the Group's large number of customers and their wide geographical spread. Risk limits and exposures are continuously monitored by country and by the nature of counterparties. The Group obtains credit insurance and similar enhancements when appropriate to protect the collection of trade receivables. At 31 December 2017 no collateral was held for trade receivables (2016: none).

Since 2010 there have been financial difficulties in Southern European countries, notably Spain, Italy, Greece and Portugal. The Group is a leading supplier to the healthcare sectors in these countries and has trade receivables of CHF 0.9 billion (2016: CHF 0.8 billion) with the public and private customers in these countries. The Group uses different measures to improve collections in these countries, including intense communication with customers, factoring, negotiations of payments plans, charging of interest for late payments, and legal action.

The nature and geographic location of counterparties to accounts receivable that are not overdue or impaired are shown in the table below. These include the balances with US national wholesalers and Southern Europe public customers described above.

Accounts receivable (not overdue): nature and geographical location of counterparties in millions of CHF

	2017				2016			
Regions	Total	Public	Wholesalers/ distributors	Private	Total	Public	Wholesalers/ distributors	Private
Switzerland	36	15	8	13	32	13	7	12
Europe	1,629	693	326	610	1,546	515	315	716
North America	3,092	56	2,295	741	2,413	55	1,713	645
Latin America	586	84	202	300	590	63	176	351
Japan	1,267	–	1,262	5	1,216	1	1,207	8
Asia, Australia and Oceania	1,192	60	491	641	1,121	46	521	554
Rest of the World	827	165	259	403	802	137	292	373
Total	**8,629**	**1,073**	**4,843**	**2,713**	**7,720**	**830**	**4,231**	**2,659**

The ageing of accounts receivable that were not impaired is shown in the table below.

Ageing of accounts receivable that are not impaired in millions of CHF

	2017	2016
Neither overdue nor impaired	8,629	7,720
Overdue under 1 month	203	330
Overdue 1–3 months	283	234
Overdue 3–6 months	251	263
Overdue 6–12 months	211	213
Overdue more than 1 year	–	–
Total accounts receivable	**9,577**	**8,760**

Cash and marketable securities. At 31 December 2017 the Group has cash and marketable securities of CHF 12.0 billion (2016: CHF 9.0 billion). These are subject to a policy of restricting exposures to high-quality counterparties and setting defined limits for individual counterparties. These limits and counterparty credit ratings are reviewed regularly. Investments in marketable securities are entered into on the basis of guidelines with regard to liquidity, quality and maximum amount. As a general rule, the Group invests only in high-quality securities with adequate liquidity. Cash and short-term time deposits are subject to rules which limit the Group's exposure to individual financial institutions.

Rating analysis of cash and fixed income marketable securities (market values)

	2017		2016	
	(CHF m)	(% of total)	(CHF m)	(% of total)
AAA range	1,924	16	966	11
AA range	1,845	15	1,741	19
A range	7,249	60	5,686	63
BBB range	797	7	381	4
Below BBB range	112	1	112	1
Unrated	60	1	152	2
Total	**11,987**	**100**	**9,038**	**100**

Master netting agreements. The Group enters into derivative transactions and collateral agreements under International Swaps and Derivatives Association (ISDA) master netting agreements with the respective counterparties in order to mitigate counterparty risk. Under such agreements the amounts owed by each counterparty on a single day in respect of all transactions outstanding in the same currency are aggregated into a single net amount that is payable by one party to the other. The ISDA agreements do not meet the criteria for offsetting in the balance sheet as the Group does not have a currently enforceable right to offset recognised amounts, because the right to offset is only enforceable on the occurrence of future events, such as a default or other credit events.

Contract terms. At 31 December 2017 there are no significant financial assets whose terms have been renegotiated (2016: none).

Impairment losses. During 2017 total impairment losses for available-for-sale financial assets amounted to CHF 17 million (2016: CHF 10 million).

