

**Measuring the globalisation of R&D
the German experience
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- **R&D-survey for BE-sector by Stifterverband
Wissenschaftsstatistik**
- BERD-concept (territory = Germany)
- In addition: Globalisation of R&D (starting 1995)
- Two “directions”
 - ⇒ German enterprises abroad (outward R&D)
 - ⇒ Foreign affiliates in Germany (inward R&D)

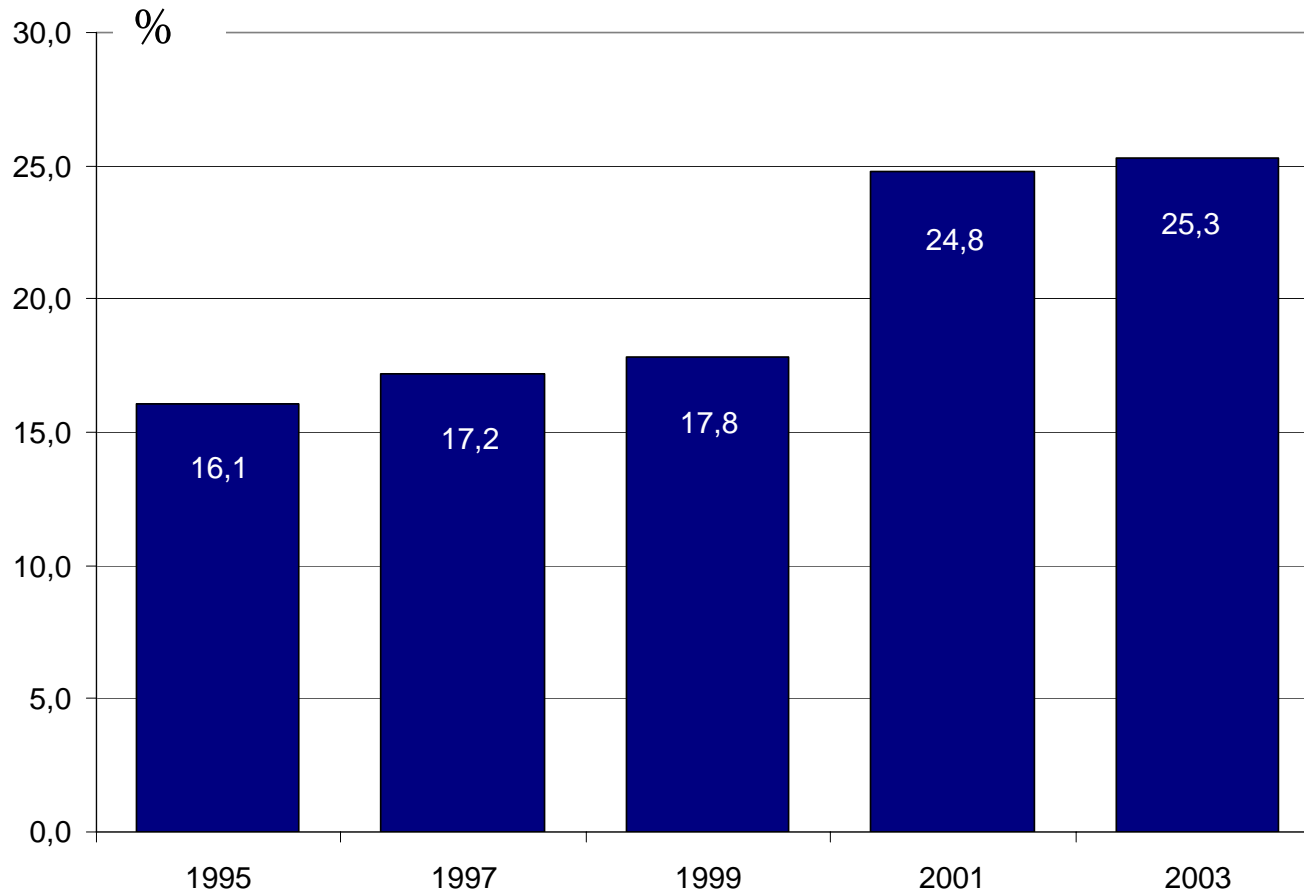
R&D Data in enterprises in Germany by owner ¹⁾ 1995 - 2003

