C 2 RESEARCH AND DEVELOPMENT

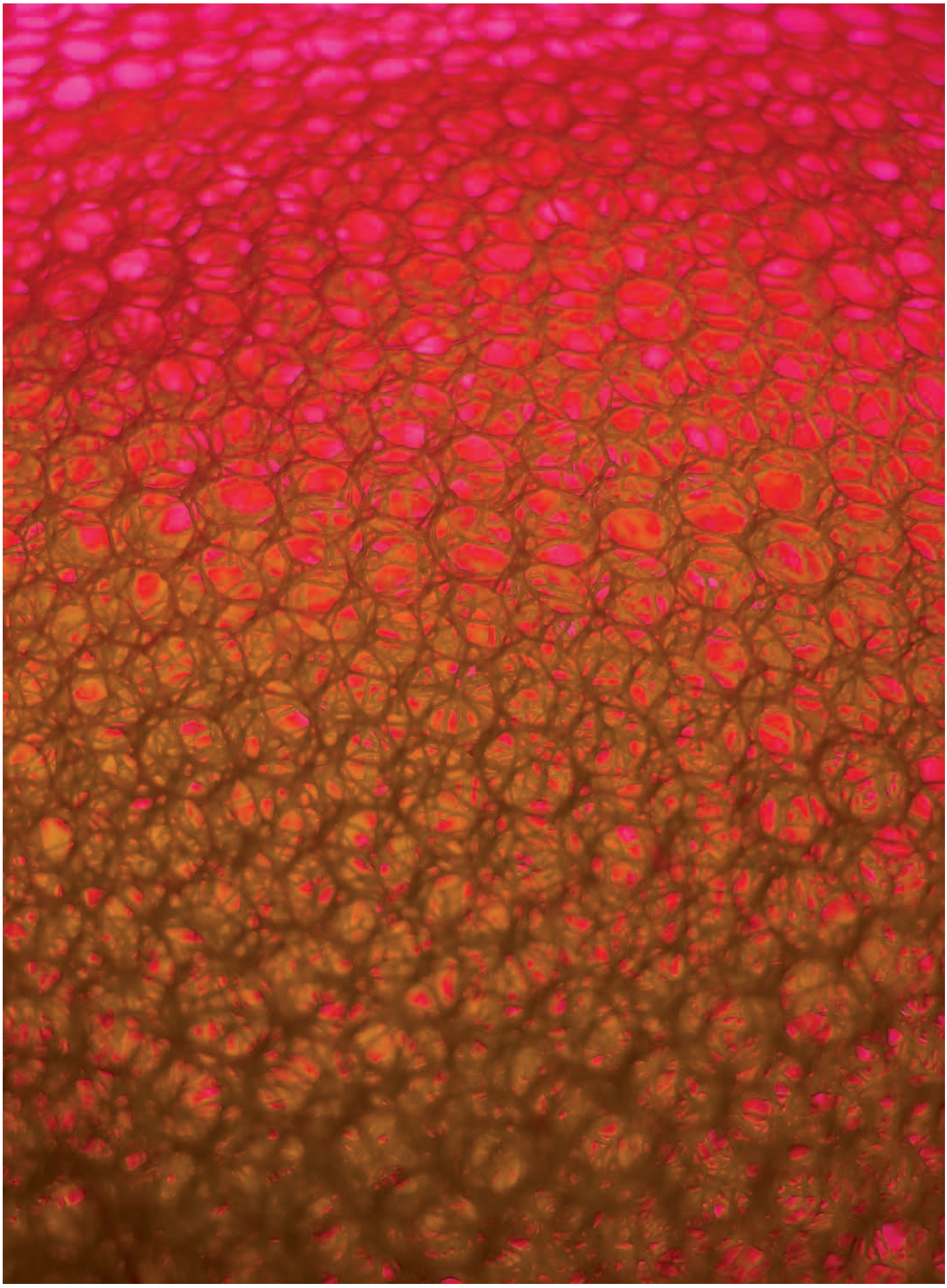
In 2010, Germany's overall expenditure on research and development reached a value of EUR 70 billion. Between 2000 and 2010, R&D expenditures increased by as much as 37 percent. With a 2.82 percent share of R&D expenditure of GDP (R&D intensity), Germany is one of Europe's leading research countries, although the three-percent target has not been quite achieved (C 2–1). The front runners in terms of R&D intensity are Finland, Sweden, Japan and Korea, with an R&D intensity significantly above 3.0 percent. Also noteworthy is the development of China, which has increased its R&D intensity from 0.6 to 1.7 percent over the last 15 years.

