C 2 Research and development[522]

R&D intensity (C 2-1) in Germany – i.e. R&D expenditure as a percentage of gross domestic product – has risen. While R&D intensity in 2016 was 2.93 percent, it reached a figure of 3.02 percent in 2017. Sweden experienced a similarly marked increase in its R&D intensity, which rose from 3.25 to 3.33 percent in the same period. However, this remains below the levels reached in 2008 and 2009, when Sweden's recorded R&D intensity was 3.5 and 3.45 percent respectively. The level of R&D intensity has decreased in the United Kingdom and France: in the UK, the figure fell from 1.69 in 2016 to 1.67 percent in 2017, while France recorded a fall from 2.25 to 2.19 percent in the same period. Japan also recorded a significant decline, with its R&D intensity falling from 3.28 in 2015 to 3.14 percent in 2016.

The budgetary estimate for civil R&D (C 2-2) – i.e. the financial resources set aside for R&D in the state budget – rose again in Germany in the past year. The 2018 figure was 58 percent above the initial level of 2008. Strong increases in budgetary estimates were also recorded in Sweden, South Korea and Switzerland, while the levels recorded in the USA, the UK and France showed only moderate growth compared to the initial year of 2008. Japan's budgetary estimate saw striking growth recently. After several years of moderate growth, the Japanese budgetary estimate increased markedly from 117 percent in 2017 to 130 percent in 2018.

The distribution of gross domestic expenditure on R&D by performing sector (C 2-3) in Germany shows that the proportion attributable to the private sector fell from 70 percent in 2006 to 68.7 percent in 2016. Tertiary education (TE) institutions have significantly increased their share of expenditure incurred in the implementation of R&D activities. TE institutions' share of R&D expenditure rose from 16.1 to 18 percent between 2006 and 2016. The state's share barely changed, decreasing from 13.9 to 13.8 percent.

At the time of going to print, figures for the Länder were only available up to 2016. The average R&D intensity of the Länder (C 2-4) increased from 2.45 to 2.93 percent between 2006 and 2016. However, the increases in R&D expenditure for the individual Länder vary significantly. While the R&D intensity of Baden-Württemberg increased from 4.04 to 4.92 percent and Lower Saxony recorded a rise from 2.21 to 3.31 percent, Berlin was the only state in which the R&D intensity failed to increase. At 3.49 percent, R&D intensity in Berlin in 2016 remained at the same level as in 2006. The R&D expenditure of the individual Länder can be subject to pronounced fluctuations from one year to the next, as changes in the R&D expenditure of individual industrial firms can heavily influence these indicators.

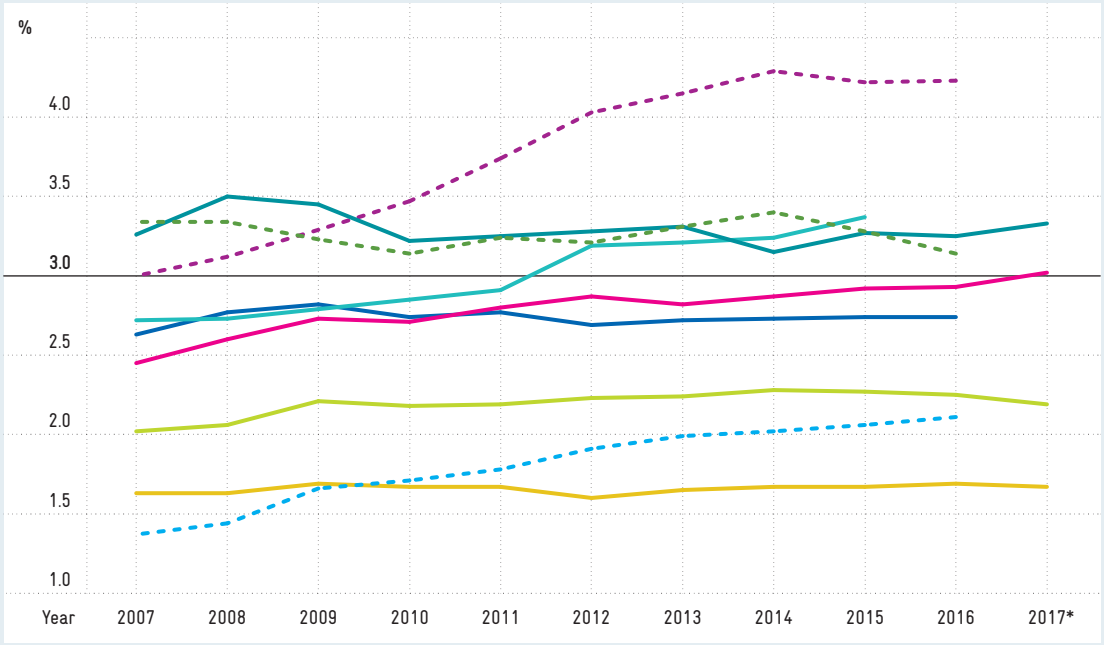
No recent data is available for the indicators 'internal corporate R&D expenditure by origin of funds' and 'internal corporate R&D expenditure as a percentage of turnover from the company's own products'. Table C 2-5 and figure C 2-6 have therefore been taken over from the 2018 report.