Year	ins- gesamt	country of owner identified						country of owner not identified
		zu- sammen	Germany	Abroad	thereof			
					NAFTA	EUROPA	JAPAN SO-ASIEN	
1	2	3	4	5	6	7	8	
Total R&D-expenditure								
2003	46 070	43 961	32 292	11 669	4 484	6 877	198	2 110
2001	43 239	39 252	28 833	10 419	4 465	5 882	72	3 987
1999	39 255	34 602	28 327	6 275	3 005	3 174	96	4 653
1997	33 030	26 636	21 786	4 850	2 220 ²⁾	2 496	134 ³⁾	6 394
1995	29 571	24 542	20 442	4 100	2 215 ²⁾	1 828	57 ³⁾	5 030
Intramural R&D-expenditure (Mill. €)								
2003	37 743	35 800	26 227	9 573	3 563	5 744	167	1 942
2001	35 969	32 344	24 331	8 013	3 236	4 719	58	3 623
1999	33 333	28 937	23 774	5 163	2 296	2 787	80	4 396
1997	28 650	24 360	20 177	4 183	1 851 ²⁾	2 226	106 ³⁾	4 290
1995	26 564	21 681	18 199	3 482	1 776 ²⁾	1 663	43 ³⁾	4 883
R&D-Personnel (Fulltime equivalent in '000)								
2003	294	271	204	67	27	38	1,6	24
2001	303	258	196	63	26	36	0,5	45
1999	303	246	200	47	22	24	0,6	57
1997	282	224	186	38	58
1995	279	210	178	33	16 ²⁾	16	0,6 ³⁾	69

1) Endeigentümer (ultimate beneficial owner); 2) USA; 3) Sonstige Staaten, im wesentlichen Japan, Süd-Ost-Asien und Kanada
... = Daten nicht verfügbar
Rundungsabweichungen

Source: Stifterverband Wissenschaftsstatistik gGmbH

Percentage of intramural R&D expenditure in Germany 1995 - 2003 performed by foreign owned companies



Source: Stifterverband Wissenschaftsstatistik gGmbH

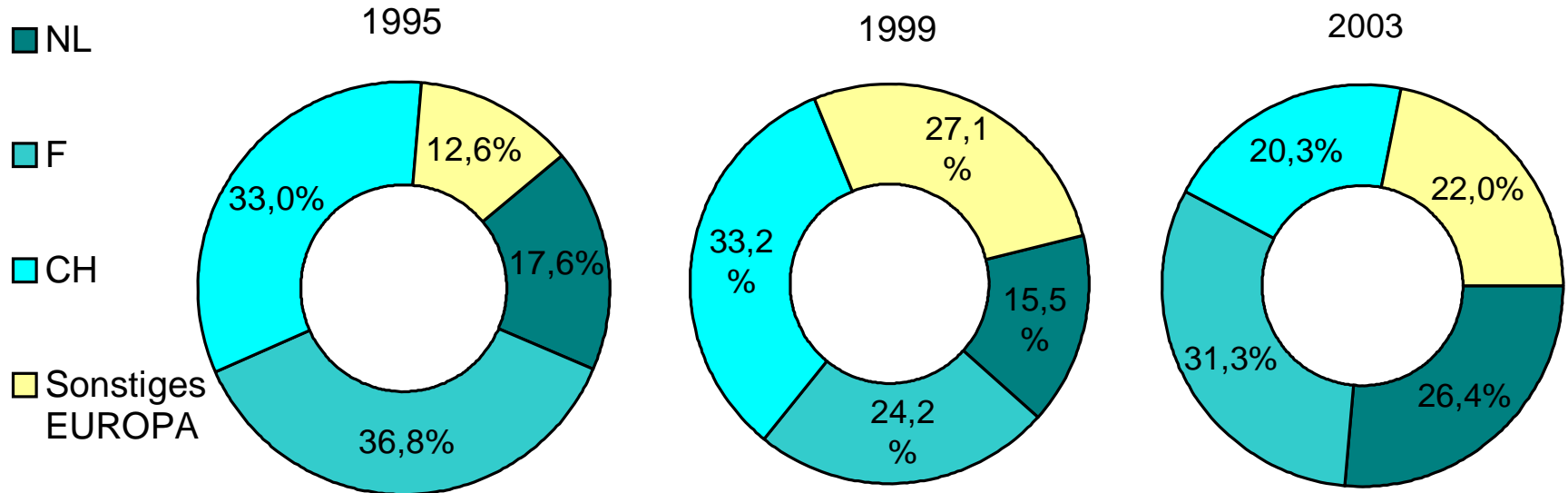
Intramural R&D expenditure in enterprises in Germany 2003 owner*) and industrial classification