Liquidity risk

Liquidity risk arises through a surplus of financial obligations over available financial assets due at any point in time. The Group's approach to liquidity risk is to maintain sufficient readily available reserves in order to meet its liquidity requirements at any point in time. Roche and Chugai enjoy strong credit quality and are rated by at least one major credit rating agency. The ratings will permit efficient access to the international capital markets in the event of major financing requirements. At 31 December 2017 the Group has unused committed credit lines with various financial institutions totalling CHF 7.6 billion (2016: CHF 8.0 billion), of which CHF 7.3 billion serve as a back-stop line for the commercial paper program.

The remaining undiscounted cash flow contractual maturities of financial liabilities, including estimated interest payments, are shown in the table below.

Contractual maturities of financial liabilities in millions of CHF

	Carrying value	Total	Less than 1 year	1–2 years	2–5 years	Over 5 years
Year ended 31 December 2017						
Debt [20]						
– Bonds and notes	17,986	22,743	2,661	2,422	5,461	12,199
– Other debt	974	974	970	1	3	–
Contingent consideration [19]	591	650	185	109	278	78
Accounts payable [16]	3,454	3,454	3,454	–	–	–
Derivative financial instruments [18]	119	119	93	10	15	1
Total financial liabilities	**23,124**	**27,940**	**7,363**	**2,542**	**5,757**	**12,278**
Year ended 31 December 2016						
Debt [20]						
– Bonds and notes	19,644	25,197	3,280	2,189	6,768	12,960
– Other debt	2,711	2,711	2,706	1	4	–
Contingent consideration [19]	1,089	1,194	339	186	455	214
Accounts payable [16]	3,375	3,375	3,375	–	–	–
Derivative financial instruments [18]	447	447	210	10	225	2
Total financial liabilities	**27,266**	**32,924**	**9,910**	**2,386**	**7,452**	**13,176**

Take-or-pay commitments. The Group has entered into contract manufacturing agreements with various companies to further develop manufacturing capacity and flexibility, mainly in the Pharmaceuticals Division. There are future minimum take-or-pay commitments within some of these agreements with a total potential commitment from the Group of CHF 1.9 billion at 31 December 2017 (2016: CHF 1.4 billion).

Market risk

Market risk arises from changing market prices, mainly foreign exchange rates and interest rates, of the Group's financial assets or financial liabilities which affect the Group's financial result and equity.

Value-at-Risk. The Group uses Value-at-Risk (VaR) to measure the impact of market risk on its financial instruments. VaR indicates the value range within which a given financial instrument will fluctuate with a pre-set probability as a result of movements in market prices. VaR is calculated using a historical simulation approach and for each scenario, all financial instruments are fully valued and the total change in value and earnings is determined. VaR calculations are based on a 95% confidence level and a holding period of 20 trading days over the past ten years. This holding period reflects the time required to change the corresponding risk exposure, should this be deemed appropriate.

Actual future gains and losses associated with our treasury activities may differ materially from the VaR analyses due to the inherent limitations associated with predicting the timing and amount of changes to interest rates, foreign exchange rates and equity investment prices, particularly in periods of high market volatilities. Furthermore, VaR does not include the effect of changes in credit spreads.

Market risk of financial instruments in millions of CHF

	2017	2016
VaR – Interest rate component	306	310
VaR – Foreign exchange component	24	38
VaR – Other price component	38	38
Diversification	(43)	(59)
VaR – Total market risk	**325**	**327**

The interest rate component remained largely stable. The foreign exchange component decreased due to a favourable exposure mix. The other price component arises mainly from movements in equity security prices and remained largely stable.

Foreign exchange risk

The Group uses the Swiss franc as its reporting currency and as a result is exposed to movements in foreign currencies, mainly the US dollar, Japanese yen and euro. The objective of the Group's foreign exchange risk management activities is to preserve the economic value of its current and future assets and to minimise the volatility of the Group's financial result. The primary focus of the Group's foreign exchange risk management activities is on hedging transaction exposures arising through foreign currency flows or monetary positions held in foreign currencies. The Group uses forward contracts, foreign exchange options and cross-currency swaps to hedge transaction exposures. Application of these instruments intends to continuously lock in favourable developments of foreign exchange rates, thereby reducing the exposure to potential future movements in such rates.

