

C 2 Research and development³⁸⁸

R&D intensity (C 2-1) in Germany – i.e. R&D expenditure as a percentage of gross domestic product – amounted to 2.94 percent in 2016.³⁸⁹ R&D intensity thus rose slightly by 0.02 percentage points compared to the previous year, but is still below the Federal Government's three-percent target. The level of R&D intensity has a similarly low level of dynamics in the UK and Sweden: R&D intensity in Sweden decreased slightly by 0.02 percentage points to 3.25 percent between 2015 and 2016; in the UK it rose from 1.65 to 1.67 percent in the same period. The development of R&D intensity in South Korea is striking, where R&D intensity decreased from 4.29 to 4.23 percent. This was the first decline during the study period.

In 2015, the budgetary estimate – i.e. the financial resources set aside in the state budget – for civil R&D (C 2-2) in Germany was 64 percent above the initial level of 2007. By far the strongest growth was recorded in Switzerland, where the budgetary estimate for civil R&D in 2016 was 102 percent higher than the initial level of 2007. Sweden and South Korea recorded growth approximately comparable with Germany: about 60 percent up on 2007.

As regards the indicator 'distribution of the gross domestic expenditure on R&D by performing sector' (C 2-3), no new data were collected. Only individual data were revised; no new comment was made.

The R&D intensity of Germany's Länder (C 2-4) increased in all 16 federal states between 2005 and 2015. The state of Lower Saxony was the most dynamic; here, R&D intensity rose from 2.19 to 3.45 percent. As a result, Lower Saxony has the third-highest R&D intensity for 2015 of all Länder after Baden-Württemberg (4.94 percent) and Berlin (3.55 percent).

Internal corporate R&D expenditure (C 2-5) amounted to almost €61 billion in 2015. Vehicle construction alone accounted for €23.5 billion and electrical engineering/electronics companies for €9.8 billion. This means that there is a very high concentration and economic dependency in R&D on vehicle construction.

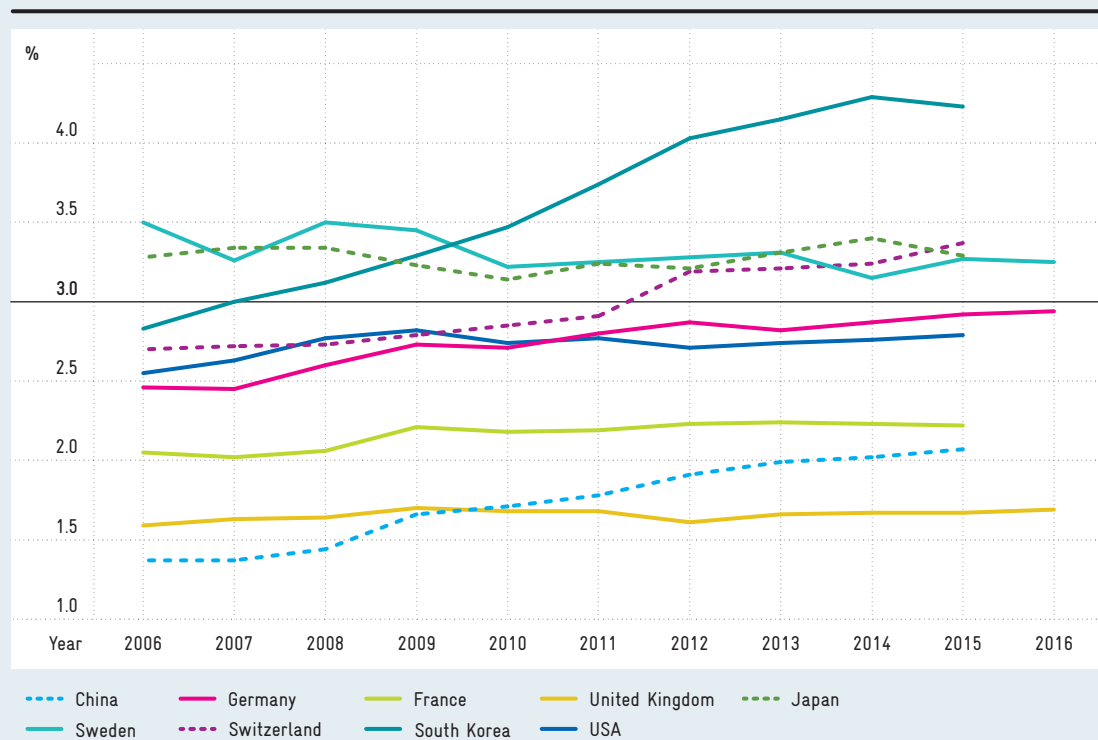
The indicator 'internal corporate R&D expenditure as a percentage of turnover from the company's own products' (C 2-6) documents a marked increase in internal R&D expenditure in the pharmaceuticals industry for 2016. R&D expenditure as a percentage of turnover from the companies' own products increased from 11.9 percent in 2015 to 14 percent in 2016.