Figure C 2–3 shows public spending on civilian R&D in selected world regions. On average, expenditures have been increased across OECD countries by a factor of 2.6. Over the same period of time, growth of public R&D expenditure in the EU-15 countries remained below the OECD average. From among the European countries, the Scandinavian countries as well as Belgium, the Netherlands, Austria and Switzerland recorded above-average growth rates in terms of public R&D expenditures. The increase in public R&D expenditure in Germany, however, remained below the average of the EU-15 countries. Noteworthy here is the decline in the share of publicly funded R&D expenditure in the private sector over the last three decades. In the late 1970s, about 14 percent of private R&D in Germany was financed by the public sector. In 1991, this share had decreased to 8.3 percent, and was further halved by 2009 to less than 4 percent.

In Germany, more than two thirds of all R&D funding is allocated to projects in the industrial sector, with a strong focus on manufacturing (C 2–5). Thus, in 2009, a total of EUR 38.7 billion (that is 86 percent) of internal R&D spending was attributable to companies from the manufacturing sector. From among the manufacturing sector, major German export industries continue to play an important role: thus automotive engineering, mechanical engineering, electrical engineering, as well as the chemical and pharmaceutical industries accounted for approximately three quarters of internal R&D expenditures in Germany.

Not least because of the economic and financial crisis, investment activities of R&D heavyweights developed very differently over the past year. Especially automotive engineering displayed a very dynamic development. With an increase of 7.2 percent, this industry sector almost matched its pre-crisis figures. This sharp upward trend is of great importance for Germany, since R&D expenditures in automotive engineering account for almost 30 percent (approx. EUR 15 billion) of Germany's overall R&D volume in the private sector. Mechanical engineering and electrical engineering also showed an upward trend, while the chemical and pharmaceutical industries decreased their R&D efforts compared with the previous year. The negative trend in the chemical and pharmaceutical industries demonstrates how industrial research in Germany is dependent on individual corporations. Thus the decline in R&D spending by some large companies resulted in negative overall results for both industries – despite the fact that the majority of companies developed well with regard to their R&D activities in 2010.

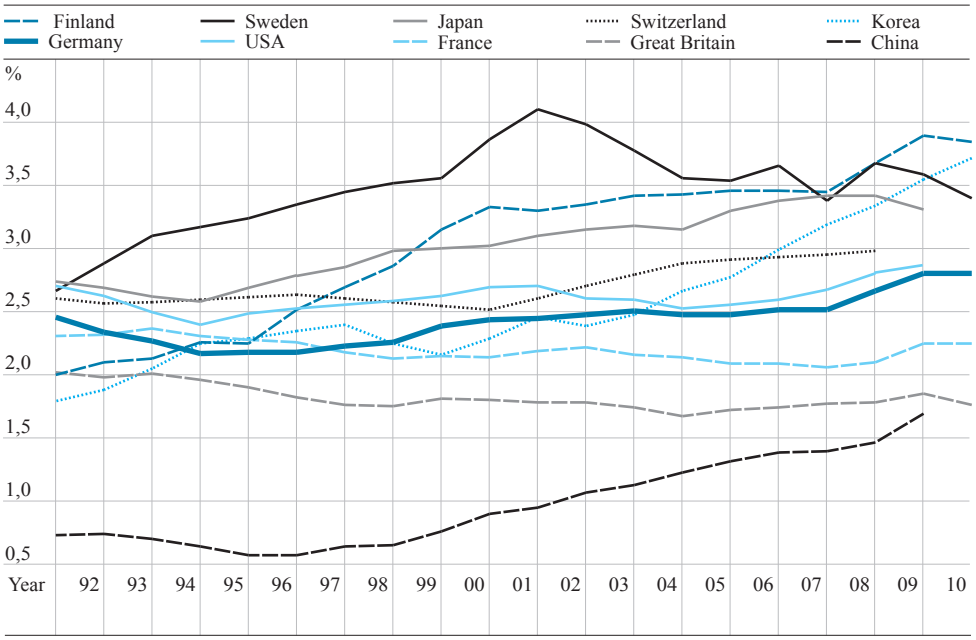
9/10 Transilluminated organic structures



10/10 Superimposed net structures

R&D intensity in selected OECD countries C 2–1
(figures in percent)

