DOCUMENT RESUME

ED 446 964 SE 064 186

AUTHOR	Collins, Deborah A.
TITLE	Science and Technology Pocket Data Book, 2000.
INSTITUTION	National Science Foundation, Arlington, VA. Div. of Science Resources Studies.
REPORT NO	NSF-00-328
PUB DATE	2000-00-00
NOTE	62p.
AVAILABLE FROM	National Science Foundation, Div. of Science Resources Studies, 4201 Wilson Blvd., Arlington, VA 22230. For full text: http://www.nsf.gov/sbe/srs/stats.htm.
PUB TYPE	Numerical/Quantitative Data (110) -- Reference Materials - General (130)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Bachelors Degrees; Data; Economics; *Engineering; Ethnicity; Evaluation; Females; Graduate Study; Higher Education; *Industry; Masters Degrees; Minority Groups; *Sciences; Sex Differences; Technology

ABSTRACT

This pocket guide presents data concerning: (1) National Research and Development (R&D) Funding Patterns; (2) Academic R&D; (3) R&D in U.S. industry; (4) Education of Scientists and Engineers; (5) Working Scientists and Engineers; (6) Public Attitudes toward Science and Technology (S&T); and (7) International S&T Trends. (YDS)

science and technology

POCKET DATA BOOK

2000

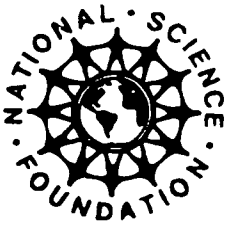
Division of Science Resources Studies
National Science Foundation
Arlington, Virginia 22230

NSF 00-328

science
and
technology

2000

POCKET DATA BOOK



Division of Science Resources Studies
National Science Foundation
Arlington, Virginia 22230

Project Manager: **Deborah A. Collins**

Additional Information

Additional information on any figure in this booklet may be obtained by calling the Division of Science Resources Studies at (703) 292-8774. The report and updated data are also accessible on the World Wide Web at ***http://www.nsf.gov/sbe/srs/stats.htm***

Telephonic Device for the Deaf

The National Science Foundation has Telephonic Device for the Deaf (TDD) capability which enables individuals with hearing impairment to communicate with the Division of Personnel and Management for information relating to NSF programs, employment, or general information. The TDD number is (703) 292-5090.

Suggested Citation

National Science Foundation, *Science and Technology Pocket Data Book, 2000,* NSF 00-328 (Arlington, VA, 2000).

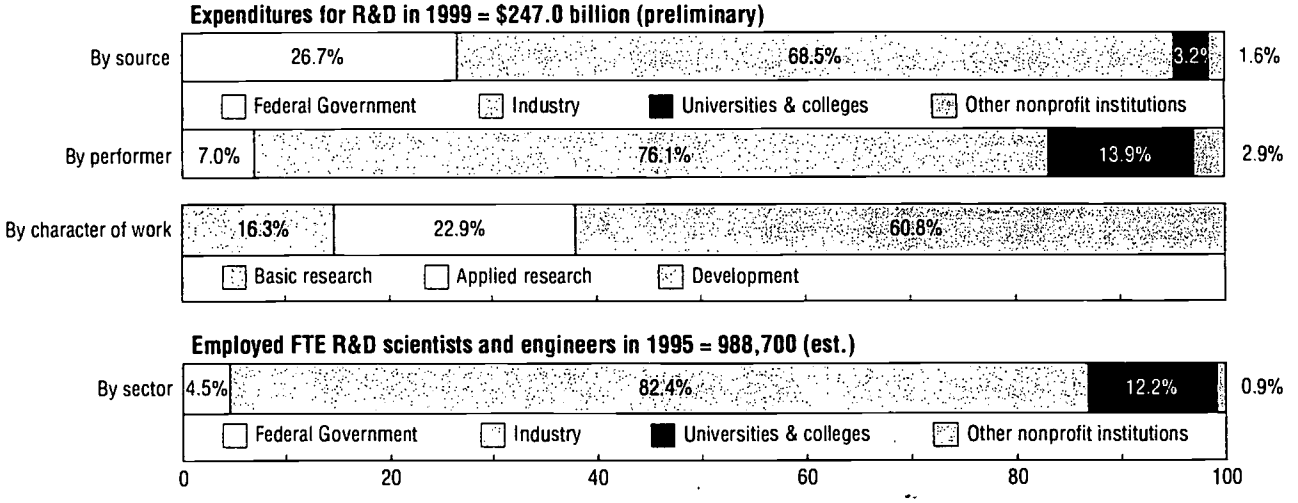
Acknowledgments

This report was prepared by Deborah A. Collins, Survey Operations Specialist, of the Science and Engineering Indicators Program, under the direction of Jennifer Sue Bond and Rolf Lehming of the Division of Science Resources Studies (SRS), Lynda T. Carlson, Director, and Mary J. Frase, Deputy Director. The entire SRS staff generously provided both data and expertise to this report and helped review the document for accuracy.

Contents

National R&D Funding Patterns

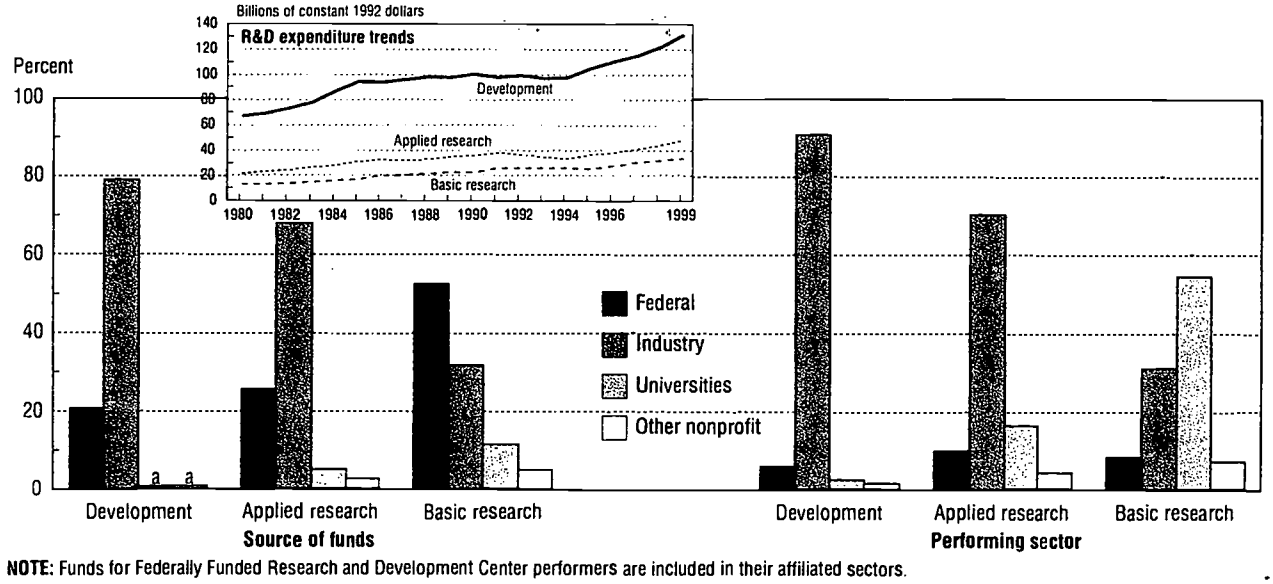
Figure 1. The national R&D effort



NOTES: Details may not total 100 because of rounding. R&D funds for Federally Funded Research and Development Centers are included in their affiliated sectors.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Research and Development in Industry 1997*, NSF 99-312 (Arlington, VA, 1999); *Academic Research and Development Expenditures, Fiscal Year 1997*, NSF 99-336 (Arlington, VA, 1999); *Federal Funds for Research and Development: Fiscal Years 1997, 1998, and 1999*, NSF 99-333 (Arlington, VA, 1999).

Figure 2. National R&D expenditures, funders, and performers, by character of work: 1999



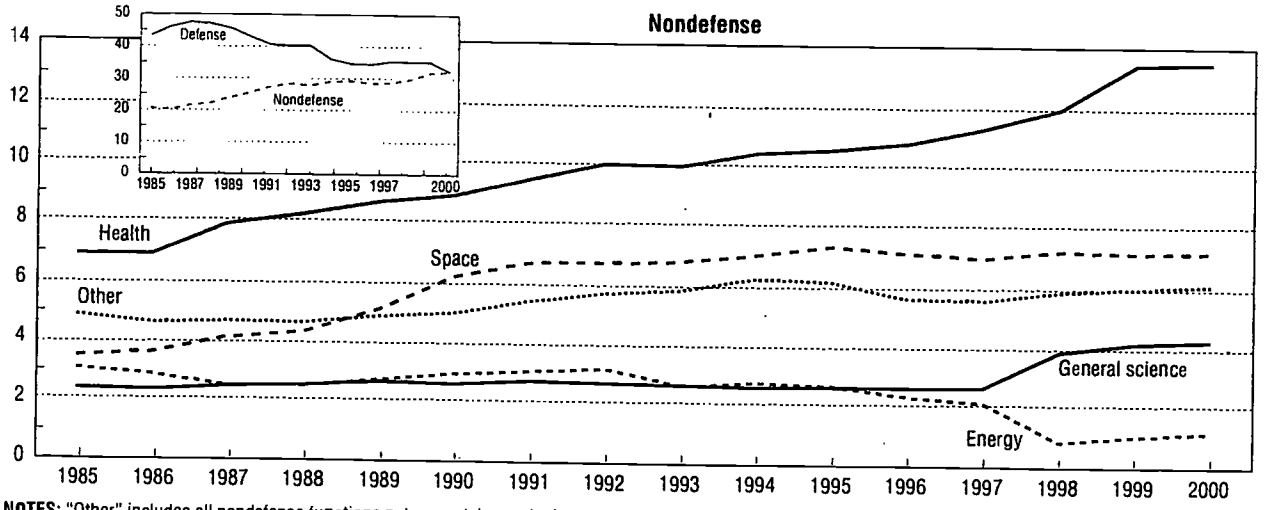
NOTE: Funds for Federally Funded Research and Development Center performers are included in their affiliated sectors.

[a] Less than 1 percent.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Research and Development in Industry 1997*, NSF 99-312 (Arlington, VA, 1999); *Academic Research and Development Expenditures, Fiscal Year 1997*, NSF 99-336 (Arlington, VA, 1999); *Federal Funds for Research and Development: Fiscal Years 1997, 1998, and 1999*, NSF 99-333 (Arlington, VA, 1999).

Figure 3. Federal R&D funding, by budget function

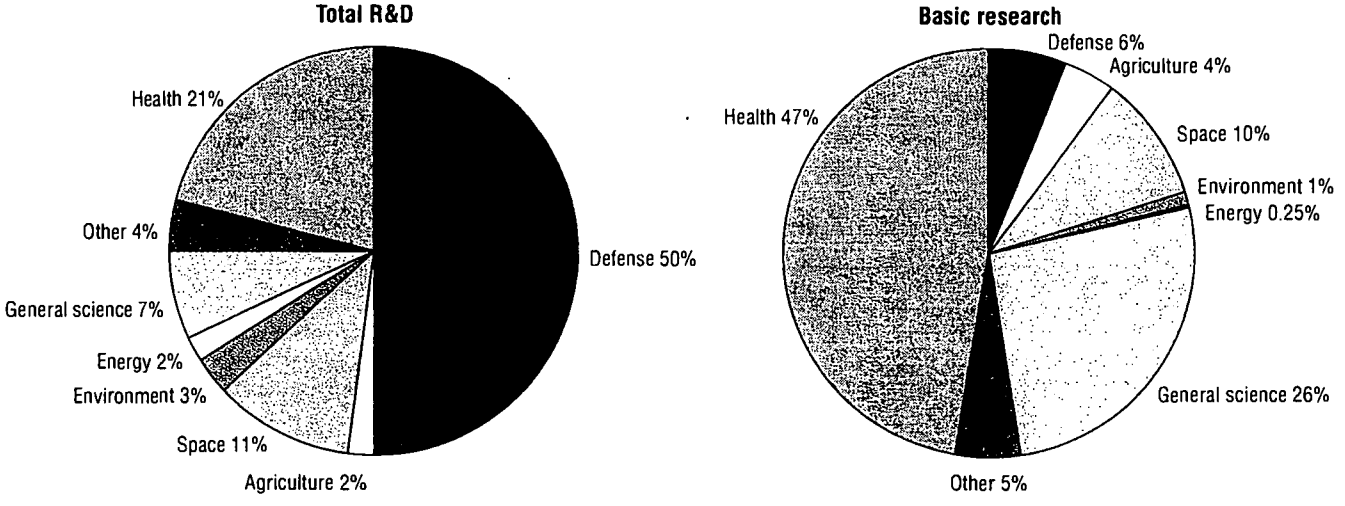
Billions of constant 1992 dollars



NOTES: "Other" includes all nondefense functions not separately graphed, such as agriculture and transportation. The 1998 changes in general science and in energy reflect a reclassification of programs.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Federal Funds for Research and Development: Fiscal Years 1997, 1998, and 1999,* NSF 99-333 (Arlington, VA, 1999), *Federal R&D Funding by Budget Function: Fiscal Years 1998-2000,* NSF 00-303 (Arlington, VA, 1999); and Executive Office of the President, Office of Management and Budget.