R&D intensity in selected OECD countries and China 2006–2016 as percentages

Fig. C 2-1

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R&D intensity: percentage of an economy's gross domestic product (GDP) spent on research and development.¹⁾



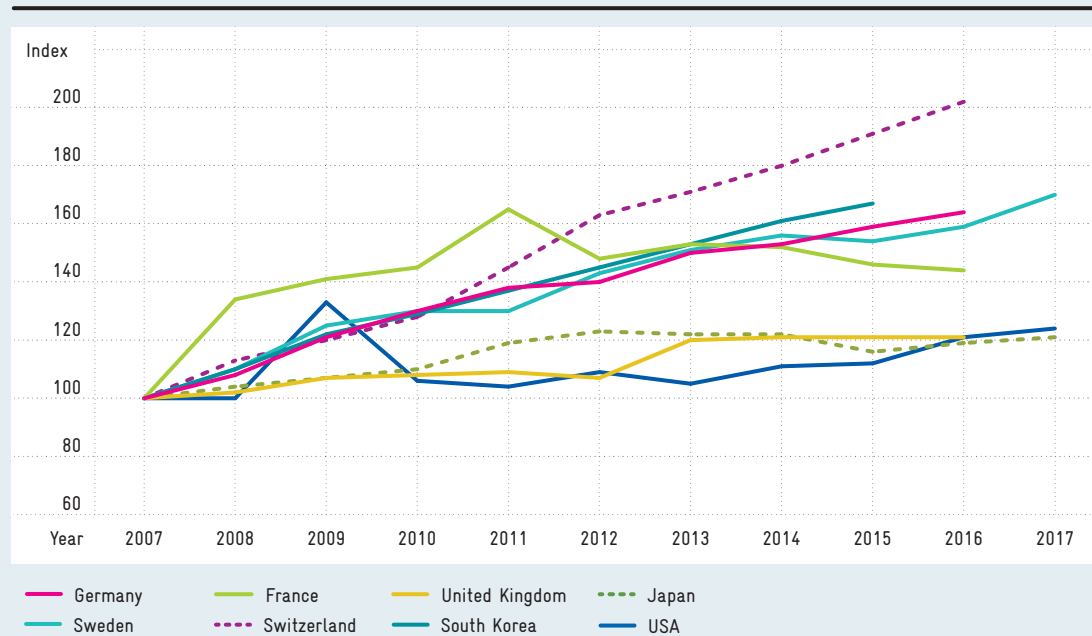
¹⁾ Gross domestic product based on the methodology of the European System of National and Regional Accounts (ESA 2010). Some of the data for Switzerland were estimated. China 2009, France 2010, Japan 2008, South Korea 2007 break in the series. Source: OECD, EUROSTAT. Calculations and estimates by CWS in Schasse et al. (2018).

Fig. C 2-2

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State budget estimates for civil R&D

R&D budget estimates: the chart shows the amounts set aside in the budget to finance R&D.



Index: 2007 = 100, data partially based on estimates.

Source: OECD, EUROSTAT. Calculations and estimates by CWS in Schasse et al. (2018).

Tab. C 2-3

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Distribution of gross domestic expenditure on R&D (GERD) by performing sector in 2005 and 2015

Gross domestic expenditure on research and development (GERD) in industry, the higher-education sector and the public sector.