Fig. C 2-1

Download data

R&D intensity in selected OECD countries and China 2007–2017 as percentages

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



* Data for 2017 is provisional.
Source: OECD, EUROSTAT. Calculations and estimates by CWS in Schasse (2019).

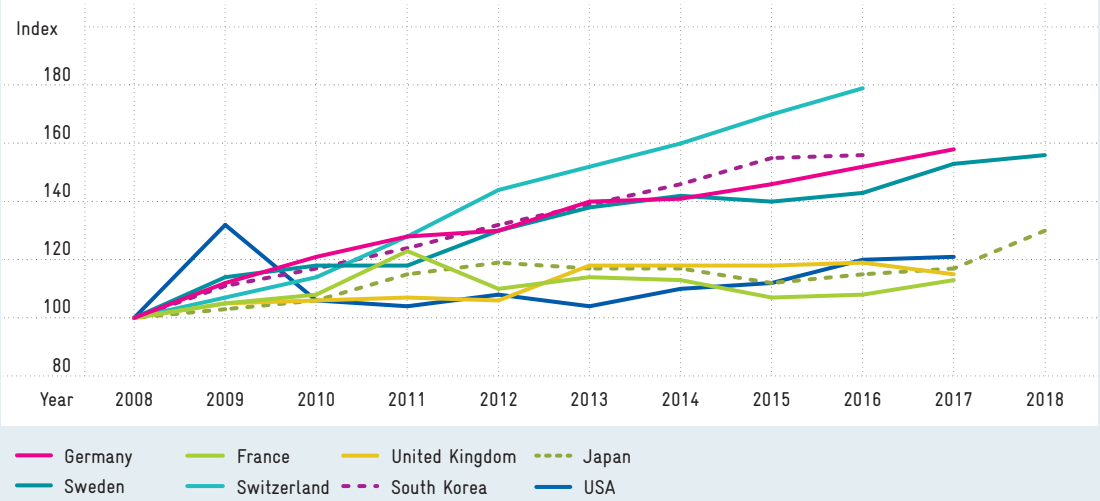
C

Fig. C 2-2

Download data

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: 2008 = 100, data partially based on estimates.
Source: OECD, EUROSTAT. Calculations and estimates by CWS in Schasse (2019).

Tab. C 2-3

Download data

Distribution of gross domestic expenditure on R&D (GERD) by performing sector in 2006 and 2016

Gross domestic expenditure on research and development (GERD) in the private sector, the tertiary education sector and the public sector.

	2006					2016				
		of which ... (in %) was performed by					of which ... (in %) was performed by			
Countries	GERD in USD m	Private sector	Tertiary education institutions	Public sector	Private non-profit	GERD in USD m	Private sector	Tertiary educa-tion	Public sector	Private non-profit
Germany	**69,318**	**70.0**	**16.1**	**13.9**	**-**	**118,159**	**68.2**	**18.0**	**13.8**	**-**
France	42,347	63.1	19.2	16.5	1.2	62,163	63.6	22.0	12.9	1.6
Japan	138,565	77.2	12.7	8.3	1.9	168,645	78.8	12.3	7.5	1.4
Sweden	11,900	74.7	20.6	4.5	0.2	15,796	69.6	26.8	3.4	0.2
Switzerland[1)]	8,436	73.7	22.9	1.1	2.3	17,788	71.0	26.7	0.9	1.5
South Korea	35,413	77.3	10.0	11.6	1.2	79,354	77.7	9.1	11.5	1.6
United Kingdom	33,299	61.7	26.1	10.0	2.2	47,245	67.0	24.6	6.3	2.1
USA	353,328	70.1	13.9	12.0	4.1	511,089	71.2	13.2	11.5	4.1
China	105,581	30.4	9.2	19.7	-	451,201	77.5	6.8	15.7	-

Data available as of 12/2018. [1)] 2004 instead of 2006, 2015 instead of 2016.
Germany and China: Private non-profit organizations included under "public sector".
Source: OECD, EUROSTAT. Calculations by CWS in Schasse (2019).