Figure 4. **Federal R&D budget authority, by function: FY 2000**



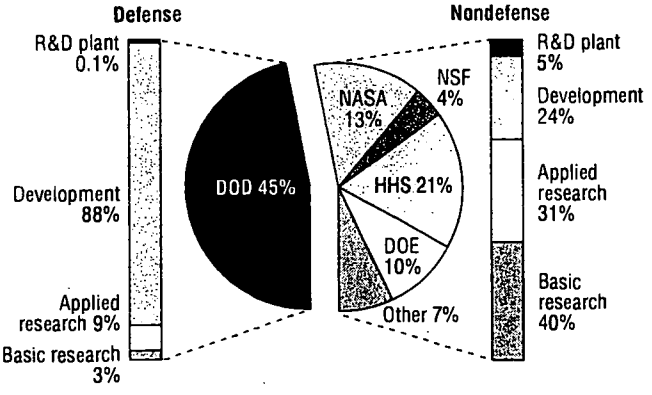
SOURCE: National Science Foundation, Division of Science Resources Studies, *Federal R&D Funding by Budget Function: Fiscal Years 1998-2000*, NSF 00-303 (Arlington, VA, 1999).

Figure 5. Federal obligations, by type of activity

(Millions of dollars)

Fiscal Year	Basic research		Applied research		Development	
	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars	Current dollars	Constant 1992 dollars
1987	8,942	10,783	8,998	10,850	37,313	44,993
1988	9,474	11,040	9,177	10,691	38,119	44,423
1989	10,602	11,854	10,164	11,364	40,641	45,439
1990	11,286	12,116	10,337	11,097	41,937	45,021
1991	12,171	12,528	11,798	12,144	37,327	38,422
1992	12,490	12,490	12,001	12,001	41,102	41,102
1993	13,399	13,054	13,491	13,144	40,424	39,384
1994	13,523	12,865	13,888	13,211	39,824	37,885
1995	13,877	12,891	14,557	13,523	39,752	36,927
1996	14,464	13,178	13,796	12,569	39,393	35,892
1997	14,942	13,361	14,423	12,898	40,461	36,184
1998	15,613	13,796	15,309	13,528	40,981	36,202
1999	17,367	15,149	16,455	14,353	41,530	36,239
2000	18,209	15,573	16,470	14,085	40,425	34,581

Total obligations for R&D and R&D plant in FY 2000 = $77.2 billion



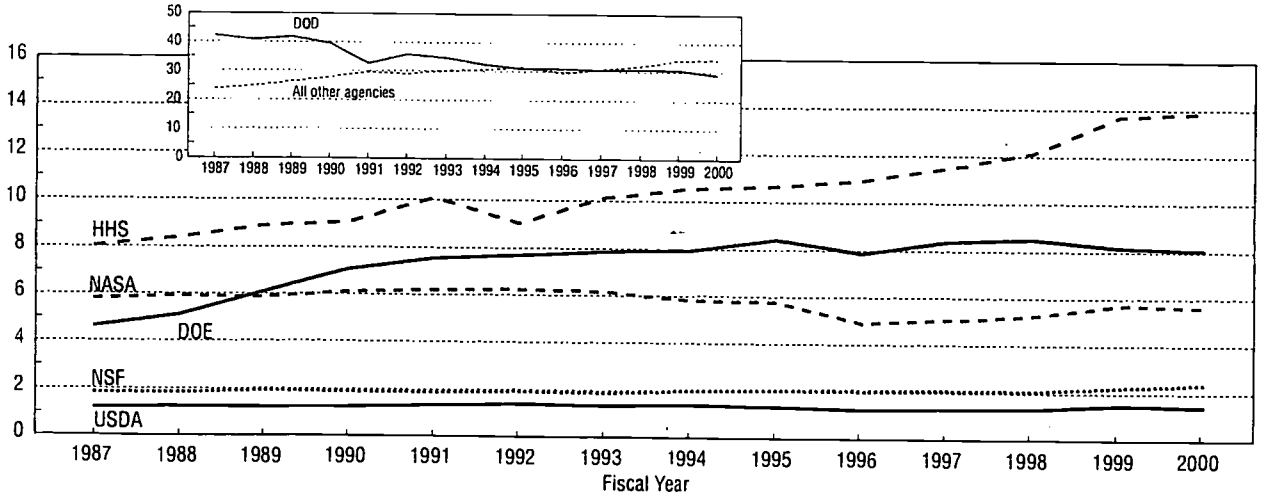
KEY: DOD = Department of Defense; DOE = Department of Energy; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; NSF = National Science Foundation.

NOTE: R&D plant (not shown in table) was estimated at $2.1 billion in FY 2000.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Federal Funds for Research and Development: Fiscal Years 1998, 1999, and 2000,* NSF 00-317 (Arlington, VA, 2000); and Office of Management and Budget, unpublished tabulations.

Figure 6. Federal R&D obligations, by selected agency

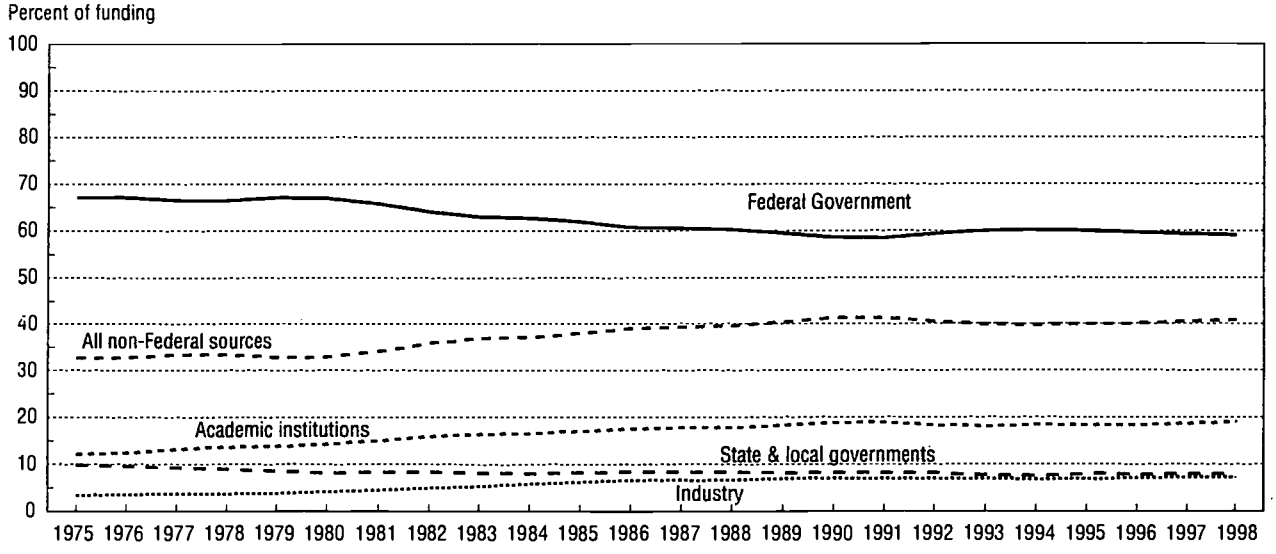
Billions of constant 1992 dollars



KEY: DOD = Department of Defense; HHS = Department of Health and Human Services; NASA = National Aeronautics and Space Administration; DOE = Department of Energy; NSF = National Science Foundation; USDA = U.S. Department of Agriculture.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Federal Funds for Research and Development: Fiscal Years 1998, 1999, and 2000*, NSF 00-317 (Arlington, VA, 2000); and Office of Management and Budget, unpublished tabulations.

Figure 7. Sources of academic R&D funding, by sector

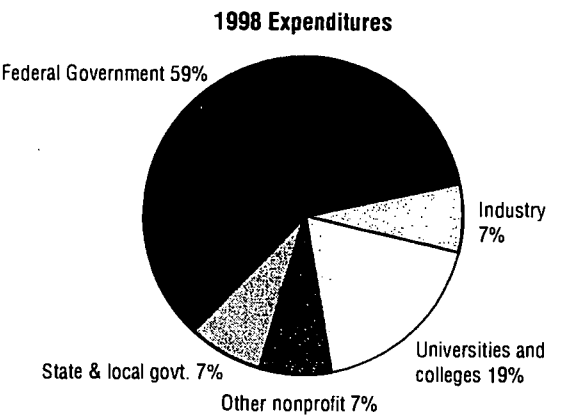


SOURCES: National Science Foundation, Division of Science Resources Studies, *Academic Research and Development Expenditures: Fiscal Year 1997*, NSF 99-336 (Arlington, VA, 1999); and annual series.

Figure 8. Academic R&D expenditures, by source of funds

(Millions of current dollars)

Year	Total	Federal Govt.	State & local govt.	Industry	U&C	Other nonprofit institutions
1985	9,687	6,064	752	560	1,617	694
1986	10,928	6,712	915	700	1,869	732
1987	12,153	7,343	1,023	790	2,168	828
1988	13,463	8,193	1,106	872	2,356	935
1989	14,977	8,991	1,224	994	2,698	1,071
1990	16,286	9,638	1,324	1,127	3,006	1,191
1991	17,585	10,234	1,474	1,204	3,367	1,307
1992	18,818	11,092	1,491	1,279	3,547	1,409
1993	19,951	11,956	1,559	1,360	3,589	1,486
1994	20,966	12,618	1,544	1,415	3,818	1,571
1995	22,098	13,297	1,676	1,481	4,035	1,609
1996	22,962	13,802	1,795	1,596	4,155	1,614
1997	24,188	14,420	1,883	1,700	4,495	1,690
1998	25,735	15,077	1,928	1,870	4,999	1,861



U&C = Universities and colleges

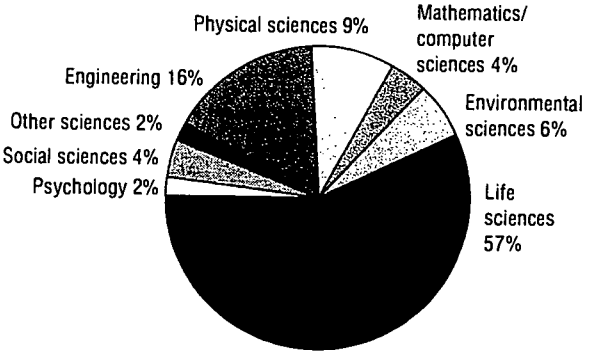
NOTE: Details may not add to totals because of rounding.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Academic Research and Development Expenditures: Fiscal Year 1997*, NSF 99-336 (Arlington, VA: 1999); and *Academic Research and Development Expenditures: Fiscal Year 1998 [Early Release Tables]*.

Figure 9. Academic R&D expenditures, by field

(Millions of current dollars)

Field	1990	1992	1994	1996	1997	1998
Total	16,286	18,818	20,966	22,962	24,188	25,735
Physical sciences	1,807	2,055	2,160	2,235	2,347	2,440
Mathematics	222	248	280	286	287	308
Computer sciences	515	555	645	688	708	754
Environmental sci.	1,069	1,242	1,391	1,482	1,523	1,615
Life sciences	8,725	10,196	11,447	12,688	13,498	14,547
Psychology	253	329	356	376	389	437
Social sciences	703	815	950	1,090	1,101	1,121
Other sciences	336	315	388	417	504	460
Engineering	2,656	3,062	3,349	3,699	3,831	4,054

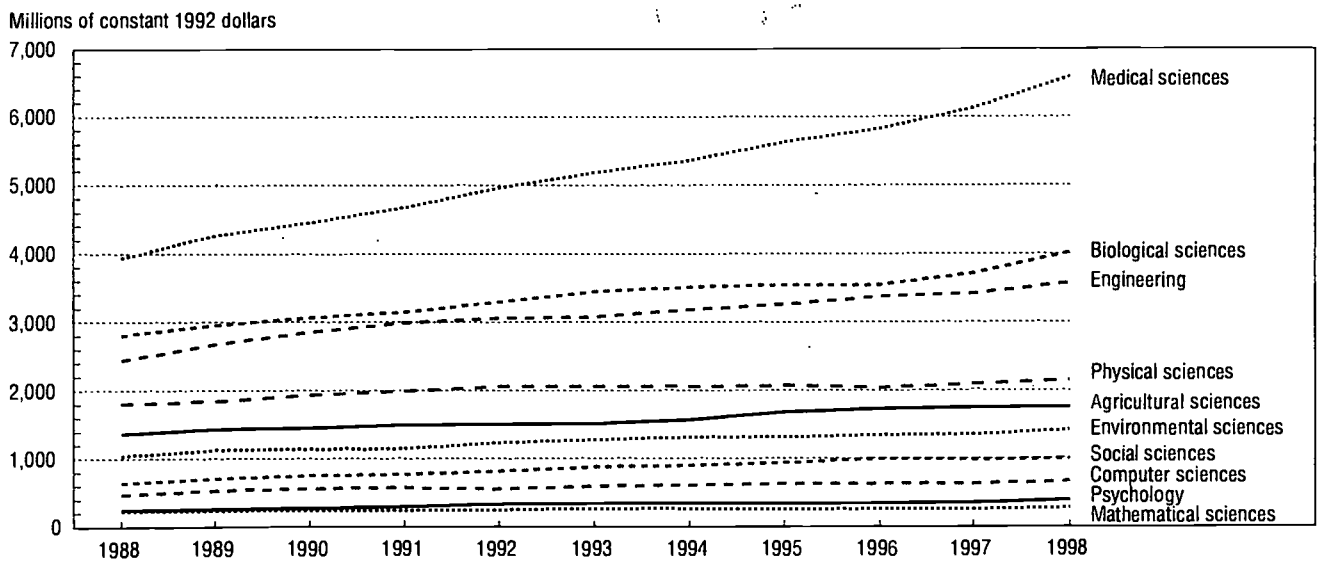


1998

NOTES: Details may not add to totals because of rounding. Life sciences includes medical, biological and agricultural sciences.