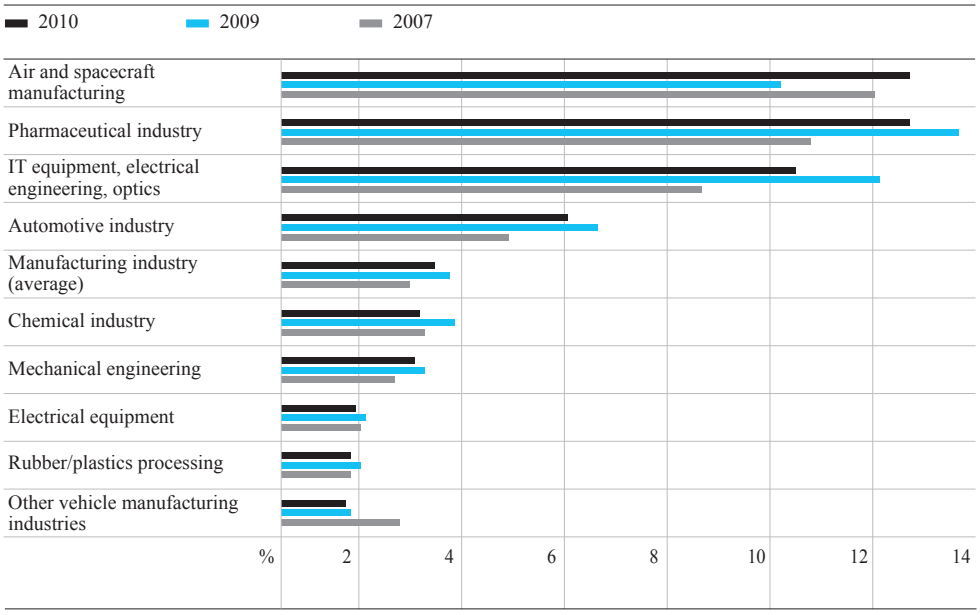
R&D intensity: share of expenditures on research and development of an economy's gross domestic product.



Source: OECD, Main Science and Technology Indicators (2011/1). Eurostat database.
Calculations and estimates by NIW, in: Schasse et al. (2012).

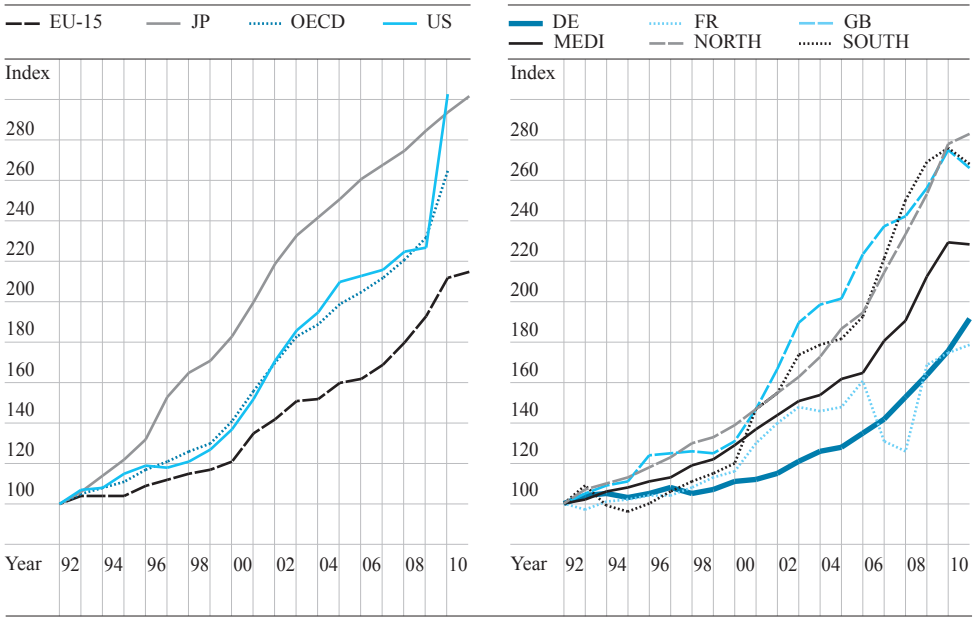
Internal private sector R&D expenditure relative to revenue C 2–2

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.



Source: *SV-Wissenschaftsstatistik*. Federal Statistical Office *(Statistisches Bundesamt)*, GENESIS-Online, industrial statistics. Calculations by NIW.