Country	2005					2015				
	GERD in USD m	of which ... (in %) was performed by				GERD in USD m	of which ... (in %) was performed by			
		Economy	Tertiary education institutions	State	Private Nonprofit*		Economy	Tertiary education institutions	State	Private Nonprofit*
Germany	63,868	69.3	16.5	14.1	-	114,778	68.7	17.3	14.1	-
France	39,530	62.1	18.8	17.8	1.3	60,819	65.1	20.3	13.1	1.5
United Kingdom	30,640	61.4	25.7	10.6	2.3	46,260	65.7	25.6	6.8	1.9
Japan	128,695	76.4	13.4	8.3	1.9	170,003	78.5	12.3	7.9	1.3
Sweden	10,388	72.8	22.0	4.9	0.3	15,372	69.7	26.7	3.4	0.2
Switzerland ¹⁾	8,436	73.7	22.9	1.1	2.3	17,688	71.0	26.7	0.9	1.5
South Korea	30,618	76.9	9.9	11.9	1.4	74,051	77.5	9.1	11.7	1.6
USA	328,128	68.9	14.3	12.3	4.4	502,893	71.5	13.2	11.2	4.1
China	86,828	68.3	9.9	21.8	-	408,829	76.8	7.0	16.2	-

¹⁾ 2004 instead of 2005.

* Private non-profit organizations are included under 'public sector' in some countries (e.g. Germany).

Source: OECD, EUROSTAT. Calculations by CWS in Schasse et al. (2018).

Tab. C 2-4

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R&D intensity of Germany's Länder in 2005 and 2015 as percentages

R&D intensity: Länder expenditure on research and development as a percentage of their gross domestic product, broken down by sectors.

Länder	2005				2015			
	Total	Economy	State	Tertiary education institutions	Total	Economy	State	Tertiary education institutions
Baden-Württemberg	4.08	3.27	0.40	0.41	4.94	4.02	0.41	0.51
Bavaria	2.89	2.32	0.26	0.31	3.16	2.44	0.31	0.41
Berlin	3.48	1.69	1.03	0.76	3.55	1.47	1.20	0.89
Brandenburg	1.17	0.29	0.61	0.27	1.64	0.60	0.70	0.34
Bremen	2.15	0.90	0.62	0.63	2.79	1.02	1.09	0.68
Hamburg	1.77	1.06	0.33	0.37	2.24	1.26	0.46	0.51
Hesse	2.46	2.00	0.15	0.30	2.82	2.15	0.24	0.43
Mecklenburg-Western Pomerania	1.45	0.31	0.62	0.51	1.87	0.60	0.63	0.65
Lower Saxony	2.19	1.46	0.33	0.40	3.45	2.53	0.39	0.53
North Rhine-Westphalia	1.72	1.06	0.25	0.41	1.95	1.13	0.32	0.50
Rhineland-Palatinate	1.66	1.17	0.16	0.33	2.35	1.79	0.15	0.41
Saarland	1.01	0.31	0.29	0.41	1.54	0.64	0.38	0.52
Saxony	2.35	1.08	0.65	0.62	2.72	1.19	0.78	0.76
Saxony-Anhalt	1.20	0.35	0.41	0.44	1.39	0.37	0.49	0.54
Schleswig-Holstein	1.14	0.52	0.30	0.32	1.47	0.77	0.34	0.36
Thuringia	1.87	0.98	0.39	0.49	2.01	0.97	0.46	0.58
Germany	2.43	1.68	0.34	0.40	2.92	2.01	0.41	0.50

Source: SV Wissenschaftsstatistik in Schasse et al. (2018).

Tab. C 2-5

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Internal corporate R&D expenditure by origin of funds, economic sector, company size and technology category in 2015

Internal R&D: research and development that is conducted inside the company, either for the company's own purposes or commissioned by a third party.

	Internal R&D expenditure				
	Total	of which funded by			
		private sector	public sector	other domestic entities	foreign entities
	in €'000	in percent			
All researching companies (without joint research)	60,657,135	90.1	3.1	0.1	6.7
Manufacturing	51,912,569	90.8	2.0	0.1	7.1
Chemical industry	3,786,071	90.1	1.4	0.0	8.4
Pharmaceutical industry	3,956,079	76.4	0.5	0.0	23.1
Plastics, glass and ceramics	1,398,754	92.6	2.7	0.3	4.4
Metal production and processing	1,354,999	80.5	9.3	0.2	9.9
Electrical engineering/electronics	9,790,457	91.1	2.7	0.0	6.2
Mechanical engineering	5,459,450	95.1	2.1	0.1	2.7
Vehicle construction	23,473,463	92.4	1.3	0.2	6.0
Other manufacturing industries	2,693,298	93.0	4.3	0.1	2.6
Remaining sectors	8,744,565	86.1	9.5	0.1	4.2
fewer than 100 employees	2,539,754	75.4	17.4	0.2	6.9
100–499 employees	5,247,883	84.6	7.9	0.2	7.2
500–999 employees	3,660,396	87.6	6.2	0.1	6.1
1,000 employees and more	49,209,102	91.6	1.6	0.1	6.6
Technology categories in industry					
Cutting-edge technology (> 9 percent of costs/turnover spent on R&D)	13,463,726	84.9	3.4	0.0	11.7
High-value technology (3–9 percent of costs/turnover spent on R&D)	32,511,084	93.3	1.1	0.2	5.5