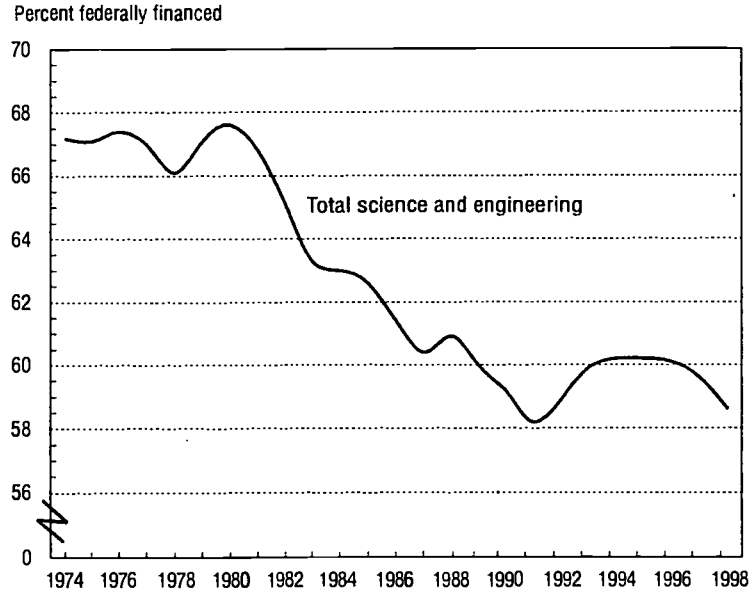
SOURCES: National Science Foundation, Division of Science Resources Studies, *Academic Research and Development Expenditures: Fiscal Year 1997*, NSF 99-336 (Arlington, VA: 1999); and *Academic Research and Development Expenditures: Fiscal Year 1998 [Early Release Tables]*

Figure 10. Academic R&D expenditures, by selected field



SOURCES: National Science Foundation, Division of Science Resources Studies, *Academic Research and Development Expenditures: Fiscal Year 1997*, NSF 99-336 (Arlington, VA: 1999); and *Academic Research and Development Expenditures: Fiscal Year 1998 [Early Release Tables]*.

Figure 11. Percent of academic R&D which is federally financed, by field



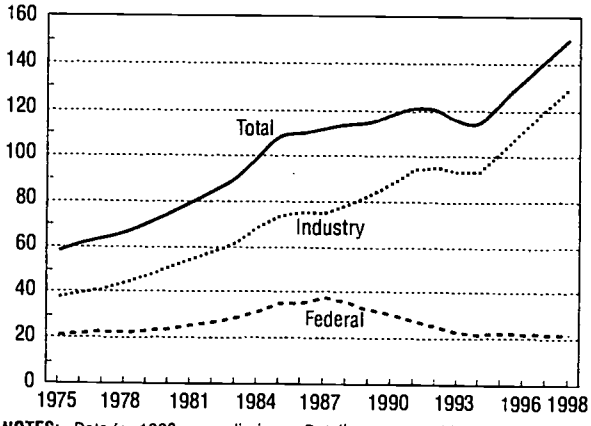
(Percent federally financed)

Field	1980	1990	1995	1998
Total science & engineering	67.6	59.2	60.2	58.6
Total sciences	67.4	59.5	60.2	58.7
Physical sciences	81.9	72.8	72.7	71.1
Mathematical sciences	78.4	72.6	73.5	69.0
Computer sciences	70.4	66.5	70.9	68.6
Environmental sciences	73.1	63.7	67.1	66.1
Life sciences	64.9	58.3	58.4	57.1
Psychology	73.3	64.8	67.6	68.0
Social sciences	53.8	32.2	38.1	37.3
Other sciences	53.6	41.1	44.9	38.8
Engineering	68.6	57.4	59.9	58.0

SOURCES: National Science Foundation, Division of Science Resources Studies, *Academic Research and Development Expenditures: Fiscal Year 1997*, NSF 99-336 (Arlington, VA: 1999); and *Academic Research and Development Expenditures: Fiscal Year 1998 [Early Release Tables]*.

Figure 12. Industrial R&D performance, by source of funds and character of work

Billions of constant 1992 dollars



NOTES: Data for 1998 are preliminary. Details may not add to totals because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Studies, *Research and Development in Industry 1997*, NSF 99-312 (Arlington, VA, 1999); *Academic Research and Development Expenditures, Fiscal Year 1997*, NSF 99-336 (Arlington, VA, 1999); *Federal Funds for Research and Development: Fiscal Years 1997, 1998, and 1999*, NSF 99-333 (Arlington, VA, 1999).

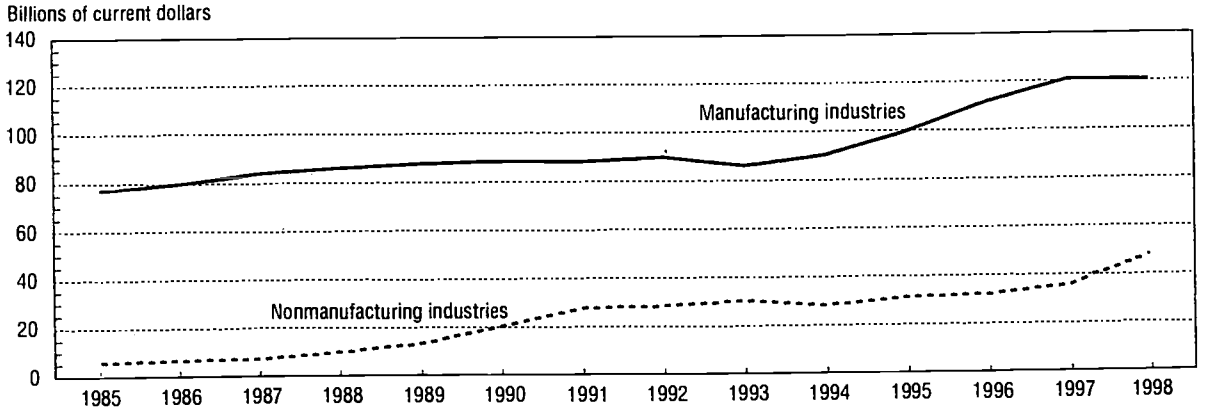
Source of funds (Millions of current dollars)

Source	1970	1980	1990	1995	1996	1997	1998 (prelim.)
Total	17,594	43,228	109,727	132,103	144,667	157,539	169,180
Industry	10,288	30,476	81,602	108,652	121,015	133,611	145,016
Federal	7,306	12,752	28,125	23,451	23,653	23,928	24,164

Character of work (Millions of current dollars)

Year	Total R&D	Basic research	Applied research	Development
1985	84,239	2,862	18,255	63,122
1986	87,823	4,047	19,759	64,017
1987	92,155	4,324	19,813	68,018
1988	97,015	4,500	20,748	71,767
1989	102,055	5,216	22,691	74,148
1990	109,727	5,128	24,785	79,814
1991	116,952	7,837	27,446	81,669
1992	119,110	7,002	26,168	85,940
1993	117,400	6,919	24,686	85,796
1994	119,595	7,017	23,490	89,088
1995	132,103	6,099	27,454	98,552
1996	144,667	8,207	29,241	107,218
1997	157,539	10,419	32,642	114,478
1998	169,180	13,595	30,572	125,013

Figure 13. Industrial R&D performance, by sector

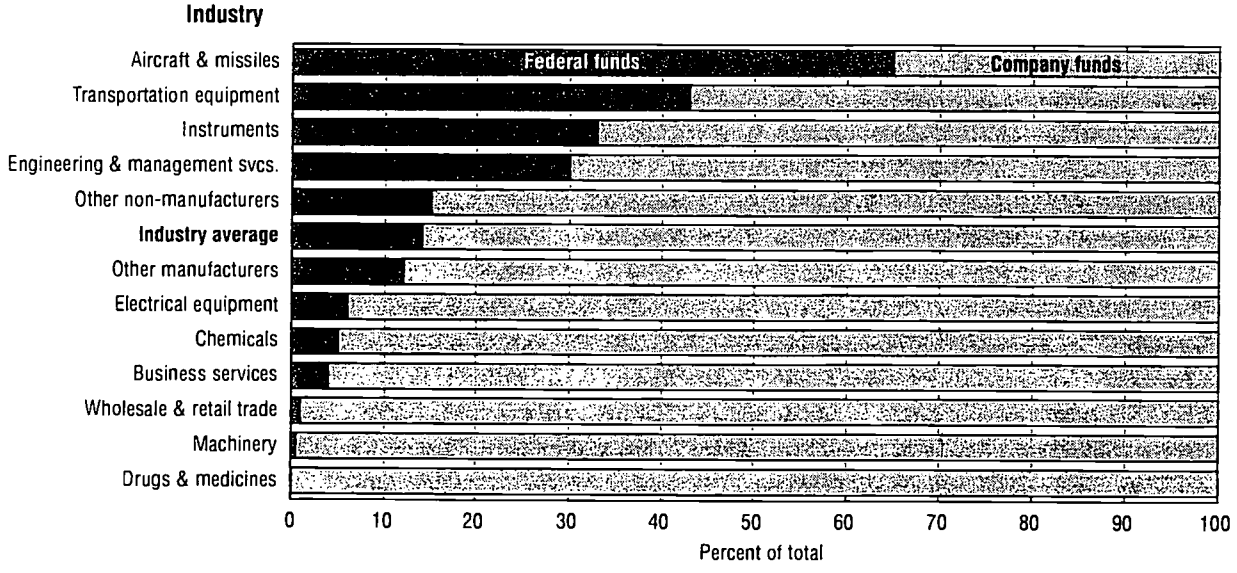


(Millions of current dollars)

Sector	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Manufacturing industries	77,525	80,377	84,311	86,503	88,024	88,934	88,506	90,177	86,569	90,749	100,067	111,864	121,025	120,401
Nonmanufacturing industries	6,714	7,446	7,844	10,513	14,031	20,793	28,446	28,933	30,831	28,846	32,036	32,803	36,514	48,780

SOURCES: National Science Foundation, Division of Science Resources Studies, *Research and Development in Industry: 1997*, NSF 99-358 (Arlington, VA, 1999); and *Research and Development in Industry: 1998 [Early Release Tables]*.

Figure 14. Share of industrial R&D funding, by source and industry: 1998

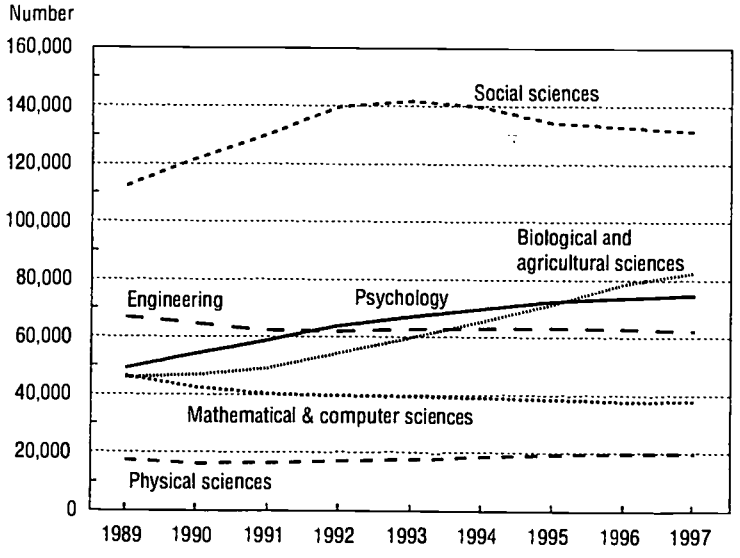


NOTE: Company-funded R&D includes funds for industrial R&D performed within company facilities from all sources except the Federal government.

SOURCE: National Science Foundation, Division of Science Resources Studies, *Research and Development in Industry: 1998 [Early Release Tables].*

Education of Scientists and Engineers

Figure 15. Bachelor's degrees awarded in major science and engineering fields

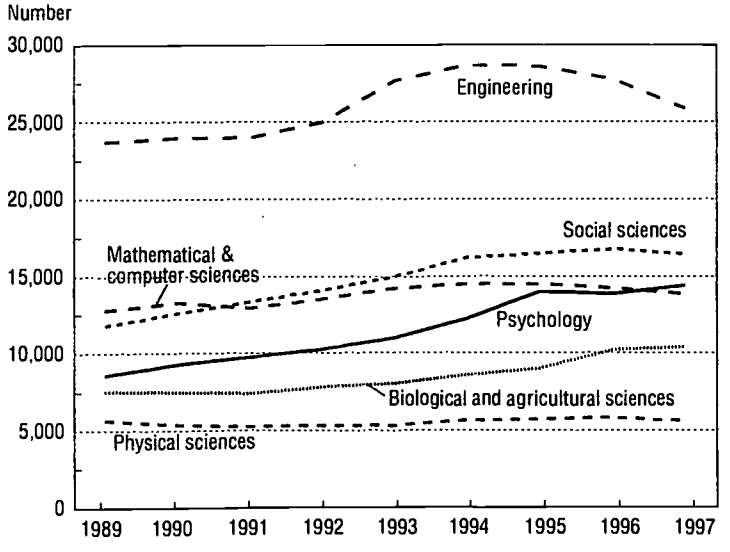


Field	1989	1997
All fields (S&E and non-S&E)	1,030,171	1,186,589
Science and engineering, total	337,431	408,749
Physical sciences	17,329	19,730
Mathematical and computer sciences	46,277	37,844
Biological and agricultural sciences	45,744	82,727
Psychology	48,954	74,734
Social sciences	112,180	131,408
Engineering	66,947	62,306
Non-science and engineering, total	692,740	777,840

NOTE: Physical sciences include earth, atmospheric, and oceanographic sciences, as well as physics, astronomy, and chemistry.