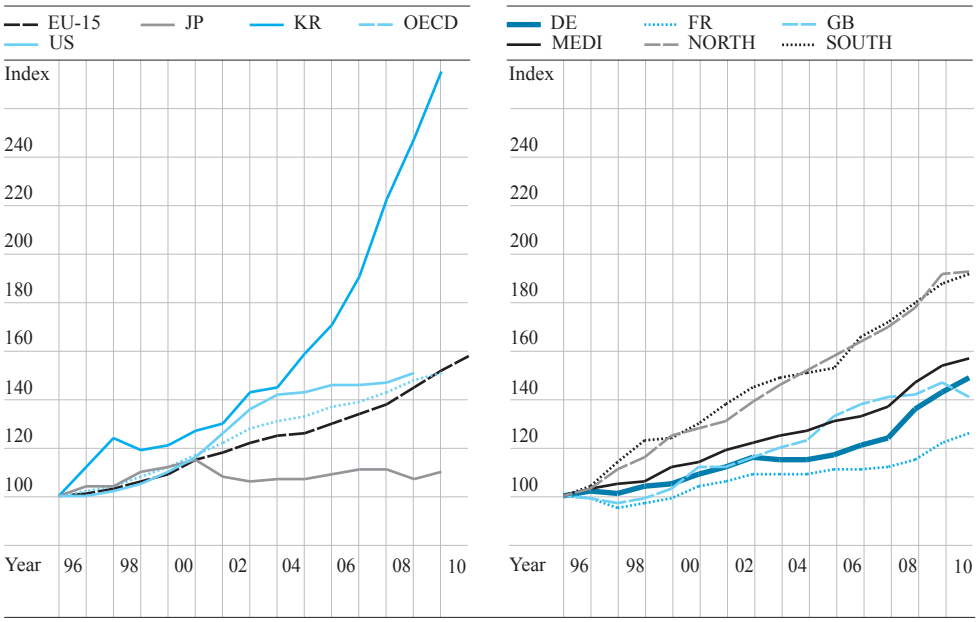
C 2–3 State budgets for civilian R&D in selected world regions



R&D budget estimates: budget resources available for the financing of R&D as specified in the state budget.

Index: 1991 = 100. NORTH: SWE, FIN, NOR, DEN, IRL, ISL. SOUTH: ITA, POR, ESP, GRE. MEDI: BEL, NED, AUT, SUI.
Source: OECD, Main Science and Technology Indicators (2011/1). Eurostat database.
Calculations and estimates by NIW, in: Schasse et al. (2012).

C 2–4 Internal R&D expenditures of universities and non-university research institutions at constant prices, according to world regions



Internal R&D expenditures: financial outlays for R&D personnel, R&D equipment, and investments in R&D within an organisation.

Index: 1991 = 100. NORTH: SWE, FIN, NOR, DEN, IRL, ISL. SOUTH: ITA, POR, ESP, GRE. MEDI: BEL, NED, AUT, SUI.
Source: OECD, Main Science and Technology Indicators (2011/1). Eurostat database.
Calculations and estimates by NIW, in: Schasse et al. (2012).

C 2–5

Internal R&D expenditures of companies in Germany according to origin of funds, industry, size, and technology classes, 2009

Internal R&D: R&D that is conducted within the company, either for its own purposes or commissioned by a third party.

Internal R&D expenditures	Total (in EUR)	of this: financed by (in percent)			
		private sector	public sector	domestic	others
Total of companies conducting research	**44,982,742**	**92.9**	**3.6**	**0.1**	**3.4**
Manufacturing sector	38,711,447	94.1	3.0	0.1	2.9
Automotive engineering	15,877,125	91.8	4.2	0.1	3.9
Electrical engineering/electronics	7,148,828	95.3	2.8	0	1.9
Mechanical engineering	4,498,533	95.2	1.8	0.1	2.9
Pharmaceutical industry	3,895,967	99.0	0.5	0	0.6
Chemical industry	3,197,776	97.3	1.4	0	1.3
Manufacturing sector, other	1,752,143	91.8	2.7	0	5.5
Metal production and processing	1,206,447	92.7	6.5	0.1	0.8
Plastics, glass and ceramic industry	1,134,628	94.0	1.7	0	4.2
Other sectors	**6,271,295**	**85.4**	**7.6**	**0.2**	**6.8**
Less than 100 employees	2,371,547	83.2	12.7	0.2	3.8
100 to 499 employees	4,665,044	89.9	4.8	0.1	5.2
500 to 999 employees	2,688,345	92.0	4.3	0.1	3.7
1000 employees and above	35,257,798	94.0	2.8	0.1	3.1
Technology classes within the industrial sector					
Cutting-edge technology					
(> 7 percent of R&D outlay / turnover)	12,213,754	90.8	6.9	0	2.3
High-value technology					
(2.5 – 7 percent of R&D outlay / turnover)	22,763,099	96.0	1.0	0.1	2.9

Source: *SV Wissenschaftsstatistik*.