industrial classification	Intramural R&D expenditure									
	insgesamt	country of owner identified						country of owner not identified		
		zusammen		thereof						
				Germany		Abroad				
	Mill. €	%	Mill. €	%	Mill. €	%	Mill. €	%		
1	2	3	4	5	6	7	10	11		
A,B Land- u. Forstwirtschaft, Fischerei u. Fischzucht	71	54	76,1	54	100,0	0	0,0	17	23,9	
C Bergbau u. Gewinnung v. Steinen u. Erden	25	24	96,9	21	88,2	3	11,8	1	3,1	
D Verarbeitendes Gewerbe	34 332	32 889	95,8	23 717	72,1	9 172	27,9	1 443	4,2	
DA Ernährungsgewerbe, Tabakverarbeitung	261	232	88,8	88	37,8	144	62,2	29	11,2	
DB,DC Textil-, Bekleidungs- u. Ledergewerbe	101	70	69,3	64	91,6	6	8,4	31	30,7	
DD,DE Holz-, Papier-, Verlags- u. Druckgewerbe	210	185	88,1	62	33,5	123	66,5	25	11,9	
DF Kokerei, Mineralölv., H. v. Brutstoffen	30	30	97,5	11	36,9	19	63,1	1	2,5	
DG Chemische Industrie	6 345	6 214	97,9	4 127	66,4	2 086	33,6	132	2,1	
DH H. v. Gummi- u. Kunststoffwaren	664	589	88,7	392	66,6	197	33,4	75	11,3	
DI Glasgewerbe, Keramik, V. v. Steinen u. Erden	293	228	77,8	131	57,5	97	42,5	65	22,2	
DJ Metallerz. u. -bearb., H. v. Metallerzeugnissen	757	628	82,9	455	72,5	172	27,5	129	17,1	
DK Maschinenbau	3 721	3 322	89,3	2 590	78,0	731	22,0	399	10,7	
DL H. v. Bürom., DV-Geräten u. -Einr., Elektrot., FuO	7 590	7 140	94,1	5 021	70,3	2 119	29,7	450	5,9	
DM Fahrzeugbau	14 208	14 134	99,5	10 677	75,5	3 458	24,5	74	0,5	
DN H. v. Möbeln, Schmuck, Musikinstr. usw., Recycl.	152	119	78,3	99	83,2	20	16,8	33	21,7	
E Energie- u. Wasserversorgung	71	71	99,3	70	98,2	1	1,8	0	0,7	
F Baugewerbe	29	17	57,0	13	79,8	3	20,2	13	43,0	
I Verkehr u. Nachrichtenübermittlung	470	470	99,9	451	96,1	19	3,9	1	0,1	
K Unternehmensdienstleistungen usw.	2 553	2 107	82,5	1 785	84,7	323	15,3	446	17,5	
O Erbringung v. sonst. öffentl. u. persönl. Dienstl.	4	1	11,8	1	100,0	0	0,0	4	88,2	
G,H,J,L-N Restliche Abschnitte	186	168	90,2	116	69,0	52	31,0	18	9,8	
I N S G E S A M T	37 743	35 800	94,9	26 227	73,3	9 573	26,7	1 942	5,1	

*) Ultimate beneficial owner

Source: Stifterverband Wissenschaftsstatistik gGmbH

Intramural R&D expenditure of business enterprises in Germany with headquarter in Europe (outside of Germany)