SOURCES: U.S. Department of Education, National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey; tabulations by National Science Foundation, Division of Science Resources Studies.

Figure 16. Master's degrees awarded in major science and engineering fields

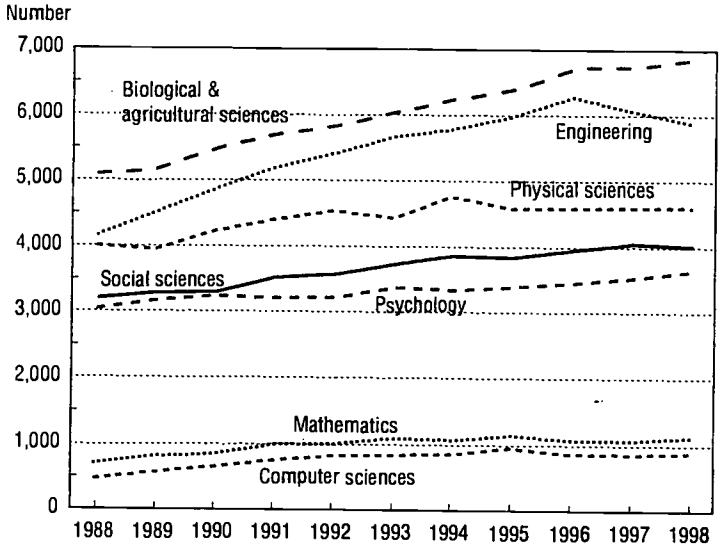


Field	1989	1997
All fields (S&E and non-S&E)	311,050	420,954
Science and engineering, total	70,333	86,697
Physical sciences	5,708	5,579
Mathematical and computer sciences	12,829	13,897
Biological and agricultural sciences	7,557	10,443
Psychology	8,652	14,442
Social sciences	11,857	16,466
Engineering	23,735	25,870
Non-science and engineering, total	240,717	334,257

NOTE: Physical sciences include earth, atmospheric, and oceanographic sciences, as well as physics, astronomy, and chemistry.

SOURCES: U.S. Department of Education, National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey; tabulations by National Science Foundation, Division of Science Resources Studies.

Figure 17. Doctorates awarded in major science and engineering fields



Field	1988	1998
All fields (S&E and non-S&E)	33,500	42,683
Science and engineering, total	20,932	27,272
Physical sciences	4,045	4,639
Mathematics	749	1,177
Computer sciences	515	923
Biological and agricultural sciences	5,126	6,883
Psychology	3,074	3,681
Social sciences	3,236	4,050
Engineering	4,187	5,919
Non-science and engineering, total	12,568	15,411

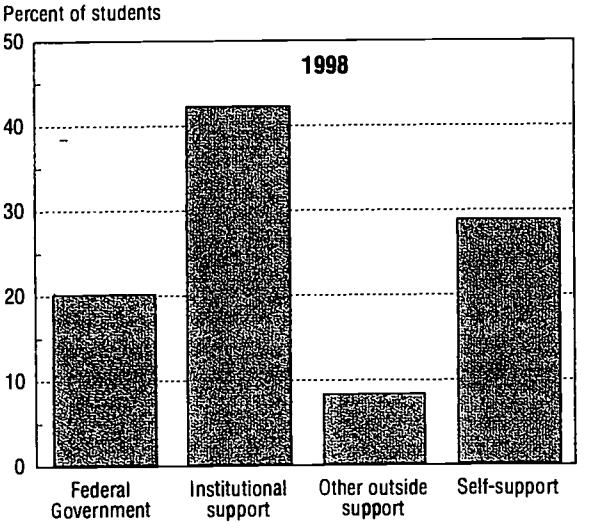
NOTE: Physical science includes earth, atmospheric, and oceanographic sciences, as well as physics, astronomy and chemistry.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Earned Doctorates.

Figure 18. Full-time science/engineering graduate students in all institutions, by source of primary support

(Number of students)

Source of primary support	1990	1993	1995	1997	1998
Total	265,399	294,030	287,223	280,708	279,517
Federal Government	52,501	60,393	59,408	56,840	56,148
Institutional support	115,864	120,899	120,417	119,267	118,815
Other outside support	24,765	24,971	23,926	23,081	24,169
Self-support	72,269	87,767	83,502	81,520	80,385

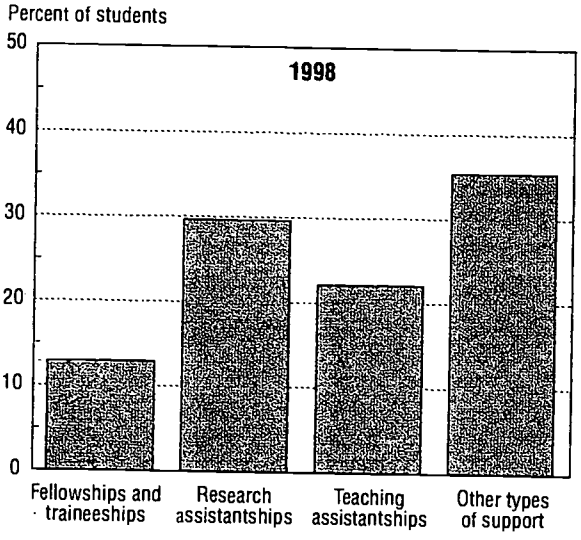


SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Graduate Students and Postdoctorates in Science and Engineering.

Figure 19. Full-time science/engineering graduate students in all institutions, by type of primary support

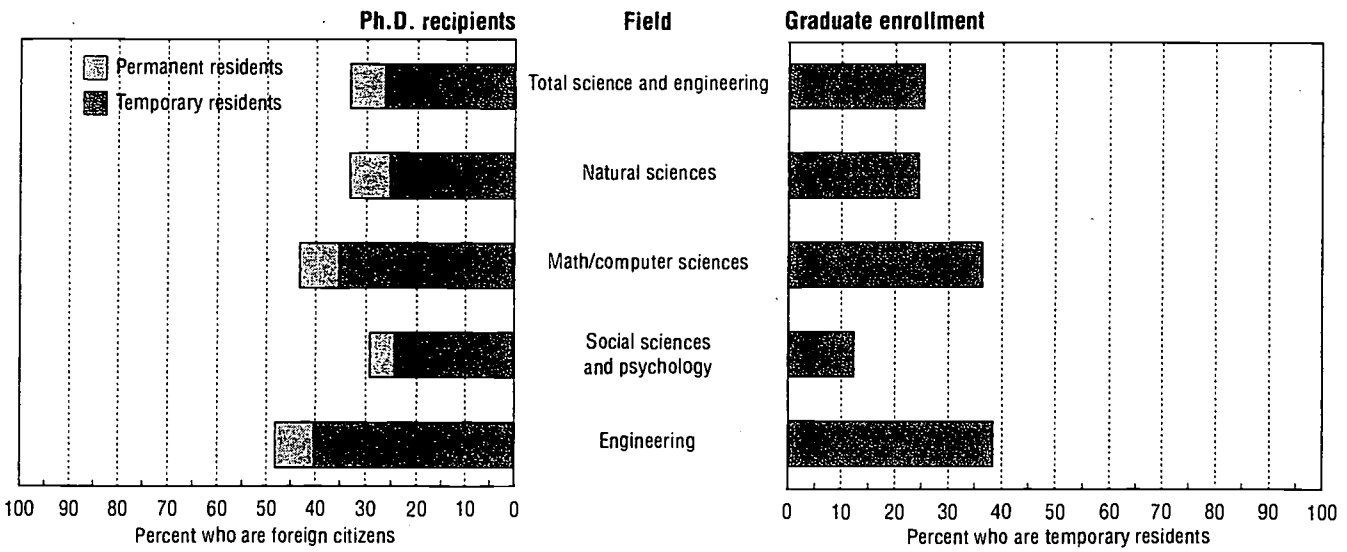
(Number of students)

Type of primary support	1990	1993	1995	1997	1998
Total	265,399	294,030	287,253	280,708	279,517
Fellowships and traineeships	33,586	37,438	37,251	36,134	36,392
Research assistantships	77,342	86,202	85,347	83,143	83,183
Teaching assistantships	62,597	64,792	63,164	62,309	62,127
Other types of support	91,874	105,598	101,491	99,122	97,815



SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Graduate Students and Postdoctorates in Science and Engineering.

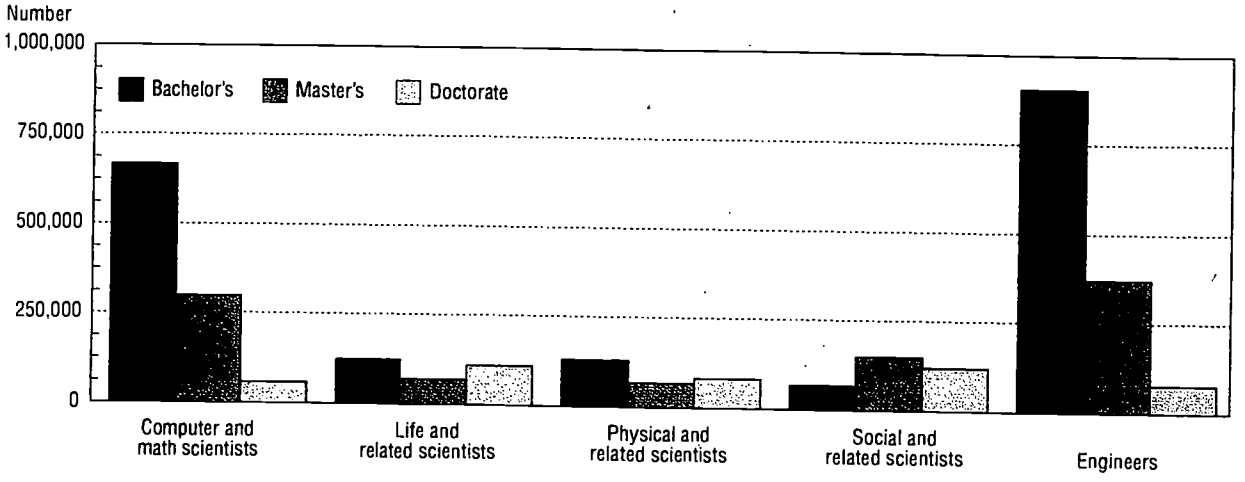
Figure 20. **Foreign citizen representation in 1998 U.S. science and engineering graduate education**



NOTES: Natural sciences here include physical, earth, atmospheric, oceanographic, biological, and agricultural sciences. Social sciences here include psychology, sociology, and other social sciences. Graduate student percentages are based on temporary residents only.

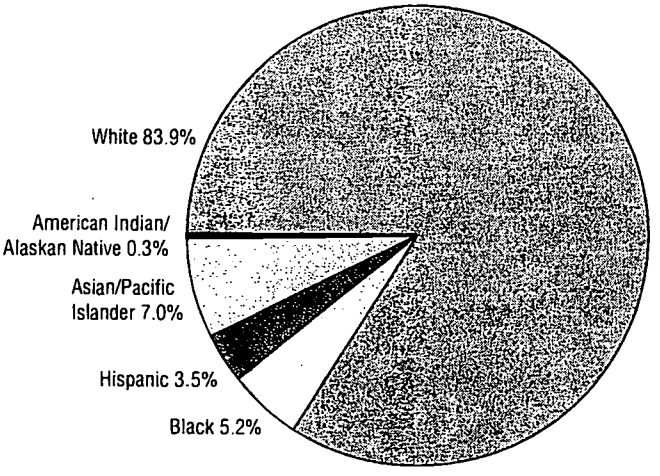
SOURCES: U.S. Department of Education, National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey. National Science Foundation, Division of Science Resources Studies, Survey of Graduate Students and Postdoctorates in Science and Engineering

Figure 21. Employed scientists and engineers by broad occupation and highest degree: 1997



SOURCES: National Science Foundation, Division of Science Resources Studies, 1997 Scientists and Engineers Statistical Data System (SESTAT) integrated database.

Figure 22. **Distribution of employed scientists and engineers by race/ethnicity: 1997**



SOURCE: National Science Foundation, Division of Science Resources Studies, 1997 Scientists and Engineers Statistical Data System (SESTAT) integrated database.

