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ABSTRACT

This is the third in a biennial series of reports designed to furnish a comprehensive overview of the status of United States scientific and technological efforts as they relate to the employment and other characteristics of science and engineering (S/E) personnel. Chapter I discusses the utilization patterns of scientists and engineers, examining current employment and trends, the character of science and technology activities (from industrial, academic and federal government perspectives), and women, racial minorities, Hispanics, and the physically handicapped in S/E. Chapter II examines labor market indicators, focusing on labor force participation, unemployment rates, S/E employment rates, S/E underemployment rates, S/E underutilization rates, salary trends, and other indicators. Chapter III examines the dynamics of S/E labor markets. Areas considered include precollege science and mathematics education (focusing on achievement levels and coursetaking habits which may influence students' decisions to enter S/E careers), postsecondary science and mathematics education, and sources of flow in the S/E market (including projected supply/demand conditions). Also included are highlights of major findings and (in an appendix) 35 tables which provide a comprehensive summary of data on S/E personnel. (JN)

science and engineering personnel: a national overview

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foreword

In the United States, scientists and engineers play major roles in efforts critical to promoting technological innovation and economic growth as well as improving industrial productivity, international competitiveness, and national security. Yet, these professionals constitute only a small fraction (3.4 percent) of the Nation's work force. This report, the third in a biennial series, provides a comprehensive overview of the status of U.S. scientific and technological efforts as they relate to the employment and other characteristics of science and engineering personnel, and provides a perspective or framework for analyzing issues relating to these personnel.

This publication is a useful complement to the *National Patterns of Science and Technology Resources* series and the National Science Board's periodic *Science Indicators* series, both developed by the Division of Science Resources Studies. Comments and suggestions are invited so that future volumes will continue to reflect the information needs of policymakers and others concerned with U.S. efforts in science and technology.

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December 1984

acknowledgments

This report was developed by Michael F. Crowley, Study Director, Demographic Studies Group, Scientific and Technical Personnel Studies Section (STPSS), with the assistance of Melissa J. Lane, Staff Economist. Contributions to the report were also provided by John A. Scopino, Program Analyst, STPSS.

Guidance and review were provided by Charles H. Dickens, Head, STPSS, and Charles E. Falk, Director, Division of Science Resources Studies.

notes

- Concepts and definitions underlying much of the data in this report, as well as the major data sources, are presented in appendix A.
- Many of the statistics presented are subject to both sampling and nonsampling error. Readers are urged to review the statistical limitations of the data presented in appendix A.
- The information on U.S. scientists and engineers is primarily based on data from the National Science Foundation's Postcensal and Experienced Sample Surveys for the seventies and eighties. Each decade NSF uses the Decennial Census to develop a baseline of data on scientists and engineers for these surveys. Since there are differences in the data concepts and definitions used in each Decennial Census, the data presented in this report for years 1976-83 are not entirely comparable with estimates from the previous decade. Detailed technical notes are presented in appendix A.

contents

highlights

employment trends and labor market conditions

- Employment of scientists and engineers increased by about 50 percent, or 5.9 percent a year, between 1976[1] and 1983. Their employment grew nearly twice as fast as that of all professional workers and about three times as fast as that of the total U.S. work force. As a result of this growth differential, scientists and engineers constituted 3.4 percent of the U.S. work force in 1983, compared to 2.7 percent in 1976. Technological change, growth in research and development (R&D) expenditures, and efforts to increase U.S. industrial competitiveness were among the factors that contributed to the relatively rapid growth in science and engineering (S/E) employment.
- In 1983, about 3 million of the 3.5 million employed U.S. scientists and engineers worked in jobs directly related to S/E activities. Most of those who worked in non-S/E jobs did so by choice. Only about one-tenth of the scientists and engineers in non-S/E jobs reported that they were so employed "involuntarily," i.e., jobs in science and engineering were not available.
- Between 1976 and 1983, the fastest growing employment field was computer specialists, which increased by 193 percent. Employment growth was also strong for mathematical, environmental, and life scientists, up 78 percent, 74 percent, and 73 percent, respectively. The engineering field with the greatest growth in employment was electrical/electronics engineering, up 66 percent. Social scientists had the smallest growth in employment, 11 percent. Other fields with relatively low employment growth were physical scientists, up 25 percent, psychologists, up 28 percent, and mechanical engineers, up 35 percent.
- Between 1973 and 1983, employment of doctoral scientists and engineers rose at an annual rate of 5.3 percent, reaching 370,000. While the vast majority of S/E doctorates work in their own or related fields, the proportion working outside S/E fields has increased from 6 percent to 11 percent between 1973 and 1983. Almost all of those holding non-S/E jobs did so by choice.
- Labor market indicators suggested a relative supply/demand balance in most S/E fields in 1983, reflecting lingering effects from the downturn in economic performance of the early eighties. Industrial recruiting plans for the 1983-84 period point to renewed high levels of employment growth in several fields, which may lead to potential supply constraints. These fields include computer engineering, electrical/electronics engineering, and computer scientists.
- Unemployment rates for scientists and engineers lie well below those for the general work force. In 1983, the unemployment rate for scientists and engineers was 2.2 percent, down from 3.4 percent in 1976. In comparison, the 1983 unemployment rate for the general work force was 9.6 percent. The S/E employment rate—the proportion of employed scientists and engineers who hold S/E jobs—was 88 percent in 1983, down from 91 percent in 1976.
- Unemployment and S/E employment rates varied substantially among fields. Engineers had a lower unemployment rate in 1983 than scientists, 1.9 percent compared to 2.6 percent. The S/E employment rate for engineers was above that for scientists, 93 percent versus 82 percent. The variations in rates for recent S/E graduates were similar to those for experienced workers.

[1] Although selected data on scientists and engineers are available from the early fifties, comparable data on demographic and other characteristics are available from 1976 to 1983 for the overall population of scientists and engineers and from 1973 to 1983 for those with doctorates

- A partial indicator of S/E underutilization can be derived by combining measures of unemployment with available measures of underemployment; i.e., those working part-time when a full-time job is preferred and those working involuntarily in a non-S/E job. In 1983, this underutilization indicator for engineers was less than one-half that for scientists, 2.5 percent versus 6.1 percent. The highest relative underutilization rates for scientists were for psychologists and social scientists, approximately 10 percent each; the lowest were for computer specialists and physical scientists, between 3 percent and 4 percent, respectively.

science and technology activities

- The basic character of the science and technology enterprise is reflected by the work activities of S/E personnel. In 1983, major work activities of S/E personnel included research and development, representing 31 percent; general management, 17 percent; production, 13 percent; R&D management, 8 percent; and teaching, 7 percent. Between 1976 and 1983, S/E employment growth in production outpaced most other activities, increasing by 75 percent; S/E employment growth in R&D activities increased by 63 percent.
- Work activities vary widely by S/E field. In 1983, engineers were more likely than scientists to be engaged in development, 30 percent versus 9 percent, or production, 17 percent versus 7 percent. By contrast, higher proportions of scientists than engineers reported teaching as their primary activity, 14 percent versus 2 percent, or the combination of activities related to reporting, computing, and statistical work, 17 percent versus 4 percent.

sector of employment

- Between 1976 and 1983, the distribution of the S/E work force shifted toward business and industry. In 1983, 67 percent of the scientists and engineers worked in this sector, compared to 62 percent in 1976. About four-fifths of all engineers and one-half of all scientists were employed in business and industry in 1983. Since 1976, employment of scientists and engineers in this sector increased more rapidly than in all other sectors combined, 60 percent compared to 30 percent.
- Educational institutions employed 12 percent of scientists and engineers in 1983. These institutions, primarily universities and colleges, employed about 24 percent of all scientists and 3 percent of all engineers in the United States. Although the number of scientists and engineers employed in the academic sector increased by 45 percent since 1976, this growth was less than in business and industry. This pattern of slower growth in the academic sector is expected to continue because of the projected decline in the traditional college-age population.
- Educational institutions remained the major employers of S/E doctorates in 1983, accounting for 53 percent of their work force, although this was down from 59 percent in 1973. The proportion employed in business and industry has been increasing, however, rising from 24 percent in 1973 to 31 percent in 1983.

women and minorities

- Women scientists and engineers made significant employment gains during the 1976-83 period. Their employment rose nearly three times faster than that of men, 120 percent compared to 42 percent. In 1983, women accounted for 13 percent of all employed scientists and engineers, compared to 9 percent in 1976. Nonetheless, women continue to be underrepresented in science and engineering. In 1983, women constituted about 44 percent of all employed persons and 48 percent of all persons in professional occupations. The representation of women among S/E fields ranged from 41 percent in psychology to 3 percent in engineering.
- Blacks continued to be underrepresented in science and engineering although they made significant gains in employment between 1976 and 1983. Over this period, their employment grew at a rate more than twice that of white scientists and engineers, 117 percent compared to 49 percent. In 1983, the approximately 82,000 blacks represented 2.4 percent of S/E employment. In contrast, they accounted for 9 percent of total U.S. employment and 6 percent of all professionals in the work force.
- Hispanics were underrepresented in science and engineering. In 1983, about 74,000, or 2 percent of all scientists and engineers were Hispanic, compared to 5 percent of all employed persons and 2.5 percent of all employed professionals.

dynamics of the s/e labor market

- The annual number of S/E baccalaureates awarded in the United States has been essentially level over the last decade; in 1982,[2] these degrees numbered 302,000. There have been substantial shifts in the field distribution of S/E bachelor's degrees since 1972. The number of engineering and computer science degrees increased dramatically, 73 percent and 1,200 percent,[3] respectively. The large increase in computer science degrees reflects both the rapid increase in occupational demand and the widespread introduction of formal degree programs in this field. Degree

[2] The National Center for Education Statistics has not yet released information on the numbers of bachelor's and master's degrees awarded in 1983.

[3] This growth rate was computed on a small base. The number of degrees increased from 1,500 to 20,000 between 1972 and 1982.

production in mathematics and social sciences declined, 58 percent and 16 percent, respectively.

- About 57,000 S/E master's degrees were awarded in 1982, up from about 54,000 in 1972. Following several years of decline, the number of S/E doctorates awarded has been slowly increasing, but the 1983 figure of approximately 18,000 was still less than the 1973 peak of 19,000.

- About four-fifths of the 1980 S/E baccalaureate recipients were in the labor force in 1982. Most of the others were enrolled in full-time graduate studies. Among those who were employed, there was wide variation by field in the proportions who found jobs in science and engineering, ranging from 26 percent in psychology to 91 percent in computer science. The 1982 S/E graduates who were employed in S/E jobs earned substantially higher salaries than those employed in non-S/E jobs, $24,000 compared to $14,400.

- The movement of scientists and engineers into and out of S/E occupations is a significant source of change in the S/E labor supply. Roughly 20 percent of those employed in S/E jobs in 1972 had changed occupations by 1978. In general, these occupational movements went from fields in which employment demand was weak to those in which it was strong, such as the flow to engineering and computer specialties from mathematics. Doctoral scientists and engineers tended to change fields less than other scientists and engineers.

chapter I.

utilization patterns of scientists and engineers

current employment and trends

The U.S. economy is becoming increasingly based on scientific and technological activities. One indicator is that the employment of scientists and engineers increased about three times as rapidly as total U.S. employment over the 1976-83 period (49 percent versus 14 percent), and almost twice as rapidly as total professional employment (24 percent).[4] As a result of this differential growth, the proportion of the U.S. work force who were scientists or engineers increased from 2.6 percent in 1976 to 3.4 percent in 1983.[5]

The more rapid increase in employment of scientists and engineers results, in part, from two major factors: the relative concentration of scientists and engineers in those industries (generally "high technology") where overall employment is increasing rapidly, and a change in the occupational mix of individual employers. This changing occupational mix, which has led to a greater concentration of science and engineering (S/E) personnel in the U.S. work force, relates directly to efforts to improve productivity and increase the competitiveness of U.S. industry; to growth in research and development (R&D) expenditures; and to the increased pace of technological change.

Growth in S/E employment varied between scientists and engineers and among fields (chart 1). Over the 1976-83 period, employment of scientists increased more rapidly than that of engineers (59 percent versus 41 percent). There is some indication that the slower rate of engineering employment growth may have resulted, in part, from supply constraints, particularly shortages of experienced personnel. Computer specialists, the fastest growing group, accounted for about two-fifths of the total employment increase among scientists. Among engineers, above average growth was recorded by electrical/electronic and chemical engineers.

In 1983, about 88 percent of the almost 3.5 million employed scientists and engineers held jobs in science or engineering. Between 1976 and 1983, employment in S/E jobs increased by 44 percent, somewhat slower than the overall increase in the employment of scientists and engineers (49 percent). For a variety of reasons, some scientists and engineers hold jobs outside of their own or related fields. The fact that some scientists and engineers are employed in non-S/E jobs does not necessarily mean that they are being underutilized from a societal perspective. Their education and training may provide insights that can be quite valuable to their nontechnical activities. Most scientists and engineers who are working in non-S/E jobs do so for "voluntary" reasons such as promotions, better pay, or location preference. In 1983, only about 10 percent were in non-S/E jobs because they believed an S/E job was not available. (See chapter II.)

Over the 1973-83 decade, the employment of S/E doctorates increased by 68 percent, reaching about 370,000 by 1983.[6] The number of doctoral scientists and engineers employed in S/E activities increased by about 60 percent. A small, but increasing number work in jobs outside of their own or related fields (11 percent in 1983 compared to 6 percent in 1973). Employment of S/E doctorates in non-S/E activities grew by 94 percent over the decade. Relatively few (8 percent) of those holding non-S/E jobs indicate that they were so employed because they believed S/E jobs were not available.

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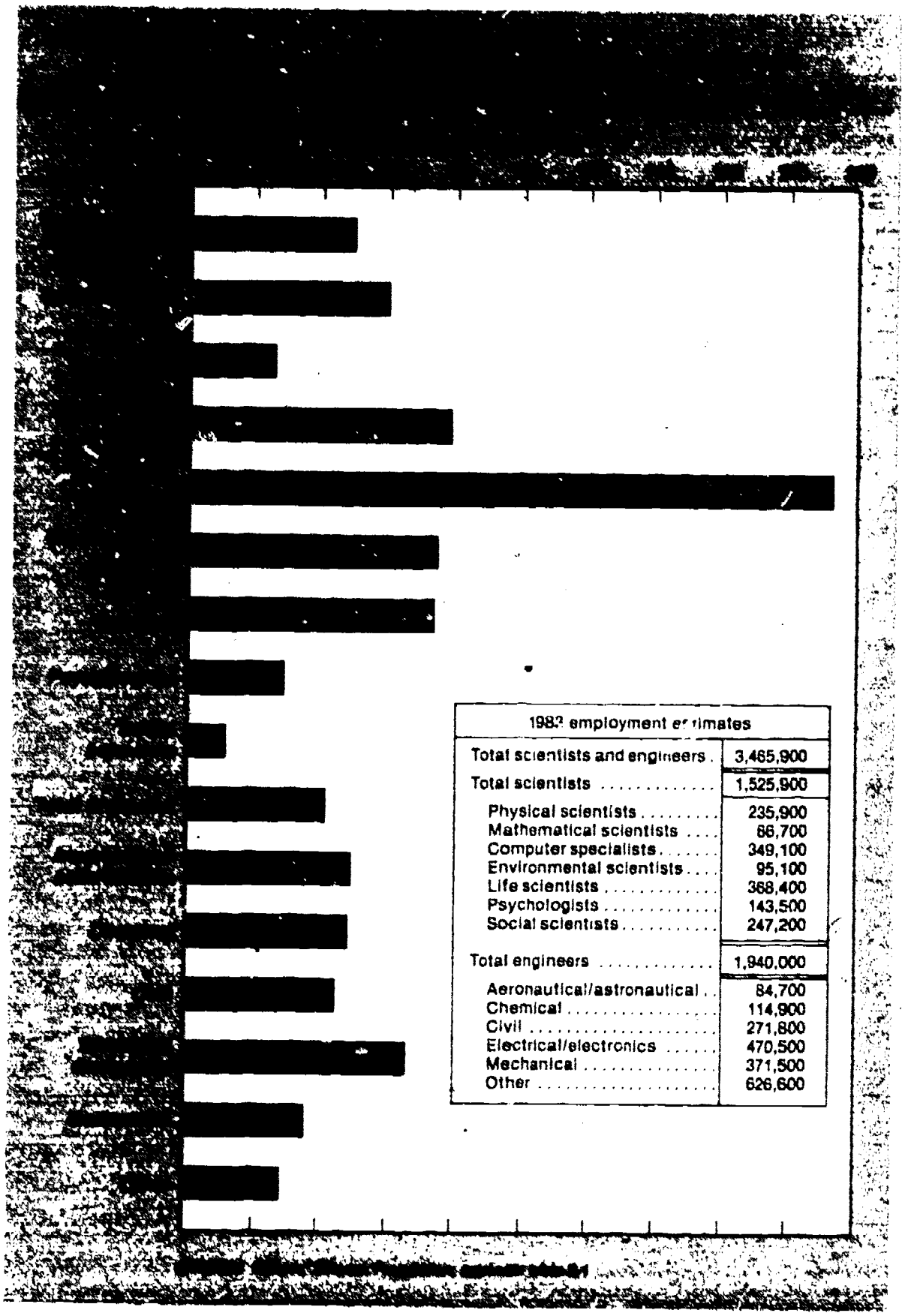
[4] Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, Vol. 31, No. 1, January 1984, pp. 14, 156, and 176.

[5] Based on the employed civilian labor force. See Department of Labor, *Employment and Earnings*, *op. cit.*, p. 156.

[6] Trend data for scientists and engineers are generally reported from the earliest to the latest available points in time. Thus, the time frame for national estimate data is from 1976 to 1983 while that for doctoral scientists and engineers is from 1973 to 1983.

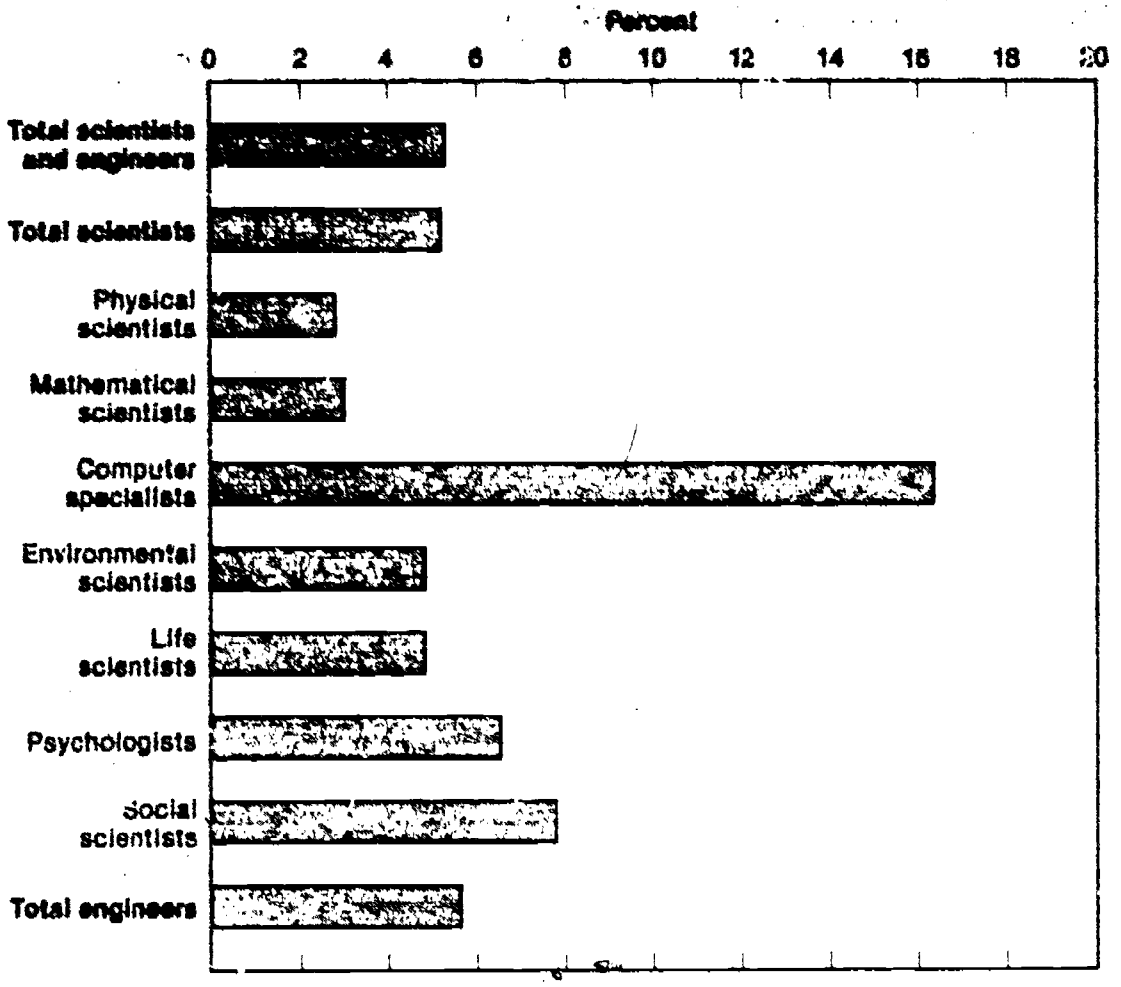


1982 employment estimates	
Total scientists and engineers	3,465,900
Total scientists	1,525,900
Physical scientists	235,900
Mathematical scientists	66,700
Computer specialists	349,100
Environmental scientists	95,100
Life scientists	368,400
Psychologists	143,500
Social scientists	247,200
Total engineers	1,940,000
Aeronautical/astronautical	84,700
Chemical	114,900
Civil	271,800
Electrical/electronics	470,500
Mechanical	371,500
Other	626,600

In 1983, scientists at the doctorate level continued to outnumber engineers by about five to one. Over the 1973-83 decade, growth rates varied considerably by field among doctoral scientists and engineers (chart 2), with below average annual growth rates in the physical and mathematical sciences. For computer specialists, the fastest growing science field, employment grew at an annual rate of about 16 percent between 1973 and 1983.

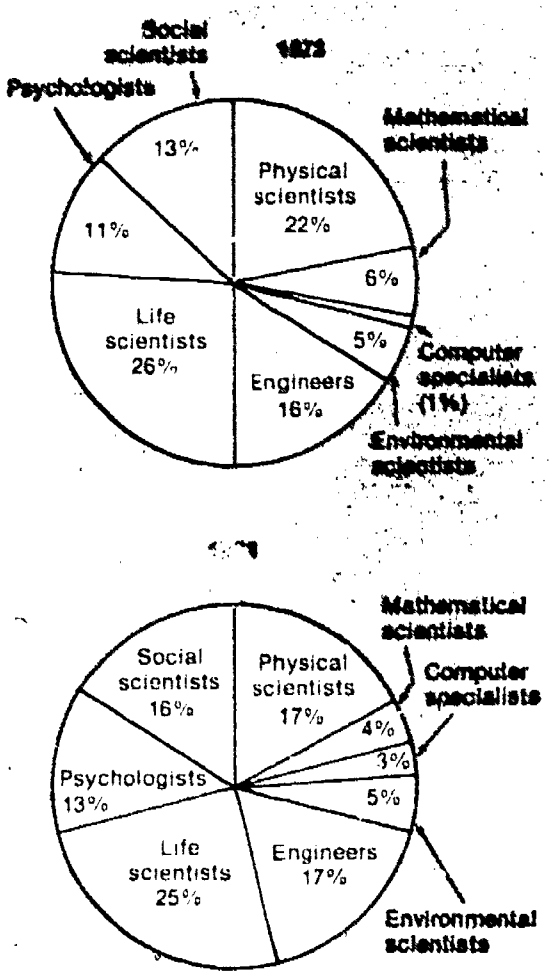
Differences in growth rates altered the field distributions of S/E doctorates over the 1973-83 decade. Most notably, the proportions in the social sciences, psychology, and computer specialties increased, while the proportion in the physical sciences declined (chart 3).

Chart 2. Annual rates of employment growth for doctoral scientists and engineers by field: 1973-83



SOURCE: National Science Foundation; appendix table B-5

Chart 3. Employed doctoral scientists and engineers by field and year



SOURCE: National Science Foundation; appendix table B-5

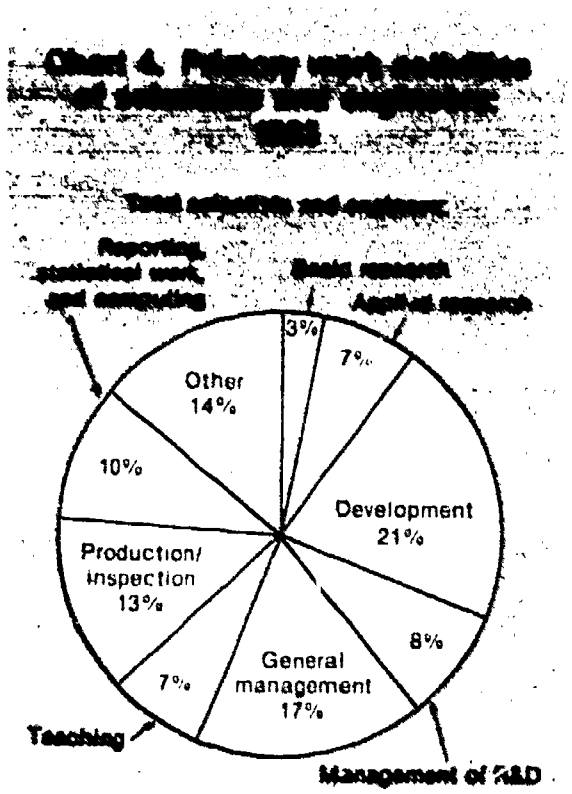
character of science and technology activities

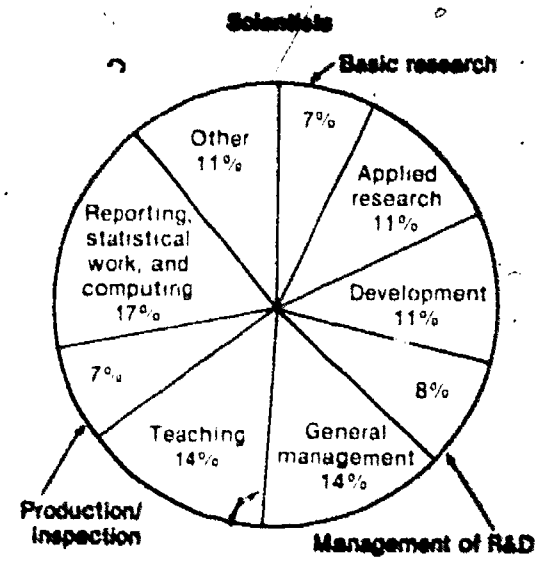
The work activities of scientists and engineers—as measured by the number, proportion, and distribution of those engaged in research and development (R&D), teaching, and other activities—are a direct indicator of the character of U.S. science and technology. There is considerable variation, however, among employment sectors, including business and industry, educational institutions, and Government. These sectoral employment patterns indicate the substantial differences in the character of the science and technology enterprise, reflecting the myriad decisions that drive U.S. science and technology.

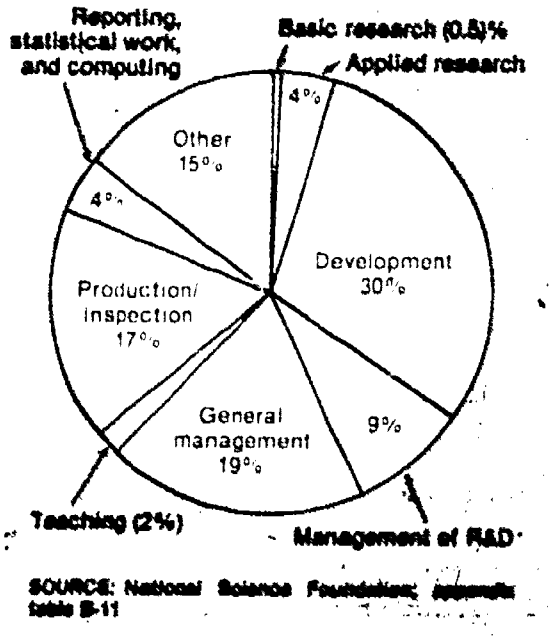
Between 1976 and 1983, the number of scientists and engineers primarily engaged in research and development increased by 63 percent. In 1983, 31 percent (1.1 million) of the Nation's scientists and engineers reported research and development as their principal activity and an additional 8 percent (288,000) were in R&D management (chart 4). Engineers were more likely than scientists to report these two activities (43 percent versus 34 percent). The situation was similar for scientists and engineers holding doctorates. In 1983, 34 percent of the doctoral scientists and engineers were primarily working in research and development, and an additional 9 percent cited R&D management as their principal activity.

Teaching was the primary work activity of about 7 percent of all scientists and engineers in 1983. Growth in teaching activities (45 percent) was somewhat slower than overall S/E employment (49 percent) over the 1976-83 period. Scientists are much more likely than engineers to report teaching as the primary activity (13 percent versus 2 percent). This contrast is in part a result of differences in educational levels—a larger proportion of scientists (20 percent) than engineers (3 percent) hold doctoral degrees which are typically prerequisites to holding academic teaching positions. At the doctoral level, 29 percent of the scientists and engineers reported teaching as their primary work activity in 1983, down from 36 percent in 1973.

The decline in the proportion of doctorates reporting teaching as their primary activity is a dramatic example of the effects of both inter- and intra-sectoral shifts on work activities. The decline was the result of two factors: (1) a shift in job opportunities away from universities and toward industry and (2) the rapidly







SOURCE: National Science Foundation; appendix table B-11

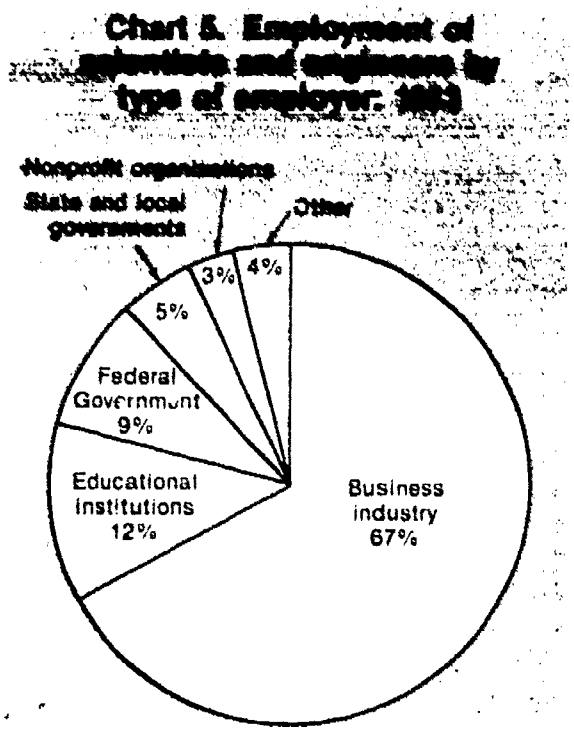
increasing number of doctorates in universities who report basic and applied research, rather than teaching, as their major activity.

Over the 1976-83 period, production and related activities, including quality control, was one of the fastest growing work activities of scientists and engineers—especially the latter. The number primarily engaged in these activities rose almost 75 percent to over 440,000 in 1983. These include roughly 107,000 scientists and 336,000 engineers.

Two-thirds of scientists and engineers (2.3 million) worked in business and industry in 1983 (chart 5), with engineers more likely than scientists to be in this sector. Educational institutions ranked a distant second, employing 12 percent (416,000). For doctoral scientists and engineers, however, educational institutions were the major employer, accounting for 53 percent of these individuals in 1983.

Since the midseventies, the sectoral distribution of employed scientists and engineers at all degree levels has changed only slightly, with a small increase in the share in business and industry and slight declines in the shares employed by educational institutions and the Federal Government. Sectoral changes have been more pronounced at the doctoral levels, with employment shifting from educational institutions to the industrial sector.

Sectoral shifts were most apparent for recent S/E graduates. In 1982, 65 percent of the 1980 and 1981 bachelor's-level graduates were employed in industry and 9 percent were employed by educational institutions. In 1976, about 55 percent of bachelor's-degree graduates from the classes of 1974 and 1975 found employment in business and industry, and 12 percent, in educational institutions. Changes at advanced-degree levels were even more dramatic. In 1982, 57 percent of the 1980 and 1981 master's-degree graduates were working in business and industry, and 17 percent in educational institutions. Comparable 1976 data for 1974 and 1975 graduates showed 37 percent in business and industry and 24 percent in educational institutions. The proportion of new doctoral scientists and engineers going into industry was lower than at other degree levels but has been increasing. In 1983, 28 percent of

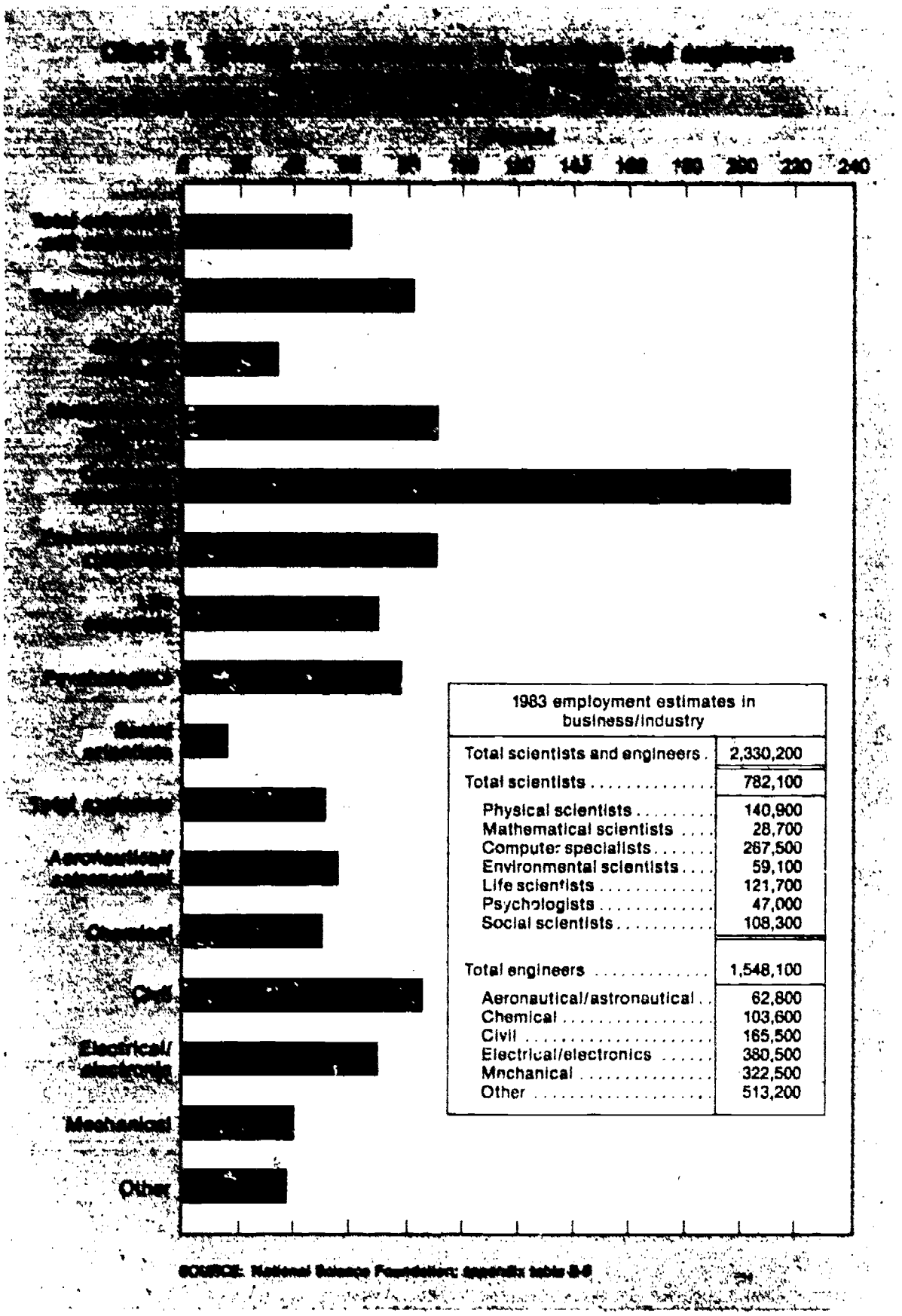


SOURCE: National Science Foundation; appendix table B-9

the 1981 and 1982 graduates were employed in this sector, compared to 22 percent of the 1977 and 1978 graduating classes.

the industrial perspective

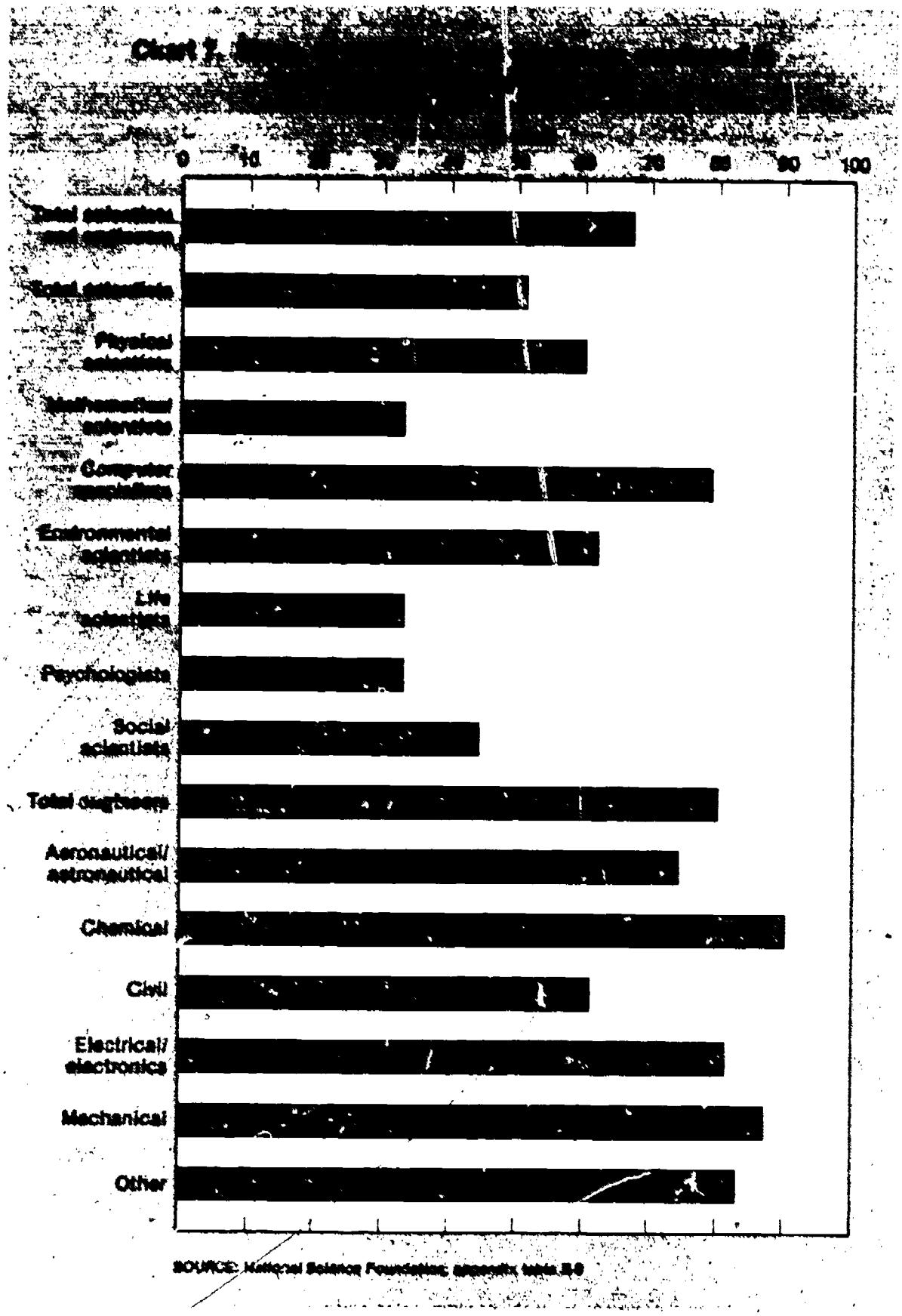
Business and industry is the largest employer of both scientists and engineers. In 1983, 51 percent of all scientists (782,000) and 80 percent of all engineers (1,548,000) worked in this sector. Between 1976 and 1983, employment of scientists and engineers in industry increased more rapidly than in other sectors (60 percent versus 49 percent). Because of the rapid growth of computer specialists over this period, the employment of scientists grew more than one and one-half times as rapidly as engineers (82 percent versus 45 percent) (chart 6). Although educational institutions continued to be the major employer of doctoral scientists and engineers, new job opportunities in this sector grew slower than in industry. Employment of S/E doctorates in industry more than doubled between 1973 and 1983 (up 113 percent), while employment in all sectors combined increased by about two-thirds (up 68 percent).



1983 employment estimates in business/industry	
Total scientists and engineers	2,330,200
Total scientists	782,100
Physical scientists	140,900
Mathematical scientists	28,700
Computer specialists	267,500
Environmental scientists	59,100
Life scientists	121,700
Psychologists	47,000
Social scientists	108,300
Total engineers	1,548,100
Aeronautical/astronautical	62,800
Chemical	103,600
Civil	165,500
Electrical/electronics	380,500
Mechanical	322,500
Other	513,200

Business and industry's importance as a source of employment for scientists and engineers varied considerably by S/E field (chart 7). Although this sector employed roughly one-half of all scientists in 1983, it provided jobs for about 80 percent of all computer specialists, and 60 percent of all physical scientists, but only about 44 percent of all social scientists. At the doctoral level, industry provided job opportunities for about 25 percent of the scientists, with a field variation similar to that for all scientists. In 1983, industry employed 56 percent of the doctoral-level computer specialists, 45 percent of the physical scientists, but only 11 percent of the social scientists.