Interest rate risk

The Group mainly raises debt on a fixed rate basis for bonds and notes. The Group is exposed to movements in interest rates, mainly for its US dollar, Swiss franc and euro floating rate financial instruments. The primary objective of the Group's interest rate management is to protect the net interest result. The Group may use forward contracts, options and swaps to hedge its interest rate exposures. Depending on the interest rate environment of major currencies, the Group will use these instruments to generate an appropriate mix of fixed and floating rate exposures.

Other price risk

Other price risk arises mainly from movements in the prices of equity securities. The Group manages the price risk through placing limits on individual and total equity investments. These limits are defined both as a percentage of total liquid funds and as an absolute number for individual equity investments.

Capital management

The Group defines the capital that it manages as the Group's total capitalisation, being the sum of debt plus equity, including non-controlling interests. The Group's objectives when managing capital are:

- To safeguard the Group's ability to continue as a going concern, so that it can continue to provide benefits for patients and returns to investors.
- To provide an adequate return to investors based on the level of risk undertaken.
- To have available the necessary financial resources to allow the Group to invest in areas that may deliver future benefits for patients and returns to investors.
- To maintain sufficient financial resources to mitigate against risks and unforeseen events.

The capitalisation is reported to senior management as part of the Group's regular internal management reporting and is shown in the table below.

Capital in millions of CHF

	2017	2016	2015
Capital and reserves attributable to Roche shareholders [21]	26,441	23,911	20,979
Equity attributable to non-controlling interests [23]	2,566	2,491	2,321
Total equity	**29,007**	**26,402**	**23,300**
Total debt [20]	**18,960**	**22,355**	**23,251**
Capitalisation	**47,967**	**48,757**	**46,551**

The Group's net equity was significantly impacted by the 2009 Genentech transaction (see Note 21).

The Group is not subject to regulatory capital adequacy requirements as known in the financial services industry. The Group has majority shareholdings in Chugai and Foundation Medicine (see Note 22). Chugai and Foundation Medicine are public companies and their objectives, policies and processes for managing their own capital are determined by local management.

Financial instrument accounting classifications and fair values

The fair values of financial assets and liabilities, together with the carrying value shown in the consolidated balance sheet are as follows:

Carrying value and fair value of financial instruments in millions of CHF

	Available-for-sale	Fair value – hedging instruments	Fair value – designated	Loans and receivables	Other financial liabilities	Total carrying value	Fair value
Year ended 31 December 2017							
Other non-current assets [14]							
– Available-for-sale investments	546	–	–	–	–	546	546
– Other financial non-current assets	–	–	–	139	–	139	139
Accounts receivable [11]	–	–	–	9,577	–	9,577	9,577
Marketable securities [12]	7,278	–	–	–	–	7,278	7,278
Cash and cash equivalents [13]	–	–	–	4,719	–	4,719	4,719
Other current assets [15]							
– Derivative financial instruments	–	97	–	–	–	97	97
– Other financial current assets	–	–	–	896	–	896	896
Total financial assets	**7,824**	**97**	**–**	**15,331**	**–**	**23,252**	**23,252**
Debt [20]							
– Bonds and notes	–	–	–	–	(17,986)	(17,986)	(19,166)
– Other debt	–	–	–	–	(974)	(974)	(974)
Contingent consideration [19]	–	–	(591)	–	–	(591)	(591)
Accounts payable [16]	–	–	–	–	(3,454)	(3,454)	(3,454)
Derivative financial instruments [18]	–	(119)	–	–	–	(119)	(119)
Total financial liabilities	**–**	**(119)**	**(591)**	**–**	**(22,414)**	**(23,124)**	**(24,304)**
Year ended 31 December 2016							
Other non-current assets [14]							
– Available-for-sale investments	528	–	–	–	–	528	528
– Other financial non-current assets	–	–	–	124	–	124	124
Accounts receivable [11]	–	–	–	8,760	–	8,760	8,760
Marketable securities [12]	4,944	–	–	–	–	4,944	4,944
Cash and cash equivalents [13]	–	–	–	4,163	–	4,163	4,163
Other current assets [15]							
– Derivative financial instruments	–	185	–	–	–	185	185
– Other financial current assets	–	–	–	1,164	–	1,164	1,164
Total financial assets	**5,472**	**185**	**–**	**14,211**	**–**	**19,868**	**19,868**
Debt [20]							
– Bonds and notes	–	–	–	–	(19,644)	(19,644)	(20,848)
– Other debt	–	–	–	–	(2,711)	(2,711)	(2,711)
Contingent consideration [19]	–	–	(1,089)	–	–	(1,089)	(1,089)
Accounts payable [16]	–	–	–	–	(3,375)	(3,375)	(3,375)
Derivative financial instruments [18]	–	(447)	–	–	–	(447)	(447)
Total financial liabilities	**–**	**(447)**	**(1,089)**	**–**	**(25,730)**	**(27,266)**	**(28,470)**