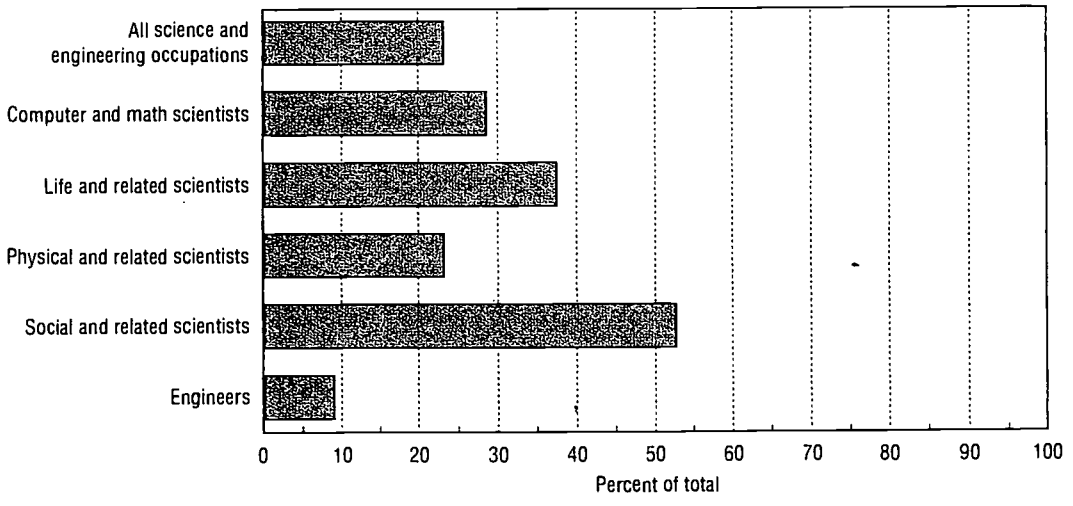
Figure 23. Scientists, engineers, and technicians (SETs) in services industries: 1997

Industry	Scientists	Engineers	Technicians	Total SETs
Total	**80,100**	**162,600**	**278,600**	**521,300**
Transportation	9,000	9,900	13,200	32,100
Communication	21,200	41,600	79,400	142,200
Electric, gas, and sanitary services	10,600	35,300	43,100	89,000
Wholesale trade—durable and nondurable goods	28,600	67,200	125,400	221,200
Retail	10,700	8,600	17,500	36,800

NOTE: The term "services industries" as used here denotes establishments engaged in wholesale and retail trade, transportation, communications, and utilities. Excluded are educational services, state and local government, and other industries traditionally thought of as "services" industries – such as financial, insurance, real estate, and legal services; entertainment; health services; social services; and hotels and other lodging places.

SOURCE: U.S. Bureau of Labor Statistics, Occupational Employment Statistics Survey.

Figure 24. **Proportion of women in the science and engineering workforce by broad occupation: 1997**



SOURCE: National Science Foundation, Division of Science Resources Studies, 1997 Scientists and Engineers Statistical Data System (SESTAT) integrated database.

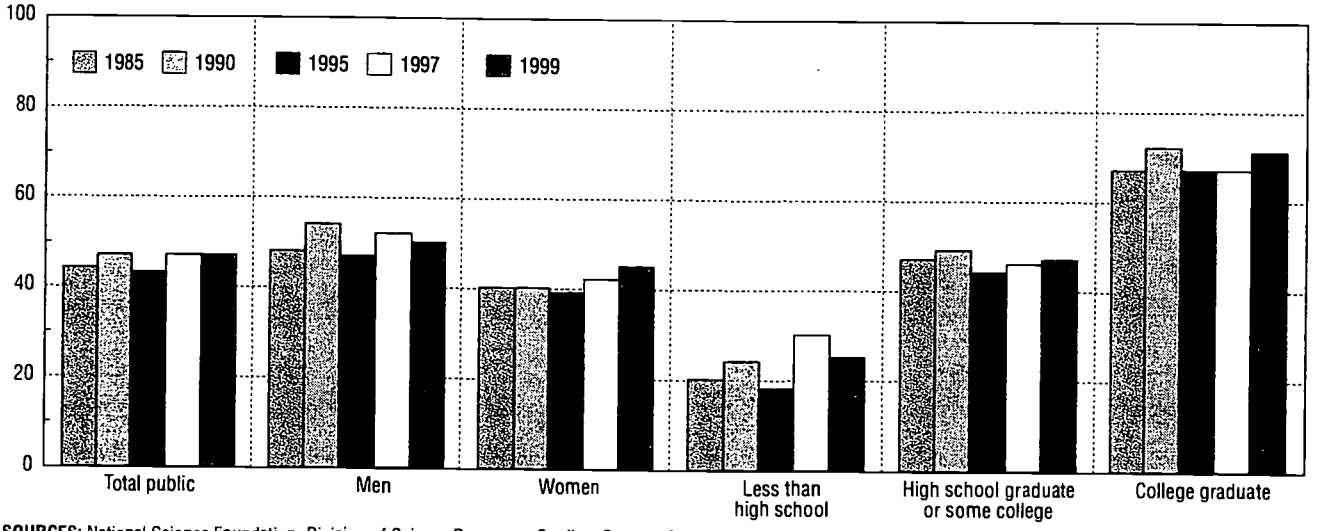
Figure 25. Proportion of minorities in the U.S. doctoral science and engineering labor force, by field of doctorate: 1997

Doctorate field	Black	Asian/Pacific Islander	Hispanic	American Indian/ Alaskan Native
Total science and engineering	2.3	13.3	2.3	0.3
Sciences	2.5	10.1	2.3	0.4
Mathematics	1.6	15.8	2.1	0.1
Computer sciences	1.5	29.0	2.4	0.1
Physical sciences	1.4	14.3	2.1	0.3
Life sciences	2.2	11.0	2.1	0.3
Social sciences	3.7	4.5	2.8	0.6
Engineering	1.4	28.8	1.9	0.1
Chemical engineering	1.1	26.8	1.6	0.0
Civil engineering	2.7	28.7	2.7	0.1
Electrical engineering	1.4	30.8	2.2	0.2
Industrial engineering	2.2	27.7	1.4	0.8

SOURCE: National Science Foundation; Division of Science Resources Studies, 1997 Survey of Doctorate Recipients.

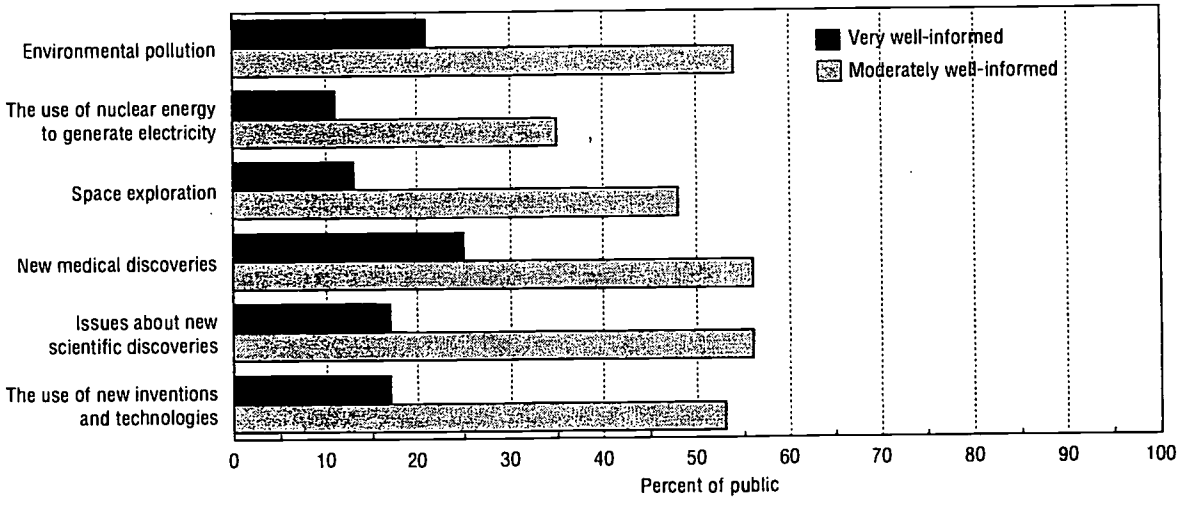
Figure 26. Assessment of scientific research

Percentage saying that the benefits of scientific research strongly outweigh the harmful results



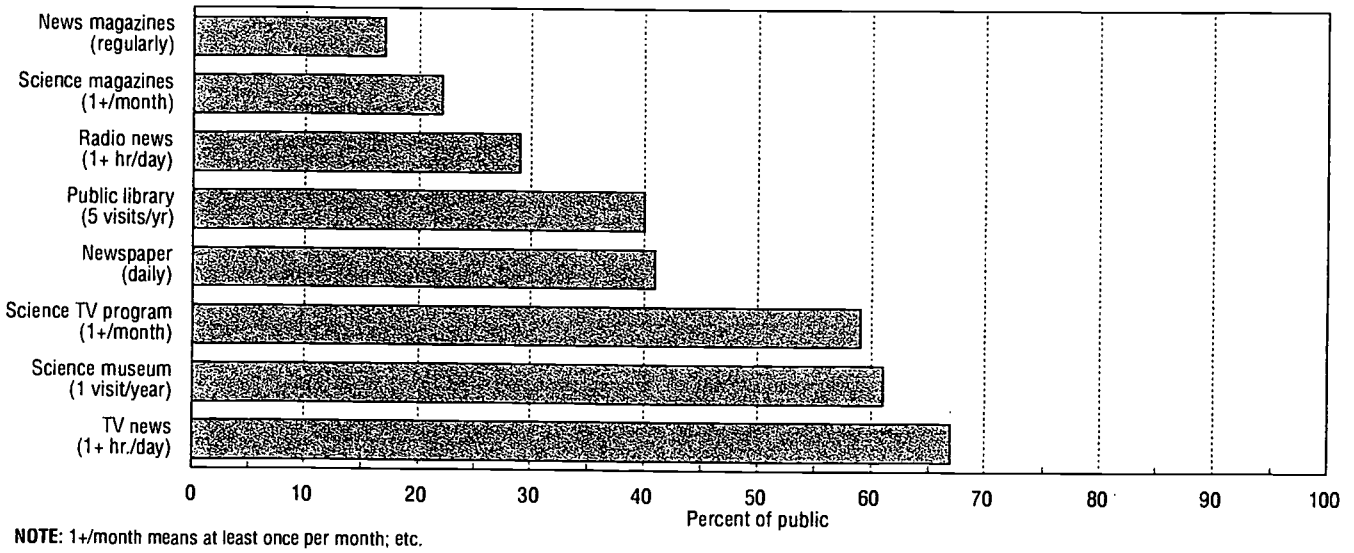
SOURCES: National Science Foundation, Division of Science Resources Studies, Survey of Public Attitudes Toward and Understanding of Science and Technology, 1999 (and earlier years). J.D. Miller and L. Kimmel, *Public Attitudes Toward Science and Technology, 1979-1999, Integrated Codebook* (Chicago: International Center for the Advancement of Scientific Literacy, Chicago Academy of Sciences, 1999); and unpublished tabulations.

Figure 27. **Percentage of the public who feel well informed about selected science-related issues: 1999**



SOURCES: National Science Foundation, Division of Science Resources Studies, Survey of Public Attitudes Toward and Understanding of Science and Technology, 1999. J.D. Miller and L. Kimmel, *Public Attitudes Toward Science and Technology, 1979-1999, Integrated Codebook* (Chicago: International Center for the Advancement of Scientific Literacy, Chicago Academy of Sciences, 1999); and unpublished tabulations.

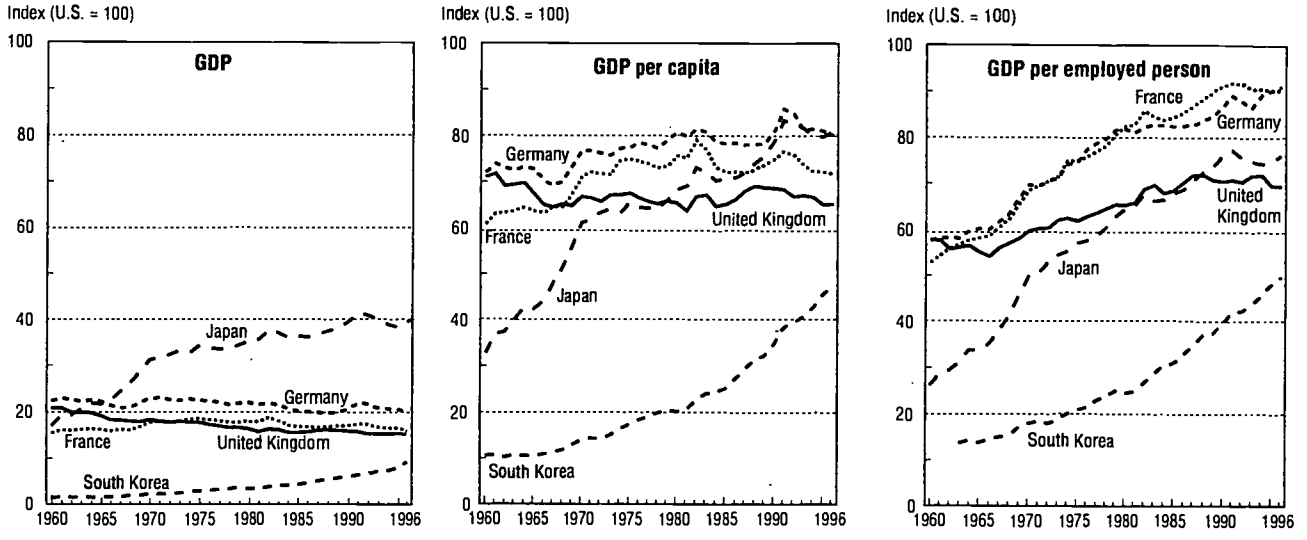
Figure 28. Public use of selected information sources: 1999



NOTE: 1+/month means at least once per month; etc.