Business and industry employed nearly 80 percent of all engineers in 1983. The proportion ranged from 61 percent of all civil engineers to 90 percent of all chemical engineers. Growth of engineering employment in this sector between 1976 and 1983 (31 percent) was paced by above-average increases for electrical engineers (up 70 percent) and civil engineers (up 86 percent). Over two-fifths of the growth in industrially employed engineers was accounted for by these two fields. Industry also was the largest employer of doctoral engineers; in 1983, 56 percent of the doctoral engineers worked in industry, up from 50 percent in the early seventies.



In the United States and in other advanced industrial societies, there has been a relative shift of resources from primary production activities such as agriculture and manufacturing to services. This shift reflects movement to an information society, which involves, for example, changes in consumer demand, government policy, patterns of foreign trade, and technology. All of these significantly affect employment opportunities for scientists and engineers.[7] A large fraction of private industry's demands for S/E personnel, however, is still concentrated in the manufacturing sector. In 1983, manufacturing employed 25 percent of all workers in private industry, but provided jobs for almost 60 percent of the engineers and 25 percent of the scientists.[8]

S/E employment is widely dispersed across industries, with only electrical machinery and business services accounting for more than one-tenth of private industry's S/E workers (table 1). The pattern of concentration of engineers by industry differed from that of scientists. For example, the business service industry employed 21 percent of the scientists in private industry, but only 6 percent of the engineers. Excluding the engineering, architectural, and surveying industry services, engineers were generally concentrated in the durable goods manufacturing industries, i.e., nonelectrical/electrical machinery and transportation equipment, while scientists were concentrated in service and nondurable goods manufacturing. Computer specialists were generally less concentrated than other occupations with significant numbers working in trade, finance, insurance, and real estate.

The concentration of scientists and engineers in a relatively small number of industries results from either the concentration of industrial activities in these industries, as reflected by their total employment, or the fact that their industrial technology requires a work force with a relatively large number of employees who have S/E skills. One way to measure the relative effect of these two determinants is a "concentration ratio" for each industry which relates an industry's share of S/E employment to its share of total employment across all occupations. Industries which are relatively technologically intensive—that is, the industry's technology requires a large number of employees with S/E skills relative to requirements in other occupations—include the chemicals, electrical equipment, transportation equipment, instruments, and machinery industries (chart 8).

Besides employing scientists and engineers, business and industry employs over 1 million S/E technicians, including drafters and computer programmers. The amount of technician support provided by scientists and engineers can be measured by the "technical support

[7] National Science Foundation, *Science Indicators—1982* (NSB 83-1)(Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1984), p. 89.

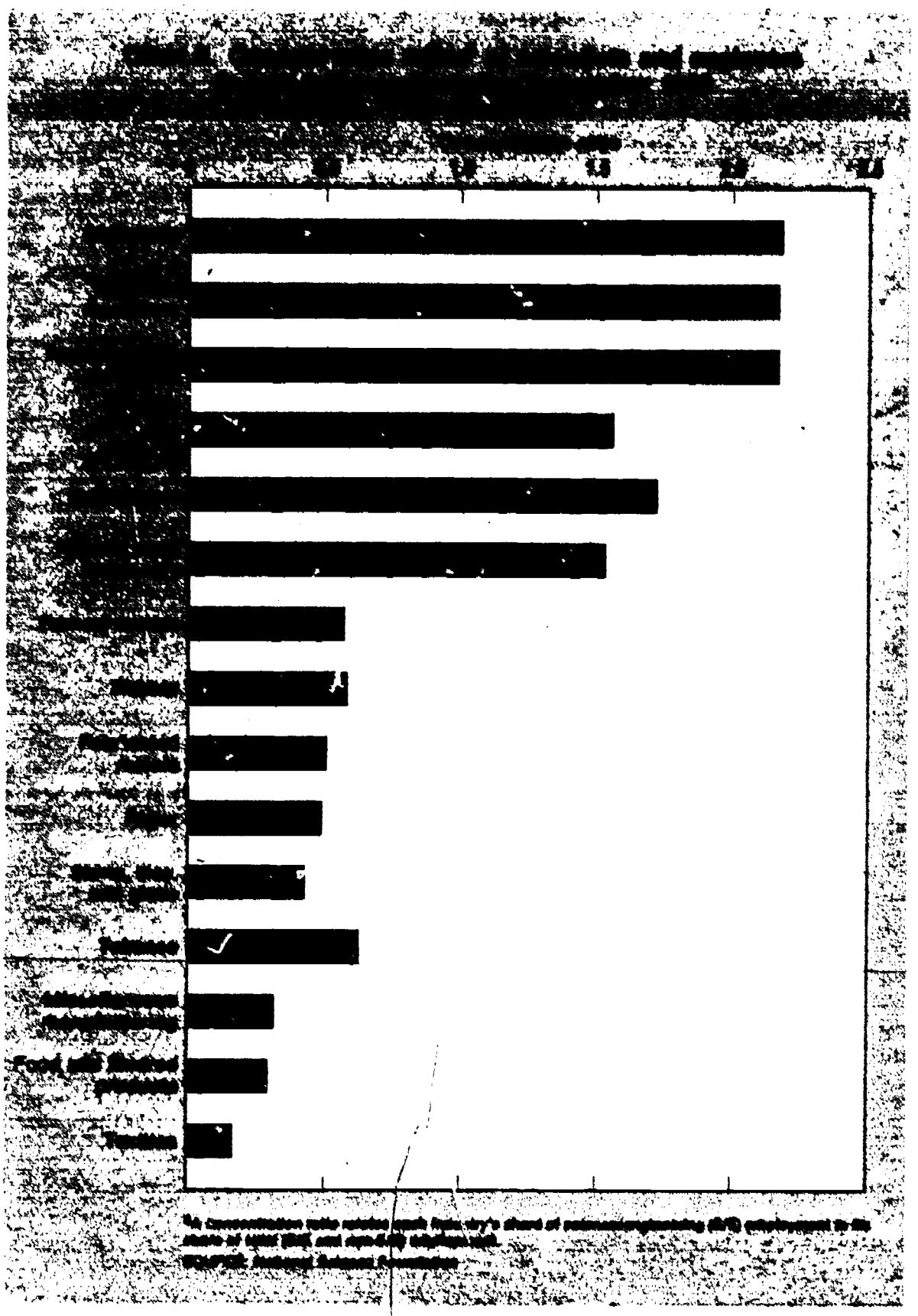
[8] Based on preliminary 1983 manufacturing data.

Table 1. Concentration of scientists and engineers in private industry: 1982[1]

Industry	Number	Percent
Total scientists and engineers		
Total	1,576,800	100.0
Nonelectrical machinery	137,200	8.7
Electrical machinery	170,300	10.8
Communications equipment	86,000	5.4
Transportation equipment	146,600	9.3
Aircraft and parts	76,600	4.8
Chemicals	91,500	5.8
Business services	178,500	11.3
Engineering, architectural, and surveying services	131,600	8.3
Scientists		
Total	560,200	100.0
Oil and gas extraction	31,900	5.7
Chemicals	51,500	9.2
Wholesale trade, durable goods	31,600	5.6
Finance, insurance, and real estate	59,900	10.7
Business services	116,700	20.8
Engineers		
Total	1,016,600	100.0
Nonelectrical machinery	121,900	12.0
Electrical machinery	152,500	15.0
Communications equipment	77,300	7.6
Transportation equipment	129,100	12.7
Aircraft and parts	66,800	6.6
Business services	61,800	6.1
Engineering, architectural, and surveying services	121,700	12.0

[1]Only industries with more than 5 percent science/engineering employment are listed.

SOURCES: National Science Foundation and Bureau of Labor Statistics.



ratio," i.e., the ratio of technicians to scientists and engineers. Technicians are generally less skilled and are used directly or indirectly to support scientists and engineers in every phase of their work. The technical support ratio for the private sector was 0.80 in 1983, meaning that for every 100 scientists and engineers, there were about 80 technicians. The ratio varied widely among industries, ranging from 2.4 in printing and publishing to 0.02 in mining (table 2). On the average, manufacturing industries have lower technical support ratios than nonmanufacturing industries. The wide variation in technical support ratios among industries is the result of several factors including the technology of the industry; the substitutability of technicians with other occupations including scientists and engineers; and the relative costs of these personnel.

Limited data suggest some "deskilling" of the work force, with technician employment increasing more rapidly than related engineering or science employment.[9] For example, between 1979 and 1982, employment of electrical/electronics engineers declined in the

[9] These data are only available for 1979 to 1982.

Table 2. Ratio of technicians to scientists and engineers in private industry by selected industry: 1982

Industry	Ratio
Total, all industries	0.61
Manufacturing	.70
Durable goods	.72
Primary metals	.72
Fabricated metals	.99
Nonelectrical machinery	.92
Electrical machinery	.72
Instruments	.90
Lumber and wood products	1.71
Furniture	1.03
Stone, clay, and glass	.73
Transportation equipment	.40
Miscellaneous manufacturing	1.18
Nondurable goods	.61
Chemicals	.55
Petroleum refining	.41
Food and kindred products	.49
Tobacco	1.22
Textiles	1.22
Apparel	.59
Paper	.46
Printing and publishing	2.40
Rubber	.60
Leather	.63
Nonmanufacturing	.91
Mining	.02
Construction	.79
Finance, insurance, and real estate	.69
Business services	.89
Transportation, communication, and public utilities	1.05
Trade	1.57

SOURCES: National Science Foundation and Bureau of Labor Statistics

communications industries, while employment of electrical/electronics engineering technicians increased.[10] Possible reasons suggested by industry representatives and others for this potential "deskilling" include changing technologies; decreasing rates of technological diffusion; job reclassifications; and changes in the composition and characteristics of industrial employers.

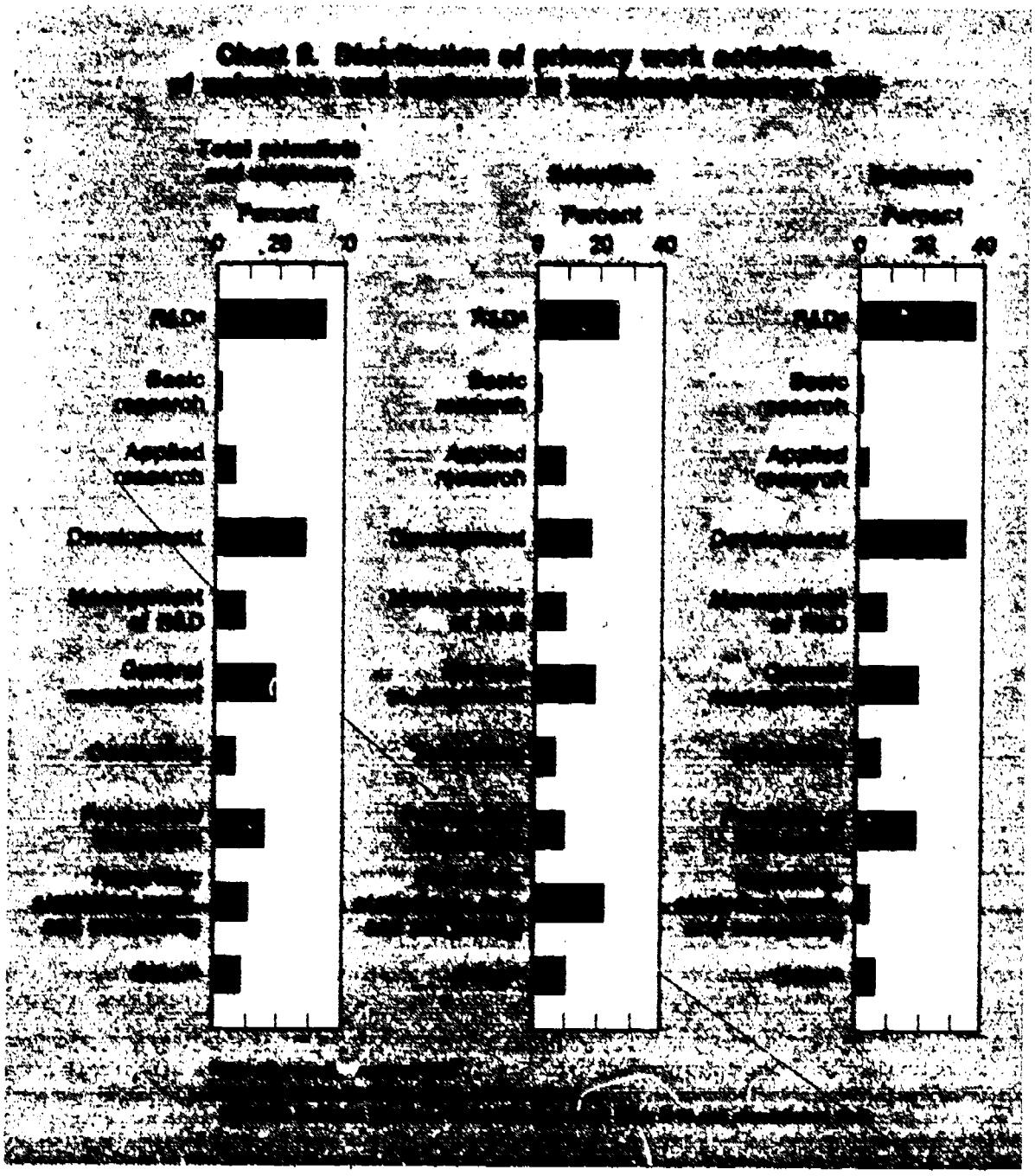
The work activities of scientists and engineers in industry (research and development, production, etc.) are a direct indicator of the character of U.S. science and technology because industry accounts for a significant portion of the Nation's science and technology effort. In addition, because innovation depends in part on research and development, the number and proportion of scientists and engineers in R&D activities may be a leading indicator of the Nation's overall innovative efforts.

Over the 1976-83 period, there has been little change in the distribution of work activities of scientists and engineers in industry. The greatest proportion continues to be engaged primarily in performing research and development, especially development. Significant shares are also found working in management, including R&D management, and production/inspection, including quality control.

The number of scientists and engineers working in production and related efforts increased greatly over the 1976-83 period. In 1983, about 343,000 scientists and engineers were primarily engaged in such efforts, almost double the number in 1976. Engineers, the major contributors to this growth, accounted for almost 80 percent of the increase. Employment growth in these activities reflects technological change, as well as the added emphasis industry is placing on improving productivity, quality control, and the international competitiveness of U.S. firms.

Primary work activities of industrially employed scientists and engineers differed significantly (chart 9). While about one-half the engineers worked in development or production, large numbers of scientists were in a combination of activities involving report writing, statistical work, or computing activities.

Regardless of field, about one-third of industrially employed scientists and engineers were in R&D activities, with



[10] National Science Foundation, *Scientific and Technical Work Force in Trade and Regulated Industries Shows Major Shift in Occupational Composition: 1979-82* (NSF 84-323)(Washington, D.C., May 1984).

about four-fifths being in development and most of the remainder in applied rather than basic research. Development is the domain of engineers. They outnumbered industrially employed scientists in this activity by almost five to one (524,000 versus 107,000). Research, on the other hand, is the domain of scientists. In 1983, more than one and one-half times as many industrially employed scientists (85,000) as engineers (48,000) were in research.

The largest share of industrially employed doctoral scientists and engineers were engaged in R&D activities. The proportion performing research and development in 1983 (41 percent) was lower than in 1973 (45 percent). Doctoral scientists are highly concentrated in research while engineers are found most often in development. Other frequently reported primary responsibilities of S/E doctorates were R&D management (18 percent) and sales and professional services (14 percent).

the academic perspective

The academic sector is the second largest employer of S/E personnel. In 1983, educational institutions, primarily universities and colleges, employed about 24 percent of all scientists and 3 percent of all engineers in the United States. These institutions employed over one-half (53 percent) of all S/E doctorates in 1983. Since 1976, the number of scientists and engineers employed in educational institutions increased by almost 45 percent, but that growth was less than in the industrial sector (60 percent). This same pattern also was evident among doctoral scientists and engineers. Between 1973 and 1983, employment of doctoral scientists and engineers in academic institutions increased by 52 percent, less than half the growth rate in the industrial sector (113 percent). This slower-than-average growth in educational institutions is expected to continue since the number of individuals in the traditional college-age groups is projected to decline through the eighties.[11]

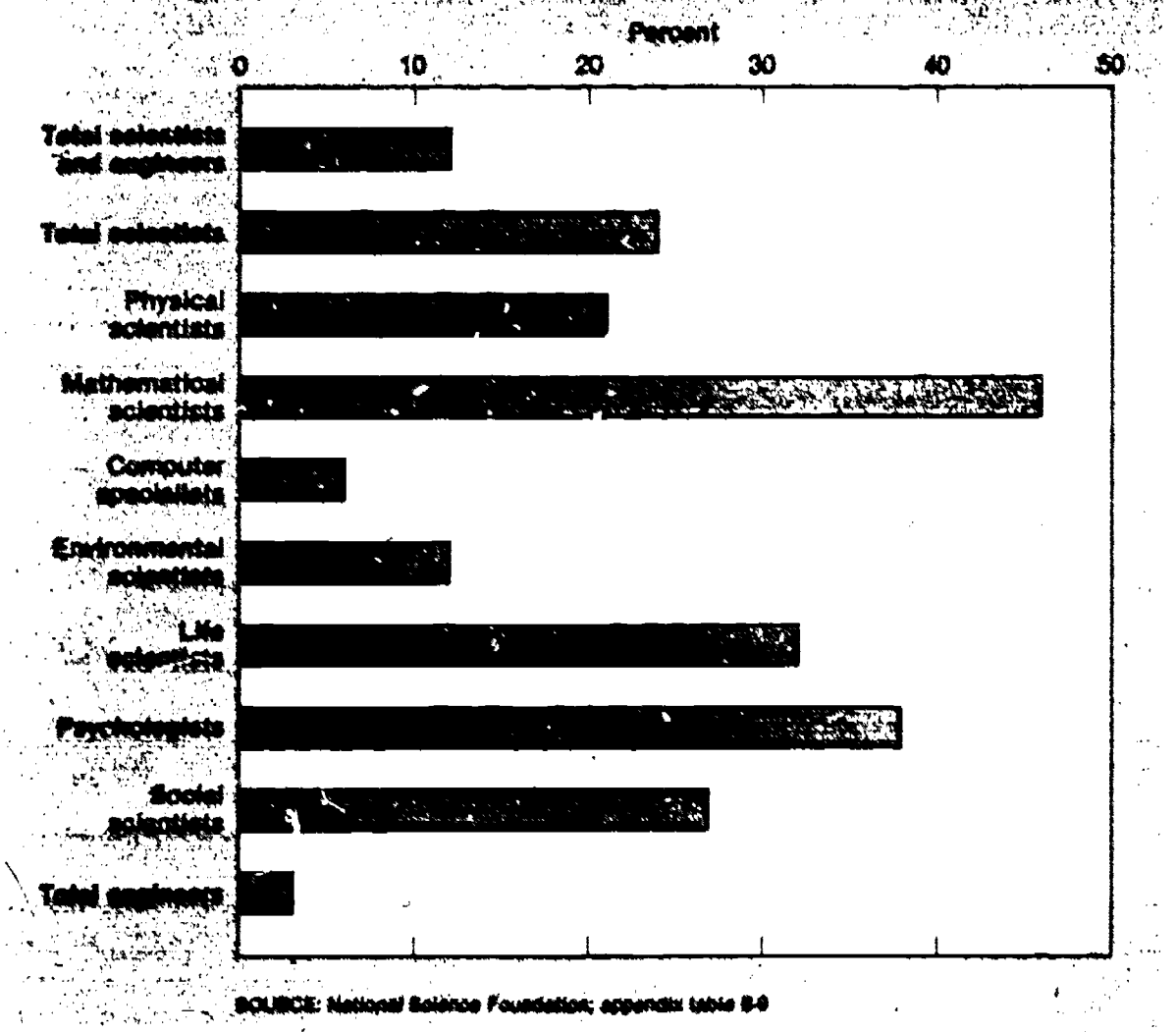
The importance of educational institutions in providing S/E employment opportunities varies significantly by field (chart 10). Educational institutions had high concentrations of mathematical scientists (46 percent), psychologists (38 percent), and life and social scientists (32 percent and 27 percent, respectively). In 1983, these institutions employed only a small fraction of the Nation's computer specialists (6 percent) and engineers (3 percent).

Educational institutions were a particularly important source of jobs for doctoral scientists and engineers, employing about one-third of the engineers, and almost three-fifths of the scientists, with some variation by field. For example, over 70 percent of all doctoral social scientists were employed in these institutions, but only 36 percent of the chemists.

In academe, employment growth at the doctoral level varied considerably between scientists and engineers and across fields over the 1973-83 decade (chart 11). There were above-average growth rates for computer specialists and social scientists, while rates for physical and mathematical scientists were below average. Variability in employment growth across fields reflects a variety of factors including R&D funding patterns, academic course load requirements, S/E doctorate production rates, shortages of tenure-track faculty openings in some fields, and the impact of industrial recruiting competition in fields such as engineering.

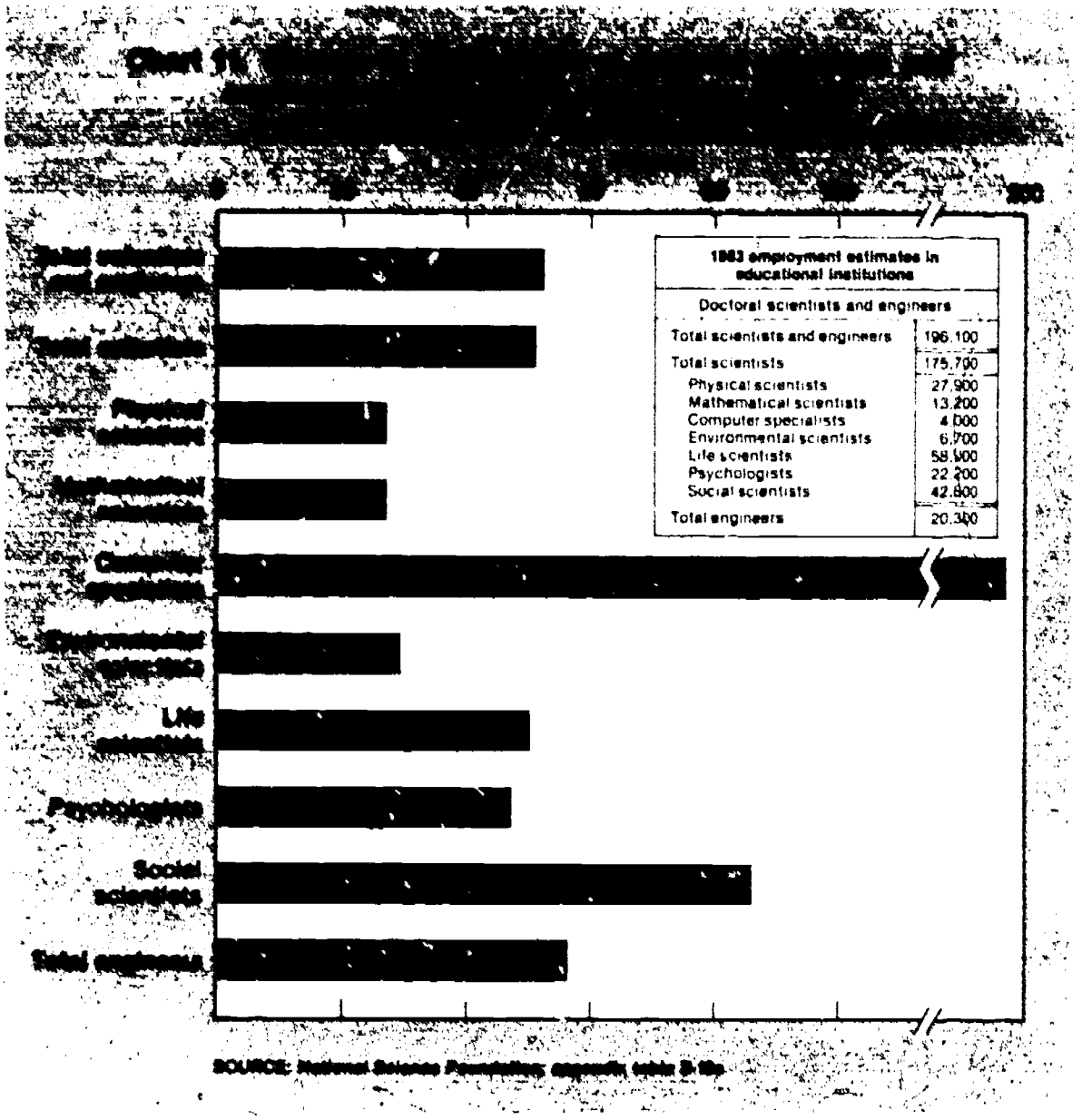
Over the past few years, most engineering colleges have reported difficulty in staffing full-time faculty positions. The slow growth in new engineering doctorate production, coupled with the

Chart 10. Share of scientists and engineers employed in educational institutions by field: 1983



SOURCE: National Science Foundation; appendix table 8-9

National Center for Education Statistics, *Projections of Education Statistics to 1988-89*, Vol. 1 (Washington, D.C.: Department of Education, March 1982).



increased demand for these graduates by industry, have contributed to faculty vacancies. About one-tenth of the full-time engineering faculty positions were vacant at the beginning of the 1980-81 academic year, although by the fall of 1983, the number of vacancies had declined to about 8.5 percent.[12] Strong demand for engineering personnel in academia has resulted, in part, from a 155-percent growth in academic R&D expenditures (in current dollars) in engineering between 1976 and 1983,[13] one of the more rapid increases among major S/E fields. Also, instructional needs in engineering have increased dramatically in recent years as a result of the 58-percent growth in full-time undergraduate enrollment in this field between 1976 and 1983.[14]

The work activities of doctoral scientists and engineers in educational institutions have also shifted over time. The number primarily involved in teaching has increased at a slower rate than the number principally involved in research and development and management. Teaching was the primary work activity of a majority of the doctoral scientists and engineers in educational institutions, but the 1983 level, 53 percent, was less than the 1973 figure of 61 percent. The proportion of doctoral scientists and engineers whose primary work activity was teaching varied by field (chart 12). Over the 1973-83 period, fields where the proportions reporting teaching declined least included mathematics, social sciences, and psychology.

The number of doctoral scientists and engineers in educational institutions who cite research and development as their major activity has increased more rapidly than the total number of S/E doctorates in this sector. As a result of this more rapid growth, the proportion primarily working in R&D activities increased from 24 percent in 1973 to 28 percent in 1983. Over this period, the proportion of S/E doctorates working in various R&D activities remained relatively constant with nearly 73 percent engaged in basic research, 25 percent in applied research, and 2 percent in development. Fields showing above-average increases in research and development included computer specialists and engineers.

Management and administration was another major activity of academically employed S/E doctorates. In 1983, about 11 percent (21,000) were primarily engaged in this activity, roughly the same proportion as in 1973.

federal government

In 1983, about 9 percent of all scientists and engineers were employed by the Federal Government, making this sector the third largest employer of these personnel. About 45 percent of Federal S/E employment was in engineering occupations, primarily electrical and civil. Life science was the largest science occupation, accounting for 37 percent of all scientists in the Federal Government.

S/E employment in this sector increased by 40 percent over the 1976-83 period, less than the growth recorded in business industry or educational institutions. The Federal Government's employment of scientists increased significantly faster than that of engineers (51 percent versus 28 percent). Over two-

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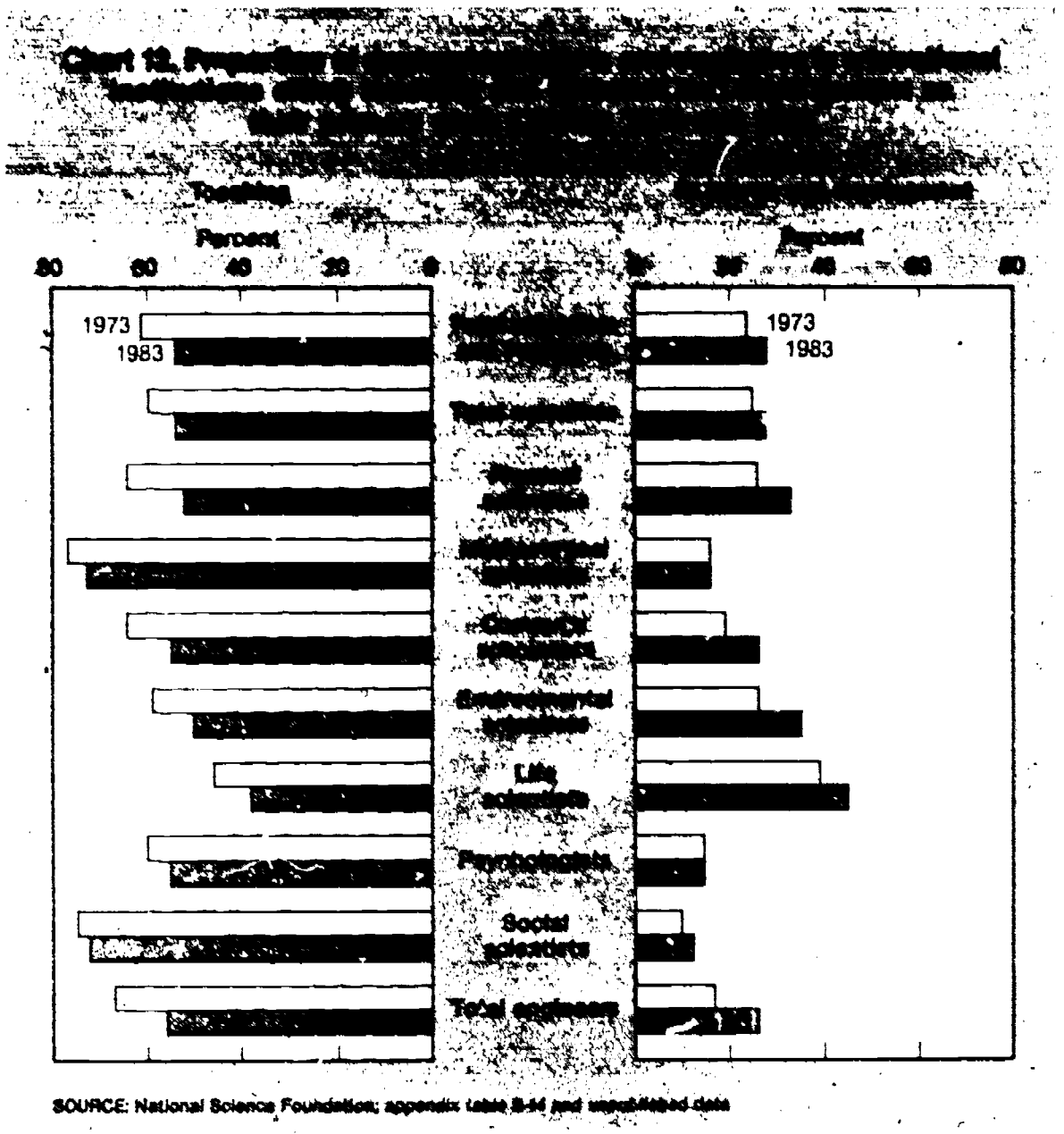
National Science Foundation, "Engineering Colleges Report 10% of Faculty Positions Vacant in Fall 1980," *Science Resources Studies Highlights* (NSF 81-322) (Washington, D.C., November 2, 1981), p. 1.; John Geils, "The Faculty Shortage: A Review of the 1981 AAES ASEE Survey," *Engineering Education*, Vol. 73, November 1982, pp. 147-154, and AAES ASEE, *Engineering Education*, October 1984.

[13] National Science Foundation, *Academic Science/Engineering R&D Funds, Fiscal Year 1982* (Detailed Statistical Tables) (NSF 84-308)(Washington, D.C., 1984), table B-3. Data for 1983 R&D expenditures in engineering are based on preliminary NSF data.

[14] Engineering Manpower Commission, *Engineering and Technology Enrollments, Fall 1983* (New York, N.Y.: Engineering Manpower Commission, 1984).



SOURCE: National Science Foundation; appendix table 8-14 and unpublished data

thirds of the increase in science employment was accounted for by increases among life scientists (40 percent) and computer specialists (27 percent). The relatively slow growth of engineering employment in the Government sector may reflect, among other factors, difficulties of the Federal Government to recruit and retain engineers because of noncompetitive salaries. In 1980, for example, there was virtually no difference between Federal Government and industry in starting salaries for baccalaureate engineers. By 1982, however, starting salaries for those in the Government had fallen to roughly 80 percent of those in industry.[15]

[15] Engineering Manpower Commission, *Professional Income of Engineers, 1980*, pp. 21 and 67 and *Professional Income of Engineers, 1982*, pp. 24 and 75 (New York, N.Y.: Engineering Manpower Commission, annual series).

women and minorities in science and engineering

women in science and engineering

Employment levels and trends. Women continue to be underrepresented in science and engineering. In 1983, women constituted almost 13 percent of all employed scientists and engineers, compared to about 44 percent of all employed persons and 48 percent of all those in professional occupations.[16] This underrepresentation persists despite significant employment gains over the 1976-83 period, when employment of women scientists and engineers grew by 120 percent as compared to a 42-percent increase for men. Employment increases for women in science and engineering far surpassed the employment growth for women in the general work force. Between 1976 and 1983, the number of women working in all occupations increased by 23 percent, compared with about 7 percent for men. Among those in professional occupations, the number of women increased by 30 percent, while employment of men was up 18 percent.[17]

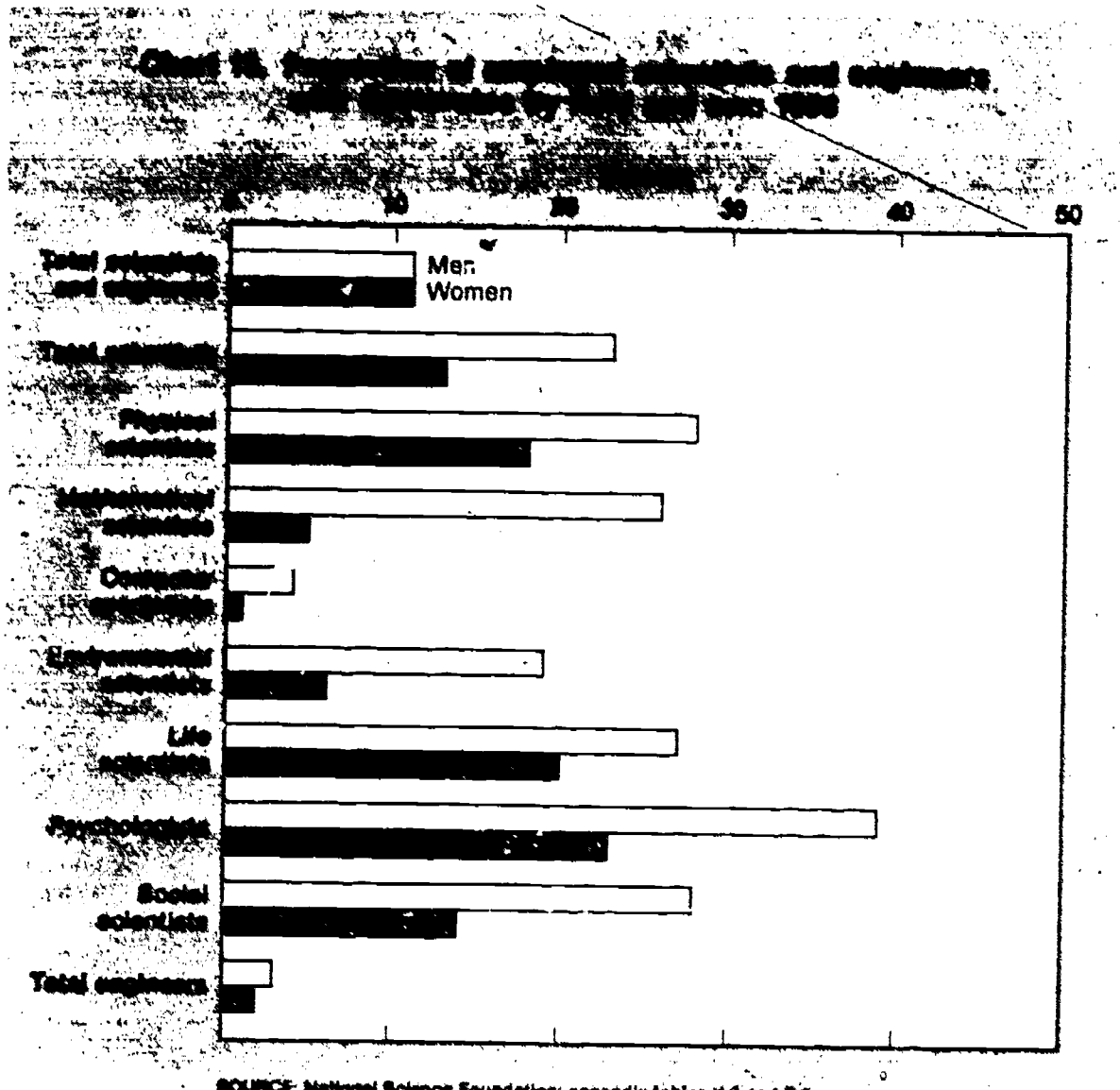
Educational attainment affects a number of employment-related variables. Women scientists, on average, were not as likely as male scientists to hold doctorates. Among employed women scientists, about 15 percent held doctorates; for men, the comparable figure was 23 percent. Differences by gender in the propensity to attain doctorates vary by field, with the largest differences found in mathematical and environmental scientists. Among engineers, about 3 percent of the men and 1 percent of the women held doctorates (chart 13).

Employment of S/E doctorates has been increasing more rapidly among women than men. Between 1973 and 1983, the number of employed women doctoral scientists and engineers grew rapidly, from 17,000 to about 49,000, a gain of 188 percent. Employment of men rose from 203,000 to about 320,000, an increase of 58 percent. With respect to recent changes, employment of women increased 19 percent between 1981 and 1983, compared with only 6 percent for men. In 1983, the 49,000 employed women doctoral scientists and engineers represented about 13 percent of all S/E doctorates, up from 8 percent in 1973.

Field. Women are more likely than men to be scientists rather than engineers; within the sciences, field concentrations differed by gender. In 1983, women represented about 25 percent of all scientists, but only about 3 percent of

[16] Department of Labor, *op. cit.*, p. 178.

[17] *Ibid.*, p. 167.



SOURCE: National Science Foundation; appendix tables 3-2 and 3-5

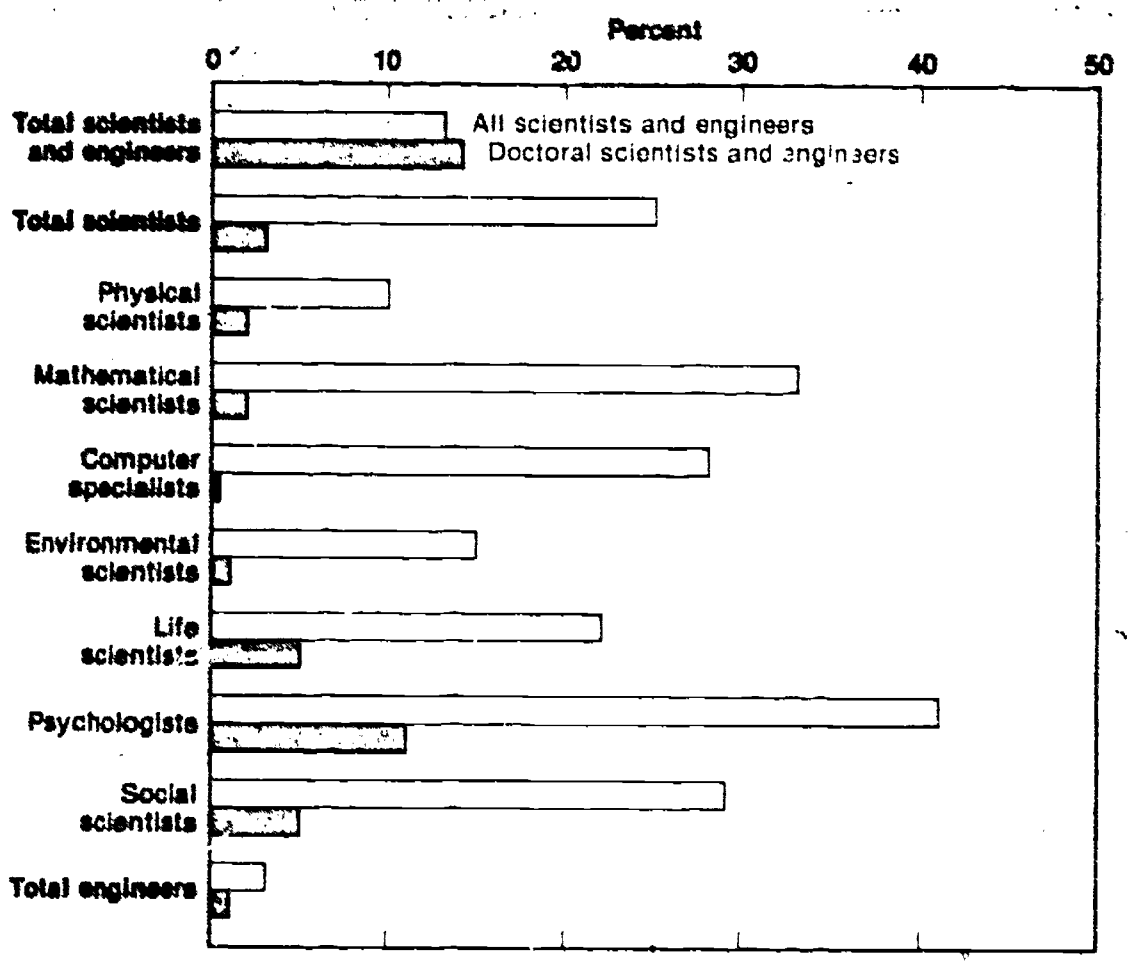
all engineers. The representation of women among science fields ranged from around 10 percent of all physical scientists to 41 percent of all psychologists (chart 14).