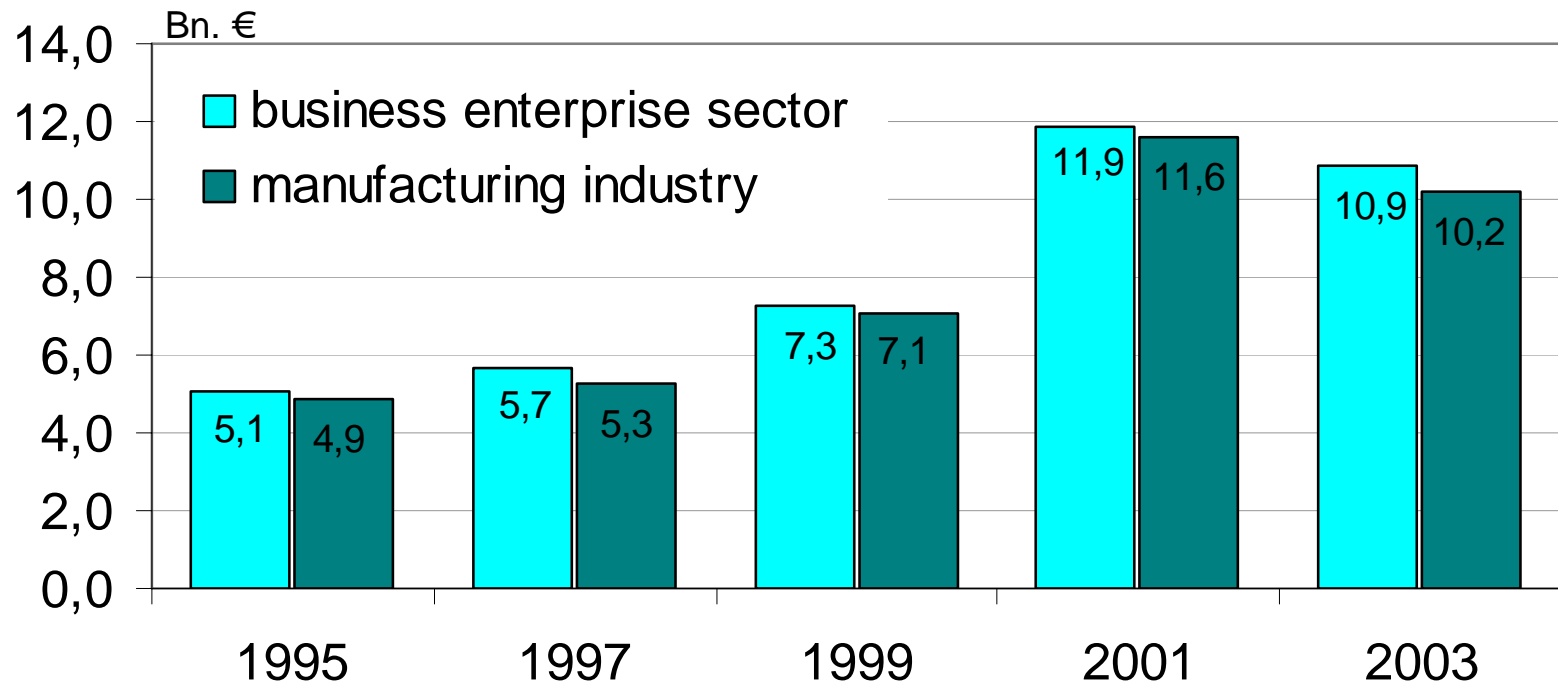
Source: Stifterverband Wissenschaftsstatistik gGmbH

R&D-expenditure of German enterprise-groups in foreign affiliates 1995 - 2003

Jahr	total R&D abroad	
	BE-sector	among them
		manufacturing industry
	Mill. €	
2003	10 900	10 200
2001	11 900	11 600
1999 ^{*)}	7 300	7 100
1997 ^{*)}	5 700	5 300
1995 ^{*)}	5 100	4 900