SOURCES: National Science Foundation, Division of Science Resources Studies, Survey of Public Attitudes Toward and Understanding of Science and Technology, 1999. J.D. Miller and L. Kimmel, *Public Attitudes Toward Science and Technology, 1979-1999, Integrated Codebook* (Chicago: International Center for the Advancement of Scientific Literacy, Chicago Academy of Sciences, 1999); and unpublished tabulations.

Figure 29. International economic comparisons



NOTES: Country gross domestic products were determined with 1993 purchasing power parities using the Elteto-Koves-Szulc (EKS) aggregation method, which is the method used by the Organisation for Economic Co-operation and Development (OECD) and EUROSTAT in their official statistics. German data are for the former West Germany only.

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, Office of Productivity and Technology, *Comparative Real Gross Domestic Product Per Capita and Per Employed Person, Fourteen Countries, 1960–1996* (Washington, DC: February 1998).

Figure 30. National expenditures on R&D, for selected countries

(Billions of constant 1992 dollars)[a]

Year	United States	Japan[b]	Germany[c]	France	United Kingdom
1981	109.5	NA	23.4	16.6	17.3
1982	115.2	36.9	24.2	17.7	17.1
1983	123.1	40.0	24.7	18.3	16.9
1984	134.8	43.5	25.5	19.5	17.6
1985	146.1	48.3	28.3	20.3	18.4
1986	149.3	49.0	29.1	20.6	19.3
1987	152.0	52.5	31.3	21.5	19.7
1988	155.5	56.6	32.4	22.5	20.3
1989	158.2	62.0	33.7	23.9	20.9
1990	162.4	67.3	34.1	25.4	21.3
1991	165.3	68.8	36.6	25.7	19.6
1992	165.2	69.2	36.8	26.4	20.6
1993	161.2	67.4	35.5	25.8	20.7
1994	160.7	66.4	35.5	25.2	20.7
1995	170.4	73.6	36.6	25.7	20.1
1996	179.4	77.9	36.4	25.4	20.4
1997	189.4	80.9	37.6	25.0	20.3
1998	201.6	NA	38.6	NA	NA

NA = not available.

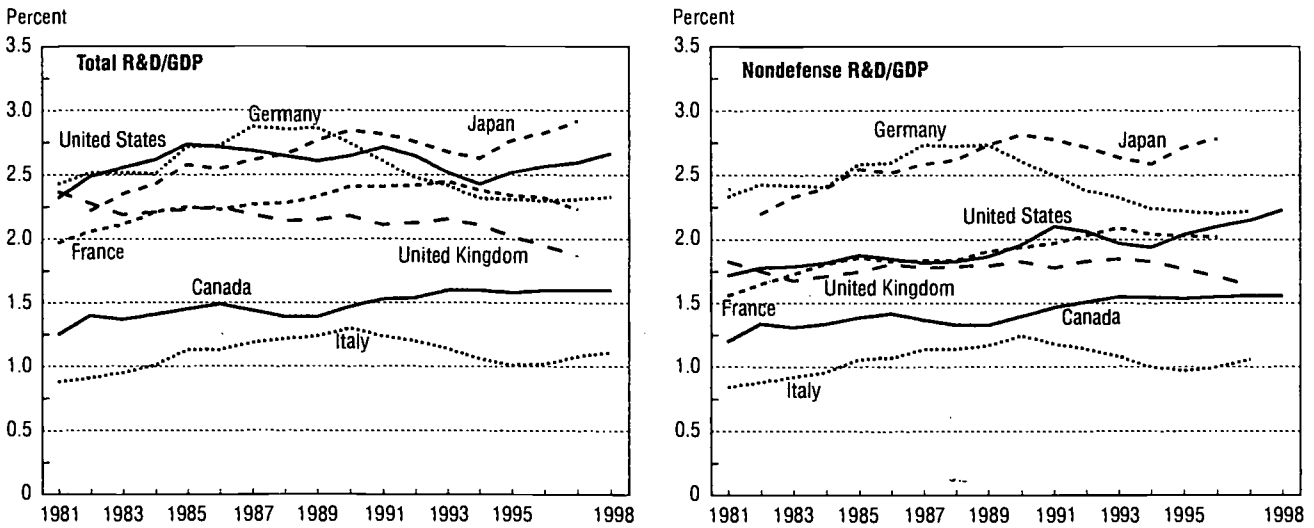
[a]Conversions of foreign currencies to U.S. dollars are calculated with purchasing power parity exchange rates.

[b]Break in Japanese data series in 1996 and later years.

[c]German data before 1991 are for West Germany.

SOURCES: National Science Foundation, Division of Science Resources Studies, *National Patterns of R&D Resources: 1998*, NSF 99-335 (Arlington, VA, 1999); and Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (Paris, 1999).

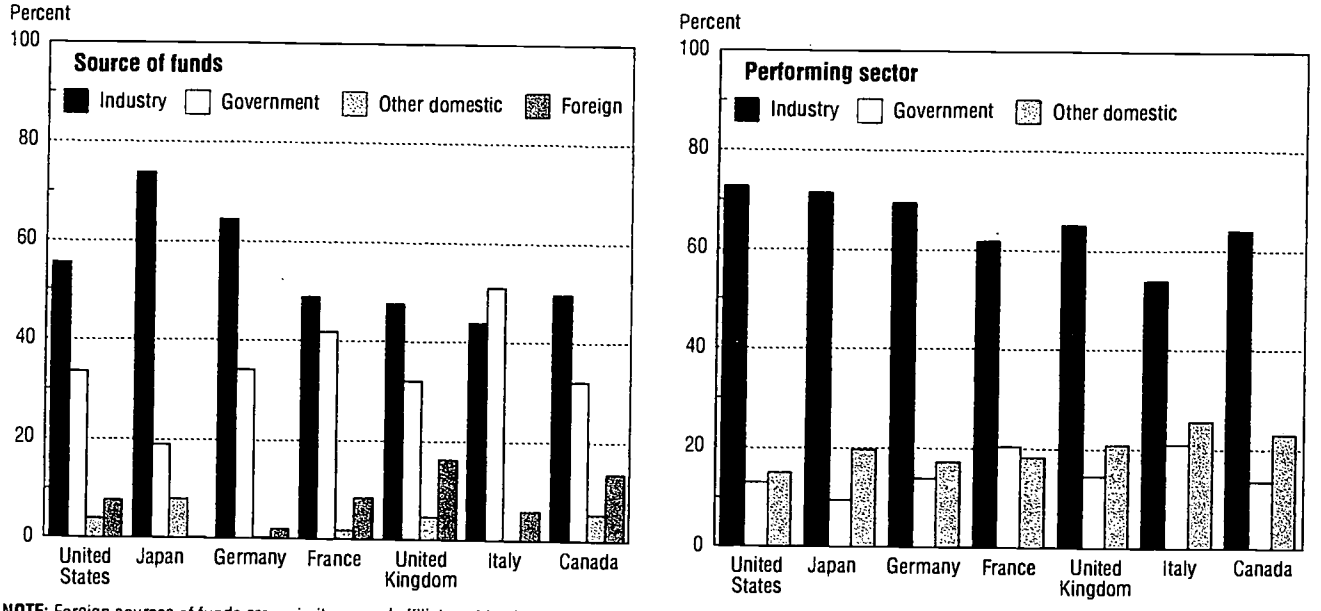
Figure 31. R&D as a percentage of GDP, for G-7 countries



GDP = gross domestic product

SOURCES: National Science Foundation, Division of Science Resources Studies, *National Patterns of R&D Resources: 1998*, NSF 99-335 (Arlington, VA, 1999); and Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (Paris, 1999).

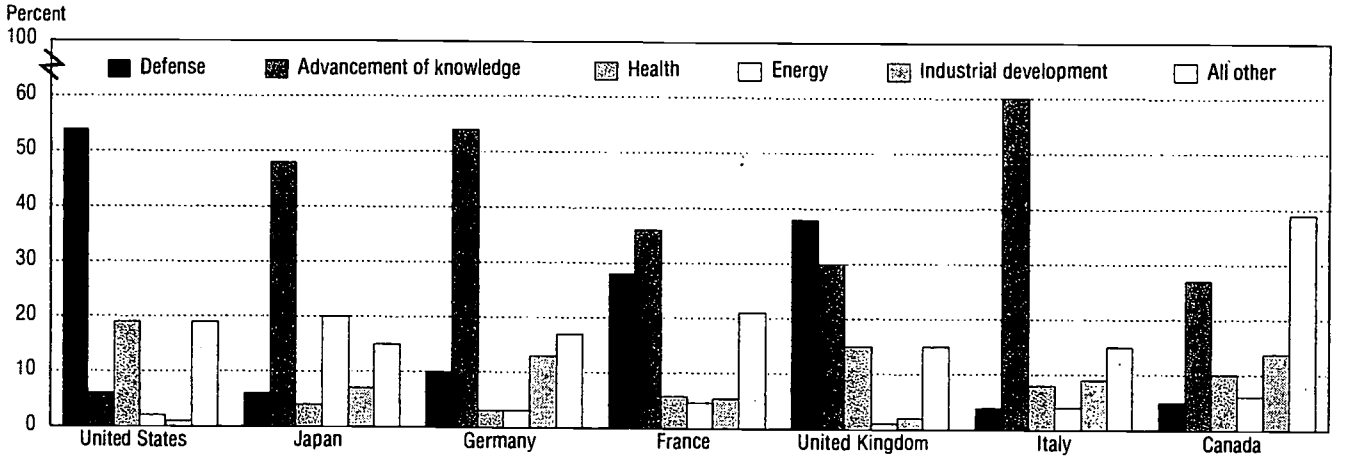
Figure 32. **R&D expenditures by country, source, and performer: 1996–98**



NOTE: Foreign sources of funds are majority-owned affiliates of foreign firms. Foreign performers are included in the "industry" and "other domestic" performing sectors.

SOURCE: Organisation for Economic Co-operation and Development, unpublished tabulations.

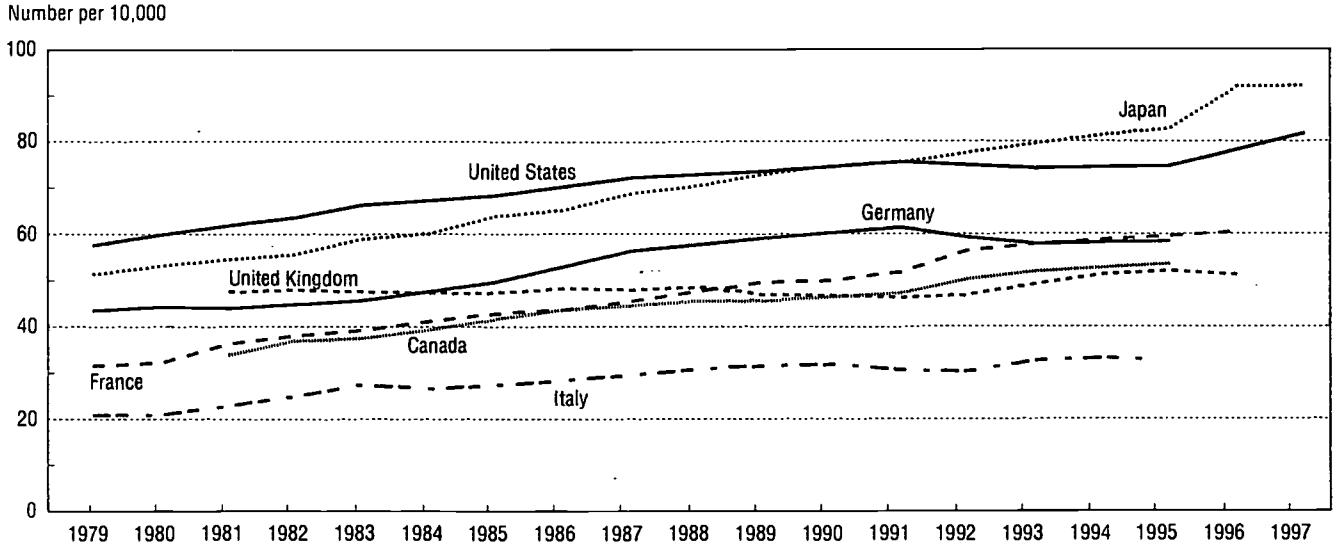
Figure 33. Government R&D support, by country and selected socioeconomic objective: 1997 or 1998



NOTES: Percentages may not add to 100 because of rounding. U.S. data are based on budget authority. Because of general university funds and slight differences in accounting practices, the distribution of government budgets among socioeconomic objectives may not completely reflect the actual distribution of government-funded research in particular fields. Japanese data are based on science and technology budget data, which include items other than R&D. Such items are a small proportion of the budget; therefore, the data may still be used as an approximate indicator of relative government emphasis on R&D by objective.

SOURCES: National Science Foundation, Division of Science Resources Studies, *Federal R&D Funding by Budget Function: Fiscal Years 1997-99* NSF 99-315 (Arlington, VA: December 1998); Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (Paris, 1999).

Figure 34. Number of R&D scientists and engineers per 10,000 workers in the labor force, by country



SOURCES: National Science Foundation, Division of Science Resources Studies, *Science & Engineering Indicators – 2000*, NSB 00-01 (Arlington, VA, 2000); and Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (Paris, 1999).