While employment of women showed increases in all major S/E fields, there was substantial variability. Below-average growth was recorded in the physical and social sciences and psychology, while the largest relative increase was recorded by computer specialties. It is interesting to note that about one-third of the total increase in the employment of women scientists and engineers since 1976 was accounted for by computer specialists.

Women doctorates are concentrated in the life and social sciences and psychology while male Ph.D.'s are more likely to be in life or physical sciences and engineering. The fields with the greatest relative growth of women doctorates were engineering, where employment of women increased from 140 in 1973 to 1,100 in 1983, and computer specialties, where the increase was from 100 to 1,300 over the same period. Despite rapid growth in these fields, only about 2 percent to 3 percent of the women holding doctorates were computer specialists or engineers in 1983. Over 80 percent of the increase in employment of women doctoral scientists and engineers took place in three major fields: life sciences, psychology, and social sciences. Over the 1973-83 period, the field distribution of women with doctorates changed slightly: women were more likely to be social scientists or computer specialists, and less likely to be mathematical or physical scientists in 1983 than a decade earlier.

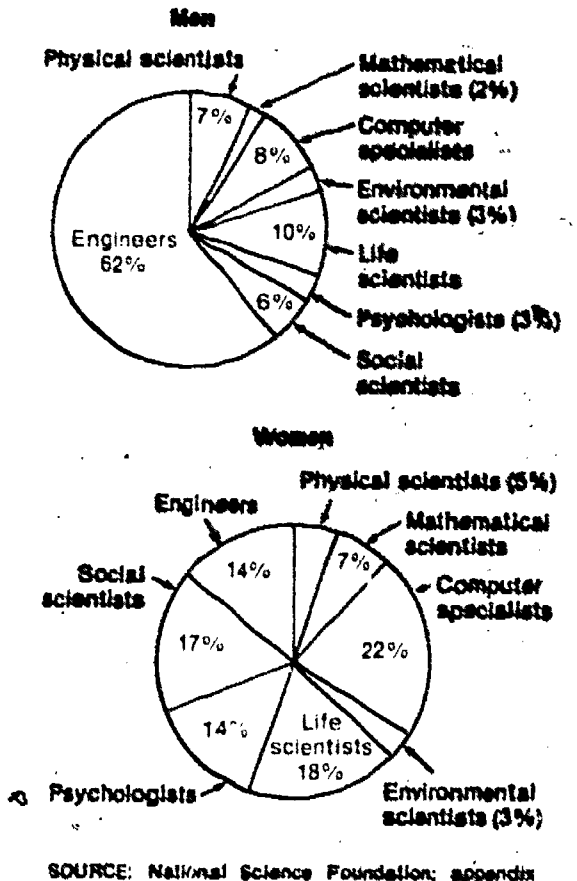
The field distributions of employed female and male scientists and engineers

Chart 14. Women as a percent of employed scientists and engineers: 1983



SOURCE: National Science Foundation; appendix tables B-2 and B-5

Chart 15. Employed scientists and engineers by sex and field: 1983



SOURCE: National Science Foundation; appendix table B-2

differ (chart 15). An "index of dissimilarity," which is a summary measure of overall differences between two distributions may be used to quantify field variations between two groups. An index value of zero would imply identical field distributions, while a value of 100 would indicate "perfect" dissimilarity. Between male and female scientists and engineers, the 1983 index of dissimilarity was 50. This statistic means that 50 percent of the women would have to change fields or occupations to have a distribution identical to that of men. If engineers are eliminated from the analysis, the difference narrows and the index falls from 50 to 26. Overall, the dissimilarity index has remained relatively constant since 1976. In 1978, the index for male and female scientists and engineers was 55. With engineers eliminated from the analysis, the 1976 index dropped to 29.

Differences between sexes in the field distribution for doctoral scientists were larger than the differences for scientists at all educational levels combined. The index of dissimilarity for doctoral scientists was 29 in 1983, compared with 26 for those at all degree levels. In 1979, the dissimilarity index was 30 for doctoral scientists.

racial minorities in science and engineering

Employment levels and trends. Blacks, Asians, and native Americans differ in representation among scientists and engineers, in representation in the general population, and in employment characteristics. Thus, any discussion of minorities in science or engineering should distinguish among various racial (or ethnic) groups.

Blacks are underrepresented in science and engineering. While blacks constituted only 2.4 percent (83,000) of all employed scientists and engineers in 1983, they accounted for 9 percent of total U.S. employment and over 6 percent of all employed professionals.[18] The representation of native Americans among scientists and engineers is roughly equal to that in the total U.S. labor force. Native Americans represented about 0.4 percent (13,500) of all scientists and engineers and about 0.5 percent of the total U.S. labor force.[19] Data for native Americans should be viewed with

[18] Ibid.

[19] Data for Native Americans and Asians are from Department of Commerce, Bureau of the Census, *Detailed Occupation and Years of School Completed by Age for the Civilian Labor Force by Sex, Race, and Spanish Origin: 1980*, Supplementary Report #PC 80 S1-8, 1980 Census of the Population (Washington, D.C., 1983).

caution, however, since the estimates for both scientists and engineers and for the overall U.S. labor force are based on an individual's own classification with respect to his or her native American heritage; such perceptions may change over time. Asians, unlike other minority groups, are represented in higher proportions in S/E fields than in the overall U.S. labor force, 4.2 percent versus 1.6 percent, respectively. In 1983, there were 145,000 Asian scientists and engineers.

Over the 1976-83 period, employment of black scientists and engineers increased more than twice as rapidly as the employment of whites (119 percent versus 49 percent), while the employment of Asians increased less rapidly (36 percent). Among blacks, significant gains were recorded by computer specialists whose number increased almost seven times to 12,000 and engineers, whose number more than doubled to about 35,000.

At the doctoral level, employment of blacks, Asians, and native Americans also increased more rapidly than that of whites. Between 1973 and 1983, employment of black Ph. D's more than doubled (2,000 to 4,900), and that of Asians tripled (to about 30,000). Among whites, doctorate employment increased 62 percent (from 202,200 to 328,500). More recently (1981-83), employment growth of both blacks and Asians doctorates—17 percent and 9 percent, respectively—was greater than that of whites, 6 percent.

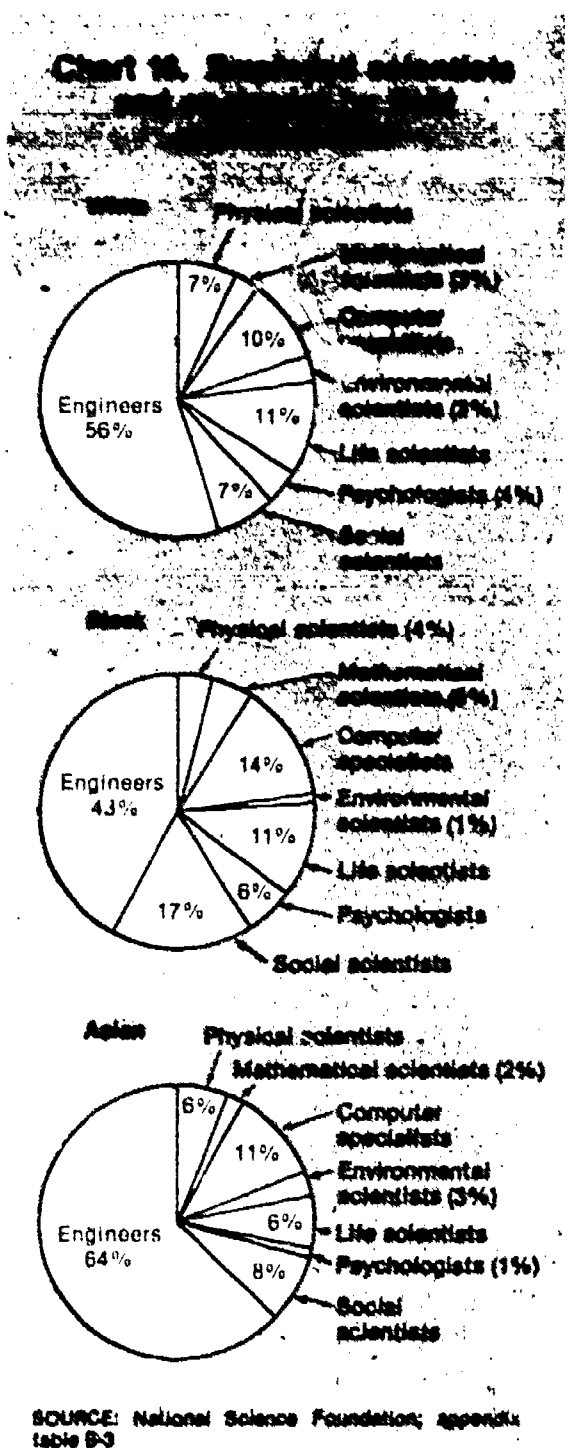
Despite rapid growth in employment, blacks in 1983 represented only about 1.3 percent of all employed doctoral scientists and engineers, up slightly since 1973 (0.9 percent). The almost 30,000 employed Asians in 1983 represented about 8 percent of the total, up significantly from 5 percent in 1973.

Field Field distributions among racial groups vary between engineers and scientists and across fields of science. Across all races, over one-half of all employed scientists and engineers in 1983 were engineers, ranging from over three-fifths of the Asians to over two-fifths of the blacks (chart 16).

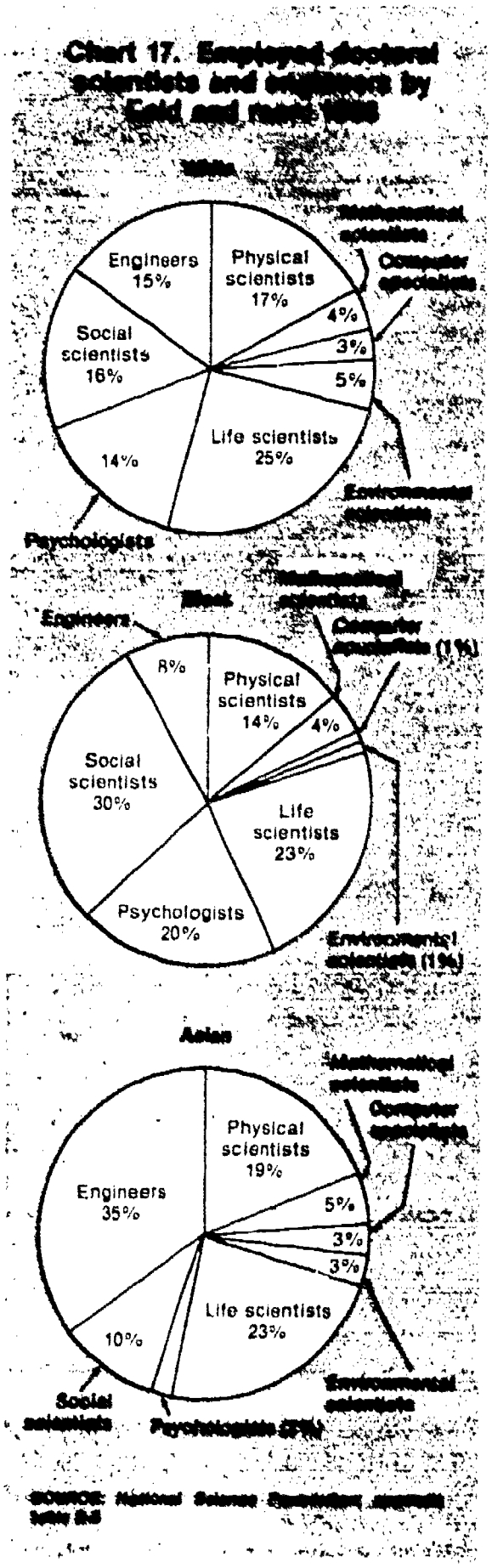
There are wide field variations in the sciences across racial groups. Blacks are more likely than whites or Asians to be social scientists. About one-quarter of the black scientists were computer specialists in 1983, as were roughly 22 percent of the whites and 30 percent of the Asians. The index of dissimilarity may be used to summarize general field differences among racial groups. The index between whites and blacks in 1983 was 19; that is, about 19 percent of the blacks would have to change fields or occupations to have a distribution identical to that of whites. The index of dissimilarity between whites and Asians was 11.

The differences in field distributions across groups affects minority representation in various fields (appendix table B-3). For example, while only 2.4 percent of all scientists and engineers were black in 1983, about 6 percent of all social scientists were black. Asians, again by way of example, represented over 4 percent of all scientists and engineers, but only about 1 percent of all psychologists.

Among doctoral scientists and engineers, the various racial groups are also distributed differently between engineers and scientists and across fields of science (chart 17). A larger proportion of



SOURCE: National Science Foundation; appendix table B-3



blacks than of whites and Asians were social scientists and psychologists in 1983, while a large share of Asians were engineers and physical scientists. The index of dissimilarity between black and white doctoral scientists and engineers in 1983 was 22; between Asians and whites, it was 24. The index has remained relatively unchanged since 1979 when the dissimilarity index was 20 between black and white doctoral scientists and engineers and 26 between Asians and whites.

Field distributions at the doctoral level have changed over time with some variation by race. The proportion of whites in the social sciences and psychology increased between 1973 and 1983 from 25 percent to 30 percent. Over the same period, the proportion of blacks increased from 32 percent to 50 percent. Among Asians, the field distributions showed relatively less change between 1973 and 1983 than for other races. The proportion who were engineers increased, while reductions were noted in most other fields, especially life and physical sciences.

hispanics in science and engineering

Hispanics are a diverse ethnic group and it is desirable to distinguish between Mexican Americans, Puerto Ricans, and other Hispanics, since their socioeconomic backgrounds and reasons for underrepresentation may differ. Because of data limitations, however, the discussion on Hispanics in this report treats them as an aggregate.

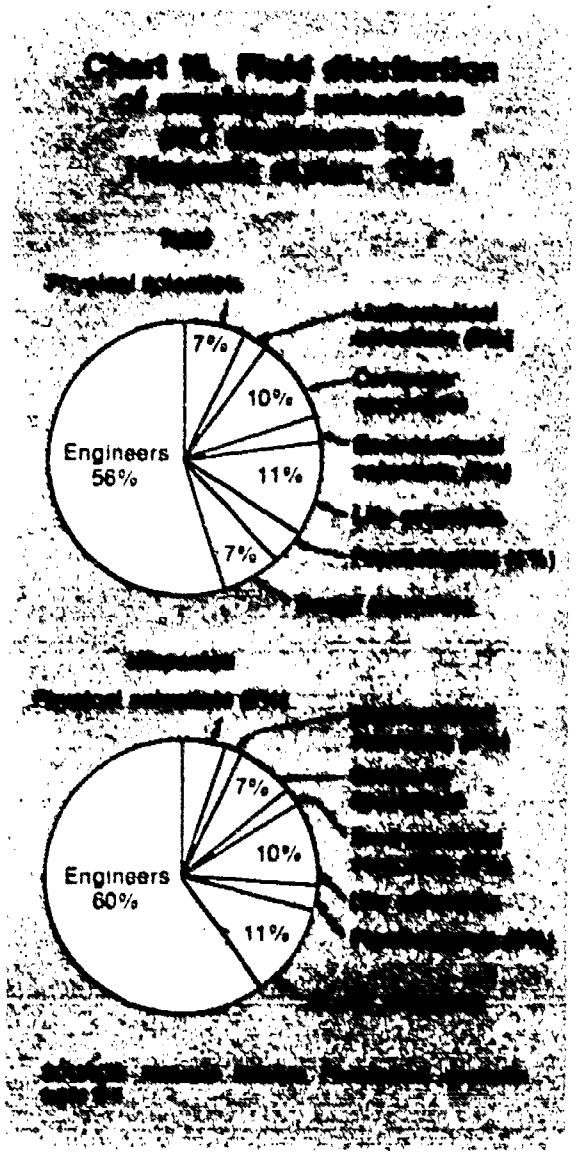
In the early eighties, over 25 percent of the Hispanic scientists and engineers were Mexican American and about 19 percent were Puerto Rican. Over one-half (53 percent) were "other Hispanics," a category that includes individuals whose origins are in Spain or the Spanish-speaking countries of Central and South America. Also included in this category are those who identified themselves as Spanish, Spanish-American, Hispano, Latino, etc. The remainder did not report the origin of their Hispanic heritage.[20]

[20] Estimates are based on the *1982 Postcensal Survey of Scientists and Engineers* (Washington, D.C.: Department of Commerce, Bureau of the Census).

Employment levels. Hispanics are underrepresented among scientists and engineers. In 1983, about 2 percent of all employed scientists and engineers were Hispanic. Over 5 percent of all employed persons were Hispanic, however, as were 2.5 percent of all workers in professional specialty occupations.[21]

Hispanics are also underrepresented among doctoral scientists and engineers. The 5,400 Hispanic Ph. D.'s in 1983 represented about 1.5 percent of the total, up from 1,200, or 0.6 percent, in 1973.

[21] Department of Labor, *op. cit.*, p. 178.



Field. The field distribution of Hispanics differs from that of all scientists and engineers (chart 18). About three-fifths of the Hispanics in 1983 were engineers rather than scientists, higher than the the overall S/E split. Hispanic scientists are somewhat more likely to be social scientists and less likely to be mathematical scientists.

At the doctoral level, the field distribution of Hispanics is similar to that for all doctoral scientists and engineers. Hispanics, however, are somewhat less likely than non-Hispanics to be physical or life scientists and somewhat more likely to be engineers or social scientists.

physically handicapped in science and engineering

As part of the surveys underlying the employment and related data in this report, respondents were asked if they were physically handicapped and, if so, to specify the nature of their disability (visual, auditory, ambulatory, or other). There were fairly high nonresponse rates to questions relating to handicap status; in the largest survey, for example, about one-half of the respondents did not answer the questions. Consequently, data pertaining to handicap status should be viewed with caution.

Among those reporting physical handicaps, 28 percent reported ambulatory, 23 percent visual, and 18 percent auditory disabilities. The remainder (about 30 percent) did not specify the nature of their handicap.

In 1982, the latest year for which data are available, about 85,000 scientists and engineers (about 2.4 percent) reported a physical disability. The field distribution of handicapped scientists and engineers is similar to that for all scientists and engineers.

One of the most striking differences between handicapped and nonhandicapped scientists and engineers was the tendency of the former to be out of the labor force. In 1982 almost 20 percent of the physically handicapped, but only 5 percent of all scientists and engineers, were not in the labor force; that is, either not working or not looking for jobs.

chapter II.

labor market indicators

Labor market indicators are useful in assessing whether the current labor supply is sufficient to meet the needs of the economy. In addition to standard labor market indicators such as labor force participation and unemployment rates, NSF has developed measures unique to scientists and engineers, including S/E employment rates, S/E underemployment rates, and S/E underutilization rates. No single statistic can provide a basis for measuring surpluses and shortages of scientists and engineers in particular fields, but some statistics, when examined together, allow inferences about the market conditions for scientists and engineers.

The statistics outlined above as well as others examined in the text reveal a tight market for engineers and computer specialists and, at least, adequate supplies in other science fields. For social scientists and psychologists, the indicators show supply in excess of demand.

labor force participation

The S/E labor force includes scientists and engineers who are employed, either in or out of science and engineering, and those who are unemployed and seeking employment (table 3). The labor force is a measure of those who are economically active and thus directly available to carry out national efforts in science and technology. Labor force participation rates measure the fraction of the S/E population in the labor force. Low rates would suggest that many of those with S/E training and skills are not using these skills in S/E jobs or in any other job.

Scientists and engineers continued to display a strong attachment to the labor force in 1983, with 3.5 million (95 percent) of the S/E population participating. This rate is higher than that for the general population with four or more years of college (87 percent).[22] The difference in participation rates cannot be accounted for by differences in the sex composition of S/E versus the general population. Stratification by sex shows that S/E women have significantly higher rates of labor force participation than women in the total civilian labor force who have completed four or more years of college (93 percent versus 77 percent, respectively). Moreover, the labor force participation of women in S/E fields is almost equal to that of men (95 percent).[23]

By field, labor force participation rates vary in a fairly narrow range, with computer specialists showing the highest rate (98 percent). Variations in rates primarily reflect differences in age across fields. On average, computer specialists are younger than other scientists or engineers. Most scientists and engineers not in the labor force (60 percent) are retired. Others are out of the labor force because of family responsibilities, poor health, or other reasons.

Table 3. Science and engineering labor force: 1976 and 1983 [in thousands]

Year	Labor force	Total employed	Unemployed
1976 . . .	2,413.3	2,331.2	82.1
1983 . . .	3,544.5	3,465.9	78.6

SOURCE: National Science Foundation; appendix table B-2

[22] Department of Labor, Bureau of Labor Statistics, "Record Increase In Workers With College Degrees," *News* (USDL 83-365)(Washington, D.C., August 28, 1983).

[23] *Ibid.*

unemployment rates

The unemployment rate, a standard measure of labor market conditions indicates the proportion of those in the labor force who are not employed but seeking employment. In 1983, the unemployment rate for scientists and engineers was 2.2 percent, down from 3.4 percent in 1976. In 1983, the S/E unemployment rate was substantially below that for the total U.S. labor force (9.6 percent) and lower than that for all professional workers (3.0 percent).[24]

There was some variation in unemployment rates among S/E fields (chart 19). The highest unemployment rate was recorded for social scientists (4.9 percent); the lowest, for computer specialists (1.1 percent).

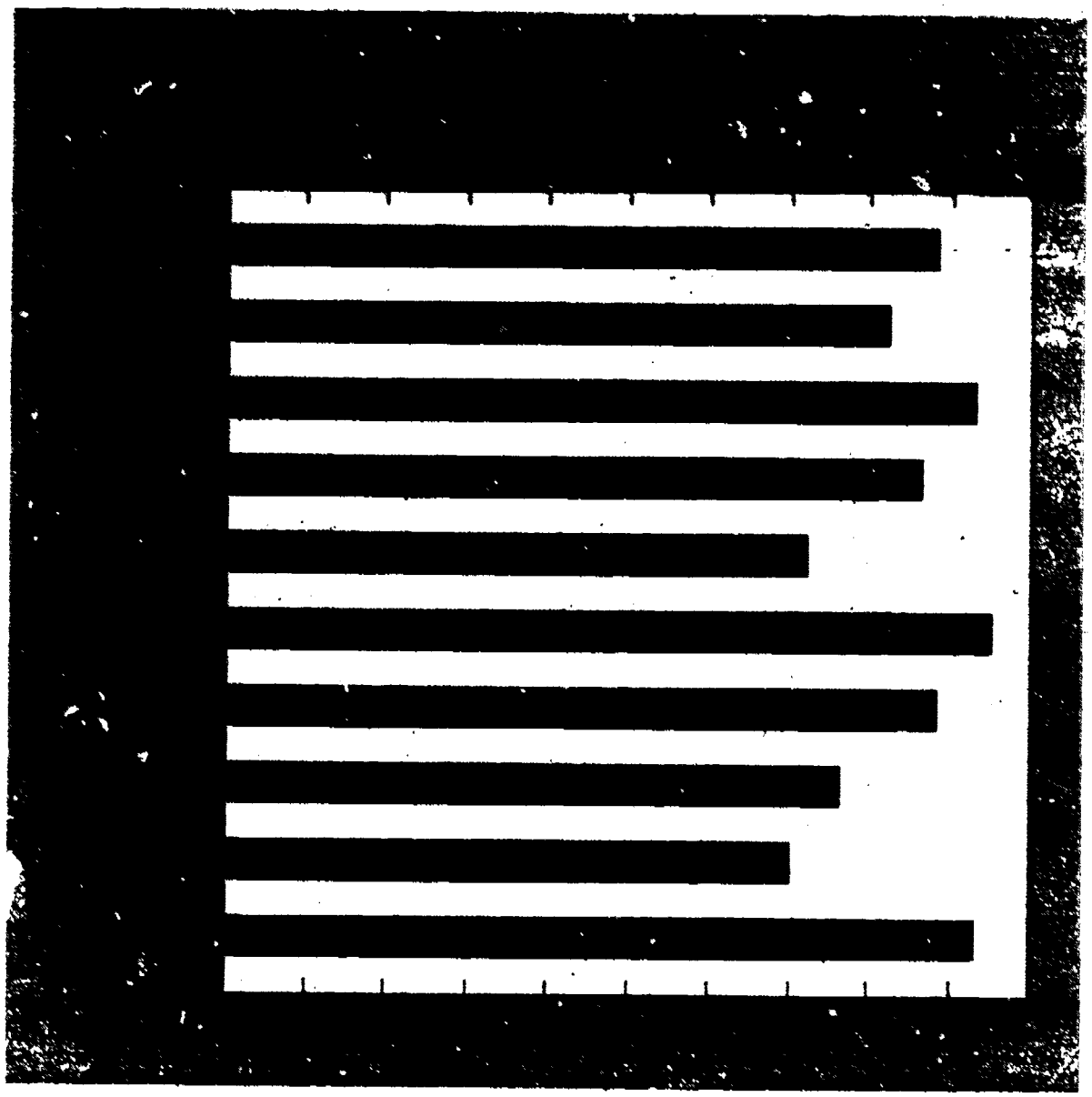
Unemployment among recent S/E bachelor's graduates also varied by field. When 1980 and 1981 graduates were surveyed in 1982, about 6 percent were unemployed, with the rate for scientists (7.2 percent) more than twice that for engineers (3.0 percent). As with all scientists and engineers, the lowest rate was recorded for computer specialists (1.6 percent), and the highest rate for social scientists (8.5 percent). A similar pattern is evident among recent master's-degree recipients, although their overall rate is lower (3.7 percent).

s/e employment rates

The S/E employment rate measures the extent to which employed scientists or engineers have a job in science or engineering. Depending on the specific reasons for non-S/E employment, a low S/E employment rate could be an indicator of underutilization. Factors relating to non-S/E employment include lack of available S/E jobs, higher pay for non-S/E employment, or preferences, in location or for jobs outside of science or engineering.

In 1983, the S/E employment rate was 88 percent, with substantial variation by field (chart 20). Rates for engineers (93 percent) were well above those for scientists (82 percent). Within science fields, the rates ranged from 70 percent in the social sciences and computer specialties to 95 percent in the environmental sciences. The relatively low S/E employment rate for computer specialists suggests that a substantial number may be applying their skills to commercial activities rather than to more traditional

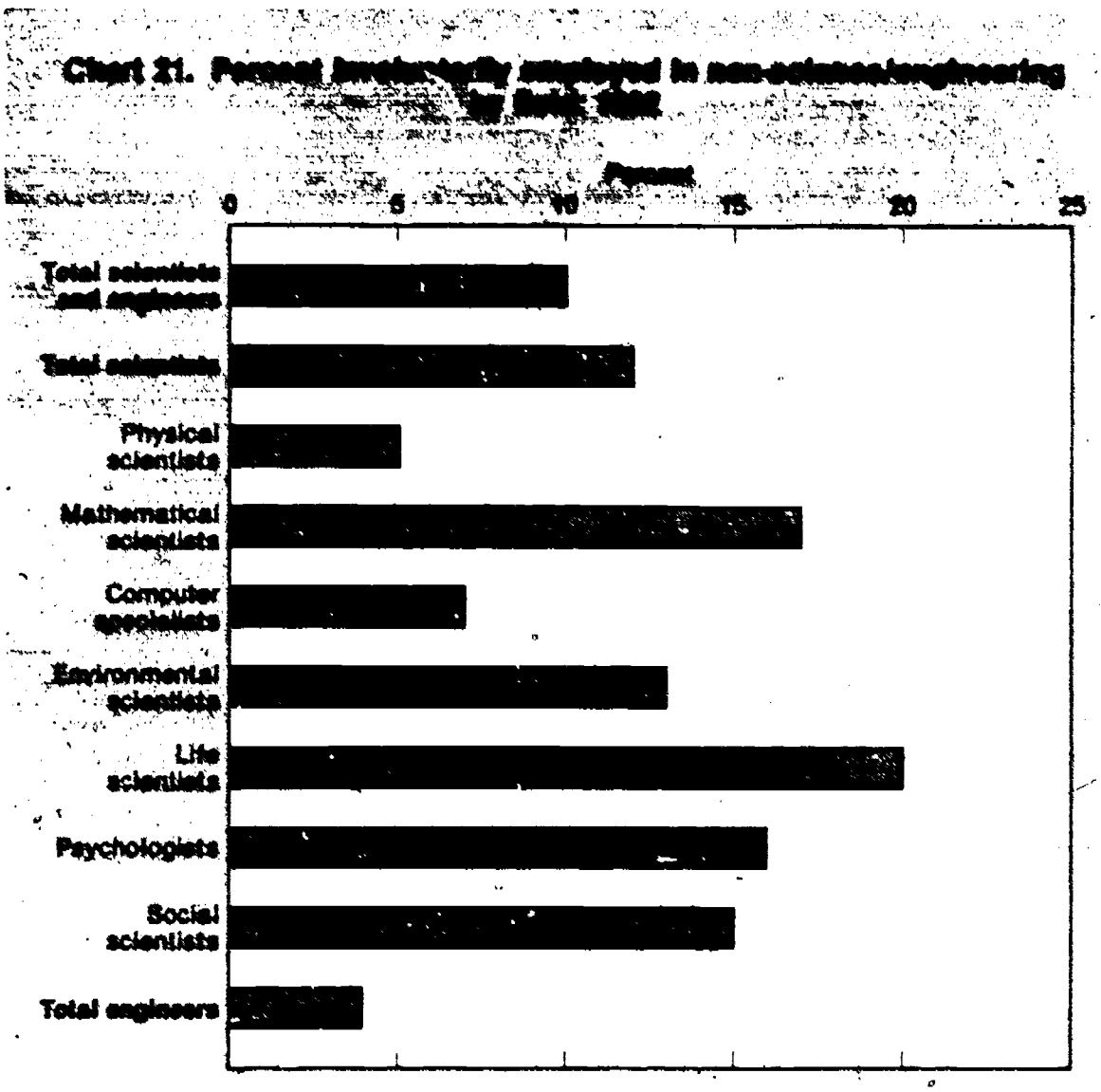
[24] Department of Labor, Bureau of Labor Statistics, *Employment and Earnings*, Vol. 31, No. 1, January 1984, p. 167.



S/E activities such as research and development. The S/E employment rate has declined slightly since 1976 when it was 91 percent.

Relatively few scientists and engineers (about 10 percent) hold non-S/E jobs because they believe S/E jobs are not available. The proportion "involuntarily" in non-S/E jobs, however, varies by field (chart 21).

Employment rates for recent S/E graduates at both the bachelor's and master's levels are below those for more experienced scientists and engineers regradless of degree attained. S/E employment rates, however, increase with additional education reflecting higher levels of investment in field-specific training. Among recent S/E graduates at the bachelor's level, the S/E employment rate was 60 percent, with the rate for engineers (88 percent) above that for scientists (50 percent). For science graduates, the S/E employment rate ranged from 91 percent for those who majored in computer science to 26 percent for psychology graduates. Although rates were higher for master's-degree recipients (74 percent), the same general pattern prevailed. Rates for engineers (87 percent) were above those for scientists (68 percent), and the lowest rate was recorded by psychology graduates (45 percent). The relatively low rates at the bachelor's level for some fields may reflect entry-level job requirements for advanced degrees.



SOURCE: National Science Foundation, unpublished data

s/e underemployment rates

Although unemployment rates for scientists and engineers are relatively low compared with the rates for the general population, those who are employed may be underemployed. Working in a non-S/E job or working part-time may indicate underemployment, depending on the reasons for such employment. To help measure the extent of potential underemployment, an S/E underemployment rate has been developed. This rate is defined as those who are involuntarily in non-S/E jobs or involuntarily working part-time as a percent of total employment.

The underemployment rate for scientists and engineers in 1983 was 1.9 percent, with substantial variation by field. In general, scientists were more likely than engineers to be underemployed, and among scientists, social scientists and psychologists were more likely than physical and environmental scientists and computer specialists to be underemployed.

s/e underutilization rates

To derive a more comprehensive indicator of potential underutilization, figures for those unemployed and those underemployed can be combined and expressed as a percent of the labor force. It is only a partial measure, however, since it does not take into account the number of scientists and engineers who may have jobs requiring skills below those that the job-holders actually possess.

In 1983, the derived underutilization rate for scientists and engineers was 4.1 percent. The rate for engineers (2.5 percent) was less than one-half that for scientists (6.1 percent) and among scientists, the highest underutilization rates were reported for psychologists and social scientists, roughly 10 percent each.

salary trends

Relative salaries and changes in salaries, especially starting salaries, can be indicators of market conditions. Fields in which demand is greater than supply can be expected to have salaries above those for fields in which the supply may be greater than demand, this is especially true of starting salaries for new labor force entrants.

Salaries for scientists and engineers vary by field, with salaries for engineers generally higher than those for scientists. In 1982 (the last year for which data are available), engineers reported average annual salaries of $35,700 compared to $32,000 for scientists. Among scientists, only environmental scientists ($37,400) reported annual salaries above those for engineers. Salaries of social and life scientists, and psychologists were below the average for all scientists.

Increases in engineering salary offers to recent graduates ranged from 5 percent to 16 percent between 1981 and 1983.[25] Petroleum engineering continued to command the highest offers, averaging about $2,500 a month, 16 percent above the 1981 figure. Among science graduates, starting salary offers ranged from $1,900 a month for those who majored in computer science (12 percent above 1981 levels) to $1,400 a month for agricultural science majors (7 percent above 1981 levels).

[25] College Placement Council, *CPC Salary Survey*, Formal Report No. 3 (Bethlehem, Pa., July 1983), p. 2.

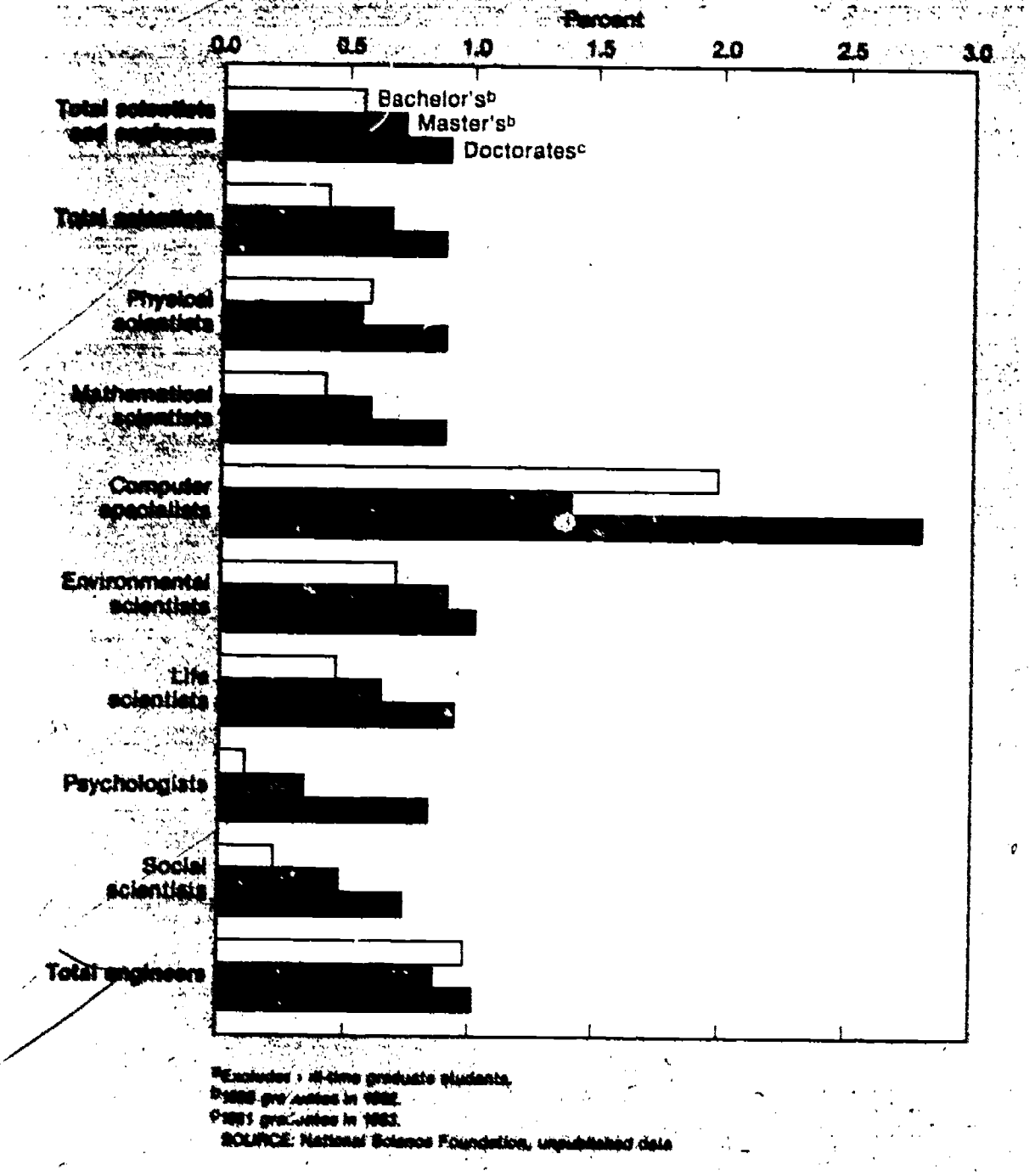
other indicators

The adequacy of recent S/E degree production to meet demand can be estimated, within certain limits, by the ratio of employment (classified by field) to the labor force (classified by field of degree). Chart 22 shows the ratio of S/E bachelor's and master's recipients employed in a certain field, relative to the number of graduates in that field who entered the labor force. A ratio of 1.0 suggests a balanced supply/demand condition in which all degree recipients gain employment in their degree field. Ratios of less than 1.0 suggest relative excess supply, i.e. insufficient job opportunities are available for new graduates in a particular field, making it necessary for them to find employment in another. On the other hand, ratios of more than 1.0 indicate relative excess demand, i.e., jobs for new graduates exceed degree production in a particular field, requiring graduates to be drawn from other programs.

These data indicate a relative supply/demand balance in engineering and an excess supply in most science fields except computer specialties. The index for engineering should be interpreted with some caution, however, since the nature of engineering jobs may make it difficult for those trained in other fields to work as engineers. The data also suggest that the relative imbalances are somewhat smaller at the master's level, although the strong demand for computer specialists is also evident among advanced-degree recipients.

The High Technology Recruitment Index (HTRI) is also an indicator of S/E market conditions. The HTRI measures the amount of advertising space devoted to recruiting scientists and engineers. Starting in 1970, the index measured 60 (chart 23). After a drop in 1971, the index steadily increased until 1974, when it dropped sharply.[26] In 1975, it began another steady increase. Demand may have peaked in 1979 at a 10-year high of 144; in 1983, the index dropped to 102. Data for the first quarter of 1984, however, suggest that demand for scientists and engineers is increasing.

Chart 22. Ratio of recent science/engineering-degree recipients[a] employed in field relative to graduates in field who entered the labor force



[a] Excludes < all-time graduate students.
[b] 1982 graduates in 1982.
[c] 1981 graduates in 1982.
SOURCE: National Science Foundation, unpublished data

To help measure market conditions for scientists and engineers, NSF periodically surveys industrial firms employing large numbers of scientists and engineers. Based on the latest survey,[27] nearly one-half (46 percent) of the firms reported fewer openings for scientists and engineers during the 1982-83 recruiting year compared with the 1981-82 period. Only 20 percent of employers reported more openings in 1982-83 and 34 percent reported no change.

The decline in job openings was a primary reason for the reduction in reported shortages of scientists and engineers. As many as 60 percent and 30 percent of employers in the 1980-81 and

[26] Based on data from Deutsch, Shea, and Evans, *High Technology Recruitment Index* (New York, N.Y.: Deutsch, Shea, and Evans, Inc., 1984).

[27] National Science Foundation, "Industry Reports Shortages of Scientists and Engineers Down Substantially From 1982 to 1983," *Science Resources Studies Highlights* (NSF 84-303) (Washington, D.C., February 17, 1984).

1981-82 recruiting years, respectively, reported shortages in some S/E fields. For no single S/E occupation, however, was a short supply reported during the 1982-83 year by more than 10 percent of the surveyed companies. The proportion of employers experiencing any shortage, regardless of field, also fell substantially—from 60 percent of firms surveyed in 1981 down to 28 percent of those surveyed in 1983.

The preponderance of reported shortages was for experienced personnel rather than for new graduates. Over 65 percent of the shortages reported for scientists and engineers were for experienced personnel.

Projected recruiting for the 1983-84 period was relatively high (new hires at between 10 percent and 15 percent of current employment levels) for several fields, including computer engineers, electrical engineers, electronics engineers, manufacturing engineers, and computer scientists (table 4).

Table 4. Demand projected by employers for scientists, engineers, and technicians: 1983-84

Field	Projected demand[1]
Computer engineers	High
Computer scientists	High
Electronic engineers	High
Electrical engineers	High
Electrical/electronic technicians	High
Systems analysts	Moderate
Industrial engineers	Moderate
Computer programmers	Moderate
Mechanical engineering technicians	Moderate
Chemical engineers	Low
Civil engineers	Low
Mechanical engineers	Low
Chemists	Low
Drafters	Low

[1]High projected hiring between 10 percent and 15 percent of current employment levels; moderate-projected hiring between 5 percent and 9 percent of current employment levels; and low-projected hiring less than 5 percent of current employment levels. Data not sufficient for fields not shown.