Tab. C 2-4

Download data

R&D intensity of Germany's Länder in 2006 and 2016 as percentages

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

Länder	2006				2016			
	Total	Private sector	Public sector	Tertiary education institutions	Total	Private sector	Public sector	Tertiary education institutions
Baden-Württemberg	4.04	3.27	0.38	0.39	4.92	4.01	0.40	0.52
Bavaria	2.95	2.37	0.25	0.33	3.17	2.42	0.31	0.44
Berlin	3.49	1.73	0.98	0.77	3.49	1.44	1.13	0.93
Brandenburg	1.22	0.29	0.66	0.26	1.73	0.61	0.76	0.36
Bremen	2.14	0.91	0.68	0.55	2.85	1.02	1.04	0.78
Hamburg	1.81	1.12	0,35	0.35	2.22	1.25	0.44	0.54
Hesse	2.55	2.06	0.16	0.33	2.88	2.16	0.27	0.45
Lower Saxony	2.21	1.49	0.32	0.40	3.31	2.43	0.36	0.53
Mecklenburg-Western Pomerania	1.45	0.33	0.58	0.55	1.85	0.60	0.64	0.60
North Rhine-Westphalia	1.74	1.09	0.26	0.39	1.98	1.13	0.30	0.54
Rhineland-Palatinate	1.69	1.21	0.16	0.33	2.44	1.80	0.17	0.46
Saarland	0.98	0.32	0.28	0.38	1.56	0.67	0.34	0.54
Saxony	2.29	1.10	0.64	0.55	2.71	1.17	0.77	0.76
Saxony-Anhalt	1.21	0.36	0.44	0.41	1.46	0.37	0.49	0.59
Schleswig-Holstein	1.18	0.54	0.31	0.33	1.49	0.77	0.33	0.39
Thuringia	1.88	1.01	0.39	0.48	2.05	0.98	0.47	0.60
Germany	**2.45**	**1.72**	**0.34**	**0.39**	**2.93**	**2.00**	**0.40**	**0.53**

Source: SV Wissenschaftsstatistik and Statistical Offices of the Federal Government and the Länder in Schasse (2019).

Tab. C 2-5

Download data

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 comissioned 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
Vehical 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

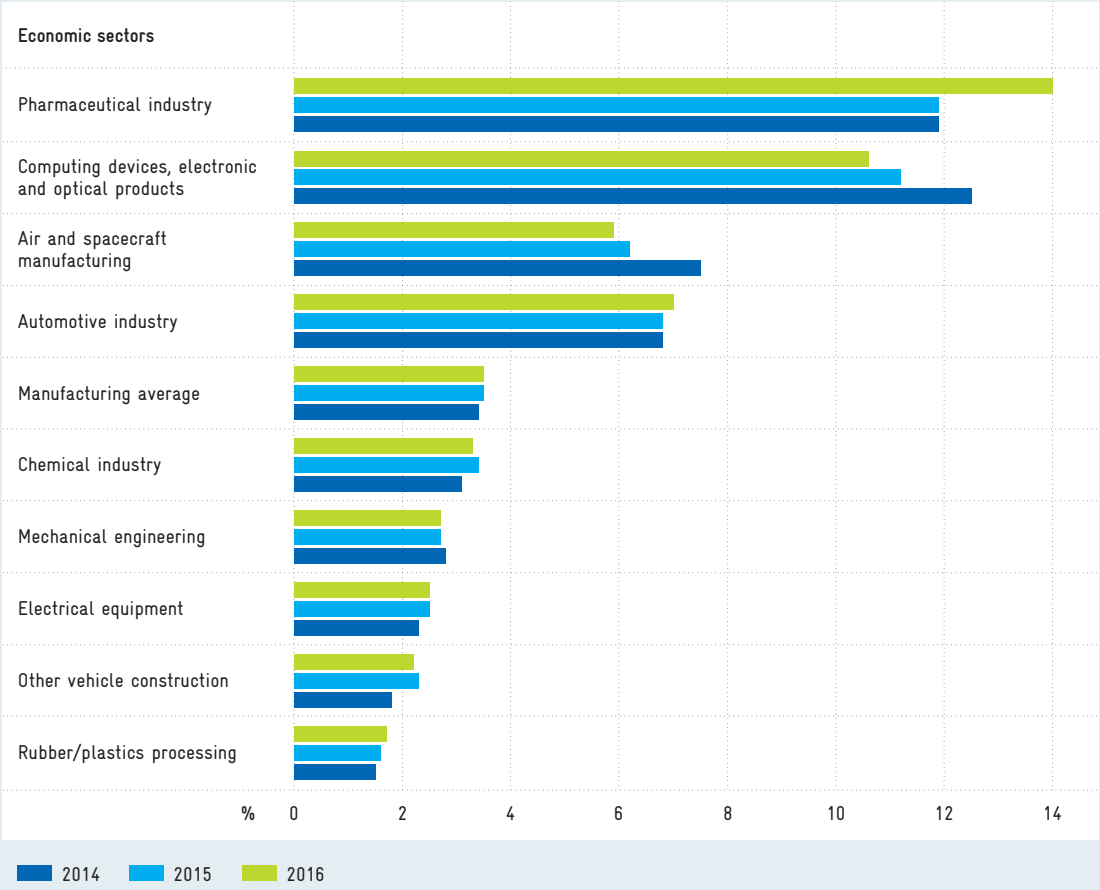
Source: SV Wissenschaftsstatistik in Schasse et al. (2018).

Fig. C 2-6

Download data

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 comissined by a third party.



Figures net, without input tax.
Source: SV Wissenschaftsstatistik, Statistisches Bundesamt (Federal Statistical Office), corporate results for Germany.
Calculactions by CWS in Schasse et al. (2018).

C