Figure 35. Scientists and engineers engaged in R&D, by country

(Thousands)

Year	France	Italy	Japan	United Kingdom	United States	Germany
1979	72.9	46.4	291.2	NA	614.5	116.9
1980	74.9	47.0	303.2	NA	651.1	120.7
1981	85.5	52.1	311.0	127.0	683.2	124.7
1982	90.1	56.7	321.0	128.0	711.8	NA
1983	92.7	63.0	347.4	127.0	751.6	130.8
1984	98.2	62.0	357.4	129.0	NA	NA
1985	102.3	63.8	380.3	131.0	801.9	143.6
1986	105.0	67.8	393.0	134.0	NA	NA
1987	109.4	70.6	415.6	134.0	877.8	165.6
1988	115.2	74.8	434.6	137.0	NA	NA
1989	120.4	76.1	457.5	133.0	924.2	176.4
1990	123.9	77.9	477.9	133.0	NA	NA
1991	129.8	75.2	491.1	131.0	960.4	241.9
1992	141.7	74.4	511.4	134.0	NA	234.3
1993	145.9	74.4	526.5	140.0	962.7	229.8
1994	149.2	75.7	541.0	146.0	NA	NA
1995	151.2	75.5	552.0	148.0	987.7	231.1
1996	154.8	76.4	617.3	146.0	NA	NA
1997	NA	NA	625.4	NA	1,114.1	NA

NA = not available

NOTES: Table includes all scientists and engineers (S&Es) engaged in R&D on a full-time equivalent (FTE) basis with the following exceptions: Japanese data include persons primarily employed in R&D in the natural sciences and engineering; and the U.S. data are a mix of S&Es engaged in R&D on an FTE basis and counts of S&Es whose primary work activity is R&D.

As a result of ongoing improvements in methodology and measurement, there are several major breaks in the continuity of the following time series: France (between 1980-81), United Kingdom (between 1984-85), and the United States (between 1983-85).

SOURCES: National Science Foundation, Division of Science Resources Studies, *Science & Engineering Indicators – 2000*, NSB 00-01 (Arlington, VA, 2000); and Organisation for Economic Co-operation and Development, *Main Science and Technology Indicators* (Paris, 1999).

Figure 36. INS permanent visas issued by S&E occupation

(Thousands)

Year	Total, all immigrant S&Es	Engineers	Natural scientists	Mathematical scientists and computer specialists	Social scientists
1988	11.0	8.1	1.2	1.2	0.5
1989	11.8	8.7	1.2	1.5	0.4
1990	12.6	9.3	1.2	1.6	0.5
1991	14.1	10.5	1.3	1.7	0.6
1992	22.9	15.6	2.8	3.4	1.1
1993	23.6	14.5	3.9	4.2	1.0
1994	17.2	10.7	3.1	2.8	0.7
1995	14.1	9.0	2.4	2.1	0.6
1996	19.4	11.6	3.7	3.3	0.8
1997	17.1	10.3	3.5	2.6	0.7
1998	13.5	7.9	2.5	2.5	0.6

SOURCE: U.S. Immigration and Naturalization Service, administrative records.

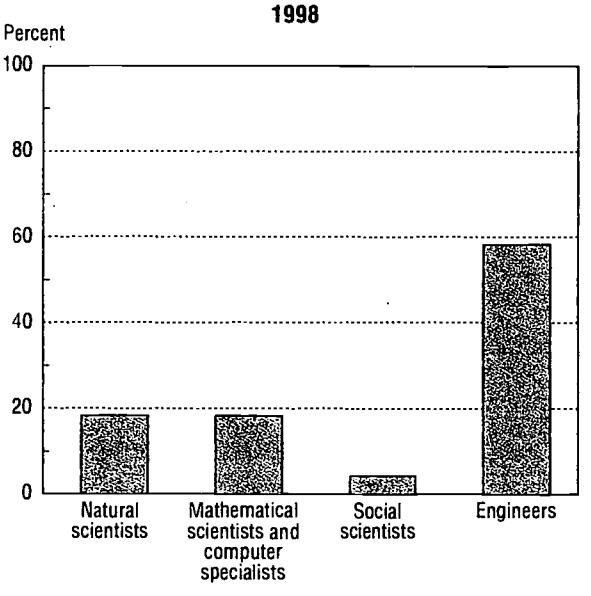
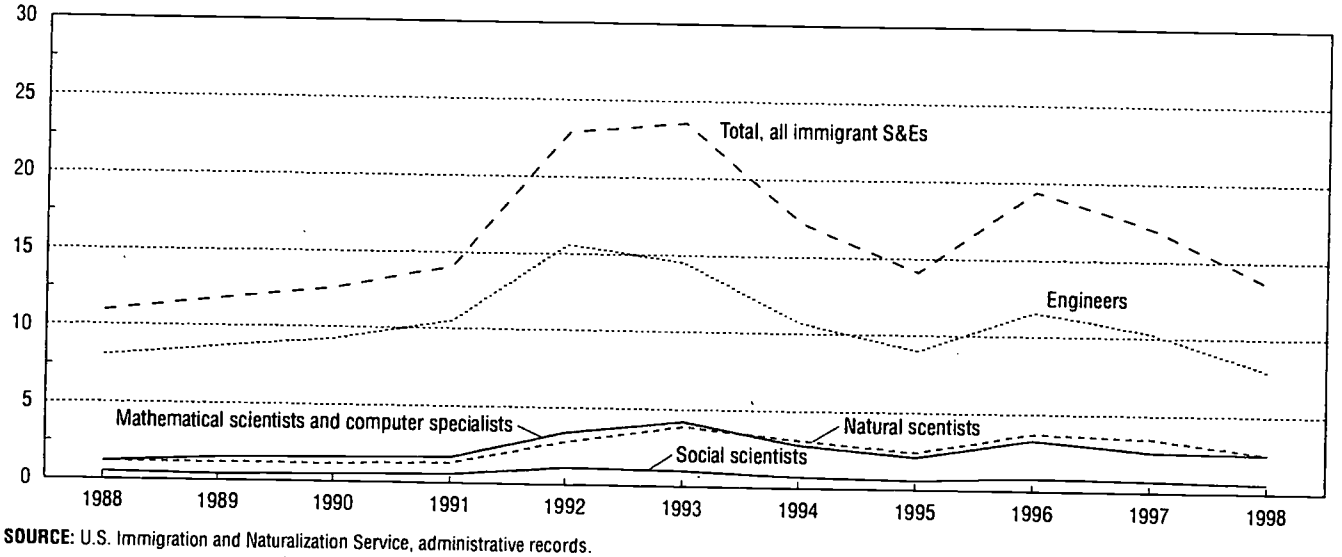


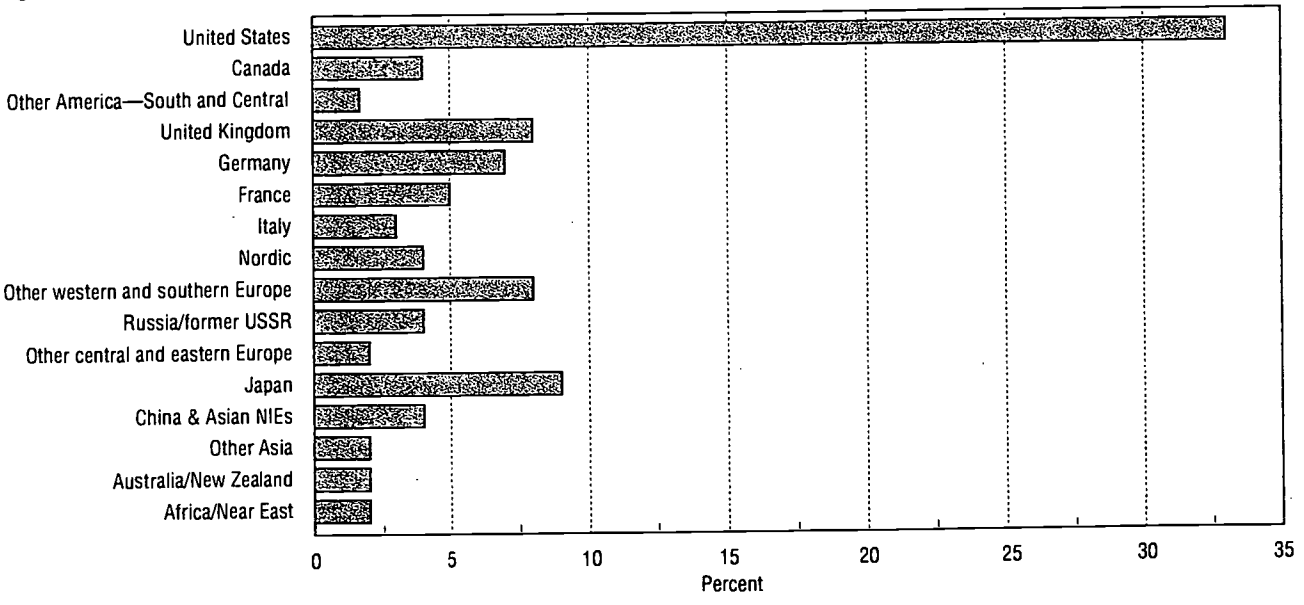
Figure 37. **Immigrant scientists and engineers admitted to the United States on permanent visas, by fiscal year of admission and S&E occupation**

Number, in thousands



SOURCE: U.S. Immigration and Naturalization Service, administrative records.

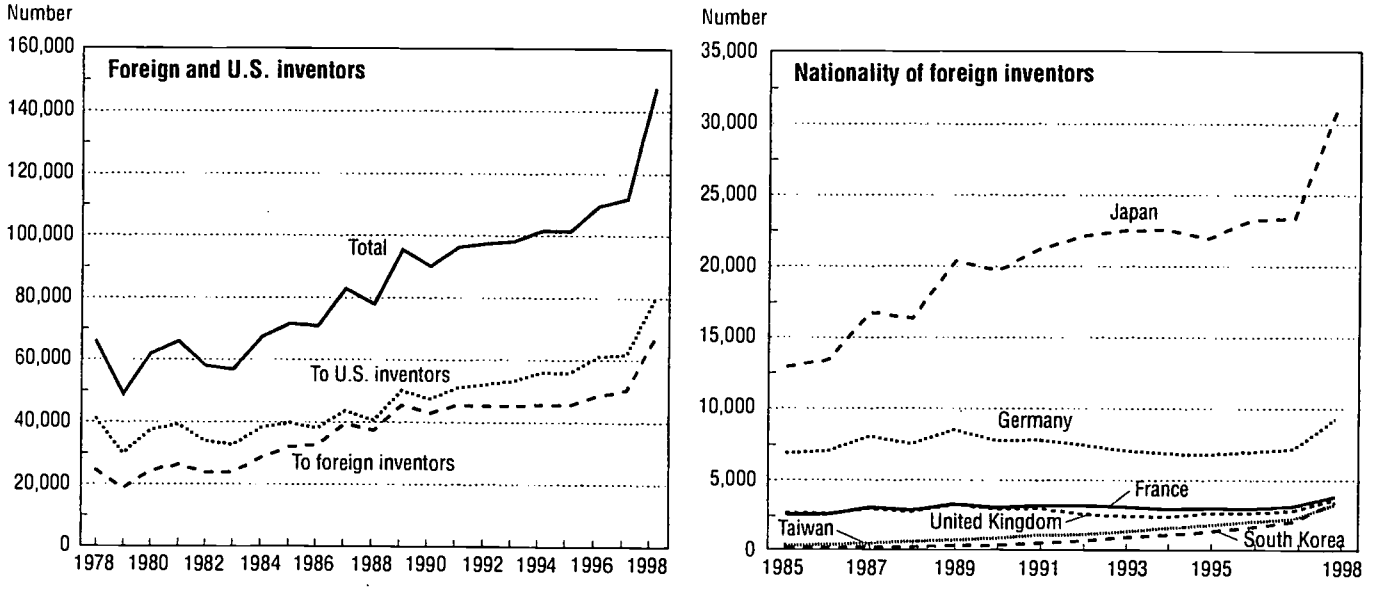
Figure 38. Distribution of the world's scientific and technical articles in major journals, by region/country: 1995–97



NOTE: NIE = newly industrialized economy. Nordic = Sweden, Norway, Denmark, Finland.

SOURCE: Institute for Scientific Information, Science and Social Science Citation Indexes; CHI Research, Inc.