SOURCE: National Science Foundation

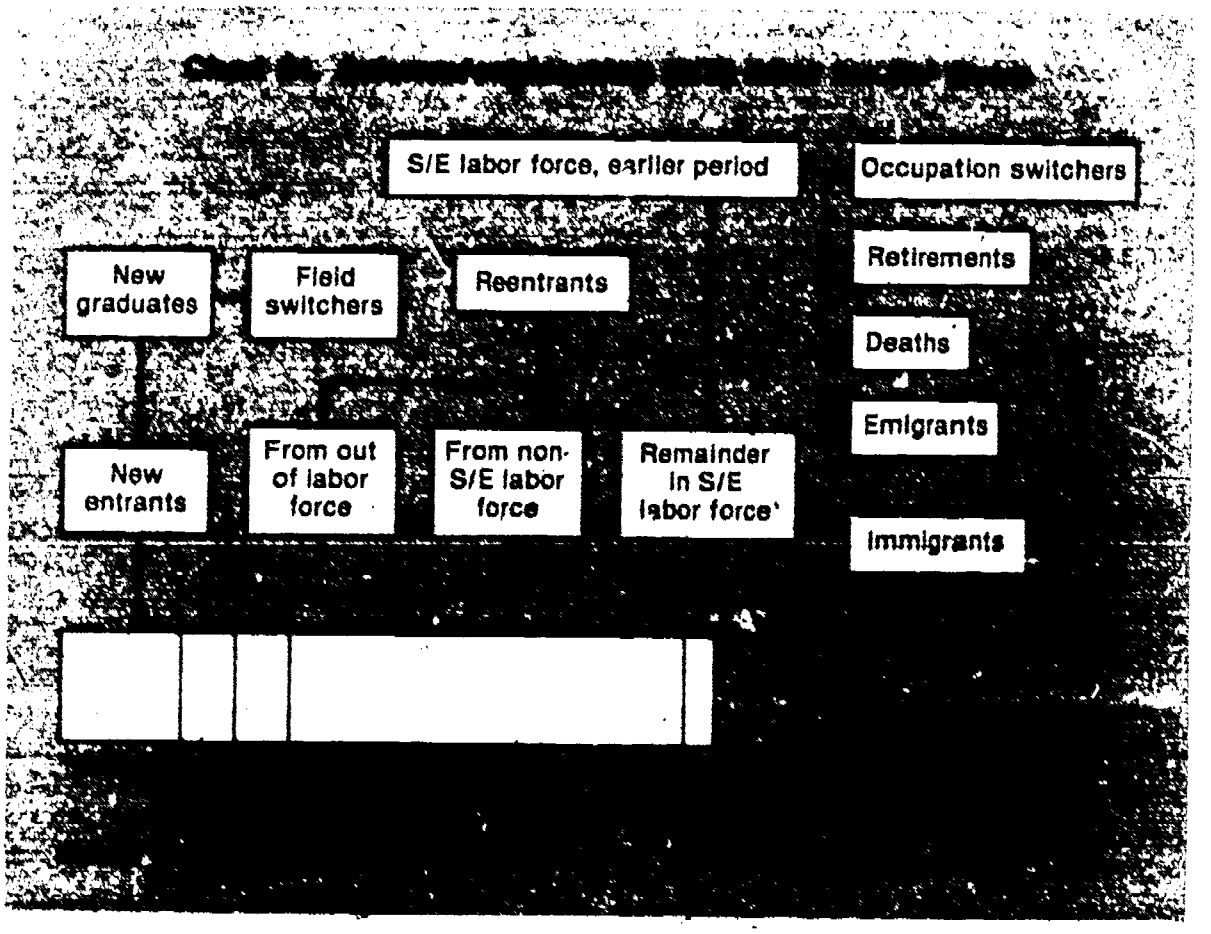
chapter III.

the dynamics of s/e labor markets

This chapter examines supply flows in and out of science and engineering, beginning with the experiences of the potential pool of future scientists and engineers and ending with the sources of loss to the S/E labor market. These flows act as equilibrating forces in the marketplace by providing the self-correcting mechanisms needed to bring supply and demand into balance. Such flows signal future supply conditions to those making career plans, those responsible for recruiting activities, those engaged in planning academic programs, and those responsible for developing Federal policies on science and technology.

Students develop their initial mathematics and science skills at the precollege level, and these skills are an important precondition for entry into S/E programs at universities and colleges. In that connection, this chapter presents information on the mathematics and science achievement levels and on coursetaking habits of precollege students. This discussion is followed by an examination of S/E degree production patterns over the last decade.

The discussion concludes with a review of the direct sources of flow into and out of science and engineering (chart 24)—new graduate entrants to the labor force, occupational mobility, and separations from the labor force. These movements form the bulk of the supply changes in the S/E labor market. The flows not dealt with—reentrants of scientists and engineers from outside the labor force, entrants and reentrants from the non-S/E labor force, and immigration and emigration—are relatively small components of total flows and are not expected to assume major roles in the future. Finally, the discussion examines the projected supply/demand conditions for scientists and engineers.



the s/e pipeline

The S/E "pipeline" begins with a student's first experiences with mathematics and science at the elementary level and ends when this same student becomes a productive member of the S/E labor force. There are many critical junctures where decisions are made as to whether a student will continue on a science and mathematics educational track or "drop out" to pursue other educational and/or career opportunities. The following discussion will trace the S/E pipeline by examining educational characteristics at the precollege, undergraduate, and graduate levels.

precollege science and mathematics education

A student's decision to pursue an undergraduate S/E program and subsequently an S/E career is significantly influenced by the extent of exposure to science and mathematics courses at the precollege level. Limited exposure could inhibit acceptance into an S/E undergraduate program for several reasons. For example, without adequate grounding in basic science and mathematics, a student would not be able to compete effectively in S/E programs at the undergraduate level. In addition, a student with little experience in science and mathematics would have a limited awareness of S/E career opportunities. Several variables will be explored to determine recent trends in precollege science and mathematics education, including the number and type of science and mathematics courses taken in high school, the influence of curriculum placement in science and mathematics coursetaking, and scores on standardized tests measuring science and mathematics achievement both at the elementary and secondary school levels.

Science and mathematics coursework. Decisions as to how much and what type of science and mathematics coursework to take in high school represent crucial points in the S/E pipeline. As science and, especially, mathematics coursework follows a progression, these decisions, which are made early in high school, are pivotal in determining future access to S/E programs.

For those sophomores in 1980 who subsequently graduated from high school in 1982, well over one-half had taken three or four mathematics courses (chart 25).[28] In addition, about one-third of the 1982 seniors had taken two science courses and another one-quarter had taken three science courses (chart 25).

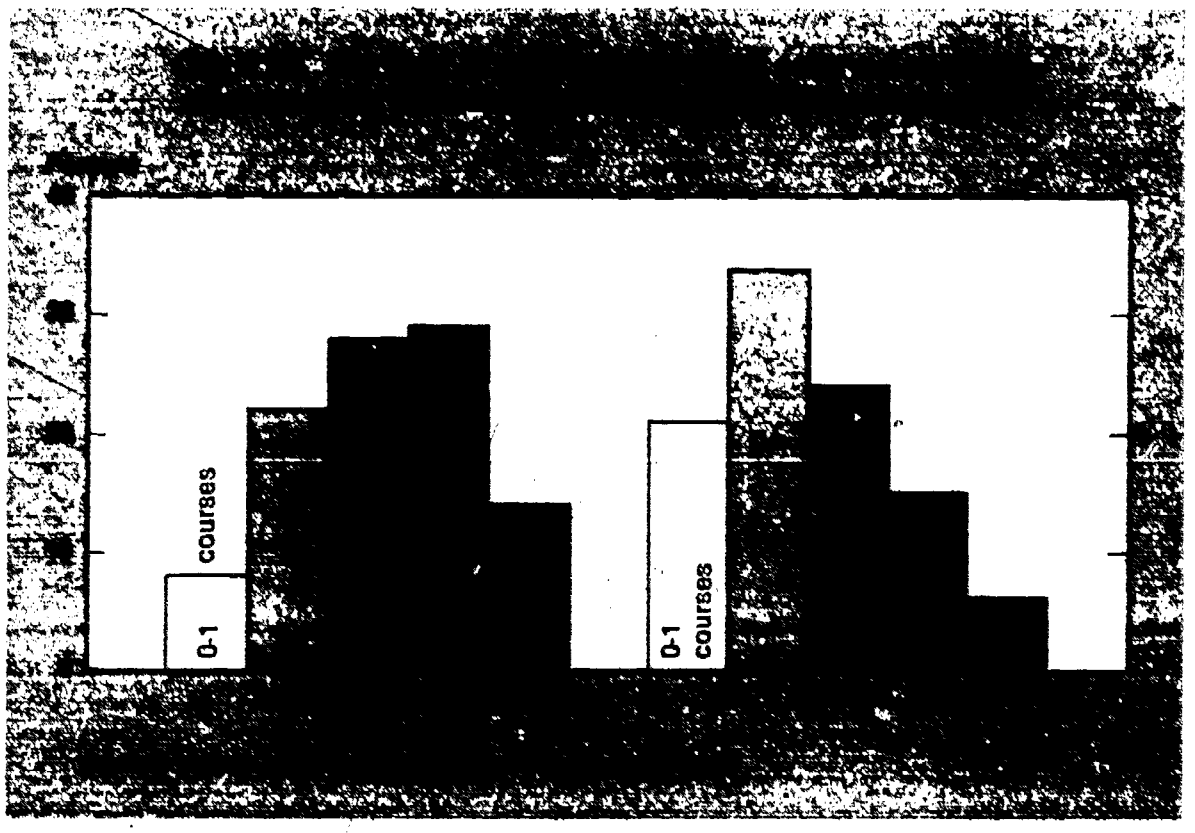
Curriculum placement is a significant factor in determining how much mathematics and science a student will take. Students in academic programs generally take more of these courses than students on either general or vocational tracks (chart 26). For example, among the 1982 seniors who were in academic programs, over three-fifths had taken four or more mathematics courses. Comparable figures for students in general or vocational programs were about one-quarter and one-fifth, respectively. Students on academic tracks also take more science courses. About 53 percent of these students had taken three or four science courses compared to about 30 percent for those in general programs and only 23 percent for the vocational students.

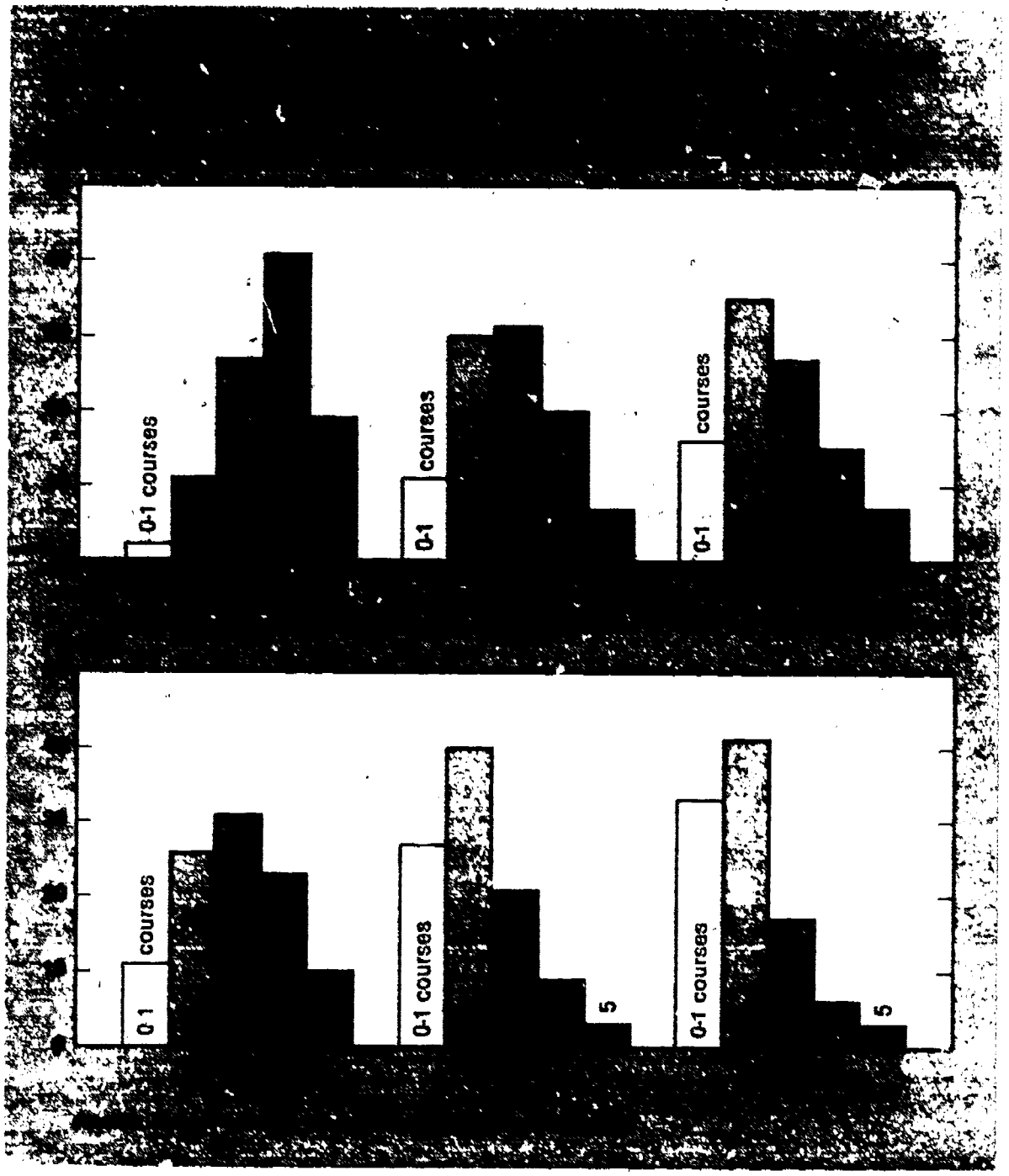
[28] All coursework and curriculum data for 1980 sophomores who graduated from high school in 1982 are from National Center for Education Statistics, *High School and Beyond Tabulation: Mathematics Coursetaking By 1980 High School Sophomores Who Graduated in 1982* and *High School and Beyond Tabulation: Science Coursetaking By 1980 High School Sophomores Who Graduated in 1982* (Washington, D.C., April 1984).

Curriculum differences also exist in the types of mathematics and science courses taken (chart 27). In mathematics, most students—regardless of educational track—had taken Algebra I: 76 percent for those in academic programs, 64 percent of those in general programs, and 56 percent of those in vocational programs. Differences are more pronounced for more advanced mathematics courses. For example, over three-quarters of the academic students compared to less than two-fifths of the general students had taken geometry. Likewise for calculus, 13 percent of the academic students took this course, compared to less than 1 percent of either the general or vocational students.

Differences exist in types of science courses attempted (chart 27). Students in general or vocational programs were more likely to have taken a physical science[29] course than students in academic programs. Academic students, however, were more likely to have taken biology, advanced biology, physics, chemistry, and advanced chemistry than other students. In biology, the range was from 69 percent (vocational) to 87 percent (academic). Differences widen substantially for more advanced science courses, e.g., 57 percent of the academic students and

[29] Does not include chemistry and physics.





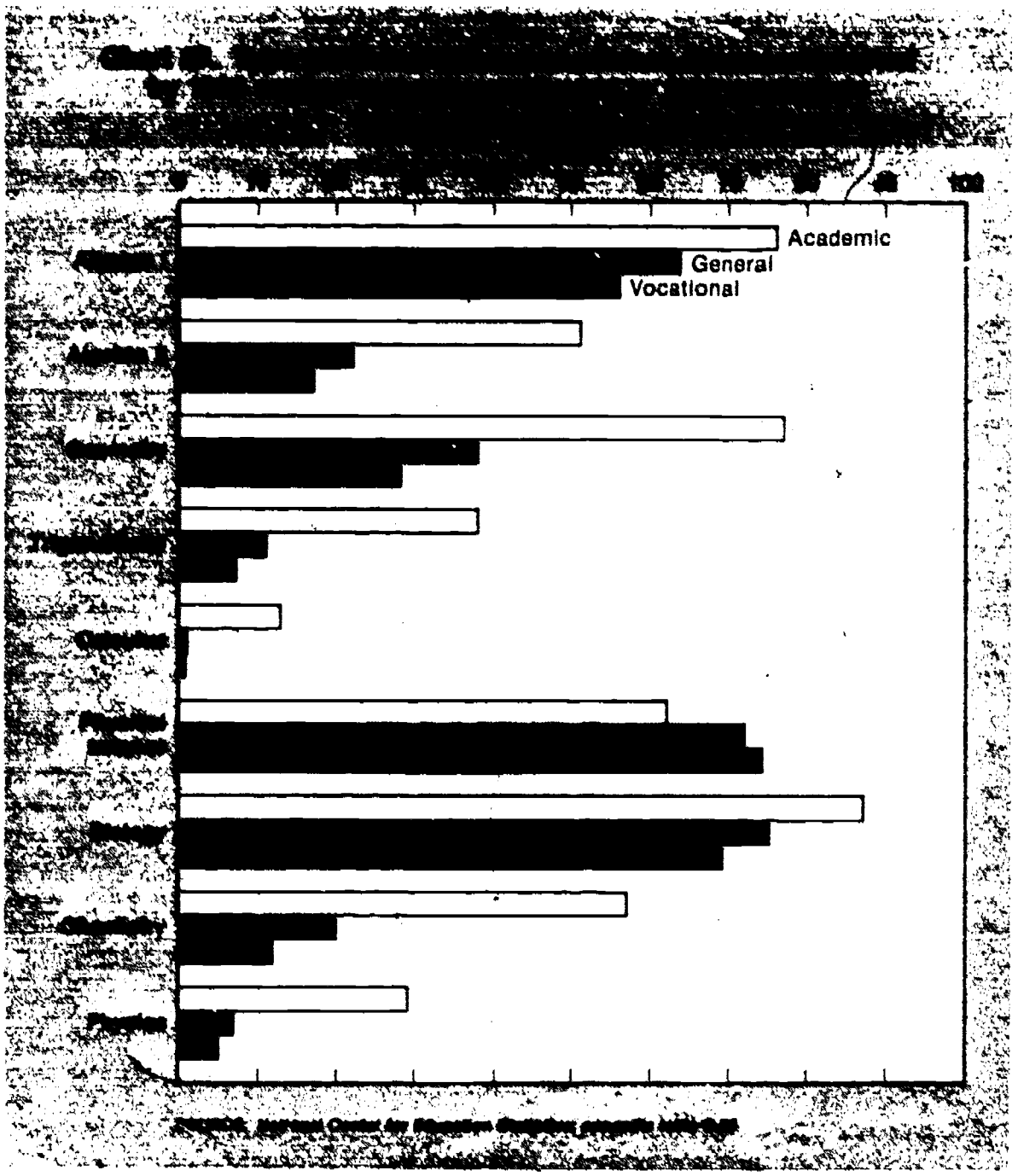
only 20 percent and 12 percent, respectively, of the general and vocational students had taken chemistry.

College-bound seniors—those students who take the Scholastic Aptitude Test (SAT) and answer the Student Descriptive Questionnaire administered by the Admissions Testing Program—take at least as much science and mathematics coursework as all students in academic programs. About one million, or approximately one-third of all high school graduates, take the SAT. Most are on academic tracks—three-quarters of those who took the SAT in 1982 were in either academic or college preparatory programs.[30] That year, over three-fifths of the college-bound seniors had taken four or more years of mathematics. In biology, about 60 percent had taken at least one year and over one-quarter had taken two years of biology. For the physical sciences (which include chemistry, physics, earth science, et.al.),[31] about 30 percent had taken at least one year and another 55 percent had taken two or three years.

Science and mathematics achievement. Another variable that may be explored in connection with precollege science and mathematics education is scores on standardized tests measuring general mathematics and science ability.

[30] Admissions Testing Program of the College Board, *Profiles, College Bound Seniors, 1982* (New York, N.Y.: College Entrance Examination Board, 1984), p. 97.

[31] *Ibid.*, p. 106.



In recent years, concern has arisen over the general decline in students' performance on various achievement tests in science and mathematics. An important source of information on this topic comes from assessments of achievement periodically administered by the National Assessment of Educational Progress (NAEP).

NAEP is designed to assess the achievement levels of precollege students in a number of cognitive areas including mathematics and science.[32] The objective of the assessments is to establish how specific groups of American students respond to academic exercises in each of these subjects rather than to measure the performance level of individual students. The assessments are administered periodically to three age groups: 9-, 13-, and 17-year-olds.

The National Assessment of mathematics measures achievement on four sets of exercises: (1) knowledge of mathematical fundamentals; (2) computational skills; (3) understanding of mathematical methods; and (4) application of mathematical principles (i.e., problem-solving ability). The science assessment also contains four components: (1) content-knowledge and skills in areas such as biology, physical science, and earth science (not administered at the 9-year-old level); (2) inquiry-understanding of scientific processes; (3) science-technology-society-the implications of science and technology for society; and (4) attitudes - students' orientation and feelings about science, primarily science classes.

The overall results of the most recent mathematics assessment show a slight increase in mathematical ability at the 9-year-old level, a substantial rise at the 13-year-old level, and a very slight decline at the 17-year-old level (table 5). Among 9-year-olds, the mean change in their performance was 1 percentage point between 1978 and 1982; this increase resulted primarily from a rise in performance on the knowledge component. Scores on the other components remained relatively stable. At age 13, scores rose significantly[33] on all four components, ranging from a 2.2-point rise on the applications portion to a 4.5-point rise on the knowledge component. For 17-year-olds, there was little change in scores on the knowledge, skills, and understanding components, but a 1.1-point decline on applications exercises.

With few exceptions, results of the science assessment show a general decline in performance at all three age levels (table 5). Between 1977 and 1982, the performance of 9-year-olds declined on the attitude and inquiry sections but rose

[32] Other areas include art, career and occupational development, citizenship, literature, music, social studies, reading, and writing.

[33] A "significant" change indicates that the change is statistically significant at the 0.05 level.

Table 5. Change in performance on mathematics and science achievement tests by age level and component

Component	9-year-olds	13-year-olds	17-year-olds
Mathematics (1978-82)			
Total	+ 1.0	+ 3.9[3]	− .2
Knowledge	+ 1.4	+ 4.5[3]	+ .2
Skills	+ 0.8	+ 4.0[3]	+ .3
Understanding	− .4	+ 3.9	− .3
Applications	+ .5	+ 2.2[3]	− 1.1
Science[1] (1977-82)			
Inquiry	− 1.0	− .6	− 2.6[3]
Content	(2)	− .4	− 2.0[3]
Science/technology/society	+ 2.8[3]	+ .4	− .5
Attitudes	− .6	− 2.6[3]	+ .9

[1]Overall mean score was not calculated on science assessment.
[2]Not administered at 9-year-old level.
[3]Significant at the 0.05 level.
SOURCE: National Assessment for Educational Progress; appendix table B-24

significantly, up about 3 points, on the science-technology-society component. The performance of 13-year-olds also showed a general decline over the 1976-81 period. The changes were slight on all components with the exception of the attitudes section, where there was a significant decrease, down 2.6 points, over the 5-year period. Among 17-year-olds, scores declined significantly on two sets of exercises between 1977 and 1982--inquiry (down 2.6 points) and content (2.0 points).

In recent years, there has been some concern over the aptitude of students choosing to pursue S/E majors in college. This concern is rooted in the steady decline in SAT scores which began in the seventies. The SAT, administered by the Admissions Testing Program of the College Entrance Examination Board, provides information on the aptitude of college-bound seniors and is a critical element in college admissions decisions. The SAT consists of a mathematics and verbal component; the former measures problem-solving ability using arithmetic reasoning as well as basic algebra and geometry skills, while the latter measures reading comprehension and vocabulary skills.[14] About one in five of those students who take the SAT also takes one or more achievement tests. This test series includes 1-hour multiple choice examinations in 13 academic subjects, 5 of which are in science or mathematics. The score range on both the SAT and achievement tests is 200 to 800.

A downward trend in SAT scores occurred between 1973 and 1981. During this time, SAT mathematics (SAT-M) scores declined 15 points from 481 to 466; SAT verbal (SAT-V) scores fell 20 points from 445 to 425 (chart 28).[15] Between 1981 and 1983, there has been a modest 2-point increase in the SAT-M scores with the SAT-V scores fluctuating around 425.

Characteristics of college-bound seniors. The proportion of college-bound seniors who intend to major in an S/E field rose steadily in the last three years from 36 percent in 1981 to about 40 percent in 1983.[16] This increase is largely attributable to the rise in the proportion of students intending to choose computer science as their undergraduate field: from about 6 percent in 1981 to more than 10 percent in 1983. The proportions who intended to major in other fields remained relatively stable. In 1983, almost 13 percent intended to major in engineering and about 10 percent expected to concentrate their studies in one of the social sciences or psychology (chart 29). Among non-S/E fields, substantial fractions of college-bound seniors chose business (19 percent) or health/medical professions (15 percent) in 1983.

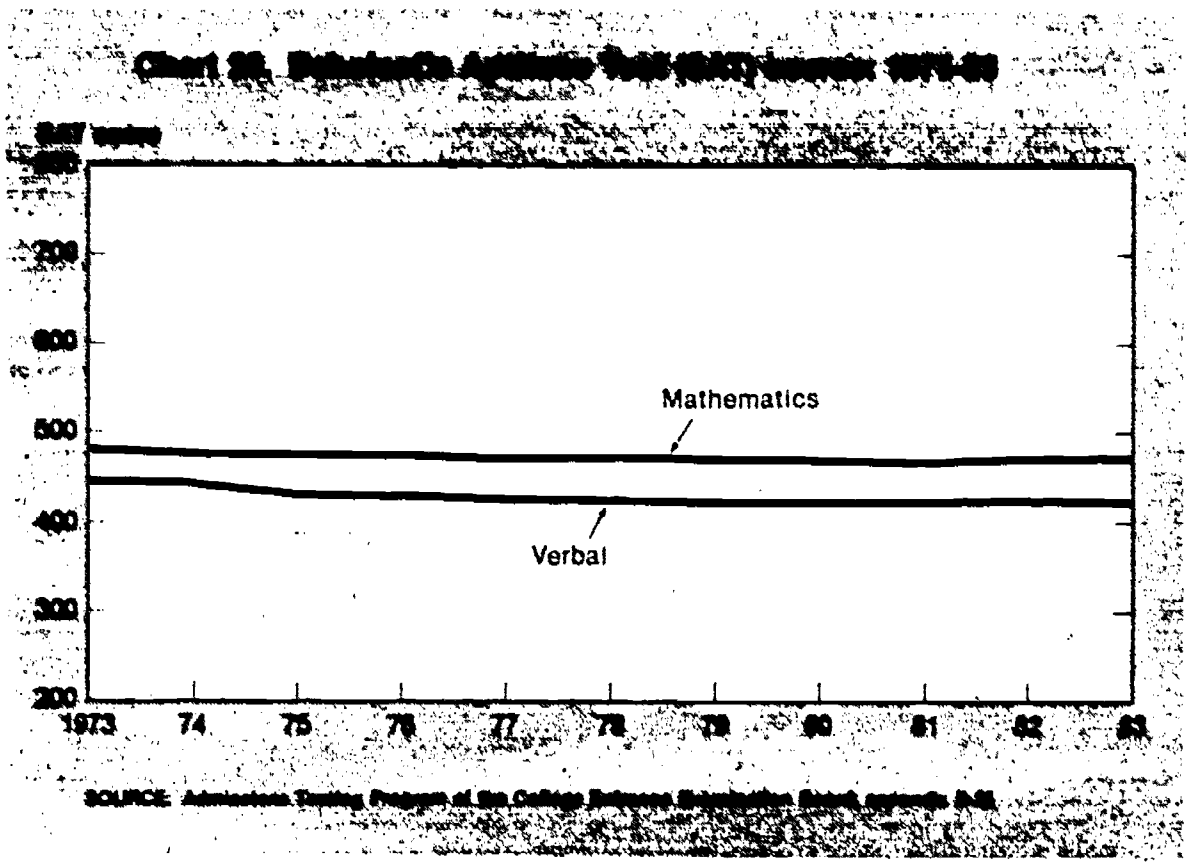
Data available on SAT-M scores of college-bound seniors intending to major in an S/E field show scores that have remained stable, generally at a level above the mathematical aptitude scores of other seniors. For example, prospective engineering majors scored 544 on the SAT-M in 1983, while potential physical science majors scored 565 (overall SAT-M score was 468). There are some exceptions: seniors intending to major in psychology registered an SAT-M score of 443 in 1983. SAT-M scores for students intending to major in other S/E fields fluctuated in a narrow range between 1981 and 1983 (appendix table B-27).

The only notable exception among prospective S/E graduates has been a downward trend in the SAT-M scores of potential computer science majors. The sharp decline in their SAT mathematics scores has occurred as the number of college-bound seniors choosing computer science as an undergraduate major increased. Although still above the average SAT-M score, their score of 483 in 1983 was 13 points below the SAT-M score for college-bound seniors intending to major in computer science in 1981.

[14] Admissions Testing Program of the College Board, *Profiles, College Bound Seniors, 1981* (New York, N.Y.: College Entrance Examination Board, 1983), p. v.

[15] Admissions Testing Program of the College Board, *National College Bound Seniors, 1983* (New York, N.Y.: College Entrance Examination Board, 1983), p. 4.

[16] College-bound seniors are asked to specify their intended undergraduate major on the Student Descriptive Questionnaire. There are 29 major fields from which to choose, seven are in science and one is in engineering.



Another indicator of the mathematical aptitude of potential S/E majors is the SAT-M scores of individuals who take achievement tests in science and mathematics. These individuals, who have a relatively high probability of majoring in an S/E field, have demonstrated greater than average aptitude in mathematics. In 1983, the mathematics test scores for college-bound seniors who took a mathematics achievement test were 556 for those taking the mathematics level I test and 649 for those taking the math level II test; 88 and 181 points above the average, respectively. SAT-M scores for those taking one or more of the science achievement tests (chemistry, physics, biology) ranged from 570 (biology) to 647 (physics) or 102 to 179 points above the average.

Besides showing higher aptitude, the SAT-M scores of students taking science and mathematics achievement tests have not followed the characteristic pattern of decline which occurred before 1981 and have, in fact, outpaced the 2-point increase which occurred from 1981 to 1983.[37] For example, mathematics scores for college-bound seniors who took the chemistry test rose from 615 to 624 during this period, compared to the overall increase of SAT-M scores from 466 to 468.

postsecondary science and mathematics education

Undergraduate preparation. An important source of information on the outcomes of undergraduate education is the Graduate Record Examination (GRE), administered by the Educational Testing Service. This instrument is utilized by many graduate and professional schools in admissions decisions as a means of supplementing undergraduate records. Like the SAT, the GRE contains a general aptitude test and offers advanced tests in several subject areas. The aptitude test is comprised of three components. The verbal component assesses the ability to use words in solving problems. The quantitative portion requires the ability to apply elementary mathematical skills and concepts to solve quantitative problems. The analytical component, a relatively new addition to the aptitude test, is a measure of deductive and inductive reasoning skills.

Those who majored in an S/E field[38] at the undergraduate level scored higher than the average for all test-takers combined on all three components of the GRE. In 1982, verbal mean scores for students majoring in S/E fields were slightly higher than overall scores (486 versus 482), quantitative mean scores were substantially higher (556 versus 525), and analytical mean scores were somewhat higher than total scores (521 versus 508). Since 1979, there has been a sharp drop in verbal scores (down 9 points) for S/E undergraduate test-takers contrasted with an even more significant increase (13 points) on the quantitative component and a smaller rise (4 points) on the analytical portion.

Among test-takers who majored in an S/E field at the undergraduate level in 1982, the range in verbal scores was about 30 points with those majoring in the biological sciences registering the highest scores (508). On the quantitative component, the range of mean scores was much greater. Social science majors scored the lowest (476) among S/E test-takers while those in engineering (657) and mathematical sciences scored the highest (657 and 656, respectively). On the analytical portions, mean scores fell between 477 (social sciences) and 570 (mathematical sciences).

S/E degree production. In 1982, over 302,000 bachelor's degrees and 57,000 master's degrees were awarded in science and engineering.[39] In 1983, about 18,000 S/E doctorates were granted.

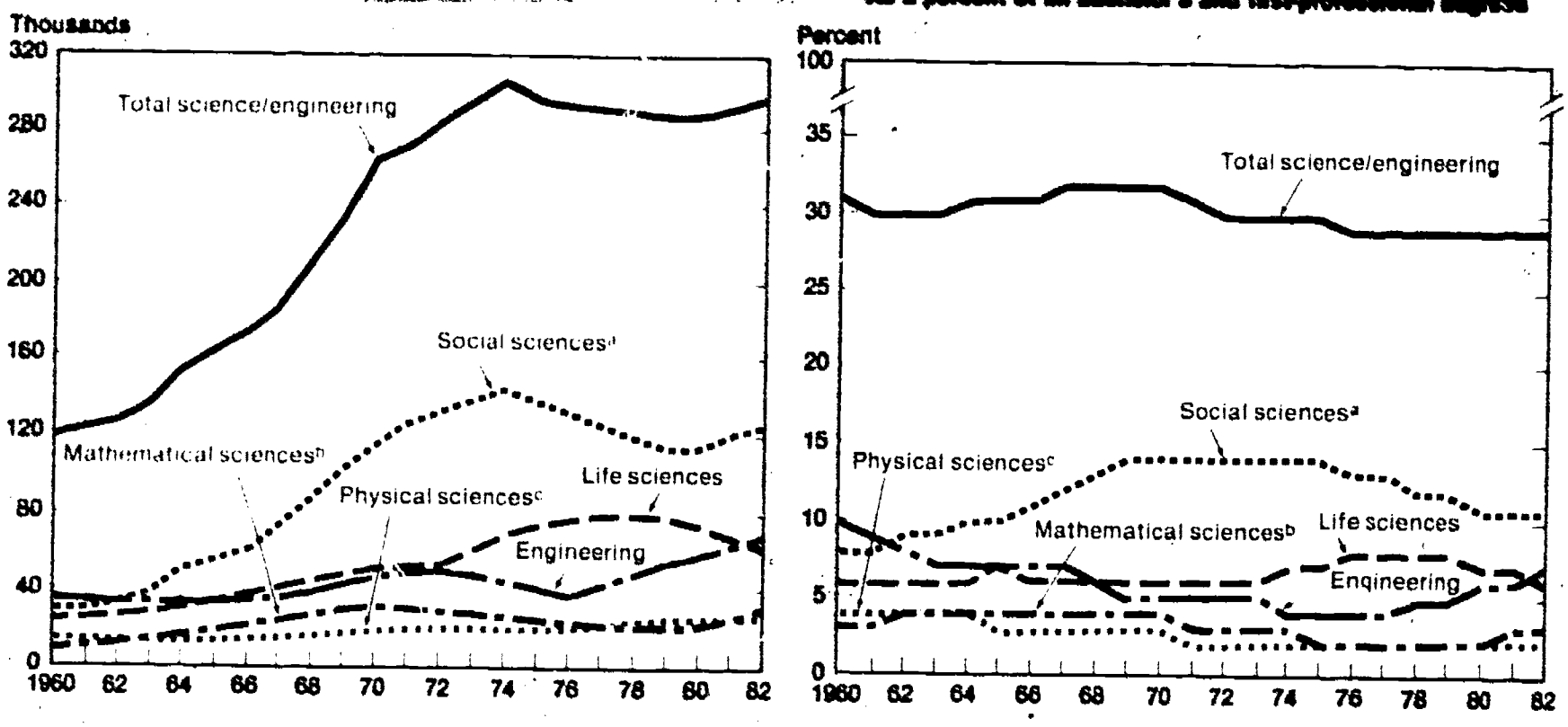
Trends in conferrals of bachelor's degrees have varied considerably by field over the 1960-82 period (chart 30). Between 1976 and 1982, for example, the number of engineering bachelor's degrees rose 73 percent, reaching an all-time high of 67,800. The most rapid growth occurred in chemical and mechanical engineering fields. Although

[37] SAT scores for students taking achievement tests in science and mathematics may be found in Admissions Testing Program of the College Board, *Profiles, College-Bound Seniors, 1983* and *Profiles, College Bound Seniors, 1981* (New York, N.Y.)

[38] Includes physical sciences, mathematical sciences, engineering, biological sciences, behavioral sciences, and social sciences. See Marlene B. Goodison, *A Summary of Data Collected from Graduate Record Examinations Test Takers During 1981-82, Data Summary Report #7* (Princeton, N.J.: Educational Testing Service, June 1983), pp. 68-70.

[39] The National Center for Education Statistics has not yet released information on the number of bachelor's and master's degrees awarded in 1983.

Chart 30. Science/engineering bachelor's and first-professional degrees awarded by field



[a]Includes psychology.
[b]Includes computer science.
[c]Includes environmental science.
SOURCE: National Science Foundation; appendix table B-29

the total number of physical science degrees granted increased about 13 percent between 1970 and 1982, there were marked differences for individual fields: degrees in physics decreased by 35 percent while those in the geological sciences increased by 142 percent. Overall, there was an increase of 10 percent in mathematical science baccalaureates between 1970 and 1982. This trend is the result of two very different phenomena. While the number of mathematics degrees awarded declined by 58 percent from 27,100 to 11,700, the number of computer science degrees granted rose 1,200 percent from 1,500 to over 20,000.

After dramatic increases in the sixties and early seventies, the number of social science baccalaureates awarded fell sharply after 1974. For example, between 1974 and 1982, the number of psychology degrees dropped 21 percent and the numbers of sociology and political science degrees declined 55 percent and 16 percent, respectively. Conversely, the number of economics degrees rose 38 percent over the same period.

The number of S/E master's degrees increased steadily through the midseventies, declined somewhat in the late seventies, then rose sharply between 1981 and 1982 to an all-time high of 57,000 (chart 31). After climbing steadily for nearly two decades, the number of S/E doctorates peaked at 19,000 in 1972, declined for several years, then leveled off after 1978 (chart 32). Although the number of S/E doctorates increased slightly between 1982 and 1983 from 17,600 to 17,900, that figure was 6 percent below the 1972 level.

Bachelor's-degree recipients constitute the pool from which recipients of graduate degrees are drawn.[30] Although the period of time required to complete a degree is not the same for all advanced-degree recipients, on average, S/E master's degrees may be appropriately related to baccalaureates received two years earlier and doctorates may be related to bachelor's degrees received seven years earlier.[31] This relationship is expressed as the graduate-degree attainment rate.