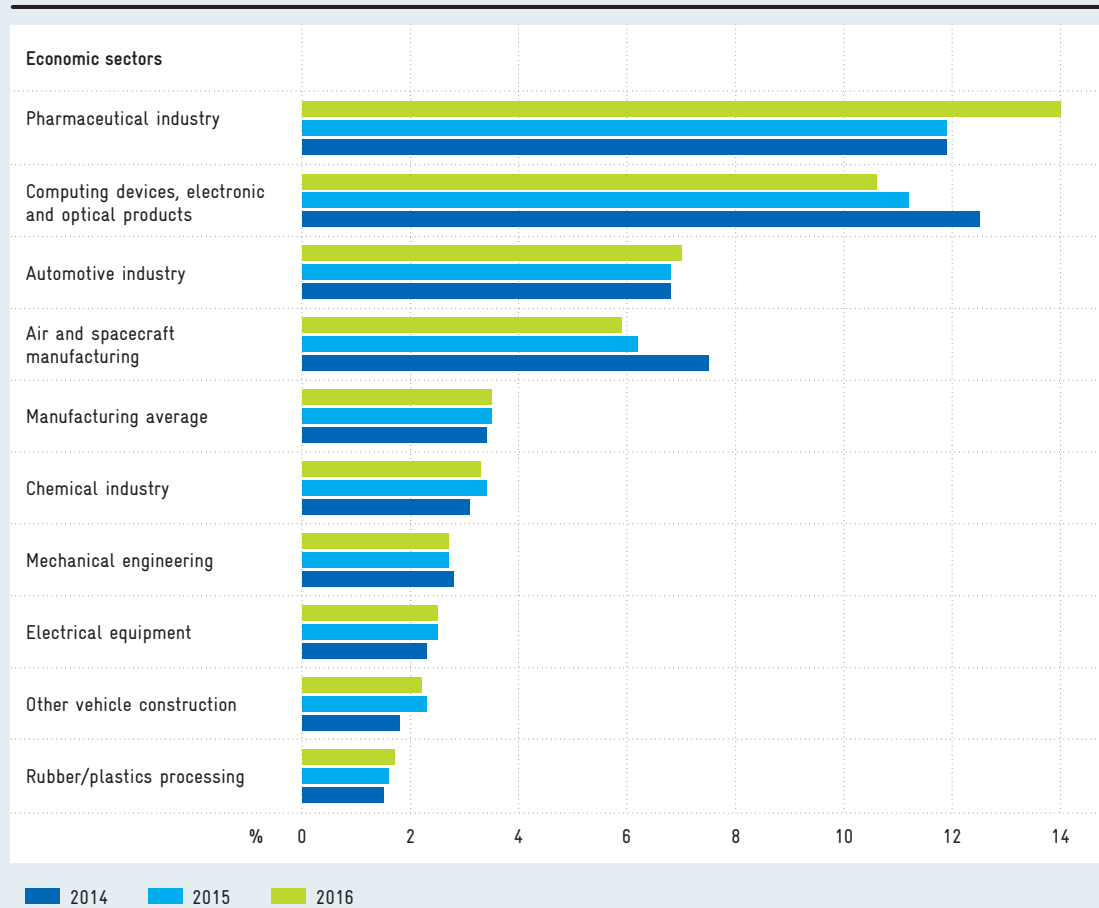
Source: SV Wissenschaftsstatistik in Schasse et al. (2018).

Fig. C 2-6

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Internal corporate R&D expenditure as a percentage of turnover from the company's own products 2014, 2015 and 2016

Internal R&D: research and development that is conducted inside the company, either for the company's own purposes or commissioned by a third party.



Figures net, without input tax. 2016 provisional.

Source: SV Wissenschaftsstatistik, Statistisches Bundesamt (Federal Statistical Office), corporate results for Germany. Calculations by CWS in Schasse et al. (2018).