Figure 39. U.S. patents granted, by nationality of inventor

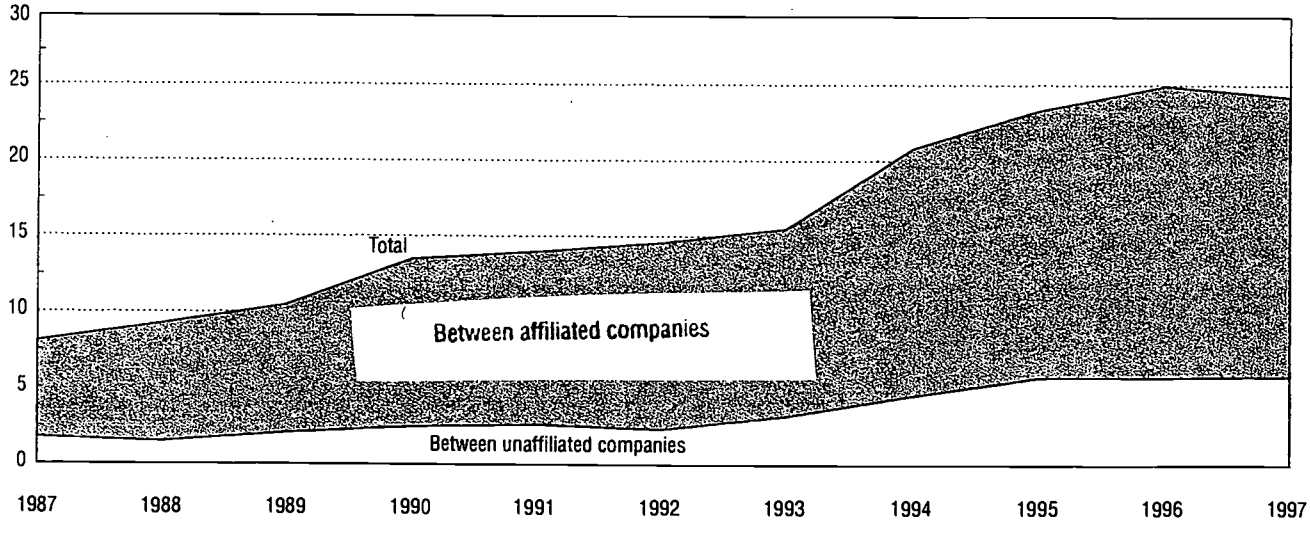


SOURCE: Patent and Trademark Office, *Patenting Trends in the United States, 1963-98* (Washington, DC: September 1999).

53

Figure 40. U.S. trade balance in intellectual property

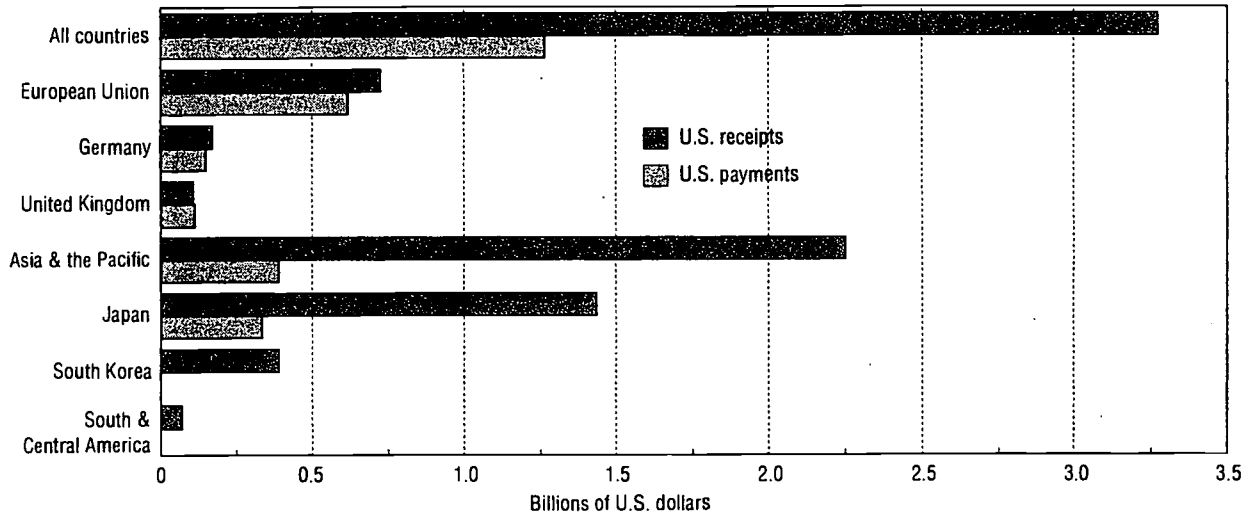
Royalties and fees in billions of U.S. dollars



NOTE: Reflects royalties and fees paid for intellectual property transactions among firms. Affiliated companies are foreign affiliates of U.S. firms.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, Vol. 78, No. 10 (October 1998).

Figure 41. **U.S. receipts and payments generated from the exchange of industrial processes between unaffiliated companies, by selected regions and countries: 1997**



NOTE: Payments by U.S. to South Korea, and to Central and South America are less than 1 million.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business*, Vol. 78, No. 10 (October 1998).

Other SRS Publications

Title	Pub. Type	NSF Pub. No.
Overviews		
Annotated List of Federally Funded Research and Development Centers: March 1999 **(electronic dissemination only)**	Report	99-334
Complex Picture of Computer Use in the Home Emerges	Issue Brief	00-314
Does the Educational Debt Burden of Science and Engineering Doctorates Differ by Race/Ethnicity and Sex?	Issue Brief	99-341
International Patenting Trends in Advanced Materials: Ceramics	Issue Brief	99-350
International Patenting Trends in Biotechnology: Genetic Engineering	Issue Brief	99-352
International Patenting Trends in Manufacturing Technologies: Robots	Issue Brief	99-343
Master Government List of Federally Funded Research and Development Centers, Fiscal Year 2000 **(electronic dissemination only)**	Report	00-305
Master Government List of Federally Funded Research and Development Centers, Fiscal Year 1999 **(electronic dissemination only)**	Report	99-308
National Patterns of R&D Resources: 1999, Data Update **(electronic dissemination only)**	Report	00-306
National Patterns of R&D Resources: 1998	Report	99-335
Science and Engineering Indicators – 2000	Report	NSB 00-1
Science and Engineering Indicators – 1998	Report	NSB 98-01
Science and Technology Pocket Data Book: 1996	Report	96-325

Title	Pub. Type	NSF Pub. No.
Social and Economic Implications of Information Technologies	Brochure	00-313
The Science and Technology Resources of Japan: A Comparison with the United States	Report	97-324
U.S. Inventors Patent Technologies Around the World	Issue Brief	99-329
WebCASPAR	Brochure	99-354
What Is the Federal Role in Supporting Academic Research and Graduate Reseach Assistants?	Issue Brief	99-342
Financial Resources		
Academic R&D Expenditures Survey Brochure	Brochure	99-306
Academic Research and Development Expenditures: Fiscal Year 1997	Tables	99-336
Federal Academic Obligations for Science and Engineering Activities Increased More Than 4 Percent in FY 1997	Data Brief	99-326
Federal Academic Science and Engineering Obligations Up More Than 6 Percent in FY 1998	Data Brief	00-312
Federal Funding Supports Moderate Growth for Basic Research in the 1990's	Data Brief	99-319
Federal Funds for Research and Development: Federal Obligations for Research by Agency and Detailed Field of Science and Engineering: Fiscal Years 1970-99 **(electronic dissemination only)**	Tables	99-345
Federal Funds for Research and Development: Federal Obligations for Research to Universities and Colleges by Agency and Detailed Field of Science and Engineering: Fiscal Years 1973–99 **(electronic dissemination only)**	Tables	99-346
Federal Funds for Research and Development: Fiscal Years 1951–99 **(electronic dissemination only)**	Tables	99-347
Federal Funds for Research and Development: Fiscal Years 1998, 1999 and 2000	Tables	00-317

Title	Pub. Type	NSF Pub. No.
Federal Funds for Research and Development: Fiscal Years 1997, 1998 and 1999	Tables	99-333
Federal R&D Funding by Budget Function: Fiscal Years 1998–2000	Tables	00-303
Federal R&D Funding by Budget Function: Fiscal Years 1997–99	Tables	99-315
Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: Fiscal Year 1998	Tables	00-315
Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions: Fiscal Year 1997	Tables	99-331
Federal Survey Shows Defense Funding of Industry Is Largest Share of Federal R&D in FY 2000	Data Brief	00-309
How Has the Field Mix of Academic R&D Changed?	Issue Brief	99-309
How Has the Field Mix of Federal Research Funding Changed Over the Past Three Decades?	Issue Brief	99-328
Latin America: R&D Spending Jumps in Brazil, Mexico, and Costa Rica	Data Brief	00-316
Preliminary Tables, Federal R&D Funding by Budget Function: Fiscal Years 1997–99	Tables	99-301
President's FY 2000 Budget Includes Reduced R&D Request; Nondefense R&D Funding Catches Up to Defense R&D	Data Brief	99-353
R&D as a Percentage of GDP Continues Upward Climb	Data Brief	99-357
R&D as a Percent of GDP is Highest in Six Years	Data Brief	99-302
Research and Development in Industry: 1995–96	Tables	99-312
Research and Development in Industry: 1997	Tables	99-358
Science and Engineering State Profiles: 1998 Data Update **(electronic dissemination only)**	Tables	99-311
U.S. Corporate R&D: Volume I. Top 500 Firms in R&D by Industry Category	Report	00-301
U.S. Corporate R&D: Volume II. Company Information on Top 500 Firms in R&D	Report	00-302

Title	Pub. Type	NSF Pub. No.
U.S. Industrial R&D Performers Report Increased R&D	Data Brief	00-320
Venture Capital Investment Trends in the United States and Europe	Issue Brief	99-303
What Are the Sources of Funding for Academically Performed R&D?	Issue Brief	99-317
What Is the Level of Federal Science and Engineering Support to Historically Black Colleges and Universities?	Issue Brief	99-356
What Is the State Government Role in the R&D Enterprise?	Issue Brief	99-348
1997 U.S. Industrial R&D Performers	Report	99-355
Human Resources		
Characteristics of Doctoral Scientists and Engineers in the United States: 1997	Tables	00-308
Counting the S&E Workforce – It's Not That Easy	Issue Brief	99-344
Degrees and Occupations in Engineering: How Do They Diverge?	Issue Brief	99-318
Despite Increases, Women and Minorities Still Underrepresented in Undergraduate and Graduate Science and Engineering Education	Data Brief	99-320
Doctoral Scientists and Engineers in the United States: 1995 Profiles	Report	99-305
Doctorate Awards Declining in Some Science and Engineering Fields	Data Brief	99-339
Does the Educational Debt Burden of Science and Engineering Doctorates Differ by Race/Ethnicity and Sex?	Issue Brief	99-341
Graduate Education Reform in Europe, Asia and the Americas and International Mobility of Scientists and Engineers: Proceedings of an NSF Workshop	Report	00-318
Graduate Enrollment in Science and Engineering Continued to Decline in 1998	Data Brief	00-307

Title	Pub. Type	NSF Pub. No.
Graduate Students and Postdoctorates in Science and Engineering: Fall 1998	Tables	00-322
Graduate Students and Postdoctorates in Science and Engineering: Fall 1997 Supplemental Tables **(electronic dissemination only)**	Tables	99-324
Graduate Students and Postdoctorates in Science and Engineering: Fall 1997	Tables	99-325
Have Forms of Primary Financial Support for S&E Graduate Students Changed During the Past Two Decades?	Issue Brief	99-313
Has the Use of Postdocs Changed?	Issue Brief	99-310
Healthy Economy Yields Even Lower Unemployment Rate for Doctoral Scientists and Engineers	Data Brief	99-340
How Large Is the Gap in Salaries of Male and Female Engineers?	Issue Brief	99-352
How Much Does the U.S. Rely on Immigrant Engineers?	Issue Brief	99-327
Human Resources for Science & Technology: The European Region	Report	96-316
Modes of Financial Support in the Graduate Education of Science and Engineering Doctorate Recipients	Report	00-319
Psychology Doctorate Recipients: How Much Financial Debt at Graduation?	Issue Brief	00-321
Retention of the Best Science and Engineering Graduates in Science and Engineering	Report	99-321
Science and Engineering Degrees: 1966–97	Tables	00-310
Science and Engineering Degrees: 1966–96	Tables	99-330
Science and Engineering Degrees by Race/Ethnicity of Recipients: 1989–97	Tables	00-311
Science and Engineering Degrees by Race/Ethnicity of Recipients: 1989–96	Tables	99-332
Science and Engineering Doctorate Awards: 1998	Tables	00-304
Science and Engineering Doctorate Awards: 1997	Tables	99-323
SESTAT: A Tool for Studying Scientists and Engineers in the United States	Report	99-337

Title	Pub. Type	NSF Pub. No.
SESTAT and NIOEM: Two Federal Databases Provide Complementary Information on the Science and Technology Labor Force	Report	99-349
Statistical Profiles of Foreign Doctoral Recipients in Science and Engineering: Plans to Stay in the United States	Report	99-304
Summary of Workshop on Graduate Student Attrition	Report	99-314
Total Science and Engineering Graduate Enrolment Falls for Fourth Consecutive Year	Data Brief	99-316
What Follows the Postdoctorate Experience? Employment Patterns of 1993 Postdocs in 1995	Issue Brief	99-307
Will Small Business Become the Nation's Leading Employer of Graduates with Bachelor's Degrees in Science and Engineering?	Issue Brief	99-322
Women, Minorities, and Persons with Disabilities in Science and Engineering: 1998	Report	99-338

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

RETURN THIS COVER SHEET TO ROOM P35, IF YOU DO NOT WISH TO RECEIVE THIS MATERIAL ☐ OR IF CHANGE OF ADDRESS IS NEEDED ☐ INDICATE CHANGE, INCLUDING ZIP CODE ON THE LABEL (DO NOT REMOVE LABEL)

Contents

National R&D Funding Patterns

Academic R&D

R&D in U.S. Industry

Education of Scientists and Engineers

Working Scientists and Engineers

Public Attitudes Toward S&T

International S&T Trends

Other Science Resources Publications

NSF 00-328

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

REPRODUCTION BASIS

☐ This document is covered by a signed "Reproduction Release (Blanket) form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☑ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").