At the S/E master's-degree level, the graduate-degree attainment rate fell slightly between 1971 and 1982 from 20.7 percent to 19.5 percent. During the first half of the seventies, the rate declined steadily, falling to less than 18 percent in 1976. Between 1977 and 1982, however, the rate has remained stable around 19 percent. At the S/E doctorate level, the graduate degree attainment rate has also fallen but much more sharply than at the master's-degree level. In 1973, the rate stood at 11 percent, but by 1981 it had

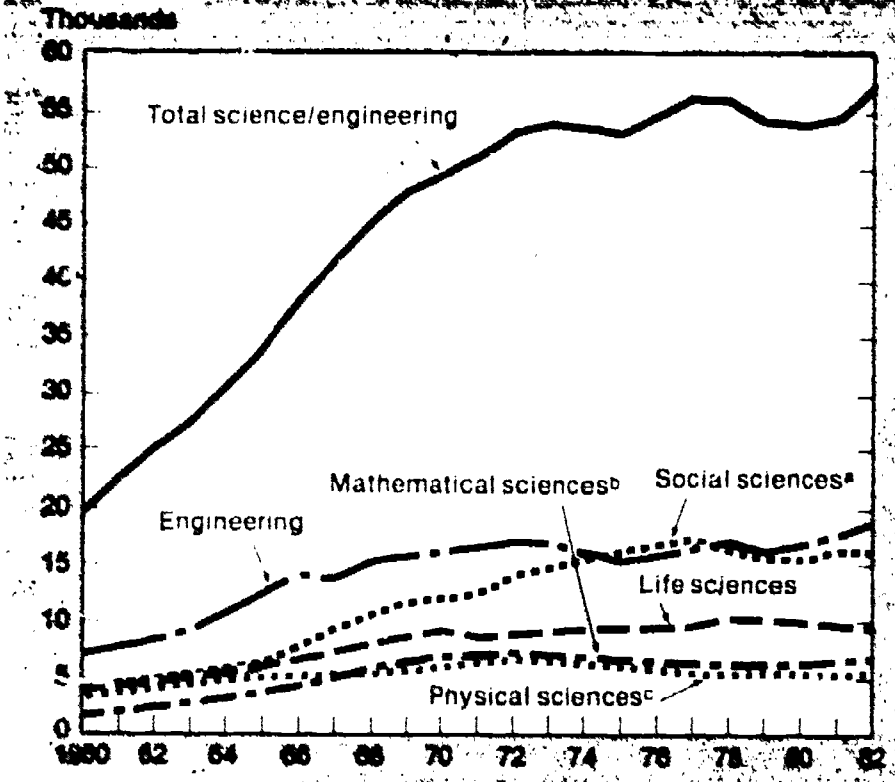
[30] This pool is limited to S/E bachelor's degrees although it is recognized that some S/E baccalaureates receive advanced degrees in nonscience fields and vice versa

[31] For a discussion of the baccalaureate to doctorate time lapse, see National Academy of Sciences, *A Century of Doctorates*, (Washington, D.C.: National Academy Press, 1978), and National Science Foundation, "Women and Non-U.S. Citizens Responsible for Increase in Production of Science and Engineering Doctorates in 1983," *Science Resources Studies Highlights* (NSF 84-328)(Washington, D.C., September 28, 1984)

Chart 32. Science/engineering doctorates awarded by field

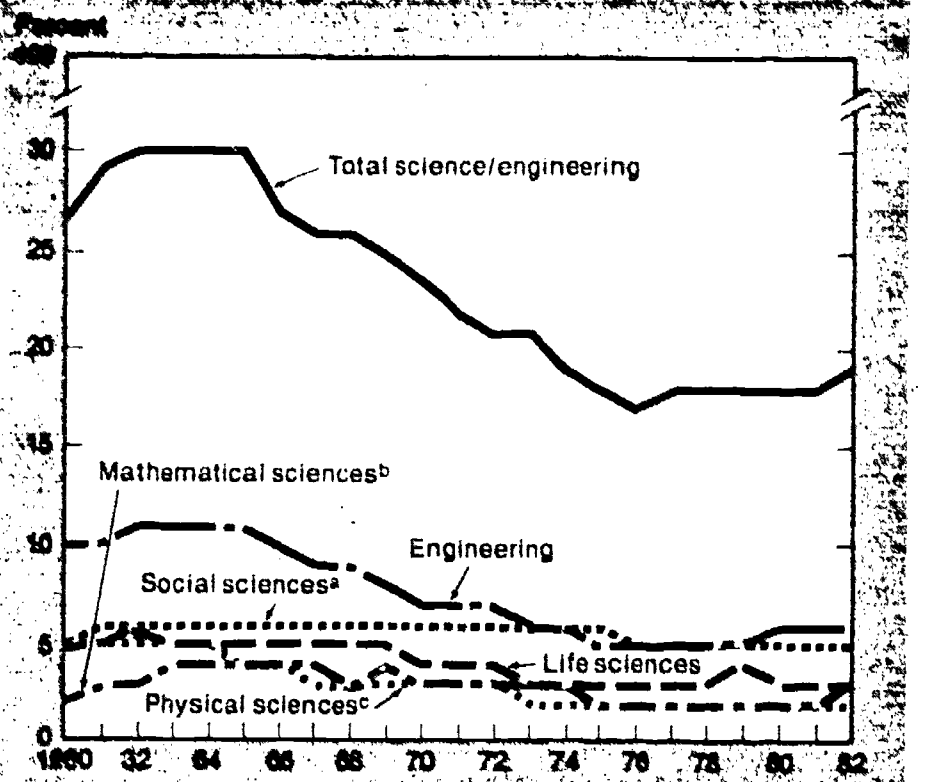
Number

Thousands



As a percent of all doctoral degrees

Percent

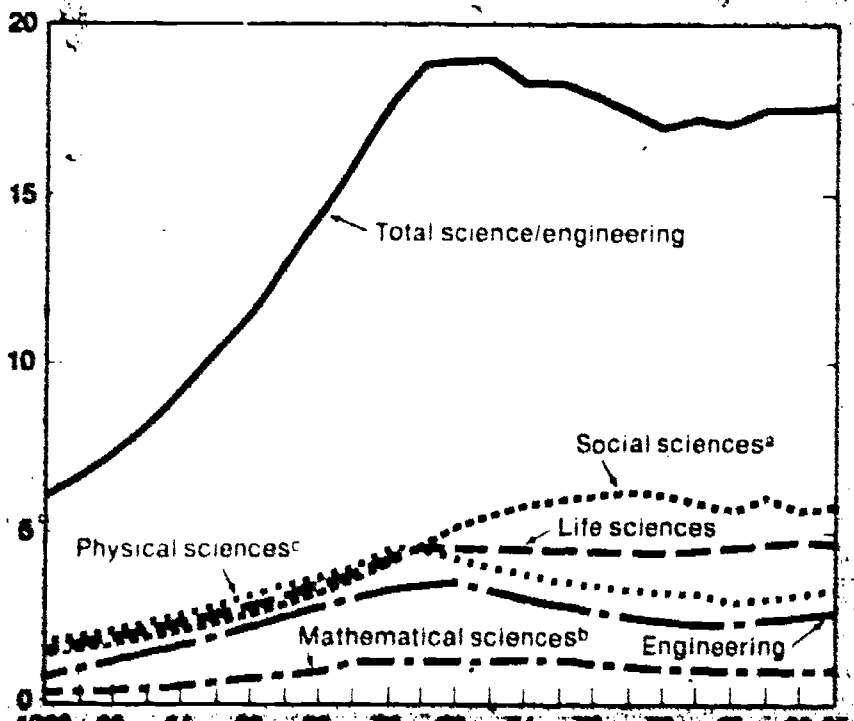


[a]Includes psychology.
[b]Includes computer science.
[c]Includes environmental science.
SOURCE: National Science Foundation; appendix table B-39

Chart 32. Science/engineering doctorates awarded by field

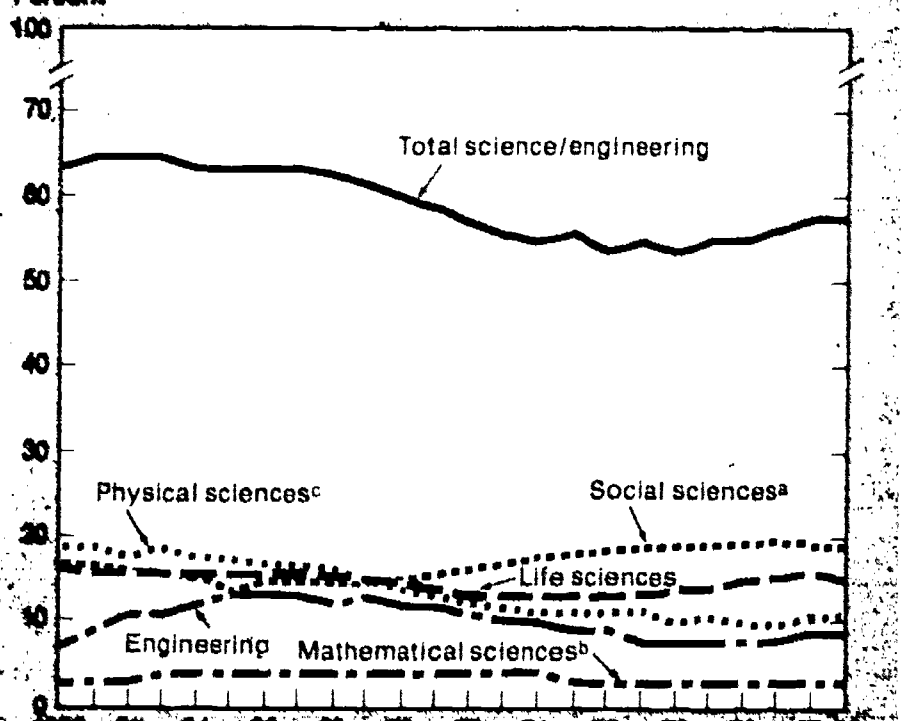
Number

Thousands



As a percent of all doctoral degrees

Percent



[a]Includes psychology.
[b]Includes computer science.
[c]Includes environmental science.
SOURCE: National Science Foundation; appendix table B-39

fallen to less than 6 percent.[42] In 1983, the graduate-degree attainment rate at the S/E doctorate level was slightly above the 6-percent mark.

The number of S/E degrees awarded is sensitive to the state of the labor market.[43] When demand in a field exceeds supply, as evidenced by relatively high starting salaries or intensified recruitment activity, more students are likely to select that field of study. For example, a 5-percent increase in the starting salaries of engineers can be associated with an increase of 10 percent to 20 percent in the production of engineering baccalaureates within about five years.[44]

Frequently, however, there is an overresponse to this excess demand because of the long lead time that occurs before supply change affects the labor market. Engineering fields provide a clear example of such repeated oscillations between "shortages" and "surpluses." Research suggests that there are similar patterns in the fields of physics, mathematics, and chemistry.[45] According to recent labor market indicators (chapter II), job and salary opportunities are relatively strong for engineers and computer specialists; this trend is confirmed by employment and salary statistics for recent S/E graduates. Thus, the strong upward trends in degree production for these fields are expected to continue in the immediate future.

sources of flow in the s/e labor market

S/E-degree recipients are the major source of supply to S/E labor markets, but the number earning S/E degrees, especially at the undergraduate level, is not identical to the supply of new S/E workers. For various reasons, some who receive S/E baccalaureate degrees do not immediately enter the S/E labor force; for example, many pursue graduate education which may be a prerequisite for employment in some fields. In addition, some S/E baccalaureates enter professional schools of medicine, law, or business.

In analyzing the flow of new graduates to the S/E labor market, two key variables are the number of S/E degrees granted and the proportion of those earning S/E degrees who enter the S/E labor force. In turn, the number earning S/E degrees at various levels depends on several variables, including demographic factors, relative economic opportunities, and precollege mathematics and science training.

new entrants

The transition of recent S/E graduates from school to work is shown in table 6. Over one-fifth of those who received S/E bachelor's degrees in 1980 were not in the labor force in 1982. This fraction may be attributed to two factors: (1) a proportion of the individuals were not employed, either because they chose to remain outside the labor force, or because they were unable to find employment; and (2) a number of individuals postponed entry into the labor force in order to pursue full-time graduate studies. At the bachelor's level, of the 64,000 individuals outside the labor force 84 percent were full-time graduate students in 1982. Within field, the highest proportion of full-time graduate students was in the physical sciences. Of those who earned their degrees in the physical sciences in 1980, over two-fifths were pursuing graduate degrees on a full-time basis in 1982. In contrast, only 2 percent of the computer science graduates and 6 percent of the engineering graduates were pursuing full-time graduate education two years after graduation.

At the S/E master's level, nine-tenths of the individuals outside the labor force were full-time graduate students in 1982. At this level, the highest proportion of full-time graduate students was in the life sciences while the lowest share was in engineering (34 percent versus 13 percent).

Of those 1980 graduates who were employed in 1982, not all were working in their field of degree (chart 33). At the bachelor's level, for example, 55,000 individuals were working as engineers, but only 47,000 had received an engineering degree two years earlier. Individuals who received degrees in fields such as chemistry, life sciences, and social sciences in 1982 were also employed in engineering in 1982. Another example is provided by those individuals who received computer science degrees. Only about two-fifths of the employed computer scientists had received computer science degrees in 1980. This trend could be the result of supply/demand adjustments in the market. (See below, "Occupational Mobility.")

At the master's-degree level, there was a closer match between field of employment and field of degree (chart 33). For example, all those who were employed

Table 6. Transition of recent science and engineering (S/E)-degree recipients from school to work
[In thousands]

Status	Bachelor's[1]	Master's[1]	Doctorates[2]
Population[3]	220\	33	17
Labor force	210	32	15
Total employed	198	31	14
Employed in S/E	119	23	13
Employed in non-S/E	79	8	1
Unemployed	12	8	2
Outside the labor force	10	1	1
Full-time graduate students	54	9	—

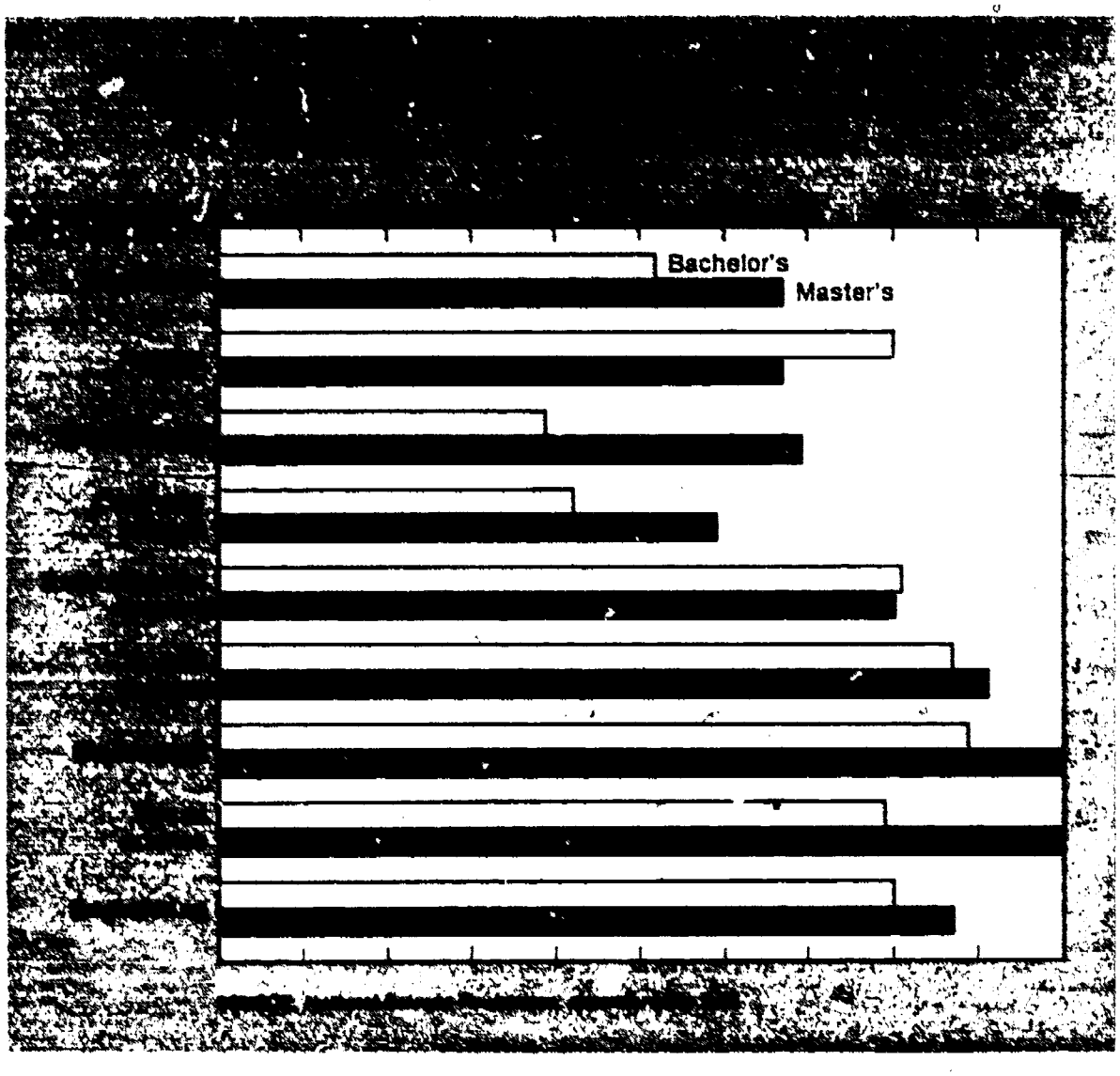
[1] 1980 graduates in 1982.
[2] 1981-82 graduates in 1983.
[3] Excludes full-time graduate students.
SOURCE: National Science Foundation

[42] The attainment rate at the doctoral level is not adjusted for the large number of foreign citizens who earn doctorates in the U.S. Consequently, the rate may be slightly overstated.

[43] For more detailed discussions of this subject, see Richard B. Freeman, *The Market for College Manpower* (Cambridge, Mass.: Harvard University Press, 1971); "Supply and Salary Adjustments to the Changing Scientific Manpower Market: Physics 1948-75," *American Economic Review*, March 1975; and "A Cobweb Model of Supply and Starting Salary of New Engineers," *Industrial and Labor Relations Review*, January 1976.

[44] Richard B. Freeman, "A Cobweb Model of Supply and Starting Salary of New Engineers," *op. cit.*

[45] See Richard B. Freeman and Jonathan Leonard, "Autoregressive Degree Patterns: Evidence of Endogenous Cycles in the Market," *Industrial Research Association, Proceedings of the Thirteenth Annual Winter Meeting*, December 29-30, 1977, pp. 13-14.



in either psychology or the social sciences in 1982 had received master's degrees in these respective fields. Among employed computer scientists, about three-fifths had been granted a master's degree in computer science two years earlier.

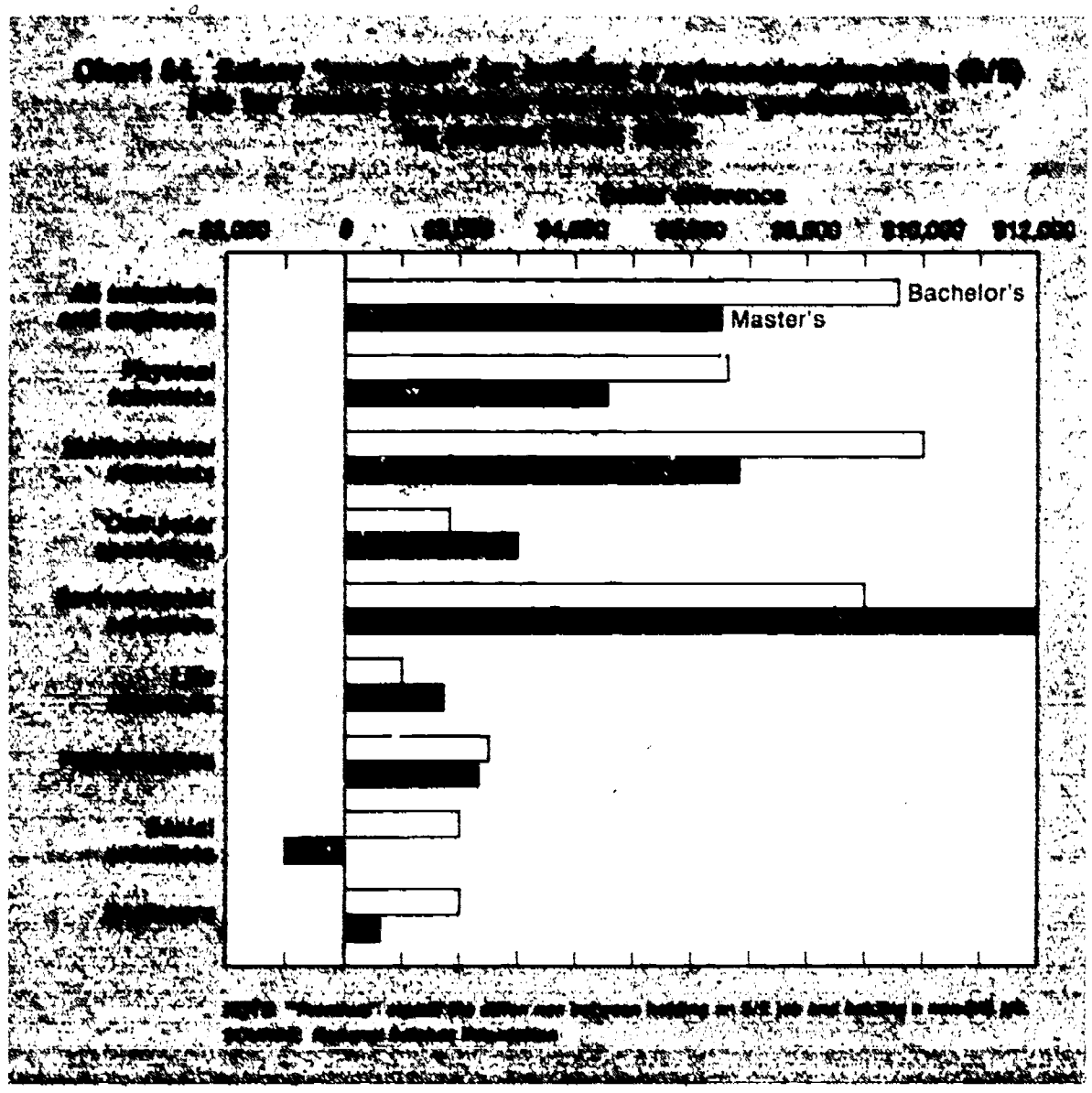
Excluding full-time graduate students from the analysis, almost all recent S/E graduates participated in the labor force in 1982. There was little variation across degree level or field. In 1982, 95 percent of the S/E bachelor's recipients were in the labor force as were 97 percent of those with S/E master's degrees.[46] The unemployment picture, however varied greatly. Recent bachelor's recipients had more difficulty finding jobs than recent master's-degree recipients, as reflected in their respective unemployment rates: 6.0 percent versus 3.7 percent. There was considerable variation by field with those earning degrees in the physical,

[46] Because of small sample size in some fields, labor market rates have been computed based on data from the combined 1980 and 1981 classes.

environmental, life, and social sciences and psychology having substantially higher unemployment rates than those in engineering or computer science.

A majority of the employed recent graduates were employed in S/E jobs. In 1982, the S/E employment rate at the bachelor's level was 60 percent; at the master's level, 74 percent. Beside degree level, the ability of new S/E graduates to find S/E jobs is influenced by field. For example, the fractions of social science- and psychology-degree recipients in S/E jobs are much lower than the comparable fractions of engineers or physicial scientists regardless of degree level. In 1982, only 34 percent of the social science baccalaureate recipients held S/E jobs compared to 88 percent of the engineering degree-holders.

Holding a job in science or engineering has implications when considering the median annual salary of recent S/E graduates (chart 34). At the bachelor's level in 1982, the overall median annual salary was $20,000 while the salary fo.



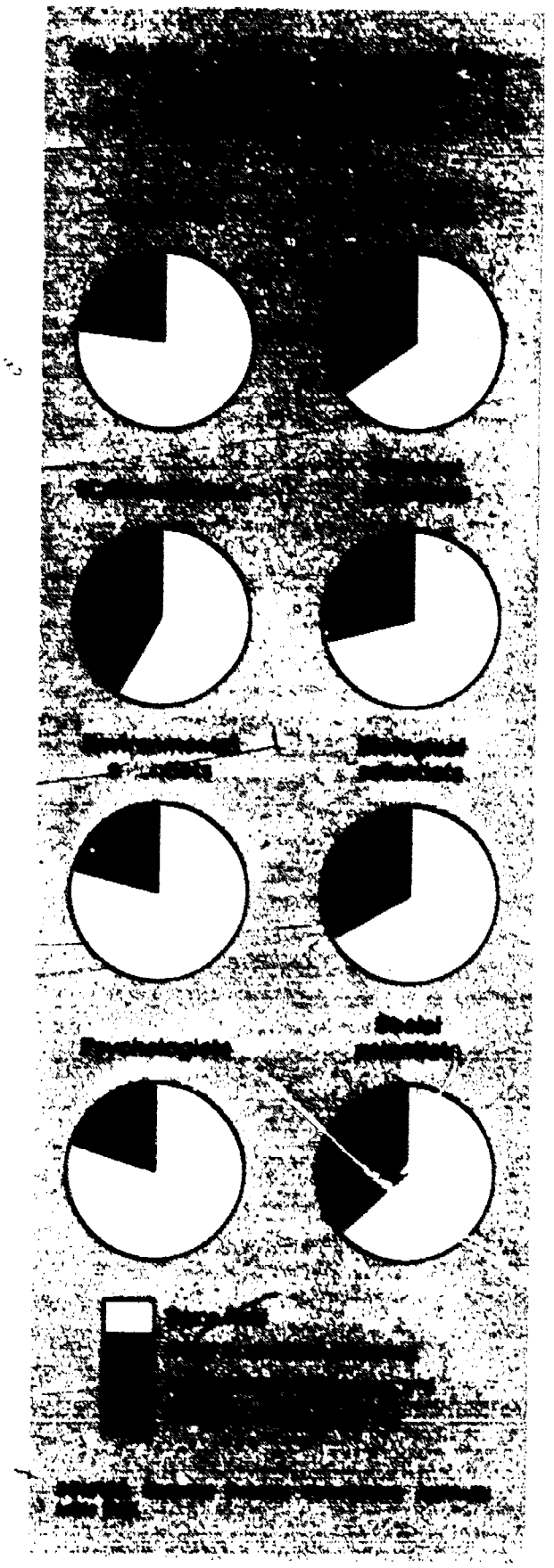
those holding S/E jobs was $24,000.[47] This pattern carried across all fields, indicating that there is a "premium" for holding an S/E job. The largest salary differentials between those in S/E and non-S/E positions occurred in the mathematical sciences ($23,000 versus $13,000) and the environmental sciences ($22,000 versus $13,000); the smallest difference was registered in the life sciences ($15,000 versus $14,000).

occupational mobility

One means of alleviating market imbalances, especially in the short run, is occupational mobility of the experienced work force. During the seventies, NSF followed two longitudinal samples of scientists and engineers who were queried about their labor market experiences—one for Experienced Scientists and Engineers (those in the labor force at the time of the 1970 Census of the Population)[48] and one for Doctoral Scientists and Engineers.[49]

The sample of experienced scientists and engineers shows that, between 1972 and 1978, while many (70 percent) changed jobs, relatively few (20 percent) changed their occupations. Chart 35 summarizes the 1972-78 movements from S/E occupations to other S/E jobs, management, and non-S/E occupations. The data show that about 30 percent moved to other S/E occupations, 14 percent changed to management jobs, and 7 percent went to other non-S/E occupations. Of those changing occupations, one-fourth remained within the S/E labor force, one-half moved to management positions, and the remainder went to non-S/E jobs. There were only slight differences between men and women in the degree of occupational mobility.

Among scientists, mathematicians were the most occupationally mobile. There was strong flow from mathematics, a field with weak demand, to engineering and computer specialties, fields with strong demand. About 8 percent of those employed as mathematicians in 1972 were employed as engineers by 1978 and an additional 7 percent were employed as computer specialists.



There was little movement between engineering and the sciences, and engineers were generally less occupationally mobile than scientists. Since engineers were aggregated over all subfields, however, the mobility pattern of engineers does not reflect flows between subfields within engineering. Engineers were more apt than scientists to become managers. In fact, the majority of occupational changes from engineering were into management jobs. This trend tended to be truer for engineers at the bachelor's-degree level than among others.

The sample of doctoral scientists and engineers indicates relatively little occupational change across most fields reflecting their large investment in field-specific training. For example, of the individuals who were life scientists in 1973, 90 percent were still life scientists in 1981. With one exception, between approximately 80 percent and 90 percent of the doctoral scientists and engineers employed in respective fields in 1973 continued to be employed in those fields in 1981 (chart 36). The exception was computer specialties. Of the doctorates employed as computer specialists in 1973, about 70 percent were so employed in 1981; of the remaining 30 percent who changed fields, about one-half moved into engineering.

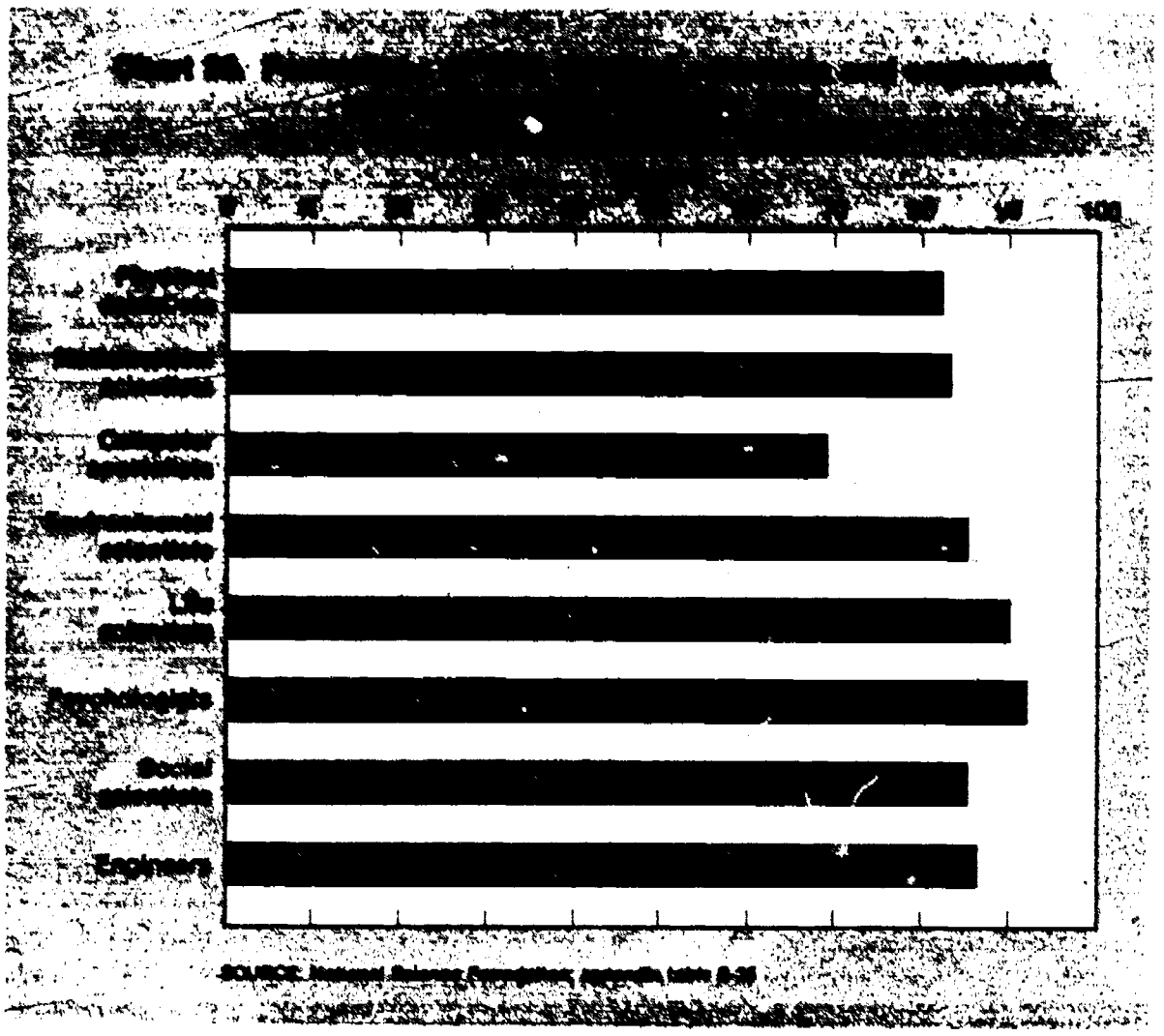
While a relatively large number of doctoral computer specialists changed occupations, the inflow into computer specialties was the largest among all S/E fields (chart 37). Among those who had moved into this field by 1981, 30 percent had been mathematical scientists, 22 percent engineers, and 16 percent physical scientists in 1973.

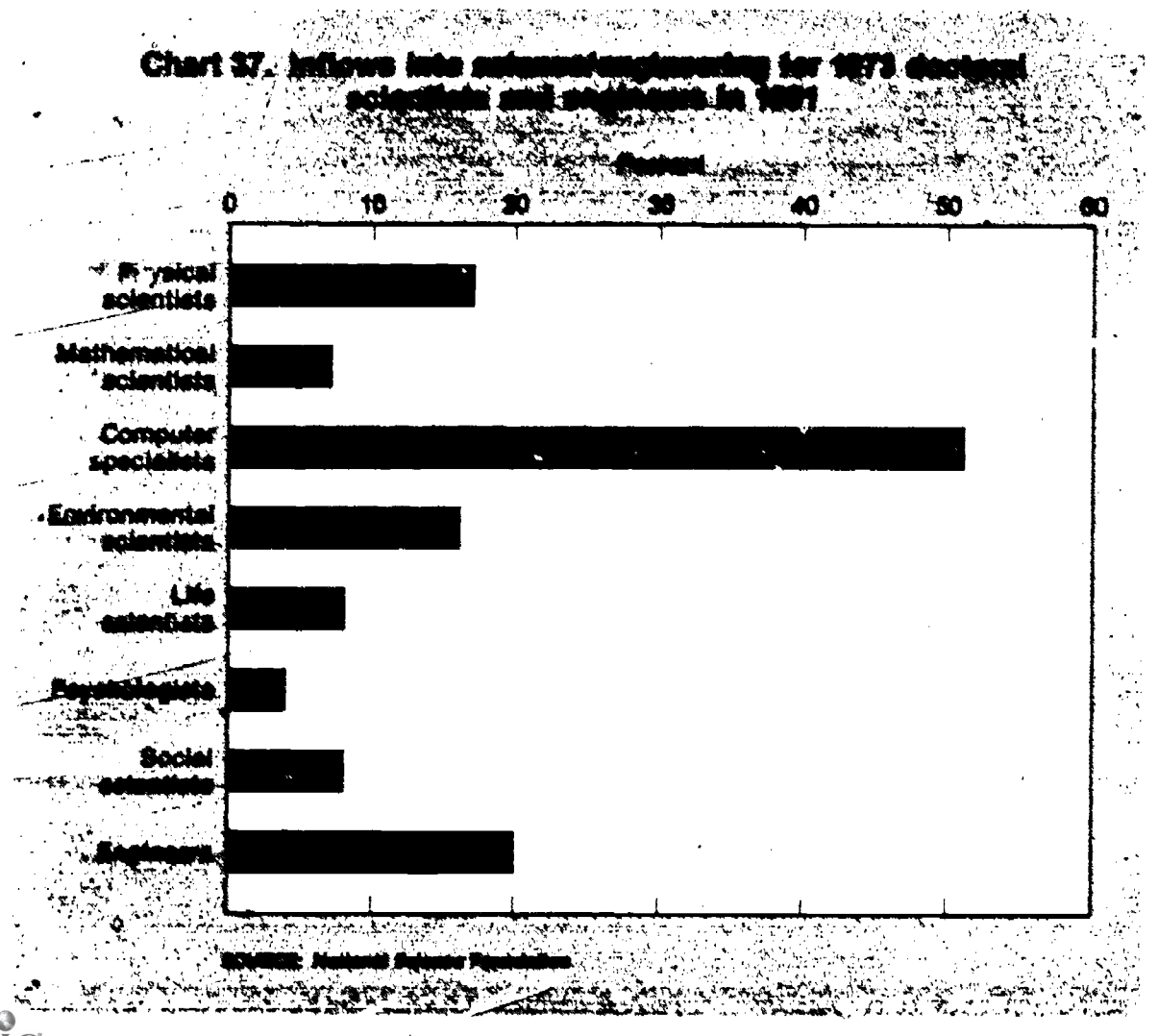
The transition from field of degree to field of employment by new S/E graduates also reflects the extent to which market imbalances can be alleviated by mobility. By and large, net transitions have occurred from fields in which employment demand has been weak to fields in which employment demand has been strong. The field distribution of new S/E graduates employed as computer spe-

[47] Because of small sample size in some fields, median annual salaries have been computed based on data from the combined 1980 and 1981 classes.

[48] National Science Foundation, *Occupational Mobility of Scientists and Engineers* (NSF 80-317)(Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1980).

[49] National Science Foundation, Survey of Doctorate Recipients, unpublished.





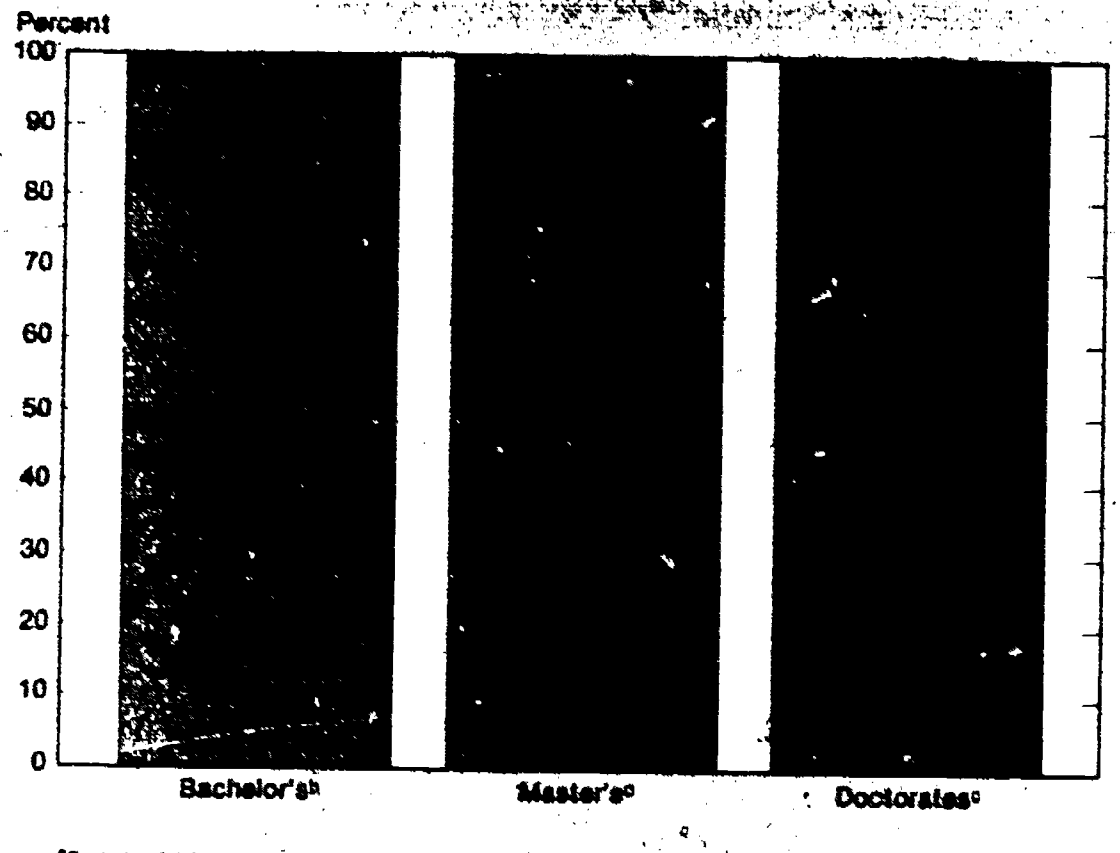
cialists illustrates these flows (chart 38). Of the approximately 20,000 S/E baccalaureates employed as computer specialists in 1982, only about 42 percent had earned their bachelor's degrees in computer science. Almost 22 percent held mathematical science degrees and another 16 percent had earned degrees in the social sciences. At the master's-degree level, 59 percent of the computer specialists held computer science degrees. About three-quarters of the remainder held either engineering or mathematical science degrees. Among doctorates who earned their degrees between 1981 and 1982 and were employed as computer specialists in 1983, about 32 percent had received doctorates in computer science. A large fraction of other computer specialists had earned their degrees in the physical sciences, social sciences, or engineering.

losses from the s/e labor market

A number of job vacancies result from death and retirement of experienced workers. In a work force characterized by steady long-term growth and a balanced age distribution, attrition from deaths and retirements would amount to about 2.5 percent annually (based on a 40-year working life). In recent S/E labor markets, however, there have been proportionately fewer older workers because of the rapid expansion of jobs in the fifties and sixties. Calculations based on unpublished data from the Bureau of Labor Statistics suggest that annual attrition in the late seventies probably amounted to approximately 1.5 percent of the S/E labor force.[50] Thus, with a current work force of approximately 3.5 million, about 53,000 would be expected to leave each year because of death and retirement. Estimated attrition rates vary for specific occupations, ranging from

[50] The Bureau of Labor Statistics information applied separation rates by age for all men and women in the labor force to the age distribution by sex of each occupation. Therefore, the BLS rates do not reflect any possible differences between separation patterns by age for scientists and engineers as compared to all workers. See, for example, Howard N. Fullerton, Jr., "A New Type of Working Life Table for Men," *Monthly Labor Review*, July 1972.

Chart 38. Distribution of recent science/engineering degree recipients[a] employed as computer specialists by field and [illegible]



[a]Excludes full-time graduate students and those holding postdoctoral appointments.
[b]1980 graduates in 1982.
[c]1981/82 graduates in 1983.

NOTE: There were no master's-degree recipients in the physical sciences who were working as computer specialists in 1982.

SOURCE: National Science Foundation; appendix table B-33 and unpublished data

less than 1 percent for computer specialists to 2.5 percent for mining engineers—a slowly growing occupation in the sixties and early seventies.

Attrition rates depend on three factors—age distribution, life expectancy, and length of time people choose to work. With regard to age, a sharp rise in S/E attrition rates may result around 1990 when many of those scientists and engineers who started work during the fifties reach retirement age. Life expectancy, probably the least important factor, may lower attrition slightly because of the slight decrease in age-specific probabilities of death. Potentially more immediate and significant effects on attrition could come from changes in the length of time that scientists and engineers choose to remain in the labor force.

Statistics show a trend toward lower retirement ages. According to unpublished data from the Bureau of Labor Statistics, the continuation of this trend could, by itself, add one-half a percentage point to the annual 1.5-percent attrition rate of the S/E work force by 1985. The trend may be counteracted, however, by Federal legislation and the state of the economy. In 1978, Congress passed the Age Discrimination in Employment Act Amendments, which prohibit compulsory retirement before age 70. Since the amendments will enable some older scientists and engineers to remain in the work force longer, a decrease in attrition could result. Moreover, economic conditions such as a rising rate of inflation can make the future purchasing power of pensions uncertain and also lead to the postponement of retirement. It is difficult to assess the net effect of these factors on future S/E labor force attrition rates.

projected supply/demand conditions

NSF recently completed a study of the science, engineering, and technician (SET) labor market over the 1982-87 period. The study was developed in response to concerns about the adequacy of S/E personnel supply to meet expected growth in demand through the mideighties. These concerns were derived from: (1) increasing growth of industrial SET employment generated by the expansion of high-technology industries, as well as industrial staffing changes throughout the economy that have increased the utilization of SET relative to non-SET personnel, and (2) the anticipated growth in demand for S/E workers in response to the defense buildup.

Four projection scenarios were evaluated for the 1982-87 period representing low and high macroeconomic activity and low and high growth rates in real defense expenditures.[51] SET employment has historically shown a high sensitivity to defense spending, primarily because it is concentrated in high-technology manufacturing industries where SET personnel is also highly concentrated.

The projection scenarios estimate that employment of SET personnel will increase between 460,000 and 740,000 over the 1982-87 period. By 1987, an estimated 4 million individuals will be required to fill SET jobs. Among S/E fields, this growth will result in probable shortages of computer specialists and aeronautical/astronautical engineers as well as a potential shortage of electrical/electronics engineers (table 7). Projected employment growth for S/E fields is illustrated in chart 39.