Source: Stifterverband Wissenschaftsstatistik gGmbH

R&D-Expenditure of German enterprise-groups in foreign affiliates 1995 - 2003



Source: Stifterverband Wissenschaftsstatistik gmbH

R&D expenditure of German MNE ¹⁾ in Germany and abroad 2001 by industrial classification ²⁾

industrial classification	FuE-Aufwendungen							nachrichtlich: FuE-Gesamt- aufwendungen aller Unternehmen
	weltweit	among them						
		R&D abroad		R&D in Germany		among them		
						intramural R&D	extramural R&D	
	Mill. €		%	Mill. €		%	Mill. €	
1	2	3	4	5	6	7	8	
D Verarbeitendes Gewerbe	31 800	11 589	36,4	20 210	63,6	17 117	3 093	39 326
darunter								
DG Chemische Industrie	7 597	3 649	48,0	3 948	52,0	3 428	519	7 029
DJ Metallerg. u. -bearb., H. v. Metallzeugnissen	251	55	21,9	196	78,1	170	26	920
DK Maschinenbau	1 124	444	39,5	680	60,5	619	62	4 058
DL H. v. Bürom., DV-Geräten u. - Einr.,	7 428	2 801	37,7	4 627	62,3	4 100	527	8 837
DM Fahrzeugbau	15 187	4 568	30,1	10 618	69,9	86 084	1 935	16 750
Sonstige Wirtschaftszweige	2 624	360	13,7	2 264	86,3	1 981	283	3 913
I N S G E S A M T	34 424	11 949	34,7	22 474	65,3	19 098	3 376	43 239

1) überwiegend deutsche Eigentümer nach Endeigentümer-Prinzip (ultimate beneficial-owner)

2) classified by the branch of the MNE headquarter in Germany, not by the branch of the affiliate abroad

Source: Stifterverband Wissenschaftsstatistik gGmbH

General results Germany

- Globalisation has increased (inward and outward)
- Inward and outward are “nearly” in balance
- Roughly 25% of BERD performed in foreign enterprises
- Globalisation of R&D is (mainly) caused by acquisition

Approach to compile data on globalization I.

Inward R&D:

- Owner not requested in questionnaire → External sources
- Enterprises were classified depending on head-quarter of MNE (not by share holders)
- Acquisition may cause instability from year to year
- **We intend to use the approach for 2005 again**

Approach to compile data on globalization II.

Outward R&D:

- 1995 - 1999: additional questions in the R&D questionnaire (Approach did not generate the expected results and had to be modified)
- 2001 and 2003: harmonizing external sources on global R&D of MNE with national R&D survey
- **We intend to use the “2003”-approach in 2005 again**
(In spite of evident limitations)

Response Characteristics in the 1999-survey I.

Form FA-1: Questionnaires with detailed additional questions on globalization

- **Questionnaires with intramural R&D** **876**
 - R&D abroad “yes” 91
 - R&D abroad “no” 652
 - R&D abroad “unknown” 123
- **R&D abroad “yes”** **91**
 - R&D expenditure available 70
 - R&D expenditure not available 21

Response Characteristics in the 1999-survey II.

Form FA-3: Questionnaires with additional key-questions on globalization

- **Questionnaires with intramural R&D** **1 473**
 - R&D abroad “yes” 54
 - R&D abroad “no” 1 284
 - R&D abroad “unknown” 135

- **R&D abroad “yes”** **54**
 - R&D expenditure available 41
 - R&D expenditure not available 20

Some Experiences (R&D-survey 1995 and 1999)

Compilation of global R&D-data based on additional questions in the R&D-survey was not successful

- The person (division), responsible to fill out the ‚national‘ R&D-form used to be unable to provide global R&D-data
- Integration of the global R&D-data remained unclear or vague
 - ⇒ Intramural R&D / Total R&D ?
 - ⇒ Only own funds ?
 - ⇒ Ultimate beneficial owner or immediate owner ?
 - ⇒ Details on R&D abroad for regions or product-groups not available or reliable
- Overlapping between different affiliates of MNE hat to be eliminated

R&D-survey 2001 and 2003

- Harmonizing external sources on global R&D of MNE with the national R&D-survey
- External sources very inhomogeneous
- Every MNE had to be treated individually
- Very labor-intensive
- Information reliable, but on a small scale
- **Approach will be used in 2005**

Thank you

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