The fair value of bonds and notes is Level 1 and is calculated based on the observable market prices of the debt instruments or the present value of the future cash flows on the instrument, discounted at a market rate of interest for instruments with similar credit status, cash flows and maturity periods.

Fair value hierarchy

The table below analyses financial instruments carried at fair value, by valuation method. The different levels have been defined as follows:
- Level 1 – quoted prices (unadjusted) in active markets for identical assets and liabilities.
- Level 2 – observable inputs other than quoted prices in active markets for identical assets and liabilities.
- Level 3 – unobservable inputs.

Fair value hierarchy of financial instruments in millions of CHF

	Level 1	Level 2	Level 3	Total
Year ended 31 December 2017				
Marketable securities				
– Equity securities	10	–	–	10
– Debt securities	1,118	43	–	1,161
– Money market instruments and time accounts over three months	50	6,057	–	6,107
Derivative financial instruments	–	97	–	97
Available-for-sale investments – held at fair value [14]	121	173	–	294
Financial assets recognised at fair value	**1,299**	**6,370**	**–**	**7,669**
Derivative financial instruments	–	(119)	–	(119)
Contingent consideration	–	–	(591)	(591)
Financial liabilities recognised at fair value	**–**	**(119)**	**(591)**	**(710)**
Year ended 31 December 2016				
Marketable securities				
– Equity securities	69	–	–	69
– Debt securities	1,509	–	–	1,509
– Money market instruments and time accounts over three months	133	3,233	–	3,366
Derivative financial instruments	–	185	–	185
Available-for-sale investments – held at fair value [14]	132	117	–	249
Financial assets recognised at fair value	**1,843**	**3,535**	**–**	**5,378**
Derivative financial instruments	–	(447)	–	(447)
Contingent consideration	–	–	(1,089)	(1,089)
Financial liabilities recognised at fair value	**–**	**(447)**	**(1,089)**	**(1,536)**

Level 1 financial assets consist of treasury bills, bonds and quoted shares. Level 2 financial assets consist primarily of commercial paper, certificates of deposit and derivative financial instruments.

The Group determines Level 2 fair values using the following valuation techniques:
- Marketable securities and derivative financial instruments are based on valuation models that use observable market data for interest rates, yield curves, foreign exchange rates and implied volatilities for similar instruments at the measurement date.
- Available-for-sale investments are based on a valuation model derived from the most recently published observable financial prices.

The Group recognises transfers between levels of the fair value hierarchy as of the end of the reporting period during which the transfer has occurred. There were no significant transfers between Level 1 and Level 2 and vice versa during the year (2016: none).