Over the next five years, employment in computer specialties (systems analysis and programming) is projected to grow at an annual rate of 5 percent to 6 percent. Over this period, regardless of scenario, growth in supply of new graduates is projected to fall behind that for demand; this situation will lead to an increasing shortage in the years ahead.

[51] Employment projections are based on the Bureau of Labor Statistics' *Occupational Employment Survey* (Washington, D.C.) and Data Resources, Inc.'s *Defense Interindustry Forecasting System* (DIFS). Supply estimates of S/E occupations were developed using the DauffenBach/Fiorito/Folk Stock-Flow Model, developed under contract to NSF. For a complete treatment of this topic, see National Science Foundation, *Projected Response of the Science, Engineering, and Technician Labor Market to Defense and Nondefense Needs, 1982-87* (NSF 84-304)(Washington, D.C., 1984).

Table 7. Projected demand/supply balance in science and engineering occupations: 1987

Occupation	STAG/LOW	OPTIM/HIGH
Scientists		
Agricultural	No shortage	No shortage
Biologists	No shortage	No shortage
Chemists	No shortage	No shortage
Computer specialists[1]	Shortage	Shortage
Geologists	No shortage	No shortage
Mathematicians	No shortage	No shortage
Physicists	No shortage	No shortage
Social	No shortage	No shortage
Engineers		
Aeronautical/astronautical	Shortage	Shortage
Chemical	No shortage	No shortage
Civil	No shortage	No shortage
Electrical/electronic	No shortage	Potential shortage
Industrial	No shortage	No shortage
Mechanical	No shortage	No shortage
Metallurgical	No shortage	No shortage
Mining/petroleum	No shortage	No shortage
Engineering, n.e.c.	No shortage	No shortage

[1]Includes both computer systems analysts and programmers.

NOTES: Shortage occupations have projected supply estimates which deviate from projected demand by 10 percent or more, potential shortage occupations have a projected supply of workers deviating from the projected level of demand by 5 percent to 10 percent.

STAG/LOW indicates the low economic growth/low defense spending scenario and OPTIM/HIGH indicates the high economic growth/high defense spending scenario.

SOURCE: National Science Foundation

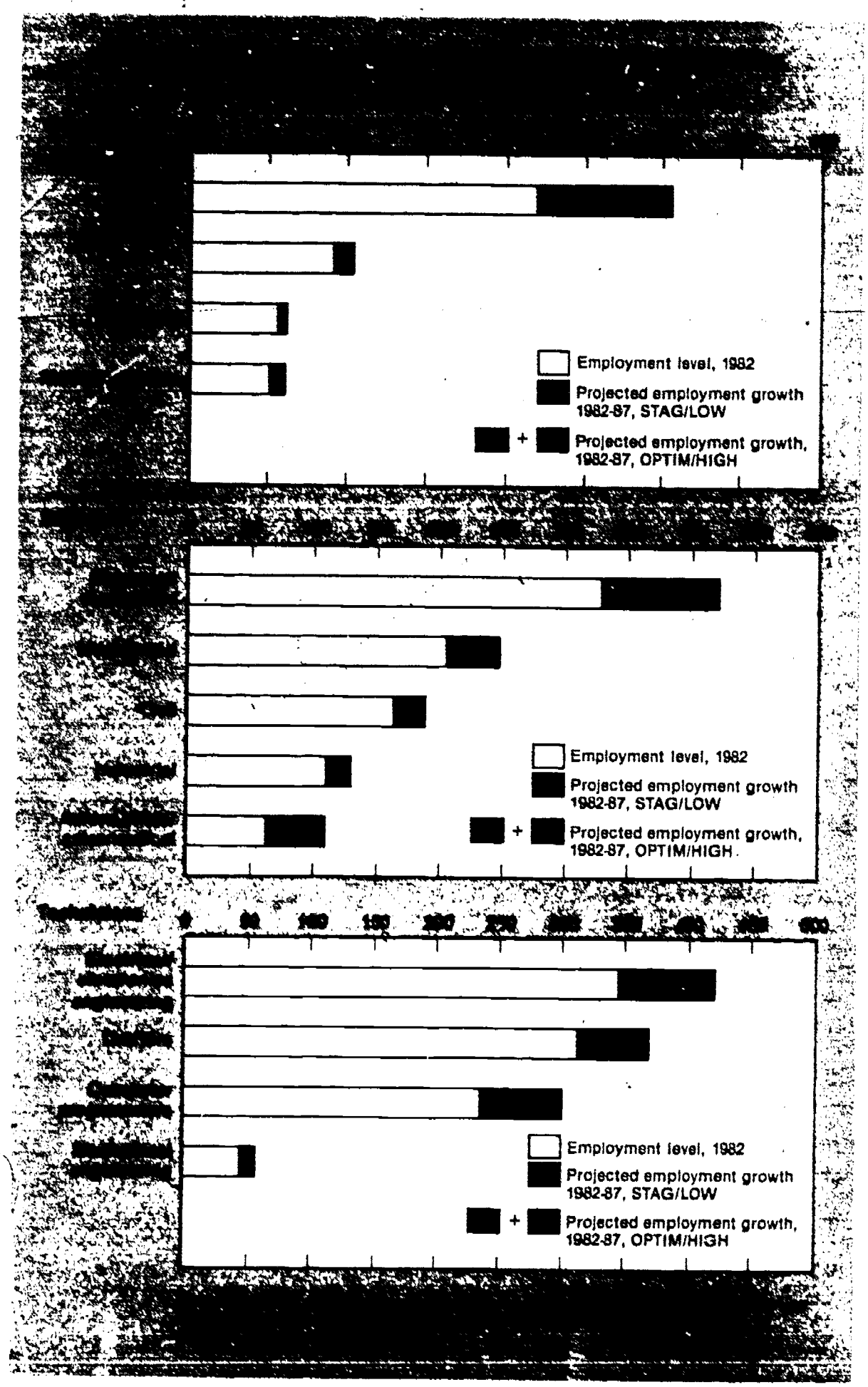
By 1987, the projected supply shortfall ranges from 15 percent in STAG/LOW to 30 percent in OPTIM/HIGH.[52] Such shortages translate into a possible need for 115,000 to 140,000 additional personnel in that year. These projections may, however, overstate potential shortages because such occupations are characterized by a highly flexible supply of workers. Expanding job opportunities and wage incentives can be expected to attract workers to these occupations.

Employment in aeronautical/astronautical engineering is projected to increase at an average annual rate between 6 percent and 11 percent over the next five years. Defense-related demand is an important factor contributing to this rapid growth since more than three-fifths of these engineers are employed on defense-related projects. Demand requirements are expected to outpace additions to the supply of new graduates in aeronautical/astronautical engineering. By 1987, shortages are projected to range from 15 percent in STAG/LOW to 45 percent in OPTIM/HIGH indicating a possible need for an additional 10,000 to 35,000 personnel.

Employment of electrical/electronics engineers is expected to increase at an average annual rate of 4 percent to 5 percent between 1982 and 1987. Increments to supply based on new labor force entrants and immigrants are adequate to balance projected employment in this field at low levels of defense spending. When defense expenditures are high, however, supply is barely adequate and, by 1987, a potential shortage of up to 30,000 personnel could arise.

Before concluding this section, it should be noted that while projections are useful, they are also very complex and certain caveats need to be stated. First, the scenarios are not predictions, they are estimates based on specific assumptions. Variations in these underlying assumptions can change the estimates substantially. Secondly, models are restricted by data availability to major occupational categories. As such, this type of analysis cannot identify shortages or surpluses in subspecialties. Third, model estimates cannot differentiate between varying characteristics of workers. For example, they cannot distinguish between experienced workers and recent entrants. Recent surveys indicate industry's immediate concerns are for experienced workers. Finally, overall employment projections do not take into account sectoral needs. For example, the industrial sector may meet their demand for mathematicians by attracting qualified personnel away from academia, resulting in shortages in the latter sector.

[52] STAG/LOW represents the low economic growth/low defense spending scenario and OPTIM/HIGH is the symbol for the high economic growth/high defense spending scenario.


Employment level, 1982
Projected employment growth 1982-87, STAG/LOW
+
Projected employment growth, 1982-87, OPTIM/HIGH
Employment level, 1982
Projected employment growth 1982-87, STAG/LOW
+
Projected employment growth, 1982-87, OPTIM/HIGH
Employment level, 1982
Projected employment growth 1982-87, STAG/LOW
+
Projected employment growth, 1982-87, OPTIM/HIGH

appendixes

a. technical notes
b. statistical tables

appendix a

technical notes

concepts and definitions

The National Science Foundation (NSF) publishes estimates on the number, type of employer, work activity, and other economic and demographic characteristics of persons who meet its definition of a scientist or engineer. Broadly speaking, a person is considered a scientist or engineer if at least two of the following criteria are met:

1. Highest degree in science (including social science) or engineering;
2. Employed in a science or engineering (S/E) occupation; and/or
3. Professional identification as a scientist or engineer based on total education and work experience.

composite estimates

The composite estimates, representing national totals, are developed as a part of NSF's Scientific and Technical Personnel Data System (STPDS). During the past two years, NSF has been in the process of revising the STPDS in two ways: (1) The completion of the 1980 decennial census provided a mechanism to redraw a sample of scientists and engineers (see "The Postcensal Survey of Scientists and Engineers" below); and (2) The basis on which total estimates are created was updated to reflect state-of-the-art methodologies. As in the past, the system consists of three subsystems, each designed to measure the characteristics of a particular subpopulation:

- **The Postcensal Survey of Scientists and Engineers** consists of almost 138,000 cases drawn from those individuals who were in the labor force or the labor reserve at the time of the 1980 decennial census. The Postcensal Survey (as well as the followup surveys of Experienced Scientists and Engineers) was conducted for NSF by the Bureau of the Census.
- **New Entrants Survey** is designed to measure the magnitude and characteristics of those who earned degrees in science and engineering after the 1980 decennial census was completed. Samples of the graduating classes of 1980 and 1981 were surveyed by the Institute for Survey Research, Temple University, Philadelphia, Pennsylvania.
- **The Roster of Doctoral Scientists and Engineers**, maintained by the Commission on Human Resources, National Research Council, National Academy of Sciences, consists of all known doctoral scientists and engineers in the United States since 1930. The roster serves as a panel from which a sample of 60,000 scientists and engineers covering the years 1940-82 were selected to provide data on the doctoral population of the Nation.

The new methodology resulted in the following changes. The estimates contained herein for 1976, 1978, and 1980 have been revised based on the 1982 Postcensal Survey. Additionally, the estimates of national totals for 1983 reflect a major innovation from past estimates. Mathematica Policy Research, Inc. (MPR) generated these estimates for NSF utilizing a computer-based model. This model will assist the Foundation in two major areas: (1) It will provide additional flexibility in the types of cross tabulations which can be produced, and (2) It has the ability to produce estimates on an annual basis, and for years in which survey data are not available.

occupation/field of science or engineering

Data on field of science or engineering are derived from responses to questions on various surveys. Fields are classified as follows:

- **Physical sciences**—chemistry, physics, astronomy, and other physical sciences including metallurgy
- **Mathematical sciences**—mathematics and statistics
- **Environmental sciences**—earth, atmospheric, and oceanographic sciences, including geophysics, geology, seismology, and meteorology
- **Life sciences**—agricultural, biological, and medical sciences (excluding those primarily engaged in patient care)
- **Social sciences**—economics, including agricultural economics, sociology, anthropology, and all other social sciences
- **Psychology**
- **Computer specialties**
- **Engineering**

Data on field of employment are derived from responses to questions that request—based on Employment Specialties lists included with the questionnaire—the name of the specialty most closely related to the respondent's principal employment. Those who selected an employment specialty not in science or engineering are assigned to an S/E field based on the field of their degree, and for those with less than a doctorate, their professional self-identification.

primary work activity

Data presented on the work activities of scientists and engineers represent their primary work activities. The data are derived from responses to a series of questions on the survey instruments that ask individuals: (1) to specify their primary work activity, and (2) to provide a percentage distribution of their work time among 10 to 15 listed activities.

other variables

Information on other economic and demographic variables, such as type of employer, sex, race, and ethnic group, are based on individual responses to survey questions. For information on the various survey instruments used in the report, see the section entitled "Data Sources" below.

statistical measures

Labor force participation rates. The labor force is defined as those employed and those seeking employment. The labor force participation rate (LFPR) is the ratio of those employed (E) and those unemployed but seeking employment (U) to the population (P).

$$\text{LFPR} = \frac{E + U}{P}$$

S/E employment rates. The S/E employment rate (ES/E) measures the ratio of those holding jobs in science or engineering (S/E) to the total employment (E) of scientists and engineers, which includes those holding nonscience and nonengineering jobs.

$$\text{ES/E} = \frac{S/E}{E}$$

Unemployment rates. The unemployment rate (UE/R) shows the ratio of those who are unemployed but seeking employment (U) to the total labor force (LF = E + U).

$$\text{UE/R} = \frac{U}{E + U}$$

S/E underemployment rates. The S/E underemployment rate (UDE) shows the ratio of those who are working part-time but seeking full-time jobs (PTS), or who are working in a non-S/E job when an S/E job would be preferred (NS/E) to total employment (E).

$$\text{UDE} = \frac{PTS + NS/E}{E}$$

S/E underutilization rates. The S/E underutilization rate (UDU) shows the proportion of those in the total labor force (LF = E + U) who are either unemployed but seeking employment (U), working part-time but seeking full-time jobs (PTS), or working involuntarily in a non-S/E job (NS/E).

$$\text{UDU} = \frac{U + PTS + NS/E}{E + U}$$

reliability of s/e estimates

Data for scientists and engineers in 1983 are computer-generated and therefore cannot be directly associated with standard errors. Nonetheless, the 1983 estimates were based on survey results from the 1982 sample of scientists and engineers. The following standard error table for composite estimates is based on 1982 results; it may be used as a proxy measure for 1983 standard-error estimates.

The sample used for a particular survey is only a large number of possible samples of the same size that could have been selected using the same sample design. Even if the same questionnaire and instructions were used, the estimate from each of the samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is defined as sampling error. The standard error of a survey estimate attempts to provide a measure of the precision with which an estimate from the sample approximates the average results of all possible samples.

Selected tables of standard errors for the various surveys are contained on the following pages as listed below.

Survey	Table
Composite estimates of total scientists and engineers	A-1
Doctoral scientists and engineers	A-2
Recent S/E graduates	A-3,-4

The sampling errors shown were generated on the basis of approximations and, therefore, must be considered estimates rather than precise measurements. The standard error may be used to construct a confidence interval about a given estimate. Thus, when the reported standard error is added to and subtracted from an estimate, the resulting range of values reflects an interval within which about 68 percent of all sample estimates, surveyed under the same conditions, will fall. Intervals reflecting a higher confidence level may be constructed by increasing the number of

standard errors for a given estimate. Thus, ± 1.6 standard errors defines a 90-percent confidence interval; ± 2 standard errors, a 95-percent confidence interval.

Nonsampling errors can be attributed to many sources: Inability to obtain information about all cases; definitional difficulties; differences in the interpretation of questions; inability or unwillingness to provide correct information on the part of the respondents; mistakes in recording or coding the information, and other errors in collection; response; processing; coverage; and imputation. Nonsampling errors are not unique to sample surveys since they can, and do, occur in complete canvasses as well. No systematic attempt has been made to identify or approximate the magnitude of the nonsampling errors associated with the estimates of scientists and engineers presented in this report.

data sources

Details on survey methods, coverage, concepts, definitions, and reliability of the data used in this report are contained in the following publications of the National Science Foundation:

U.S. Scientists and Engineers: 1982 (Detailed Statistical Tables) (NSF 84-321).

Characteristics of Doctoral Scientists and Engineers in the United States: 1983 (Detailed Statistical Tables) (NSF 85-303), in press.

Characteristics of Recent Science and Engineering Graduates: 1982 (Detailed Statistical Tables) (NSF 84-318).

For a brief description of major surveys and copies of the survey instruments, see *A Guide to NSF Science Resources Data*, available from the Editorial and Inquiries Unit, Division of Science Resources Studies, Room L-611, National Science Foundation, Washington, D.C. 20550.

Table A-1. Standard errors for estimates of total scientists and engineers

Size of estimate	Total all fields	Physical scientists	Mathematical scientists	Computer specialists	Environmental scientists	Engineers	Life scientists	Psychologists	Social scientists
100	75	80	60	80	60	70	80	90	80
200	100	120	90	120	80	100	120	130	120
500	170	190	150	200	130	160	180	200	190
700	200	230	170	230	160	190	220	240	220
1,000	240	270	210	280	190	230	260	280	260
2,500	380	430	320	430	290	360	400	450	420
5,000	540	610	450	620	410	510	570	630	590
10,000	770	850	600	870	570	720	880	880	810
25,000	1,200	1,300	740	1,300	810	1,100	1,200	1,300	1,200
50,000	1,700	1,700		1,800	920	1,600	1,700	1,600	1,700
75,000	2,100	2,000		2,200	740	1,900	2,000	1,800	2,000
80,000	2,200	2,000		2,200	650	2,000	2,100	1,700	2,000
100,000	2,400	2,100		2,400		2,200	2,200	1,400	2,100
125,000	2,700	2,200		2,600		2,500	2,300		2,200
150,000	2,900	2,100		2,700		2,700	2,400		2,200
175,000	3,100	1,900		2,700		2,900	2,500		2,200
200,000	3,300	1,700		2,800		3,000	2,500		2,000
225,000	3,500	1,200		2,700		3,200	2,500		1,800
250,000	3,700					3,400	2,400		1,400
275,000	3,900					3,500	2,200		
300,000	4,000					3,600	2,000		
400,000	4,600					4,100			
500,000	5,000					4,400			
600,000	5,400					4,600			
700,000	5,800					4,800			
800,000	6,100					5,000			
900,000	6,300					5,100			
1,000,000	6,500					5,100			
1,200,000	6,900					5,000			
1,300,000	7,000					4,800			
1,500,000	7,200					4,400			
2,000,000	7,200								
2,500,000	6,700								
3,000,000	5,400								
3,500,000	2,300								

SOURCE Mathematica Policy Research, Inc.

Table A-2. Standard errors for doctoral scientists and engineers

Total employed

Size of estimate	Estimated sampling error	Base of percent	Estimated percent					
			1/99	2/98	5/95	10/90	25/75	50
100	35	500	1.53	2.15	3.35	4.62	6.66	7.69
200	50	1,000	1.08	1.52	2.37	3.26	4.71	5.44
500	75	2,000	.77	1.08	1.68	2.31	3.33	3.85
1,000	110	5,000	.48	.68	1.06	1.46	2.11	2.43
2,000	150	10,000	.34	.48	.75	1.03	1.49	1.72
5,000	240	15,000	.28	.39	.61	.84	1.22	1.40
10,000	340	20,000	.24	.34	.53	.73	1.05	1.22
15,000	410	30,000	.20	.28	.43	.60	.86	.99
20,000	470	40,000	.17	.24	.37	.52	.74	.86
30,000	570	50,000	.15	.22	.34	.46	.67	.77
40,000	650	75,000	.13	.18	.27	.38	.54	.63
50,000	720	100,000	.11	.15	.24	.33	.47	.54
75,000	840	150,000	.09	.12	.19	.27	.38	.44
100,000	930	200,000	.08	.11	.17	.23	.33	.38
150,000	1,030	250,000	.07	.10	.15	.21	.30	.34
200,000	1,040	275,000	.07	.09	.14	.20	.28	.33
250,000	980	300,000	.06	.09	.14	.19	.27	.31
300,000	820	325,000	.06	.08	.13	.18	.26	.30

Employed women

Size of estimate	Estimated sampling error	Base of percent	Estimated percent					
			1/99	2/98	5/95	10/90	25/75	50
100	20	500	.96	1.35	2.10	2.89	4.17	4.82
200	30	1,000	.68	.95	1.49	2.05	2.95	3.41
500	50	2,000	.48	.67	1.05	1.45	2.09	2.41
1,000	65	5,000	.30	.43	.66	.91	1.32	1.52
2,000	95	10,000	.21	.30	.47	.65	.93	1.08
5,000	140	15,000	.18	.25	.38	.53	.76	.88
10,000	190	20,000	.15	.21	.33	.46	.66	.76
15,000	220	25,000	.14	.19	.30	.41	.59	.68
20,000	230	30,000	.12	.17	.27	.37	.54	.62
30,000	230	35,000	.11	.16	.25	.35	.50	.58
40,000	180	40,000	.11	.15	.23	.32	.47	.54

SOURCE National Science Foundation

Table A-3. Generalized standard errors for combined 1980 and 1981 science/engineering bachelor's-degree recipients

Size of estimate	Total all fields	Physical scientists	Mathe-matical scientists	Computer specialists	Environ-mental scientists	Engineers	Life scientists	Psychol-ogists	Social scientists
100	160	90	95	80	85	100	140	130	190
200	230	130	130	120	120	140	190	180	270
300	280	160	160	140	150	170	230	230	330
400	320	180	190	160	170	200	270	260	380
500	360	200	210	180	190	220	300	290	430
750	440	250	260	220	230	270	370	360	520
1,000	510	280	290	250	260	310	430	410	600
2,000	720	390	400	350	350	440	600	570	840
3,000	890	460	480	420	400	540	730	700	1,050
4,000	1,000	510	540	470	430	620	840	800	1,200
5,000	1,150	550	580	520	430	690	930	880	1,300
6,000	1,250	580	620	550	420	750	1,000	960	1,450
7,000	1,350	600	650	580	390	810	1,100	1,000	1,550
8,000	1,450	600	670	600	340	860	1,150	1,100	1,650
9,000	1,500	620	680	620	240	910	1,200	1,150	1,750
10,000	1,600	620	680			950	1,250	1,200	1,800
15,000	1,950	480	610			1,150	1,500	1,350	2,200
20,000	2,250					1,300	1,650	1,500	2,450
30,000	2,700					1,500	1,850	1,550	2,850
40,000	3,100					1,600	1,950	1,400	4,000
50,000	3,400					1,700	1,900	1,000	3,250
60,000	3,700					1,700	1,700		3,250
70,000	3,950					1,650	1,350		3,200
80,000	4,150					1,550			3,050
90,000	4,350					1,400			2,800
100,000	4,500					1,150			2,350
200,000	5,400								
300,000	5,050								
400,000	3,250								

SOURCES Institute for Survey Research, Temple University, and National Science Foundation

Table A-4. Generalized standard errors for combined 1980 and 1981 science/engineering master's-degree recipients

Size of estimate	Total all fields	Physical scientists	Mathe-matical scientists	Computer specialists	Environ-mental scientists	Engineers	Life scientists	Psychol-ogists	Social scientists
100	90	60	90	75	40	65	75	95	110
200	130	80	130	100	55	95	110	130	150
300	150	100	150	130	65	110	130	160	190
400	180	110	180	150	75	130	150	190	210
500	200	120	190	160	80	150	170	210	240
750	240	150	230	190	90	180	200	250	290
1,000	280	160	260	220	100	200	230	280	330
1,500	340	180	300	260	100	250	280	320	390
2,000	390	190	330	290	80	280	310	350	440
3,000	480	160	350	320		340	370	370	520
4,000	550		320	330		380	400	340	550
5,000	610			320		410	410	250	570
6,000	660			280		440	420		570
7,000	710					460	410		550
8,000	750					470	390		510
9,000	790					480	360		440
10,000	820					490	300		
15,000	970					460			
20,000	1,050					300			
30,000	1,150								
40,000	1,200								
50,000	1,100								
60,000	800								

SOURCES Institute for Survey Research, Temple University, and National Science Foundation

appendix b

statistical tables

Table B-1. Number of employed scientists and engineers by field: 1976-83

Field	Total Employed				
	1976	1978	1980	1982	1983
Total, all fields	2,331,200	2,609,800	2,860,400	3,253,100	3,465,900
Total scientists	959,500	1,071,000	1,184,500	1,405,700	1,525,900
Physical scientists	188,900	208,300	215,200	227,400	235,900
Chemists	132,800	143,000	148,800	154,100	158,900
Physicists/astronomers	44,300	46,400	47,200	47,600	48,400
Other physical scientists	11,800	18,800	19,300	25,600	28,600
Mathematical scientists	48,600	53,700	64,300	79,400	86,700
Mathematicians	43,400	46,300	53,400	62,500	66,000
Statisticians	5,200	7,300	11,000	16,900	20,700
Computer specialists	119,000	177,000	207,800	299,000	349,100
Environmental scientists	54,800	68,900	77,600	87,200	95,100
Earth scientists	46,500	54,000	64,000	73,600	80,100
Oceanographers	4,400	7,300	5,100	3,400	2,900
Atmospheric scientists	3,800	7,600	8,500	10,300	12,100
Life scientists	213,500	244,100	287,500	337,100	368,400
Biological scientists	139,400	164,000	198,300	233,800	255,200
Agricultural scientists	40,700	49,600	59,300	73,800	84,100
Medical scientists	33,300	30,500	29,900	29,500	29,100
Psychologists	112,500	121,700	128,100	138,400	143,500
Social scientists	222,300	197,400	204,000	237,200	247,200
Economists	62,500	62,100	75,000	103,100	112,500
Sociologists/ anthropologists	33,900	40,900	48,300	57,000	62,200
Other social scientists	125,900	94,400	80,700	77,200	72,500

See footnotes at end of table.

Table B-1. Number of employed scientists and engineers by field: 1976-83-Continued

Field	Total Employed				
	1976	1978	1980	1982	1983
Total Engineers	1,371,700	1,538,800	1,675,900	1,847,300	1,940,000
Astronautical/ aeronautical	56,800	62,000	69,500	80,800	84,700
Chemical	77,500	84,200	94,500	107,700	114,900
Civil	188,200	211,700	232,100	258,200	271,800
Electrical/electronic	283,000	341,500	383,100	437,700	470,500
Mechanical	276,200	299,300	322,600	357,900	371,500
Other engineers	490,000	540,100	574,100	604,900	626,500

See footnotes at end of table.

Table B-1. Number of employed scientists and engineers by field: 1976-83-Continued

Field	Employed in S/E				
	1976	1978	1980	1982	1983
Total, all fields	2,122,100	2,364,400	2,542,700	2,866,700	3,049,700
Total scientists	843,800	937,500	1,032,800	1,147,500	1,244,000
Physical scientists	154,900	168,200	166,300	210,500	218,400
Chemists	108,000	111,500	111,600	142,100	146,500
Physicists/astronomers	37,000	40,000	39,000	44,900	45,600
Other physical scientists	10,000	16,600	15,700	23,500	26,300
Mathematical scientists	43,800	48,000	57,300	68,300	74,800
Mathematicians	38,800	41,000	46,900	52,800	55,900
Statisticians	5,000	7,100	10,300	15,500	18,900
Computer specialists	116,000	171,400	196,700	216,100	252,400
Environmental scientists	46,600	56,900	63,100	82,700	90,200
Earth scientists	39,600	44,300	50,900	69,900	76,000
Oceanographers	3,500	5,700	4,600	3,100	2,600
Atmospheric scientists	3,400	6,900	7,700	9,800	11,600
Life scientists	198,200	227,800	267,300	298,000	325,600
Biological scientists	128,600	150,600	182,000	210,100	229,300
Agricultural scientists	39,100	49,100	58,200	62,300	71,000
Medical scientists	30,600	28,100	27,100	25,700	25,300
Psychologists	103,700	107,400	112,500	105,600	109,300
Social scientists	180,500	157,800	169,700	166,200	173,200
Economists	53,700	52,900	65,500	74,900	81,900
Sociologists/ anthropologists	30,000	32,200	40,200	37,800	40,900
Other social scientists	96,900	72,700	64,000	53,500	50,300

See footnotes at end of table.

Table B-1. Number of employed scientists and engineers by field: 1976-83-Continued

Field	Employed in S/E				
	1976	1978	1980	1982	1983
Total Engineers	1,278,300	1,426,900	1,509,900	1,719,100	1,805,700
Astronautical/ aeronautical	55,700	61,100	65,000	77,200	80,900
Chemical	76,400	81,900	89,000	101,100	107,800
Civil	182,800	205,200	217,000	243,700	256,600
Electrical/electronic	267,900	327,000	357,400	413,500	444,500
Mechanical	272,800	296,500	308,800	334,400	347,100
Other engineers	422,700	455,300	472,600	549,200	568,900

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-2. Employment status of scientists and engineers by field and sex: 1976 and 1983

Field and sex	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Total, all fields	2,530,100	3,734,000	2,413,300	3,544,500	2,331,200	3,465,900	2,122,100	3,049,700
Men	2,295,300	3,240,700	2,202,300	3,084,500	2,131,600	3,026,100	1,947,200	2,695,100
Women	234,800	493,300	211,000	460,000	199,700	439,800	174,900	354,600
Total scientists	1,048,400	1,647,800	996,000	1,567,000	959,500	1,525,900	843,800	1,244,000
Men	837,900	1,225,200	807,000	1,173,200	781,300	1,149,300	689,100	948,200
Women	210,600	422,600	189,000	393,800	178,200	376,600	154,700	295,800
Physical scientists	203,900	258,700	194,800	241,900	188,900	235,900	154,900	218,400
Men	185,400	231,400	177,800	217,500	172,700	212,800	143,600	197,100
Women	18,500	27,400	17,000	24,400	16,200	23,100	11,300	21,300
Chemists	142,500	176,200	136,300	163,300	132,800	158,900	108,000	146,500
Men	127,200	153,900	122,300	143,600	119,100	140,300	98,200	129,300
Women	15,300	22,200	14,100	19,700	13,700	18,700	9,800	17,200
Physicists/astronomers	48,400	52,000	45,800	49,300	44,300	48,400	37,000	45,600
Men	46,100	48,900	43,800	46,600	42,600	45,800	35,900	43,200
Women	2,300	3,000	2,000	2,700	1,700	2,600	1,100	2,400
Other physical scientists	13,000	30,600	12,700	29,300	11,800	28,600	10,000	26,300
Men	12,100	28,500	11,800	27,300	10,900	26,700	9,500	24,600
Women	900	2,100	900	2,000	800	1,900	400	1,700
Mathematical scientists	55,000	94,200	51,100	88,600	48,600	86,700	43,800	74,800
Men	40,700	61,900	39,000	58,700	37,100	57,700	33,700	48,700
Women	14,300	32,300	12,200	29,900	11,500	29,000	10,000	26,100
Mathematicians	49,200	72,000	45,800	67,500	43,400	66,000	38,300	55,900
Men	36,900	50,000	35,500	47,400	33,700	46,600	30,500	38,600
Women	12,300	22,100	10,300	20,200	9,700	19,400	8,200	17,300

See footnotes at end of table.

Table B-2. Employment status of scientists and engineers by field and sex: 1976 and 1983-Continued

Field and sex	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Statisticians	5,800	22,200	5,400	21,100	5,200	20,700	5,000	18,900
Men	3,800	11,900	3,500	11,400	3,400	11,100	3,200	10,200
Women	2,000	10,300	1,800	9,700	1,800	9,600	1,800	8,800
Computer specialists	125,900	361,200	122,000	352,800	119,000	349,100	116,000	252,400
Men	101,600	256,900	100,200	254,200	98,400	251,700	95,100	181,400
Women	24,300	104,200	21,800	98,700	20,600	97,400	20,900	71,000
Environmental scientists	58,300	103,900	56,000	97,800	54,800	95,100	46,600	90,200
Men	53,800	87,200	52,000	82,500	50,900	80,500	44,000	76,400
Women	4,500	16,700	4,000	15,300	3,900	14,600	2,600	13,800
Earth scientists	49,600	87,400	47,600	82,400	46,500	80,100	39,600	76,000
Men	45,400	72,300	43,900	68,500	42,900	66,800	37,300	63,500
Women	4,200	15,200	3,700	13,900	3,600	13,300	2,400	12,600
Oceanographers	4,600	3,200	4,500	3,100	4,400	2,900	3,500	2,600
Men	4,600	2,800	4,500	2,800	4,400	2,600	3,500	2,300
Women	(1)	400	(1)	400	(1)	300	(1)	300
Atmospheric scientists	4,100	13,300	3,900	12,300	3,800	12,100	3,400	11,600
Men	3,800	12,100	3,600	11,200	3,600	11,000	3,200	10,600
Women	300	1,200	300	1,100	300	1,100	200	1,000
Life scientists	230,700	399,800	219,700	377,800	213,500	368,400	198,200	325,600
Men	191,800	307,900	184,500	293,100	179,600	288,100	167,700	256,400
Women	38,900	92,000	35,300	84,700	33,900	80,300	30,500	69,200
Biological scientists	151,100	277,500	143,600	261,800	139,400	255,200	128,600	229,300
Men	124,000	212,600	119,100	202,300	115,300	199,000	106,200	180,700
Women	27,100	64,900	24,600	59,500	24,100	56,200	22,400	48,600

See footnotes at end of table.

Table B-2. Employment status of scientists and engineers by field and sex: 1976 and 1983-Continued

Field and sex	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Agricultural scientists	44,300	91,600	41,900	86,600	40,700	84,100	39,100	71,000
Men	42,500	72,000	40,300	68,300	39,100	66,700	37,400	56,000
Women	1,800	19,600	1,700	18,300	1,600	17,400	1,600	15,000
Medical scientists	35,300	30,800	34,100	29,400	33,300	29,100	30,600	25,300
Men	25,300	23,300	25,100	22,500	25,100	22,300	24,100	19,700
Women	9,900	7,500	9,000	6,900	8,200	6,800	6,500	5,600
Psychologists	122,500	155,000	118,200	148,200	112,500	143,500	103,700	109,300
Men	81,800	89,500	80,200	86,600	76,900	84,200	71,600	67,300
Women	40,700	65,400	38,000	61,600	35,600	59,300	32,000	42,100
Social scientists	252,200	275,000	234,200	259,800	222,300	247,200	180,500	173,200
Men	182,800	190,400	173,400	180,600	165,700	174,400	133,200	120,900
Women	69,400	84,600	60,800	79,300	56,600	72,800	47,300	52,300
Economists	70,300	124,200	64,300	117,500	62,500	112,500	53,700	81,900
Men	60,500	99,200	56,400	94,100	54,600	90,900	46,300	65,300
Women	9,800	24,900	8,000	23,400	8,000	21,600	7,400	16,600
Sociologists/ anthropologists	41,600	68,700	39,400	65,300	33,900	62,200	30,000	40,900
Men	26,100	37,600	25,400	35,700	22,500	34,800	19,700	23,600
Women	15,500	31,100	13,900	29,600	11,400	27,400	10,300	17,300
Other social scientists	140,300	82,200	130,500	77,100	125,900	72,500	96,900	50,300
Men	96,200	53,600	91,500	50,800	88,700	48,700	67,200	31,900
Women	44,200	28,500	38,900	26,300	37,200	23,800	29,600	18,400
Total Engineers	1,481,700	2,086,200	1,417,300	1,977,500	1,371,700	1,940,000	1,278,300	1,805,700
Men	1,457,500	2,015,600	1,395,300	1,911,400	1,350,300	1,876,700	1,258,100	1,746,900
Women	24,200	70,700	22,000	66,200	21,400	63,300	20,200	58,800
Astronautical/ aeronautical	62,300	91,300	59,200	86,300	56,800	84,700	55,700	80,900
Men	61,500	89,600	58,700	84,700	56,400	83,100	55,100	79,400
Women	900	1,700	400	1,600	400	1,600	400	1,500

See footnotes at end of table.

Table B-2. Employment status of scientists and engineers by field and sex: 1976 and 1983-Continued

Field and sex	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Chemical	83,900	127,500	79,300	118,400	77,500	114,900	76,400	107,800
Men	81,000	118,600	76,600	110,700	75,000	107,600	73,700	100,900
Women	3,000	8,900	2,800	7,700	2,500	7,300	2,500	6,900
Civil	201,800	292,100	193,500	277,200	188,200	271,800	182,800	256,600
Men	195,900	285,800	187,600	271,400	182,800	266,300	178,100	251,200
Women	6,000	6,300	5,800	5,900	5,400	5,500	4,800	5,400
Electrical/electronics	295,600	496,900	288,100	476,400	283,000	470,500	267,900	444,500
Men	293,200	486,300	286,500	466,400	281,400	461,100	266,500	436,100
Women	2,400	10,600	1,600	9,900	1,600	9,400	1,400	8,400
Mechanical	297,800	403,500	288,500	379,300	276,200	371,500	272,800	347,100
Men	295,400	397,500	286,200	373,600	273,900	366,000	270,600	342,000
Women	2,500	6,000	2,300	5,700	2,300	5,400	2,200	5,100
Other engineers	540,100	675,000	508,800	639,900	490,000	626,500	422,700	568,900
Men	530,600	637,800	499,700	604,600	480,900	592,600	414,200	537,400
Women	9,500	37,200	9,100	35,300	9,100	33,900	8,500	31,500

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-3. Employment status of scientists and engineers by field and race: 1976 and 1983

Field and race	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Total, all fields	2,530,100	3,734,000	2,413,300	3,544,500	2,331,200	3,465,900	2,122,100	3,049,700
White	2,328,100	3,426,700	2,215,200	3,247,900	2,141,900	3,180,000	1,949,700	2,800,300
Black	42,000	88,800	40,500	86,600	38,100	82,800	34,900	67,900
Asian	109,900	155,700	108,300	150,200	106,600	145,300	98,500	132,200
Other	50,100	62,800	49,400	59,900	44,600	57,800	38,900	49,300
Total scientists	1,048,400	1,647,800	996,000	1,567,000	959,500	1,525,900	843,800	1,244,000
White	954,400	1,511,100	904,400	1,436,500	870,900	1,401,000	764,200	1,144,500
Black	24,000	51,000	22,600	49,500	21,400	47,400	19,400	35,200
Asian	49,700	57,300	49,200	54,500	48,500	52,400	43,100	44,500
Other	20,400	28,400	19,700	26,500	18,700	25,080	17,100	19,700
Physical scientists	203,900	258,700	194,800	241,900	188,900	235,900	154,900	218,400
White	186,100	241,400	177,700	226,200	172,400	221,000	141.200	205,300
Black	3,400	4,300	3,400	3,900	3,200	3,700	2,400	3,000
Asian	8,200	9,700	8,000	9,000	7,600	8,500	6,400	7,800
Other	6,200	3,300	5,700	2,800	5,700	2,700	4,900	2,300
Chemists	142,500	176,200	136,300	163,300	132,800	158,900	108,000	146,500
White	130,200	163,100	124,500	151,500	121,200	147,800	98,700	136,800
Black	2,800	3,600	2,800	3,200	2,800	3,100	2,100	2,600
Asian	7,100	7,500	7,000	6,900	6,800	6,500	5,600	5,700
Other	2,300	2,000	2,000	1,600	2,000	1,600	1,600	1,400
Physicists/astronomers	48,400	52,000	45,800	49,300	44,300	48,400	37,000	45,600
White	44,000	49,200	41,700	46,700	40,500	46,000	33,400	43,400
Black	500	500	500	500	300	400	200	200
Asian	700	1,400	700	1,400	600	1,400	600	1,400
Other	3,200	800	2,900	700	2,900	600	2,700	600
Other physical scientists	13,000	30,600	12,700	29,300	11,800	28,600	10,000	26,300
White	11,800	29,200	11,500	27,900	10,700	27,200	9,100	25,100
Black	100	200	100	200	100	200	100	200
Asian	400	700	400	700	200	700	200	700
Other	700	500	700	400	700	400	600	300

See footnotes at end of table.

Table B-3. Employment status of scientists and engineers by field and race: 1976 and 1983-Continued

Field and race	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Mathematical scientists	55,000	94,200	51,100	88,600	48,600	86,700	43,800	74,800
White	50,400	85,700	46,800	80,600	44,200	79,000	39,400	67,600
Black	2,700	4,100	2,600	4,000	2,600	3,900	2,500	3,700
Asian	1,700	3,500	1,600	3,100	1,600	3,100	1,600	2,800
Other	200	900	200	800	200	800	200	700
Mathematicians	49,200	72,000	45,800	67,500	43,400	66,000	38,800	55,900
White	45,300	65,700	42,100	61,500	39,700	60,300	35,200	50,400
Black	2,500	2,900	2,300	2,800	2,300	2,600	2,200	2,600
Asian	1,200	2,600	1,200	2,500	1,200	2,400	1,200	2,200
Other	200	800	200	700	200	700	200	700
Statisticians	5,800	22,200	5,400	21,100	5,200	20,700	5,000	18,900
White	5,000	20,000	4,700	19,100	4,500	18,700	4,300	17,200
Black	300	1,200	200	1,200	200	1,200	200	1,100
Asian	500	900	400	700	400	700	400	600
Other	(1)	100	(1)	100	(1)	100	(1)	(1)
Computer specialists	125,900	361,200	122,000	352,800	119,000	349,100	116,000	252,400
White	116,800	326,700	113,100	319,100	110,700	315,900	108,000	227,500
Black	2,300	12,100	2,200	11,900	1,600	11,700	1,500	8,200
Asian	4,000	16,500	4,000	16,300	4,000	16,000	3,900	12,700
Other	2,700	5,800	2,700	5,600	2,700	5,500	2,600	4,000
Environmental scientists	58,300	103,900	56,000	97,800	54,800	95,100	46,600	90,200
White	51,600	96,900	49,300	91,200	48,300	88,700	40,700	84,000
Black	2,100	700	2,100	700	2,000	600	1,800	400
Asian	3,400	4,000	3,400	3,800	3,200	3,700	2,900	3,700
Other	1,200	2,300	1,200	2,100	1,200	2,100	1,200	2,100
Earth scientists	49,600	87,400	47,600	82,400	46,500	80,100	39,600	76,000
White	45,300	81,800	43,300	76,900	42,400	74,900	35,800	71,000
Black	200	600	200	600	200	600	200	400
Asian	2,900	3,000	2,900	3,000	2,700	3,000	2,500	2,900
Other	1,200	2,000	1,200	1,800	1,200	1,700	1,200	1,700

See footnotes at end of table.

Table B-3. Employment status of scientists and engineers by field and race: 1976 and 1983-Continued

Field and race	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Oceanographers	4,600	3,200	4,500	3,100	4,400	2,900	3,500	2,600
White	2,700	2,900	2,600	2,900	2,600	2,600	1,800	2,300
Black	1,800	100	1,800	(1)	1,800	(1)	1,600	(1)
Asian	100	100	100	100	100	100	100	100
Other	(1)	200	(1)	200	(1)	200	(1)	200
Atmospheric scientists	4,100	13,300	3,900	12,300	3,800	12,100	3,400	11,600
White	3,600	12,200	3,400	11,400	3,400	11,200	3,000	10,700
Black	(1)	100	(1)	100	(1)	100	(1)	100
Asian	400	900	400	700	400	700	400	700
Other	(1)	100	(1)	100	(1)	100	(1)	100
Life scientists	230,700	399,800	219,700	377,800	213,500	368,400	198,200	325,600
White	217,500	375,700	206,900	355,000	200,700	346,100	186,100	306,200
Black	4,900	9,500	4,900	9,200	4,900	9,000	4,700	8,500
Asian	5,600	9,200	5,400	8,600	5,300	8,400	5,300	7,000
Other	2,600	5,400	2,500	5,000	2,500	4,800	2,000	3,900
Biological scientists	151,100	277,500	143,600	261,800	139,400	255,200	128,600	229,300
White	142,400	260,300	135,200	245,400	131,000	239,100	120,700	214,800
Black	3,000	7,600	3,000	7,300	3,000	7,300	2,900	6,800
Asian	3,900	6,000	3,700	5,600	3,700	5,500	3,700	5,000
Other	1,700	3,600	1,700	3,500	1,700	3,300	1,200	2,600
Agricultural scientists	44,300	91,600	41,900	86,600	40,700	84,100	39,100	71,000
White	42,300	86,700	40,000	82,100	38,800	79,800	37,200	67,800
Black	500	1,500	500	1,500	500	1,400	400	1,300
Asian	900	2,000	900	1,900	900	1,800	900	1,000
Other	600	1,300	500	1,100	500	1,100	500	900
Medical scientists	35,300	30,800	34,100	29,400	33,300	29,100	30,600	25,300
White	32,700	28,700	31,700	27,500	30,900	27,200	28,200	23,600
Black	1,400	400	1,400	400	1,400	400	1,400	400
Asian	700	1,200	700	1,100	700	1,100	600	1,000
Other	300	400	300	400	300	400	300	400

See footnotes at end of table.

Table B-3. Employment status of scientists and engineers by field and race: 1976 and 1983-Continued

Field and race	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Psychologists	122,500	155,000	118,200	148,200	112,500	143,500	103,700	109,300
White	114,100	145,600	109,800	139,400	105,100	135,100	97,100	104,200
Black	3,800	5,200	3,800	5,100	3,800	4,700	3,700	2,500
Asian	1,000	1,700	1,000	1,400	1,000	1,400	700	1,200
Other	3,600	2,500	3,600	2,300	2,600	2,200	2,100	1,500
Social scientists	232,200	275,000	234,200	259,800	222,300	247,200	180,500	173,200
White	217,800	239,000	200,800	225,100	189,400	215,300	151,600	149,700
Black	4,700	15,000	3,700	14,700	3,300	13,700	2,900	8,900
Asian	25,900	12,700	25,800	12,100	25,800	11,300	22,100	9,400
Other	3,800	8,300	3,800	7,900	3,800	7,000	3,800	5,200
Economists	70,300	124,200	64,300	117,500	62,500	112,500	53,700	81,900
White	62,300	109,200	56,300	103,000	54,500	99,200	46,000	70,300
Black	800	3,200	800	3,200	800	3,000	700	2,400
Asian	6,700	8,500	6,700	8,100	6,700	7,500	6,600	6,600
Other	500	3,300	500	3,100	500	2,800	500	2,600
Sociologists/ anthropologists	41,600	68,700	39,400	65,300	33,900	62,200	30,000	40;900
White	37,900	57,600	35,700	54,700	30,200	52,500	26,200	35,300
Black	500	6,300	500	6,000	500	5,900	400	2,900
Asian	1,100	1,900	1,100	1,900	1,100	1,800	1,200	1,500
Other	2,000	2,800	2,000	2,600	2,000	1,900	2,000	1,200
Other social scientists	140,300	82,200	130,500	77,100	125,900	72,500	96,900	50,300
White	117,700	72,200	108,800	67,300	104,700	63,700	79,500	44,100
Black	3,400	5,500	2,400	5,500	2,000	4,700	1,800	3,600
Asian	18,000	2,300	18,000	2,100	18,000	1,900	14,400	1,300
Other	1,200	2,200	1,200	2,200	1,200	2,200	1,200	1,400
Total Engineers	1,481,700	2,086,200	1,417,300	1,977,500	1,371,700	1,940,000	1,278,300	1,805,700
White	1,373,700	1,915,600	1,310,800	1,811,400	1,271,000	1,779,000	1,185,500	1,655,800
Black	18,100	37,800	17,800	37,100	16,700	35,400	15,500	32,700
Asian	60,200	98,400	59,100	95,700	58,100	92,900	55,400	87,600
Other	29,700	34,400	29,700	33,400	25,900	32,800	21,900	29,600

See footnotes at end of table.

Table B-3. Employment status of scientists and engineers by field and race: 1976 and 1983-Continued

Field and race	Total		Labor Force		Total Employed		Employed in S/E	
	1976	1983	1976	1983	1976	1983	1976	1983
Astronautical/ aeronautical	62,300	91,300	59,200	86,300	56,800	84,700	55,700	80,900
White	59,700	85,800	56,500	80,800	54,100	79,500	52,900	76,000
Black	300	1,400	300	1,400	300	1,400	300	1,300
Asian	1,600	3,000	1,600	2,900	1,600	2,800	1,600	2,800
Other	700	1,100	700	1,100	700	1,100	700	800
Chemical	83,900	127,500	79,300	118,400	77,500	114,900	76,400	107,800
White	78,200	114,600	73,600	106,300	72,200	103,500	71,100	97,100
Black	1,500	1,300	1,500	1,300	1,500	1,100	1,500	1,000
Asian	2,900	9,500	2,900	9,000	2,400	8,600	2,400	8,100
Other	1,400	2,100	1,400	1,900	1,400	1,700	1,400	1,600
Civil	201,800	292,100	193,500	277,200	188,200	271,800	182,800	256,600
White	177,400	262,100	169,300	248,100	165,700	243,400	162,500	230,100
Black	1,700	4,500	1,600	4,400	1,600	4,200	1,600	4,100
Asian	15,100	19,300	14,800	18,600	14,800	18,200	14,800	17,000
Other	7,700	6,300	7,700	6,200	6,100	6,000	3,700	5,400
Electrical/electronics	295,600	496,900	288,100	476,400	283,000	470,500	267,900	444,500
White	274,800	449,400	267,600	430,200	262,500	425,200	248,800	401,600
Black	3,100	12,600	2,900	12,200	2,900	11,700	2,600	10,600
Asian	14,000	27,000	13,800	26,300	13,800	26,000	12,700	25,200
Other	3,800	7,800	3,800	7,700	3,800	7,600	3,800	7,000
Mechanical	297,800	403,500	288,500	379,300	276,200	371,500	272,800	347,100
White	277,600	375,700	268,900	352,100	258,700	345,400	255,300	322,600
Black	2,400	4,200	2,400	4,200	2,400	4,000	2,200	3,600
Asian	10,500	17,500	9,900	17,200	9,700	16,400	9,600	15,300
Other	7,400	6,100	7,400	5,800	5,500	5,700	5,500	5,500
Other engineers	540,100	675,000	508,800	639,900	490,000	626,500	422,700	568,900
White	506,100	628,100	474,900	593,900	457,800	582,000	394,900	528,300
Black	9,200	13,700	9,100	13,600	8,000	13,000	7,000	12,000
Asian	16,000	22,100	16,000	21,700	15,800	20,900	14,300	19,300
Other	8,800	11,000	8,800	10,800	8,500	10,600	6,500	9,300

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-4. Employment status of Hispanic scientists and engineers by field: 1983

Field	Total	Labor force	Total employed	Employed in S/E
Total, all fields	79,500	76,200	74,100	61,800
Total scientists	33,300	31,200	30,100	21,900
Physical scientists	4,500	3,900	3,700	3,100
Chemists	2,800	2,400	2,300	2,000
Physicists/astronomers	1,200	900	900	700
Other physical scientists	600	600	600	400
Mathematical scientists	1,700	1,600	1,600	1,400
Mathematicians	1,100	1,000	1,000	900
Statisticians	600	600	600	500
Computer specialists	5,400	5,300	5,300	3,800
Environmental scientists	1,600	1,500	1,500	1,400
Earth scientists	1,400	1,300	1,300	1,200
Oceanographers	(1)	(1)	(1)	(1)
Atmospheric scientists	200	100	100	100
Life scientists	8,200	7,600	7,300	5,700
Biological scientists	5,200	5,000	4,700	3,800
Agricultural scientists	2,100	1,800	1,800	1,300
Medical scientists	900	900	900	600
Psychologists	2,600	2,400	2,400	1,200
Social scientists	9,400	9,000	8,300	5,200
Economists	3,000	2,900	2,600	1,900
Sociologists/anthropologists	3,500	3,400	3,200	1,500
Other social scientists	2,800	2,600	2,600	1,800

See footnotes at end of table.

Table B-4. Employment status of Hispanic scientists and engineers by field: 1983-Continued

Field	Total	Labor force	Total employed	Employed in S/E
Total engineers	46,200	45,000	44,100	39,900
Aeronautical/astronautical	1,600	1,600	1,600	1,300
Chemical	3,500	3,300	3,200	2,700
Civil	8,900	8,700	8,400	7,900
Electrical/electronics	10,100	9,900	9,800	9,300
Industrial	3,000	2,800	2,800	2,400
Materials	500	300	300	300
Mechanical	7,400	7,300	7,200	6,400
Mining	100	100	100	100
Nuclear	200	200	200	200
Petroleum	1,000	900	900	800
Other engineers	9,800	9,700	9,600	8,400

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983

Field and sex	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Total, all fields	238,800	364,200	395,000	224,300	346,600	373,000
Men	218,000	318,400	340,500	205,800	304,700	322,900
Women	20,800	45,700	54,600	18,500	42,000	50,100
Total scientists	201,500	305,800	331,200	188,200	289,500	311,200
Men	180,900	260,900	277,800	169,900	248,300	262,200
Women	20,700	44,900	53,400	18,300	41,200	49,000
Physical scientists	53,100	67,600	69,600	49,800	63,600	64,800
Men	50,500	63,300	64,800	47,600	59,800	60,500
Women	2,600	4,300	4,800	2,300	3,800	4,300
Chemists	34,000	45,300	45,600	31,700	42,200	41,900
Men	32,000	41,700	41,600	29,900	39,000	38,300
Women	2,000	3,700	4,000	1,800	3,200	3,600
Physicists/Astronomers	19,100	22,300	24,000	18,100	21,400	22,900
Men	18,500	21,600	23,200	17,700	20,700	22,200
Women	500	700	800	500	600	700
Mathematical scientists	13,100	16,500	17,400	12,400	15,700	16,500
Men	12,100	15,000	15,800	11,500	14,300	15,100
Women	1,000	1,500	1,600	800	1,300	1,400

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Mathematicans	11,600	13,800	14,500	10,900	13,100	13,700
Men	10,700	12,700	13,200	10,100	12,100	12,600
Women	900	1,200	1,200	800	1,000	1,100
Statisticians	1,500	2,600	2,900	1,500	2,600	2,800
Men	1,400	2,300	2,600	1,400	2,300	2,500
Women	100	300	300	100	300	300
Computer specialists	2,800	9,100	12,300	2,700	9,100	12,200
Men	2,700	8,400	11,000	2,600	8,400	10,900
Women	100	700	1,300	100	700	1,300
Environmental scientists	10,900	16,400	17,100	10,400	16,000	16,600
Men	10,600	15,500	16,200	10,200	15,100	15,600
Women	300	900	1,000	300	900	900
Earth scientists	9,100	12,400	13,100	8,700	12,100	12,600
Men	8,800	11,800	12,400	8,400	11,500	11,900
Women	200	600	700	200	600	700
Oceanographers	1,200	1,800	1,800	1,100	1,800	1,800
Men	1,200	1,600	1,600	1,100	1,600	1,600
Women	(1)	200	200	(1)	200	200
Atmospheric scientists	700	2,200	2,300	600	2,100	2,200
Men	600	2,100	2,200	600	2,000	2,100
Women	(1)	100	100	(1)	100	100

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Life scientists	62,100	91,900	101,400	57,800	86,000	94,000
Men	54,400	76,600	82,900	51,000	72,200	77,300
Women	7,700	15,300	18,500	6,700	13,800	16,700
Biological scientists	40,600	54,400	60,900	37,700	50,500	56,200
Men	34,400	43,700	48,400	32,300	41,100	45,100
Women	6,200	10,600	12,500	5,500	9,400	11,100
Agricultural scientists	10,000	14,700	16,000	9,300	13,600	14,700
Men	9,800	14,300	15,200	9,100	13,200	14,000
Women	200	500	800	200	400	700
Medical scientists	11,500	22,800	24,500	10,800	21,900	23,200
Men	10,200	18,600	19,200	9,600	17,900	18,200
Women	1,300	4,200	5,300	1,100	4,000	5,000
Psychologists	27,100	45,000	49,700	25,200	43,300	47,200
Men	21,500	32,400	34,800	20,200	31,400	33,300
Women	5,600	12,600	14,900	5,000	11,900	13,900
Social scientists	32,500	59,200	63,700	29,900	56,000	60,000
Men	29,100	49,600	52,400	26,800	47,100	49,600
Women	3,400	9,600	11,300	3,100	8,800	10,400
Economists	10,800	17,100	18,100	9,800	16,000	17,000
Men	10,200	15,700	16,500	9,200	14,800	15,600
Women	600	1,400	1,600	500	1,200	1,400

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Sociologists/Arthropologists	7,200	11,900	13,400	6,700	11,200	12,400
Men	5,800	8,700	9,500	5,400	8,100	8,700
Women	1,400	3,300	4,000	1,300	3,100	3,600
Other social scientists	14,500	30,200	32,200	13,400	28,700	30,600
Men	13,100	25,200	26,500	12,100	24,200	25,200
Women	1,400	5,000	5,700	1,300	4,600	5,400
Total engineers	37,300	58,400	63,800	36,100	57,100	61,800
Men	37,100	57,600	62,700	36,000	56,300	60,700
Women	200	800	1,100	200	800	1,100
Aeronautical/astronautical	1,700	2,500	3,700	1,700	2,500	3,700
Men	1,700	2,500	3,700	1,700	2,500	3,600
Women	(1)	(1)	100	(1)	(1)	100
Chemical	4,800	7,600	7,700	4,500	7,200	7,200
Men	4,800	7,600	7,600	4,500	7,100	7,100
Women	(1)	100	100	(1)	100	100
Civil	3,200	6,200	5,500	3,100	6,100	5,300
Men	3,200	6,100	5,400	3,100	6,000	5,200
Women	(1)	100	100	(1)	100	100
Electrical/electronics	7,300	10,800	13,100	7,100	10,600	12,700
Men	7,300	10,700	12,800	7,100	10,500	12,500
Women	(1)	100	200	(1)	100	200

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Mechanical	3,400	5,600	5,900	3,300	5,400	5,700
Men	3,400	5,500	5,900	3,300	5,300	5,600
Women	(1)	(1)	100	(1)	(1)	100
Nuclear	1,300	2,100	2,300	1,300	2,100	2,300
Men	1,300	2,000	2,300	1,300	2,000	2,300
Women	(1)	(1)	(1)	(1)	(1)	(1)
Other engineers	15,600	23,600	25,500	15,100	23,300	24,900
Men	15,600	23,200	25,000	15,100	22,900	24,400
Women	100	400	500	100	400	500

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Total, all fields	220,300	344,000	369,300	208,300	314,500	327,400
Men	203,400	303,000	320,500	192,600	277,800	284,900
Women	16,900	41,000	48,800	15,700	36,800	42,500
Total scientists	184,600	286,900	307,800	173,800	261,400	271,200
Men	167,800	246,700	260,000	158,300	225,400	229,700
Women	16,800	40,200	47,800	15,500	36,000	41,500
Physical scientists	48,500	63,100	64,000	45,100	57,100	56,300
Men	46,600	59,300	59,800	43,400	53,800	52,700
Women	1,900	3,800	4,200	1.700	3,300	3,600
Chemists	30,800	41,900	41,300	28,300	38,000	36,900
Men	29,300	38,800	37,800	27,000	35,300	33,900
Women	1,500	3,200	3,500	1,300	2,800	3,000
Physicists/Astronomers	17,800	21,200	22,700	16,800	19,000	19,400
Men	17,300	20,600	22,000	16,400	18,500	18,800
Women	400	600	700	400	500	600
Mathematical scientists	12,100	15,600	16,400	11,800	14,100	14,300
Men	11,400	14,300	15,000	11,100	12,900	13,100
Women	800	1,300	1,400	700	1,200	1,200

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Mathematicans	10,700	13,000	13,600	10,400	11,700	11,700
Men	10,000	12,000	12,500	9,700	10,800	10,800
Women	700	1,000	1,100	700	900	900
Statisticians	1,500	2,500	2,800	1,400	2,400	2,600
Men	1,400	2,300	2,500	1,400	2,100	2,300
Women	100	300	300	100	300	300
Computer specialists	2,700	9,100	12,200	2,700	9,000	12,000
Men	2,600	8,400	10,900	2,600	8,300	10,700
Women	100	700	1,300	100	700	1,300
Environmental scientists	10,300	15,900	16,500	10,100	15,300	15,700
Men	10,100	15,100	15,600	9,900	14,500	14,800
Women	300	900	900	300	800	900
Earth scientists	8,600	12,000	12,500	8,400	11,500	11,900
Men	8,300	11,400	11,900	8,200	10,900	11,300
Women	200	600	600	200	500	600
Oceanographers	1,100	1,800	1,700	1,100	1,700	1,700
Men	1,100	1,600	1,600	1,100	1,600	1,500
Women	(1)	200	200	(1)	200	200
Atmospheric scientists	600	2,100	2,200	600	2,100	2,100
Men	600	2,000	2,100	600	2,000	2,000
Women	(1)	100	100	(1)	100	100

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Life scientists	56,700	84,900	92,800	54,800	80,700	85,900
Men	50,600	71,600	76,600	49,000	68,300	71,000
Women	6,100	13,300	16,200	5,800	12,500	14,900
Biological scientists	36,800	49,600	55,200	35,400	46,700	50,500
Men	31,900	40,600	44,600	30,800	38,500	40,900
Women	4,900	9,000	10,600	4,600	8,300	9,600
Agricultural scientists	9,200	13,500	14,500	8,900	12,600	13,400
Men	9,100	13,100	13,900	8,800	12,300	12,800
Women	100	400	700	100	300	600
Medical scientists	10,700	21,800	23,100	10,400	21,300	22,000
Men	9,600	17,800	18,100	9,400	17,500	17,300
Women	1,100	3,900	4,900	1,000	3,800	4,700
Psychologists	24,800	42,800	46,600	23,500	39,400	41,700
Men	20,000	31,100	33,000	19,000	28,700	29,500
Women	4,800	11,700	13,700	4,500	10,600	12,200
Social scientists	29,400	55,500	59,300	25,900	45,800	45,300
Men	26,500	47,000	49,300	23,400	38,900	37,900
Women	2,900	8,600	10,100	2,500	6,900	7,500
Economists	9,700	16,000	17,000	8,300	13,200	13,400
Men	9,200	14,800	15,500	7,900	12,200	12,200
Women	500	1,200	1,400	400	1,000	1,200

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Sociologists/Anthropologists	6,500	11,000	12,100	6,000	9,100	9,500
Men	5,300	8,100	8,600	4,900	6,600	6,800
Women	1,200	2,900	3,500	1,100	2,500	2,700
Other social scientists	13,200	28,500	30,300	11,500	23,500	22,400
Men	12,000	24,100	25,200	10,500	20,100	18,900
Women	1,200	4,400	5,100	1,000	3,400	3,600
Total engineers	35,800	57,000	61,500	34,400	53,200	56,200
Men	35,600	56,300	60,500	34,300	52,400	55,200
Women	100	800	1,100	100	700	1,000
Aeronautical/astronautical	1,700	2,500	3,700	1,600	2,200	3,400
Men	1,700	2,500	3,600	1,600	2,200	3,300
Women	(1)	(1)	100	(1)	(1)	100
Chemical	4,500	7,100	7,000	4,200	6,400	6,100
Men	4,500	7,100	6,900	4,200	6,300	6,000
Women	(1)	100	100	(1)	100	100
Civil	3,100	6,100	5,300	3,000	5,500	5,000
Men	3,100	6,000	5,200	3,000	5,400	4,900
Women	(1)	100	100	(1)	100	100
Electrical/electronics	7,100	10,600	12,700	6,800	10,000	11,400
Men	7,000	10,500	12,500	6,800	9,900	11,200
Women	(1)	100	200	(1)	100	200

See footnotes at end of table.

Table B-5. Employment status of doctoral scientists and engineers by field and sex: 1973, 1981, and 1983-Continued

Field and sex	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Mechanical	3,300	5,400	5,700	3,100	5,000	5,100
Men	3,300	5,300	5,600	3,100	4,900	5,100
Women	(1)	(1)	100	(1)	(1)	100
Nuclear	1,300	2,100	2,300	1,200	2,000	2,200
Men	1,300	2,000	2,300	1,200	2,000	2,200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Other engineers	15,000	23,200	24,900	14,500	22,000	23,000
Men	14,900	22,800	24,400	14,400	21,700	22,500
Women	100	400	500	100	400	500

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983

Field and race	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Total, all fields	238,800	364,200	395,000	224,300	346,600	373,000
White	218,600	327,200	352,300	205,800	310,900	331,600
Black	2,200	4,500	5,300	2,100	4,300	5,000
Asian	10,900	28,300	30,900	10,600	27,600	30,100
Other (1)	7,100	4,200	6,600	5,900	3,900	6,300
Total scientists	201,500	305,800	331,200	188,200	289,500	311,200
White	185,500	278,900	300,600	173,600	263,700	281,700
Black	2,100	4,200	4,900	2,000	4,000	4,600
Asian	7,800	19,100	20,100	7,600	18,600	19,500
Other (1)	6,200	3,600	5,600	5,000	3,300	5,300
Physical scientists	53,100	67,600	69,600	49,800	63,600	64,800
White	48,200	60,400	61,800	45,300	56,500	57,200
Black	500	600	800	500	600	700
Asian	2,600	5,900	5,900	2,500	5,800	5,800
Other (1)	1,800	700	1,200	1,500	600	1,100
Chemists	34,000	45,300	45,600	31,700	42,200	41,900
White	31,000	40,500	40,400	28,900	37,600	36,800
Black	400	400	500	400	400	400
Asian	1,600	3,900	4,000	1,500	3,900	3,900
Other (1)	1,000	500	700	800	400	700
Physicists/Astronomers	19,100	22,300	24,000	18,100	21,400	22,900
White	17,200	19,900	21,400	16,400	19,000	20,400
Black	100	200	300	100	200	300
Asian	1,000	2,000	1,900	1,000	1,900	1,900
Other (1)	800	200	400	700	200	400
Mathematical scientists	13,100	16,500	17,400	12,400	15,700	16,500
White	11,900	14,700	15,500	11,300	14,000	14,600
Black	100	200	200	100	200	200
Asian	600	1,200	1,400	600	1,200	1,400
Other (1)	400	400	300	400	300	300

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Mathematicans	11,600	13,800	14,500	10,900	13,100	13,700
White	10,500	12,400	13,000	9,900	11,800	12,300
Black	100	200	200	100	200	200
Asian	500	900	1,000	500	900	1,000
Other (1)	400	300	300	300	300	200
Statisticians	1,500	2,600	2,900	1,500	2,600	2,800
White	1,400	2,300	2,400	1,400	2,200	2,300
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	300	400	100	300	400
Other (1)	(2)	100	(2)	(2)	100	(2)
Computer specialists	2,800	9,100	12,300	2,700	9,100	12,200
White	2,600	8,100	11,100	2,500	8,000	11,000
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	900	1,000	100	900	900
Other (1)	(2)	100	200	(2)	100	200
Environmental scientists	10,900	16,400	17,100	10,400	16,000	16,600
White	10,300	15,500	16,100	9,800	15,000	15,600
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	300	800	800	300	800	800
Other (1)	300	200	200	300	200	200
Earth scientists	9,100	12,400	13,100	8,700	12,100	12,600
White	8,500	11,700	12,300	8,100	11,300	11,800
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	300	500	600	300	500	600
Other (1)	200	200	200	200	100	100
Oceanographers	1,200	1,800	1,800	1,100	1,800	1,800
White	1,100	1,700	1,700	1,100	1,700	1,700
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	100	100	(2)	100	100
Other (1)	100	(2)	(2)	100	(2)	(2)
Atmospheric scientists	700	2,200	2,300	600	2,100	2,200
White	600	2,000	2,100	600	2,000	2,100
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	100	100	(2)	100	100
Other (1)	(2)	(2)	(2)	(2)	(2)	(2)

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Life scientists	62,100	91,900	101,400	57,800	86,000	94,000
White	57,200	83,400	91,300	53,300	77,900	84,400
Black	700	1,100	1,200	600	1,000	1,200
Asian	2,800	6,600	7,200	2,700	6,300	6,900
Other (1)	1,500	800	1,700	1,100	700	1,600
Biological scientists	40,600	54,400	60,900	37,700	50,500	56,200
White	37,100	49,100	54,700	34,700	45,500	50,300
Black	500	700	700	500	600	700
Asian	1,800	4,200	4,500	1,700	4,000	4,300
Other (1)	1,100	500	1,000	800	400	900
Agricultural scientists	10,000	14,700	16,000	9,300	13,600	14,700
White	9,500	13,800	14,800	8,900	12,800	13,500
Black	(2)	100	100	(2)	100	100
Asian	300	700	900	300	700	800
Other (1)	200	100	200	100	100	200
Medical scientists	11,500	22,800	24,500	10,800	21,900	23,200
White	10,600	20,500	21,800	9,800	19,600	20,600
Black	100	300	500	100	300	400
Asian	700	1,700	1,800	700	1,600	1,700
Other (1)	200	300	500	200	300	400
Psychologists	27,100	45,000	49,700	25,200	43,300	47,200
White	25,600	43,000	47,200	23,900	41,400	44,700
Black	300	800	1,000	300	800	1,000
Asian	200	600	700	200	600	700
Other (1)	1,000	500	900	800	500	800
Social scientists	32,500	59,200	63,700	29,900	56,000	60,000
White	29,800	53,700	57,600	27,400	50,800	54,100
Black	400	1,400	1,600	400	1,300	1,500
Asian	1,200	3,200	3,300	1,100	3,000	3,200
Other (1)	1,100	900	1,300	900	800	1,200
Economists	10,800	17,100	18,100	9,800	16,000	17,000
White	9,800	15,400	16,100	8,900	14,400	15,100
Black	100	300	300	100	200	300
Asian	500	1,200	1,300	500	1,200	1,300
Other (1)	300	200	400	300	100	400

See footnotes at end of table.

Table 3-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Sociologists/Anthropologists	7,200	11,900	13,400	6,700	11,200	12,400
White	6,700	11,000	12,300	6,200	10,400	11,300
Black	100	300	400	100	300	400
Asian	200	400	500	200	400	400
Other (1)	300	200	200	200	200	200
Other social scientists	14,500	30,200	32,200	13,400	28,700	30,600
White	13,400	27,300	29,300	12,400	26,000	27,700
Black	200	800	800	200	800	800
Asian	500	1,500	1,500	500	1,400	1,400
Other (1)	500	500	700	400	500	700
Total engineers	37,300	58,400	63,700	36,100	57,100	61,800
White	33,200	48,300	51,600	32,100	47,200	49,900
Black	100	300	400	100	300	400
Asian	3,000	9,200	10,800	3,000	9,000	10,500
Other (1)	1,000	600	900	900	600	900
Aeronautical/astronautical	1,700	2,500	3,700	1,700	2,500	3,700
White	1,500	2,300	3,200	1,500	2,200	3,100
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	300	500	100	300	500
Other (1)	100	(2)	100	100	(2)	100
Chemical	4,800	7,600	7,700	4,500	7,200	7,200
White	4,300	6,000	5,900	4,000	5,600	5,500
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	400	1,600	1,700	400	1,600	1,600
Other (1)	100	(2)	100	100	(2)	100
Civil	3,200	6,200	5,500	3,100	6,100	5,300
White	2,600	4,900	4,400	2,500	4,800	4,200
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	500	1,200	1,100	500	1,200	1,100
Other (1)	100	100	(2)	100	100	(2)
Electrical/electronics	7,300	10,800	13,100	7,100	10,600	12,700
White	6,500	9,100	10,600	6,400	8,900	10,300
Black	(2)	(2)	100	(2)	(2)	100
Asian	500	1,600	2,200	500	1,600	2,100
Other (1)	300	100	200	200	100	200

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Total			Labor force		
	1973	1981	1983	1973	1981	1983
Mechanical	3,400	5,600	5,900	3,300	5,400	5,700
White	3,000	4,500	4,600	2,900	4,300	4,400
Black	(2)	(2)	100	(2)	(2)	100
Asian	400	1,000	1,200	400	1,000	1,200
Other (1)	100	(2)	(2)	100	(2)	(2)
Nuclear	1,300	2,100	2,300	1,300	2,100	2,300
White	1,200	1,600	1,900	1,200	1,600	1,900
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	400	400	(2)	400	400
Other (1)	(2)	100	100	(2)	100	100
Other engineers	15,600	23,600	25,500	15,100	23,300	24,900
White	14,100	20,000	21,100	13,700	19,800	20,500
Black	(2)	100	200	(2)	100	200
Asian	1,100	3,100	3,800	1,000	3,000	3,800
Other (1)	400	300	400	400	300	400

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Total, all fields	220,300	344,000	369,300	208,300	314,500	327,400
White	202,200	308,600	328,500	191,000	282,200	291,800
Black	2,000	4,200	4,,00	1,800	3,600	4,000
Asian	10,300	27,300	29,700	10,000	25,300	27,100
Other (1)	5,700	3,800	6,200	5,400	3,400	4,500
Total scientists	184,600	286,900	307,800	173,800	261,400	271,200
White	170,400	261,400	278,700	160,400	238,200	246,500
Black	1,900	4,000	4,500	1,700	3,400	3,600
Asian	7,300	18,300	19,300	7,100	16,900	17,200
Other (1)	4,800	3,200	5,300	4,600	2,800	4,000
Physical scientists	48,500	63,100	64,000	45,100	57,100	56,300
White	44,200	56,100	56,500	41,000	50,700	49,900
Black	500	600	700	400	500	600
Asian	2,400	5,800	5,700	2,300	5,300	5,100
Other (1)	1,400	600	1,100	1,300	600	800
Chemists	30,800	41,900	41,300	28,300	38,000	36,900
White	28,200	37,300	36,300	25,900	33,800	32,400
Black	400	400	400	400	300	400
Asian	1,400	3,900	3,900	1,400	3,600	3,600
Other (1)	800	400	700	700	300	500
Physicists/Astronomers	17,800	21,200	22,700	16,800	19,000	19,400
White	16,100	18,900	20,200	15,100	16,900	17,500
Black	100	200	200	100	200	200
Asian	900	1,900	1,800	900	1,700	1,500
Other (1)	700	200	400	600	200	300
Mathematical scientists	12,100	15,600	16,400	11,800	14,100	14,300
White	11,100	13,900	14,500	10,700	12,300	12,800
Black	100	200	200	100	100	200
Asian	600	1,200	1,400	600	1,100	1,100
Other (1)	400	300	300	400	300	200

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Mathematicans	10,700	13,000	13,600	10,400	11,700	11,700
White	9,700	11,700	12,200	9,400	10,600	10,600
Black	100	200	200	100	100	100
Asian	500	900	1,000	500	800	800
Other (1)	300	300	200	300	200	200
Statisticians	1,500	2,500	2,800	1,400	2,400	2,600
White	1,400	2,200	2,300	1,300	2,100	2,200
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	300	400	100	200	400
Other (1)	(2)	100	(2)	(2)	100	(2)
Computer specialists	2,700	9,100	12,200	2,700	9,000	12,000
White	2,500	8,000	11,000	2,500	8,000	10,900
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	900	900	100	900	900
Other (1)	(2)	100	200	(2)	100	100
Environmental scientists	10,300	15,900	16,500	10,100	15,300	15,700
White	9,700	15,000	15,500	9,500	14,400	14,700
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	300	700	800	300	700	700
Other (1)	300	200	200	300	200	200
Earth scientists	8,600	12,000	12,500	8,400	11,500	11,900
White	8,100	11,300	11,700	7,900	10,800	11,100
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	300	500	600	300	500	600
Other (1)	200	100	100	200	100	100
Oceanographers	1,100	1,800	1,700	1,100	1,700	1,700
White	1,100	1,700	1,700	1,000	1,600	1,600
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	100	100	(2)	100	100
Other (1)	100	(2)	(2)	100	(2)	(2)
Atmospheric scientists	600	2,100	2,200	600	2,100	2,100
White	600	2,000	2,100	600	1,900	2,000
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	100	100	(2)	100	100
Other (1)	(2)	(2)	(2)	(2)	(2)	(2)

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Life scientists	56,700	84,900	92,800	54,800	80,700	85,900
White	52,300	76,900	83,400	50,600	73,200	77,400
Black	600	1,000	1,100	600	900	1,000
Asian	2,600	6,300	6,800	2,600	5,900	6,400
Other (1)	1,100	700	1,500	1,100	700	1,200
Biological scientists	36,800	49,600	55,200	35,400	46,700	50,500
White	33,800	44,700	49,500	32,600	42,100	45,400
Black	500	600	600	400	500	500
Asian	1,700	4,000	4,200	1,700	3,800	4,000
Other (1)	800	400	900	800	400	600
Agricultural scientists	9,200	13,500	14,500	8,900	12,600	13,400
White	8,800	12,700	13,400	8,500	11,900	12,400
Black	(2)	100	100	(2)	100	100
Asian	300	700	800	300	600	800
Other (1)	100	100	200	100	100	200
Medical scientists	10,700	21,800	23,100	10,400	21,300	22,000
White	9,800	19,600	20,500	9,500	19,200	19,500
Black	100	300	400	100	300	400
Asian	600	1,600	1,700	600	1,600	1,600
Other (1)	200	300	400	200	300	400
Psychologists	24,800	42,800	46,600	23,500	39,400	41,700
White	23,500	40,900	44,200	22,300	37,700	39,800
Black	300	800	1,000	200	700	800
Asian	200	600	600	200	500	500
Other (1)	800	500	800	700	400	600
Social scientists	29,400	55,500	59,300	25,900	45,800	45,300
White	27,000	50,500	53,600	23,800	41,700	41,100
Black	400	1,300	1,500	300	1,100	1,000
Asian	1,100	2,900	3,100	1,000	2,400	2,400
Other (1)	900	800	1,200	800	600	800
Economists	9,700	16,000	17,000	8,300	13,200	13,400
White	8,800	14,400	15,000	7,600	11,800	11,800
Black	100	200	300	100	200	200
Asian	500	1,200	1,300	500	1,100	1,100
Other (1)	200	100	400	200	100	300

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Sociologists/Anthropologists	6,500	11,000	12,100	6,000	9,100	9,500
White	6,100	10,200	11,100	5,600	8,500	8,800
Black	100	300	400	100	200	200
Asian	200	300	400	100	300	400
Other (1)	200	100	200	200	100	100
Other social scientists	13,200	28,500	30,300	11,500	23,500	22,400
White	12,200	25,900	27,500	10,600	21,500	20,500
Black	200	800	800	200	600	600
Asian	500	1,400	1,400	400	1,000	900
Other (1)	400	500	700	300	400	400
Total engineers	35,800	57,000	61,500	34,400	53,200	56,200
White	31,800	47,200	49,700	30,600	43,900	45,400
Black	100	300	400	100	200	400
Asian	3,000	9,000	10,500	2,900	8,400	9,900
Other (1)	900	600	900	900	600	600
Aeronautical/astronautical	1,700	2,500	3,700	1,600	2,200	3,400
White	1,500	2,200	3,100	1,400	2,000	2,800
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	100	300	500	100	200	500
Other (1)	100	(2)	100	100	(2)	(2)
Chemical	4,500	7,100	7,000	4,200	6,400	6,100
White	4,000	5,600	5,400	3,700	4,900	4,600
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	400	1,600	1,500	400	1,500	1,400
Other (1)	100	(2)	100	100	(2)	(2)
Civil	3,100	6,100	5,300	3,000	5,500	5,000
White	2,500	4,800	4,200	2,400	4,300	3,900
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	500	1,200	1,100	500	1,100	1,000
Other (1)	100	100	(2)	100	100	(2)
Electrical/electronics	7,100	10,600	12,700	6,800	10,000	11,400
White	6,300	8,900	10,300	6,000	8,400	9,400
Black	(2)	(2)	100	(2)	(2)	100
Asian	500	1,600	2,100	500	1,500	1,900
Other (1)	200	100	200	200	100	100

See footnotes at end of table.

Table B-6. Employment status of doctoral scientists and engineers by field and race: 1973, 1981, and 1983-Continued

Field and race	Employed			Employed in S/E		
	1973	1981	1983	1973	1981	1983
Mechanical	3,300	5,400	5,700	3,100	5,000	5,100
White	2,800	4,300	4,400	2,700	4,000	3,900
Black	(2)	(2)	100	(2)	(2)	10%
Asian	400	1,000	1,200	400	900	1,100
Other (1)	100	(2)	(2)	100	(2)	(2)
Nuclear	1,300	2,100	2,300	1,200	2,000	2,200
White	1,200	1,600	1,900	1,200	1,600	1,800
Black	(2)	(2)	(2)	(2)	(2)	(2)
Asian	(2)	400	400	(2)	300	300
Other (1)	(2)	100	100	(2)	100	100
Other engineers	15,000	23,200	24,900	14,500	22,000	23,000
White	13,500	19,800	20,500	13,100	18,800	19,000
Black	(2)	100	200	(2)	100	200
Asian	1,000	3,000	3,800	1.000	2,900	3,600
Other (1)	400	300	400	400	300	300

(1) Includes Native American, Other, and No report
(2) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-7. Employment status of doctoral Hispanic scientists and engineers by field: 1983

Field	Total	Labor force	Employed	Employed in S/E
Total, all fields	5,600	5,400	5,400	4,700
Total scientists	4,700	4,500	4,400	4,000
Physical scientists	900	900	900	800
Chemists	700	700	700	600
Physicists/Astronomers	200	200	200	200
Mathematical scientists	200	200	200	200
Mathematicians	200	200	200	200
Statisticians	(1)	(1)	(1)	(1)
Computer specialists	200	200	200	200
Environmental scientists	200	200	200	200
Earth scientists	200	200	200	200
Oceanographers	(1)	(1)	(1)	(1)
Atmospheric scientists	(1)	(1)	(1)	(1)
Life scientists	1,400	1,300	1,300	1,200
Biological scientists	700	700	700	600
Agricultural scientists	300	300	300	200
Medical scientists	400	300	300	300
Psychologists	700	700	700	600
Social scientists	1,000	1,000	1,000	800
Economists	300	300	300	300
Sociologists/Anthropologists	200	200	200	100
Other social scientists	500	500	400	400

See footnotes at end of table.

Table B-7. Employment status of doctoral Hispanic scientists and engineers by field: 1983-Continued

Field	Total	Labor force	Employed	Employed in S/E
Total engineers	1,000	900	900	700
Aeronautical/astronautical	(1)	(1)	(1)	(1)
Chemical	100	100	100	100
Civil	100	100	100	100
Electrical/electronics	200	200	200	100
Materials	200	200	200	200
Mechanical	100	100	100	100
Nuclear	(1)	(1)	(1)	(1)
Systems design	100	100	100	(1)
Other engineers	100	100	100	100

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-8. Employment status of recent science and engineering graduates by field and level of degree

Field of degree	Total(3)			Labor force		
	Bachelor(1)	Master(1)	Doctorate(2)	Bachelor(1)	Master(1)	Doctorate(2)
Total S/E	278,400	42,300	28,000	213,200	32,500	27,200
Total science	217,500	30,400	23,800	156,700	22,300	22,900
Physical sciences	16,700	3,000	3,600	9,200	2,000	3,500
Chemistry	12,900	1,500	2,300	6,500	1,100	2,300
Physics/Astronomy	3,800	1,500	1,300	2,700	900	1,200
Mathematical sciences	12,300	2,700	1,200	10,300	2,300	1,200
Mathematics	12,000	2,200	1,200	9,900	1,900	1,200
Statistics	300	600	(4)	300	500	(4)
Computer specialties	10,700	3,700	400	10,300	3,200	400
Environmental sciences	6,900	1,500	1,000	4,600	1,100	900
Earth sciences	5,800	1,200	700	3,800	800	700
Oceanography	400	100	200	200	100	200
Atmospheric sciences	800	200	100	700	200	100
Life sciences	58,200	8,400	5,800	37,800	5,400	5,300
Biological sciences	41,300	5,900	4,700	24,100	3,500	4,200
Agricultural sciences	16,900	2,500	1,100	13,700	1,900	1,100
Psychology	37,100	4,000	5,900	27,600	3,300	5,800
Social sciences	75,600	6,900	5,900	56,900	5,100	5,800
Economics	20,600	2,100	1,300	18,100	1,500	1,300
Sociology/Anthropology	25,700	1,700	1,600	20,600	1,000	1,600
Other social sciences	29,400	3,100	3,000	18,300	2,500	2,900

See footnotes at end of table.

Table B-8. Employment status of recent science and engineering graduates by field and level of degree-Continued

Field of degree	Total(3)			Labor force		
	Bachelor(1)	Master(1)	Doctorate(2)	Bachelor(1)	Master(1)	Doctorate(2)
Total engineering	60,900	11,900	4,200	56,500	10,200	4,200
Aeronautical/astronautical	1,000	300	100	1,000	200	100
Chemical	5,900	1,000	900	5,100	800	900
Civil	10,600	1,700	600	10,000	1,500	600
Electrical/electronic	16,300	3,000	700	15,700	2,600	700
Materials	1,100	400	200	900	300	200
Mechanical	12,500	1,700	500	11,700	1,600	500
Nuclear	500	300	300	400	200	300
Other engineering	12,900	3,500	900	11,600	3,100	900

See footnotes at end of table.

Table B-8. Employment status of recent science and engineering graduates by field and level of degree-Continued

Field of degree	Employed			Employed in S/E		
	Bachelor(1)	Master(1)	Doctorate(2)	Bachelor(1)	Master(1)	Doctorate(2)
Total S/E	201,500	31,700	26,700	120,600	23,600	23,900
Total science	146,500	21,700	22,400	72,200	14,800	19,900
Physical sciences	8,900	2,000	3,400	6,400	1,200	3,300
Chemistry	6,200	1,100	2,200	4,600	700	2,200
Physics/Astronomy	2,700	900	1,200	1,800	500	1,100
Mathematical sciences	9,900	2,200	1,100	7,500	1,800	1,000
Mathematics	9,600	1,800	1,100	7,200	1,400	1,000
Statistics	300	500	(4)	300	400	(4)
Computer specialties	10,300	3,200	400	9,400	2,900	400
Environmental sciences	4,300	1,000	900	3,500	1,000	900
Earth sciences	3,600	800	700	2,900	700	700
Oceanography	(4)	100	200	(4)	100	200
Atmospheric sciences	600	200	100	600	200	100
Life sciences	35,300	5,300	5,200	21,200	3,900	4,800
Biological sciences	22,400	3,400	4,100	11,200	2,300	3,900
Agricultural sciences	12,900	1,900	1,100	10,100	1,600	1,000
Psychology	25,800	3,000	5,700	6,700	1,400	5,200
Social sciences	52,000	4,900	5,600	17,500	2,600	4,400
Economics	17,800	1,400	1,300	6,900	800	1,200
Sociology/Anthropology	18,200	1,000	1,500	5,100	400	1,200
Other social sciences	16,000	2,600	2,800	5,400	1,400	2,000

See footnotes at end of table.

Table B-8. Employment status of recent science and engineering graduates by field and level of degree-Continued

Field of degree	Employed			Employed in S/E		
	Bachelor(1)	Master(1)	Doctorate(2)	Bachelor(1)	Master(1)	Doctorate(2)
Total engineering	54,900	9,900	4,200	48,400	8,700	4,000
Aeronautical/astronautical	900	200	100	800	100	100
Chemical	5,000	700	900	4,700	700	800
Civil	9,800	1,400	600	8,200	1,200	500
Electrical/electronic	15,400	2,600	700	14,100	2,400	600
Materials	800	300	200	700	300	200
Mechanical	11,500	1,500	500	10,200	1,400	500
Nuclear	400	200	300	400	200	300
Other engineering	11,000	3,000	900	9,300	2,600	900

(1) 1980 graduates in 1982.
(2) 1981 and 1982 graduates in 1982.
(3) Exclusive of full-time graduate students.
(4) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983

Field and sex	Total		Business/ industry		Educational institutions		Federal Government	
	1976	1983	1976	1983	1976	1983	1976	1983
Total, all fields	2,331,200	3,465,900	1,456,500	2,330,200	287,600	415,500	219,200	306,100
Men	2,131,600	3,026,100	1,385,100	2,098,400	232,400	315,400	200,600	266,500
Women	199,700	439,800	71,400	231,800	55,200	100,100	18,500	39,500
Total scientists	959,500	1,525,900	430,300	782,100	248,000	362,500	110,700	167,400
Men	781,300	1,149,300	373,200	602,300	194,000	265,000	93,600	131,500
Women	178,200	376,600	57,000	179,800	54,000	97,400	17,000	35,900
Physical scientists	188,900	235,900	105,400	140,900	39,100	50,000	22,400	25,000
Men	172,700	212,800	97,200	127,500	34,400	44,700	20,900	23,200
Women	16,200	23,100	8,200	13,400	4,700	5,300	1,500	1,800
Chemists	132,800	158,900	87,200	109,400	22,700	27,800	10,700	10,700
Men	119,100	140,300	79,600	97,700	19,300	24,100	9,500	9,600
Women	13,700	18,700	7,700	11,700	3,500	3,700	1,200	1,100
Physicists/astronomers	44,300	48,400	13,100	17,500	15,000	17,800	8,900	8,300
Men	42,600	45,800	12,900	16,500	13,900	16,500	8,600	8,000
Women	1,700	2,600	200	1,000	1,200	1,200	200	300
Other physical scientists	11,800	28,600	5,100	14,000	1,400	4,400	2,800	6,100
Men	10,900	26,700	4,800	13,400	1,300	4,000	2,800	5,600
Women	800	1,900	300	700	100	400	100	500
Mathematical scientists	48,600	86,700	15,000	28,700	21,100	40,100	9,000	12,200
Men	37,100	57,700	12,000	20,900	15,700	27,500	7,200	6,100
Women	11,500	29,000	2,900	7,700	5,500	12,600	1,800	6,100
Mathematicians	43,400	66,000	13,900	21,800	20,000	34,800	7,000	6,900
Men	33,700	46,600	11,500	17,100	14,900	23,900	5,500	4,000
Women	9,700	19,400	2,400	4,700	5,100	10,900	1,500	2,800

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	Total		Business/ industry		Educational institutions		Federal Government	
	1976	1983	1976	1983	1976	1983	1976	1983
Statisticians	5,200	20,700	1,100	6,900	1,200	5,300	2,100	5,300
Men	3,400	11,100	600	3,800	800	3,600	1,700	2,100
Women	1,800	9,600	500	3,000	400	1,800	400	3,200
Computer specialists	119,000	349,100	86,800	276,500	6,900	19,700	9,300	24,500
Men	98,400	251,700	72,300	201,400	5,800	14,100	7,700	16,100
Women	20,600	97,400	14,500	75,100	1,100	5,600	1,600	8,400
Environmental scientists	54,800	95,100	30,900	59,100	6,100	11,600	10,100	16,400
Men	50,900	80,500	28,900	50,600	5,200	9,700	9,300	13,600
Women	3,900	14,600	2,000	8,500	900	2,000	800	2,800
Earth scientists	46,500	80,100	27,000	55,200	4,600	8,600	7,800	10,500
Men	42,900	66,800	25,100	46,800	3,900	6,800	7,000	8,400
Women	3,600	13,300	1,900	8,400	600	1,700	700	2,100
Oceanographers	4,400	2,900	3,200	500	500	1,000	500	1,100
Men	4,400	2,600	3,200	400	500	1,000	500	1,000
Women	(1)	300	(1)	100	(1)	(1)	(1)	100
Atmospheric scientists	3,800	12,100	600	3,400	1,000	2,000	1,800	4,800
Men	3,600	11,000	600	3,300	800	1,800	1,800	4,100
Women	300	1,100	(1)	100	200	200	(1)	700
Life scientists	213,500	368,400	71,500	121,700	63,300	119,200	39,300	62,200
Men	179,600	288,100	63,600	94,900	50,800	89,000	34,200	53,300
Women	33,900	80,300	7,900	26,800	12,600	30,300	5,200	9,000
Biological scientists	139,400	255,200	37,600	78,000	44,700	82,500	30,700	49,900
Men	115,300	199,000	33,000	61,700	34,900	59,400	26,000	42,700
Women	24,100	56,200	4,600	16,300	9,800	23,100	4,700	7,100

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	Total		Business/ industry		Educational institutions		Federal Government	
	1976	1983	1976	1983	1976	1983	1976	1983
Agricultural scientists	40,700	84,100	19,100	38,700	9,400	21,200	5,800	10,300
Men	39,100	66,700	18,400	29,700	9,100	17,300	5,600	8,900
Women	1,600	17,400	700	9,100	400	3,900	200	1,400
Medical scientists	33,300	29,100	14,800	5,000	9,300	15,600	2,900	2,100
Men	25,100	22,300	12,200	3,600	6,900	12,200	2,600	1,600
Women	8,200	6,800	2,600	1,300	2,400	3,300	300	400
Psychologists	112,500	143,500	26,400	47,000	43,800	54,100	5,200	3,400
Men	76,900	84,200	20,400	26,800	29,900	32,100	3,100	2,300
Women	35,600	59,300	6,000	20,200	13,900	22,100	2,100	1,100
Social scientists	222,300	247,200	94,400	108,300	67,700	67,700	15,300	23,600
Men	165,700	174,400	78,800	80,200	52,300	48,100	11,200	16,900
Women	56,600	72,800	15,600	28,100	15,500	19,500	4,000	6,600
Economists	62,500	112,500	34,800	58,300	13,000	23,700	8,300	16,200
Men	54,600	90,900	30,400	47,500	12,000	20,800	6,600	12,400
Women	8,000	21,600	4,400	10,800	1,000	2,900	1,600	3,800
Sociologists/ anthropologists	33,900	62,200	10,900	23,300	16,300	22,000	1,000	2,700
Men	22,500	34,800	7,200	13,600	11,500	12,100	500	1,300
Women	11,400	27,400	3,700	9,700	4,700	9,900	500	1,400
Other social scientists	125,900	72,500	48,700	26,700	38,400	22,000	6,000	4,700
Men	88,700	48,700	41,200	19,100	28,700	15,300	4,100	3,200
Women	37,200	23,800	7,500	7,600	9,700	6,700	1,900	1,500
Total Engineers	1,371,700	1,940,000	1,026,200	1,548,100	39,600	53,000	108,500	138,700
Men	1,350,300	1,876,700	1,011,900	1,496,100	38,400	50,300	107,000	135,000
Women	21,400	63,300	14,300	52,000	1,200	2,700	1,500	3,600
Astronautical/ aeronautical	56,800	84,700	40,300	62,800	1,800	2,400	11,100	14,000
Men	56,400	83,100	39,900	61,700	1,800	2,200	11,100	13,900
Women	400	1,600	400	1,000	(1)	200	(1)	100

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	Total		Business/ industry		Educational institutions		Federal Government	
	1976	1983	1976	1983	1976	1983	1976	1983
Chemical	77,500	114,900	69,200	103,600	900	3,100	2,700	3,100
Men	75,000	107,600	67,100	96,900	900	3,000	2,600	2,900
Women	2,500	7,300	2,100	6,800	(1)	100	100	100
Civil	188,200	271,800	88,800	165,500	5,500	6,000	21,300	25,600
Men	182,800	266,300	86,900	162,200	5,200	5,800	20,900	24,900
Women	5,400	5,500	1,900	3,300	300	200	400	800
Electrical/electronics	283,000	470,500	223,500	380,500	10,800	14,300	28,300	41,900
Men	281,400	461,100	222,400	372,900	10,700	13,600	28,300	41,300
Women	1,600	9,400	1,100	7,600	100	700	(1)	600
Mechanical	276,200	371,500	230,400	322,500	8,700	10,300	15,400	18,800
Men	273,900	366,000	228,400	317,900	8,600	9,800	15,100	18,700
Women	2,300	5,400	1,900	4,500	100	600	300	100
Other engineers	490,000	626,500	374,000	513,200	11,900	16,800	29,600	35,200
Men	480,900	592,600	367,100	484,500	11,200	15,900	29,000	33,300
Women	9,100	33,900	6,900	28,700	600	900	700	1,900

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	State/local government		Nonprofit organizations		Other (2)	
	1976	1983	1976	1983	1976	1983
Total, all fields	134,500	179,200	87,000	116,400	146,400	118,600
Men	117,300	155,800	63,500	81,400	132,600	108,600
Women	17,300	23,400	23,500	34,900	13,700	10,100
Total scientists	59,900	89,500	63,200	90,900	47,500	33,500
Men	45,100	68,200	40,300	56,600	35,100	25,700
Women	14,800	21,300	22,900	34,300	12,400	7,800
Physical scientists	5,700	6,600	8,900	9,400	7,400	4,000
Men	5,200	5,500	7,800	8,200	7,100	3,700
Women	500	1,100	1,100	1,200	300	300
Chemists	4,200	5,100	2,700	3,800	5,300	2,200
Men	3,800	4,200	2,000	2,700	5,000	2,000
Women	400	900	700	1,100	200	200
Physicists/astronomers	800	200	4,700	3,600	1,900	1,100
Men	800	200	4,600	3,500	1,900	1,100
Women	(1)	(1)	100	100	(1)	(1)
Other physical scientists	800	1,300	1,500	2,000	200	700
Men	700	1,100	1,200	2,000	200	700
Women	100	200	300	(1)	(1)	(1)
Mathematical scientists	1,300	1,900	900	2,400	1,200	1,400
Men	700	1,100	600	1,000	900	900
Women	600	800	300	1,400	300	500
Mathematicians	700	400	700	1,100	1,100	1,100
Men	400	300	600	600	800	700
Women	300	100	200	500	300	400

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	State/local government		Nonprofit organizations		Other (2)	
	1976	1983	1976	1983	1976	1983
Statisticians	600	1,500	200	1,300	100	300
Men	300	800	100	500	100	300
Women	400	600	200	900	(1)	100
Computer specialists	5,000	12,500	5,600	9,900	5,400	6,000
Men	4,100	8,900	4,600	6,500	3,900	4,800
Women	900	3,600	1,000	3,400	1,500	1,200
Environmental scientists	2,200	4,600	2,000	900	3,700	2,400
Men	2,100	3,800	1,700	600	3,700	2,200
Women	100	700	200	300	(1)	200
Earth scientists	1,900	4,200	1,800	400	3,400	1,200
Men	1,900	3,400	1,600	300	3,400	1,000
Women	(1)	700	200	200	(1)	200
Oceanographers	100	(1)	(1)	100	100	100
Men	100	(1)	(1)	100	100	100
Women	(1)	(1)	(1)	100	(1)	(1)
Atmospheric scientists	200	400	100	300	100	1,200
Men	200	400	100	300	100	1,100
Women	(1)	(1)	(1)	100	(1)	100
Life scientists	20,100	36,400	12,200	23,100	7,000	5,700
Men	17,500	31,100	7,700	15,100	5,800	4,600
Women	2,600	5,300	4,500	7,900	1,200	1,100
Biological scientists	15,100	25,800	6,500	15,600	4,900	3,400
Men	12,900	22,200	4,400	10,500	4,200	2,600
Women	2,200	3,600	2,100	5,100	700	800

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	State/local government		Nonprofit organizations		Other (2)	
	1976	1983	1976	1983	1976	1983
Agricultural scientists	4,600	9,500	400	2,900	1,500	1,400
Men	4,500	8,300	400	1,300	1,300	1,200
Women	100	1,200	(1)	1,600	200	200
Medical scientists	500	1,100	5,300	4,600	600	900
Men	200	600	2,900	3,400	400	800
Women	300	400	2,400	1,200	200	100
Psychologists	7,600	8,300	19,400	27,000	10,100	3,700
Men	5,100	5,300	11,600	15,800	6,800	2,000
Women	2,500	3,100	7,800	11,200	3,300	1,700
Social scientists	18,000	19,100	14,200	18,300	12,700	10,200
Men	10,300	12,400	6,200	9,400	6,900	7,400
Women	7,600	6,700	8,000	8,900	5,900	2,900
Economists	2,600	3,900	900	3,300	2,900	7,100
Men	2,200	2,400	600	2,600	2,700	5,300
Women	500	1,500	200	700	200	1,800
Sociologists/ anthropologists	3,600	7,100	1,700	5,200	500	2,000
Men	2,200	4,900	900	1,400	200	1,600
Women	1,400	2,200	800	3,800	300	400
Other social scientists	11,800	8,200	11,700	9,800	9,400	1,100
Men	6,000	5,100	4,700	5,400	4,000	600
Women	5,800	3,000	6,900	4,400	5,400	600
Total Engineers	74,600	89,700	23,900	25,400	98,900	85,100
Men	72,200	87,600	23,200	24,800	97,600	82,800
Women	2,500	2,100	600	600	1,300	2,300
Astronautical/ aeronautical	700	400	700	1,100	2,200	4,100
Men	700	400	700	1,100	2,200	3,900
Women	(1)	(1)	(1)	(1)	(1)	200

See footnotes at end of table.

Table B-9. Scientists and engineers by field, sex, and type of employer: 1976 and 1983-Continued

Field and sex	State/local government		Nonprofit organizations		Other (2)	
	1976	1983	1976	1983	1976	1983
Chemical	1,100	800	1,200	1,400	2,500	2,800
Men	900	800	1,200	1,300	2,400	2,700
Women	200	(1)	(1)	100	100	200
Civil	50,700	60,100	2,000	1,700	19,900	12,900
Men	48,600	59,100	2,000	1,600	19,100	12,700
Women	2,000	1,100	(1)	100	800	200
Electrical/electronics	4,300	5,100	4,000	8,000	11,900	20,700
Men	4,300	5,100	4,000	7,900	11,600	20,300
Women	(1)	(1)	(1)	100	300	400
Mechanical	3,100	3,300	6,900	4,200	11,600	12,400
Men	3,100	3,300	6,900	4,100	11,600	12,300
Women	(1)	(1)	(1)	100	(1)	100
Other engineers	14,700	19,900	9,000	9,100	50,800	32,300
Men	14,500	19,000	8,400	8,900	50,700	31,000
Women	200	900	600	200	100	1,300

(1) Too few cases to estimate.
(2) Includes no report.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983

Field and sex	Total		R & D		Mgt./adm.		Teaching	
	1976	1983	1976	1983	1976	1983	1976	1983
Total, all fields	2,331,200	3,465,900	655,500	1,066,000	687,100	886,400	163,300	236,900
Men	2,131,600	3,026,100	606,200	953,800	652,900	820,600	131,800	177,700
Women	199,700	439,800	49,300	112,300	34,200	65,900	31,500	59,200
Total scientists	959,500	1,525,900	231,000	401,400	263,500	350,500	141,300	205,400
Men	781,300	1,149,300	191,400	312,000	232,600	293,600	109,900	148,300
Women	178,200	376,600	39,600	89,300	30,900	56,800	31,400	57,100
Physical scientists	188,900	235,900	77,600	105,300	50,700	55,600	22,700	29,500
Men	172,700	212,800	70,700	95,000	48,400	53,100	20,300	26,200
Women	16,200	23,100	6,800	10,300	2,300	2,500	2,300	3,200
Chemists	132,800	158,900	50,300	67,500	38,600	38,800	13,300	17,500
Men	119,100	140,300	44,400	59,300	36,700	36,800	11,600	15,100
Women	13,700	18,700	6,000	8,200	1,900	1,900	1,800	2,400
Physicists/astronomers	44,300	48,400	20,900	22,300	9,200	11,200	8,400	9,800
Men	42,600	45,800	20,300	21,100	8,900	11,000	7,900	9,200
Women	1,700	2,600	600	1,200	300	300	500	600
Other physical scientists	11,800	28,600	6,300	15,500	2,900	5,600	900	2,100
Men	10,900	26,700	6,100	14,500	2,700	5,300	800	2,000
Women	800	1,900	200	1,000	100	300	100	200
Mathematical scientists	48,600	86,700	8,300	14,000	13,800	19,100	17,400	32,200
Men	37,100	57,700	6,400	9,700	12,200	15,200	12,500	21,300
Women	11,500	29,000	1,900	4,300	1,600	3,800	5,000	10,800
Mathematicians	43,400	66,000	7,400	11,100	11,900	16,700	16,900	29,500
Men	33,700	46,600	5,800	8,100	10,900	13,400	12,000	19,300
Women	9,700	19,400	1,700	2,900	1,000	3,300	4,900	10,200

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Total		R & D		Mgt./adm.		Teaching	
	1976	1983	1976	1983	1976	1983	1976	1983
Statisticians	5,200	20,700	900	2,900	1,900	2,400	500	2,600
Men	3,400	11,100	600	1,600	1,300	1,900	500	2,000
Women	1,800	9,600	200	1,400	600	500	(1)	600
Computer specialists	119,000	349,100	27,500	66,500	24,800	49,200	3,800	8,800
Men	98,400	251,700	21,600	48,300	22,800	40,600	2,900	5,600
Women	20,600	97,400	5,900	18,200	2,000	8,600	900	3,200
Environmental scientists	54,800	95,100	22,900	41,500	14,900	20,600	3,100	5,900
Men	50,900	80,500	20,000	33,100	14,800	19,200	2,700	4,700
Women	3,900	14,600	2,900	8,500	200	1,400	400	1,200
Earth scientists	46,500	80,100	17,500	34,600	13,800	18,100	3,000	5,400
Men	42,900	66,800	14,800	27,000	13,700	16,800	2,600	4,100
Women	3,600	13,300	2,700	7,600	100	1,300	300	1,200
Oceanographers	4,400	2,900	3,800	1,900	300	500	(1)	100
Men	4,400	2,600	3,800	1,700	300	500	(1)	100
Women	(1)	300	(1)	300	(1)	(1)	(1)	(1)
Atmospheric scientists	3,800	12,100	1,600	5,000	800	2,000	100	400
Men	3,600	11,000	1,400	4,400	800	1,900	100	400
Women	300	1,100	200	600	(1)	100	(1)	(1)
Life scientists	213,500	368,400	64,800	126,700	62,300	97,100	29,300	50,900
Men	179,600	288,100	50,800	94,100	56,600	85,400	23,300	38,400
Women	33,900	80,300	14,000	32,600	5,700	11,700	6,000	12,400
Biological scientists	139,400	255,200	41,100	89,300	37,100	69,900	22,400	37,000
Men	115,300	199,000	31,100	65,300	34,000	61,400	18,000	26,800
Women	24,100	56,200	10,000	24,000	3,100	8,400	4,300	10,200

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Total		R & D		Mgt./adm.		Teaching	
	1976	1983	1976	1983	1976	1983	1976	1983
Agricultural scientists	40,700	84,100	10,900	26,000	11,900	22,000	2,500	6,500
Men	39,100	66,700	10,400	20,300	11,700	19,400	2,400	5,500
Women	1,600	17,400	500	5,700	200	2,500	100	1,000
Medical scientists	33,300	29,100	12,900	11,500	13,400	5,300	4,400	7,400
Men	25,100	22,300	9,300	8,500	11,000	4,500	2,900	6,100
Women	8,200	6,800	3,600	3,000	2,500	800	1,600	1,300
Psychologists	112,500	143,500	7,900	11,300	22,000	29,600	21,600	29,100
Men	76,900	84,200	5,900	6,600	17,400	19,300	14,300	18,100
Women	35,600	59,300	2,000	4,700	4,600	10,300	7,400	11,000
Social scientists	222,300	247,200	22,000	35,900	74,800	79,300	43,400	49,200
Men	165,700	174,400	15,900	25,300	60,400	60,800	34,000	34,000
Women	56,600	72,800	6,000	10,600	14,400	18,500	9,400	15,200
Economists	62,500	112,500	6,900	18,700	24,300	35,400	9,800	17,400
Men	54,600	90,900	6,300	14,600	23,100	30,900	8,500	15,000
Women	8,000	21,600	600	4,100	1,200	4,500	1,300	2,300
Sociologists/ anthropologists	33,900	62,200	5,700	10,500	7,400	17,400	9,600	15,700
Men	22,500	34,800	3,700	5,500	5,000	10,300	7,300	8,500
Women	11,400	27,400	1,900	5,000	2,400	7,100	2,300	7,100
Other social scientists	125,900	72,500	9,400	6,700	43,100	26,400	24,000	16,200
Men	88,700	48,700	5,900	5,100	32,300	19,500	18,200	10,500
Women	37,200	23,800	3,500	1,500	10,800	6,900	5,800	5,700
Total Engineers	1,371,700	1,940,000	424,500	664,700	423,600	536,000	22,000	31,500
Men	1,350,300	1,876,700	414,700	641,700	420,300	526,900	21,900	29,400
Women	21,400	63,300	9,800	22,900	3,300	9,000	200	2,100
Astronautical/ aeronautical	56,800	84,700	25,400	39,400	19,000	24,900	1,000	1,200
Men	56,400	83,100	25,000	38,600	19,000	24,700	1,000	1,100
Women	400	1,600	400	800	(1)	200	(1)	100

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Total		R & D		Mgt./adm.		Teaching	
	1976	1983	1976	1983	1976	1983	1976	1983
Chemical	77,500	114,900	28,400	46,900	28,600	33,800	600	1,500
Men	75,000	107,600	27,800	43,100	28,100	33,200	600	1,400
Women	2,500	7,300	500	3,800	500	600	(1)	100
Civil	188,200	271,800	34,400	50,700	64,800	89,200	2,300	3,600
Men	182,800	266,300	31,900	48,900	64,000	88,100	2,200	3,400
Women	5,400	5,500	2,500	1,800	800	1,000	100	200
Electrical/electronics	283,000	470,500	114,300	206,100	87,100	121,800	4,800	8,100
Men	281,400	461,100	113,700	201,700	86,900	120,500	4,800	7,600
Women	1,600	9,400	600	4,400	200	1,300	(1)	400
Mechanical	276,200	371,500	112,900	163,700	88,800	104,100	5,500	6,100
Men	273,900	366,000	112,100	161,200	87,900	103,400	5,500	5,900
Women	2,300	5,400	700	2,600	1,000	700	(1)	300
Other engineers	490,000	626,500	109,200	157,900	135,300	162,200	7,900	10,900
Men	480,900	592,600	104,200	148,300	134,500	157,000	7,900	9,900
Women	9,100	33,900	5,000	9,600	800	5,200	(1)	1,000

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Production/ inspection		Reporting/ statistical work/computing		Other (2)	
	1976	1983	1976	1983	1976	1983
Total, all fields	253,000	442,300	107,700	334,700	464,700	499,500
Men	241,300	408,300	88,600	241,600	410,900	424,200
Women	11,700	34,000	19,100	93,100	53,800	75,400
Total scientists	58,500	106,800	70,300	254,200	195,000	207,600
Men	50,200	85,400	52,100	168,600	145,100	141,300
Women	8,300	21,400	18,100	85,700	50,000	66,300
Physical scientists	19,700	27,000	3,800	5,200	14,500	13,200
Men	17,600	22,800	3,000	4,100	12,600	11,600
Women	2,100	4,300	700	1,200	1,800	1,600
Chemists	18,000	23,500	2,000	3,400	10,500	8,200
Men	16,000	19,500	1,300	2,700	9,100	6,800
Women	1,900	4,100	700	700	1,400	1,300
Physicists/astronomers	1,300	1,300	1,200	1,000	3,200	2,800
Men	1,100	1,200	1,200	700	3,100	2,700
Women	10	100	(1)	300	100	100
Other physical scientists	400	2,200	500	800	700	2,300
Men	400	2,100	500	700	500	2,100
Women	100	100	(1)	100	300	200
Mathematical scientists	2,000	2,400	4,500	15,700	2,600	3,300
Men	1,400	2,000	2,500	7,400	2,200	2,000
Women	600	400	2,000	8,400	400	1,300
Mathematicians	1,800	1,900	3,200	4,800	2,200	2,100
Men	1,200	1,800	1,900	2,700	1,900	1,300
Women	500	100	1,400	2,100	300	800

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Production/ inspection		Reporting/ statistical work/computing		Other (2)	
	1976	1983	1976	1983	1976	1983
Statisticians	200	500	1,200	11,000	400	1,200
Men	200	200	600	4,700	300	700
Women	100	300	700	6,300	100	500
Computer specialists	4,000	10,200	38,700	183,200	20,300	31,200
Men	3,100	7,600	31,700	126,300	16,400	23,400
Women	900	2,600	7,000	57,000	3,900	7,700
Environmental scientists	3,400	9,600	2,300	6,300	8,100	11,200
Men	3,300	8,900	2,100	5,000	8,100	9,700
Women	100	800	200	1,200	100	1,500
Earth scientists	3,000	8,000	1,700	3,800	7,500	10,100
Men	2,800	7,300	1,500	2,900	7,400	8,800
Women	100	800	200	1,000	100	1,300
Oceanographers	200	200	(1)	100	100	100
Men	200	200	(1)	100	100	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Atmospheric scientists	200	1,400	500	2,300	500	1,000
Men	200	1,400	500	2,100	500	800
Women	(1)	(1)	(1)	300	(1)	100
Life scientists	14,900	40,500	3,200	10,800	38,800	42,300
Men	12,800	31,700	2,400	7,200	33,600	31,200
Women	2,100	8,800	800	3,600	5,200	11,200
Biological scientists	9,200	23,000	2,300	8,400	27,400	27,700
Men	7,600	19,000	1,500	5,500	23,100	20,900
Women	1,600	3,900	800	3,000	4,400	6,700

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Production/ inspection		Reporting/ statistical work/computing		Other (2)	
	1976	1983	1976	1983	1976	1983
Agricultural scientists	5,600	16,800	700	2,000	9,300	10,800
Men	5,100	12,300	600	1,500	8,900	7,600
Women	400	4,500	(1)	500	400	3,200
Medical scientists	100	700	300	400	2,100	3,900
Men	100	400	300	200	1,700	2,600
Women	100	300	(1)	200	400	1,300
Psychologists	1,800	6,200	1,300	3,500	57,700	63,800
Men	1,300	3,800	700	1,500	37,300	34,800
Women	600	2,300	600	2,000	20,400	29,000
Social scientists	12,600	10,900	16,500	29,400	52,900	42,500
Men	10,700	8,700	9,800	17,100	34,900	28,600
Women	1,900	2,200	6,700	12,300	18,100	13,900
Economists	1,300	4,100	7,700	19,500	12,500	17,500
Men	1,200	3,900	4,600	12,300	10,900	14,200
Women	200	200	3,100	7,200	1,600	3,300
Sociologists/ anthropologists	600	3,100	3,300	4,500	7,300	10,900
Men	500	1,700	2,100	2,000	3,900	6,700
Women	100	1,400	1,200	2,500	3,400	4,300
Other social scientists	10,700	3,800	5,600	5,400	33,200	14,100
Men	9,100	3,100	3,100	2,800	20,100	7,700
Women	1,600	700	2,400	2,600	13,000	6,400
Total Engineers	194,500	335,500	37,400	80,400	269,700	291,900
Men	191,100	322,900	36,400	73,000	265,800	282,800
Women	3,400	12,600	1,000	7,500	3,900	9,100
Astronautical/ aeronautical	4,400	8,300	2,200	4,700	4,800	6,300
Men	4,300	7,900	2,200	4,500	4,800	6,200
Women	100	400	(1)	100	(1)	100

See footnotes at end of table.

Table B-10. Scientists and engineers by field, sex, and selected primary work activity: 1976 and 1983-Continued

Field and sex	Production/ inspection		Reporting/ statistical work/computing		Other (2)	
	1976	1983	1976	1983	1976	1983
Chemical	10,300	19,800	1,400	3,300	8,200	9,600
Men	9,000	18,000	1,300	2,900	8,100	9,000
Women	1,300	1,800	100	500	100	600
Civil	38,400	55,300	6,100	11,200	42,200	61,800
Men	38,100	54,400	5,600	10,700	41,000	60,700
Women	300	900	400	500	1,200	1,100
Electrical/electronics	30,200	69,300	6,500	16,300	40,200	49,000
Men	30,000	67,700	6,500	15,500	39,600	48,000
Women	200	1,500	(1)	800	600	1,000
Mechanical	30,600	52,200	3,200	7,300	35,200	37,900
Men	30,000	51,200	3,200	7,000	35,200	37,400
Women	600	1,000	(1)	300	100	500
Other engineers	80,700	130,600	18,000	37,600	139,000	127,300
Men	79,700	123,600	17,600	32,300	137,000	121,500
Women	900	6,900	400	5,300	1,900	5,700

(1) Too few cases to estimate.
(2) Includes no report.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983

Field and sex	Primary work activity							
	Total	Research and development				Management/admin.		
		Total	Basic research	Appld. research	Develop-ment	Total	of R&D	Other than R&D
Total, all fields	3,465,900	1,066,000	113,800	233,900	718,300	886,400	288,200	598,300
Men	3,026,100	953,800	89,500	194,100	670,200	820,600	268,900	551,700
Women	439,800	112,300	24,200	39,900	48,100	65,900	19,300	46,600
Total scientists	1,525,900	401,300	104,200	164,700	132,500	350,500	115,600	234,900
Men	1,149,300	312,000	80,200	128,100	103,700	293,600	99,000	194,700
Women	376,600	89,300	23,900	36,600	28,800	56,800	16,600	40,200
Physical scientists	235,900	105,300	23,900	45,000	36,400	55,600	31,100	24,600
Men	212,800	95,000	21,900	39,800	33,300	53,100	30,100	23,000
Women	23,100	10,300	2,100	5,100	3,100	2,500	900	1,600
Chemists	158,900	67,500	10,600	29,700	27,100	38,800	19,800	19,000
Men	140,300	59,300	9,400	25,600	24,300	36,800	19,100	17,800
Women	18,700	8,200	1,200	4,100	2,800	1,900	700	1,200
Physicists/astronomers	48,400	22,300	9,900	7,900	4,600	11,200	8,200	3,000
Men	45,800	21,100	9,200	7,500	4,500	11,000	8,100	2,900
Women	2,600	1,200	600	400	100	300	100	200
Other physical scientists	28,600	15,500	3,400	7,400	4,700	5,600	3,100	2,500
Men	26,700	14,500	3,200	6,800	4,500	5,300	3,000	2,300
Women	1,900	1,000	200	600	300	300	100	200
Mathematical scientists	86,700	14,000	3,500	6,300	4,300	19,100	8,100	10,900
Men	57,700	9,700	3,200	3,900	2,600	15,200	6,300	8,900
Women	29,000	4,300	300	2,400	1,600	3,800	1,800	2,000
Mathematicians	66,000	11,100	3,300	4,000	3,800	16,700	7,000	9,700
Men	46,600	8,100	3,100	2,700	2,300	13,400	5,300	8,000
Women	19,400	2,900	200	1,300	1,400	3,300	1,700	1,600
Statisticians	20,700	2,900	100	2,300	500	2,400	1,100	1,300
Men	11,100	1,600	100	1,200	300	1,900	1,000	900
Women	9,600	1,400	(1)	1,100	200	500	100	400

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Total	Primary work activity						
		Research and development				Management/admin.		
		Total	Basic research	Appld. research	Development	Total	of R&D	Other than R&D
Computer specialists	349,100	66,500	1,300	7,000	58,200	49,200	19,400	29,800
Men	251,700	48,300	1,200	4,800	42,200	40,600	15,400	25,200
Women	97,400	18,200	100	2,200	16,000	8,600	4,000	4,600
Environmental scientists	95,100	41,500	8,300	23,200	10,100	20,600	8,200	12,400
Men	80,500	33,100	7,000	17,800	8,300	19,200	7,500	11,700
Women	14,600	8,500	1,300	5,400	1,800	1,400	700	700
Earth scientists	80,100	34,600	4,900	20,200	9,500	18,100	7,200	10,900
Men	66,800	27,000	4,000	15,200	7,800	16,800	6,500	10,200
Women	13,300	7,600	900	5,000	1,700	1,300	700	700
Oceanographers	2,900	1,900	900	800	200	500	300	200
Men	2,600	1,700	800	800	100	500	300	200
Women	300	300	100	100	100	(1)	(1)	(1)
Atmospheric scientists	12,100	5,000	2,400	2,200	400	2,000	800	1,200
Men	11,000	4,400	2,200	1,900	400	1,900	700	1,200
Women	1,100	600	300	300	(1)	100	100	(1)
Life scientists	368,400	126,700	55,000	56,100	15,700	97,100	26,400	70,700
Men	288,100	94,100	39,000	43,700	11,400	85,400	23,600	61,800
Women	80,300	32,600	16,000	12,400	4,200	11,700	2,800	8,900
Biological scientists	255,200	89,300	44,700	35,000	9,500	69,900	18,400	51,400
Men	199,000	65,300	31,600	26,400	7,200	61,400	16,100	45,300
Women	56,200	24,000	13,100	8,600	2,300	8,400	2,300	6,100
Agricultural scientists	84,100	26,000	3,700	17,000	5,300	22,000	5,900	16,000
Men	66,700	20,300	2,500	14,100	3,700	19,400	5,500	13,900
Women	17,400	5,700	1,200	2,800	1,600	2,500	400	2,100
Medical scientists	29,100	11,500	6,500	4,100	800	5,300	2,000	3,300
Men	22,300	8,500	4,900	3,100	500	4,500	2,000	2,600
Women	6,800	3,000	1,700	1,000	300	800	100	700

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity							
	Total	Research and development				Management/admin.		
		Total	Basic research	Appld. research	Development	Total	of R&D	Other than R&D
Psychologists	143,500	11,300	4,200	4,800	2,400	29,600	5,600	24,000
Men	84,200	6,600	2,400	2,800	1,400	19,300	3,800	15,500
Women	59,300	4,700	1,800	2,000	1,000	10,300	1,700	8,500
Social scientists	247,200	35,900	8,000	22,300	5,500	79,300	16,800	62,500
Men	174,400	25,300	5,600	15,200	4,400	60,800	12,200	48,500
Women	72,800	10,600	2,400	7,100	1,100	18,500	4,500	14,000
Economists	112,500	18,700	2,800	13,400	2,500	35,400	7,300	28,100
Men	90,900	14,600	2,200	10,300	2,100	30,900	6,800	24,100
Women	21,600	4,100	600	3,100	400	4,500	500	3,900
Sociologists/anthropologists	62,200	10,500	3,900	5,300	1,300	17,400	3,400	14,100
Men	34,800	5,500	2,200	2,600	700	10,300	1,700	8,700
Women	27,400	5,000	1,700	2,700	600	7,100	1,700	5,400
Other social scientists	72,500	6,700	1,300	3,600	1,700	26,400	6,100	20,400
Men	48,700	5,100	1,200	2,300	1,700	19,500	3,800	15,800
Women	23,800	1,500	100	1,400	100	6,900	2,300	4,600
Total engineers	1,940,000	664,700	9,600	69,200	585,900	536,000	172,600	363,400
Men	1,876,800	641,700	9,300	65,900	566,500	526,900	169,900	357,100
Women	63,300	22,900	300	3,300	19,300	9,000	2,700	6,300
Aeronautical/astronautical	84,700	39,400	800	6,800	31,800	24,900	16,100	8,800
Men	83,100	38,600	700	6,600	31,200	24,700	16,000	8,800
Women	1,600	800	100	200	500	200	100	100

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity							
	Total	Research and development				Management/admin.		
		Total	Basic research	Appld. research	Development	Total	of R&D	Other than R&D
Chemical	114,900	46,900	400	5,800	40,700	33,800	11,000	22,800
Men	107,600	43,100	400	5,300	37,400	33,200	10,900	22,300
Women	7,300	3,800	(1)	500	3,200	600	100	500
Civil	271,800	50,700	500	4,700	45,500	89,100	9,900	79,200
Men	266,300	48,900	400	4,600	43,900	88,100	9,900	78,200
Women	5,500	1,800	(1)	100	1,600	1,000	100	1,000
Electrical/electronics	470,500	206,100	3,200	19,100	183,800	121,800	57,500	64,200
Men	461,100	201,700	3,200	18,500	180,100	120,500	57,000	63,500
Women	9,400	4,400	(1)	600	3,700	1,300	600	700
Industrial	117,000	24,700	100	900	23,700	36,500	5,100	31,400
Men	111,500	23,300	100	800	22,400	35,400	4,900	30,500
Women	5,500	1,400	(1)	100	1,300	1,100	200	900
Materials	40,600	15,000	700	3,900	10,400	11,300	5,500	5,800
Men	38,500	13,900	700	3,700	9,500	11,000	5,300	5,700
Women	2,100	1,100	(1)	200	900	300	200	(1)
Mechanical	371,500	163,800	1,500	11,200	151,100	104,100	34,700	69,400
Men	366,100	161,200	1,400	11,000	148,800	103,400	34,400	68,900
Women	5,400	2,600	(1)	200	2,300	700	300	500
Mining	14,700	3,500	200	1,100	2,200	3,700	900	2,800
Men	14,100	3,300	200	1,000	2,200	3,700	900	2,800
Women	600	200	(1)	100	100	(1)	(1)	(1)
Nuclear	18,800	5,600	200	1,200	4,200	6,300	2,000	4,300
Men	18,300	5,400	200	1,100	4,100	6,300	2,000	4,300
Women	500	100	(1)	100	100	(1)	(1)	(1)
Petroleum	28,700	5,800	300	1,100	4,400	7,000	1,400	5,600
Men	27,000	5,200	300	1,000	3,900	6,800	1,400	5,300
Women	1,700	700	(1)	100	500	200	(1)	200
Other engineers	406,800	103,300	1,800	13,500	88,100	97,400	28,400	69,000
Men	383,200	97,200	1,600	12,400	83,100	93,800	27,300	66,600
Women	23,600	6,200	100	1,100	5,000	3,600	1,200	2,400

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity					
	Teaching	Consulting	Product/ Inspection	Reptg./ stats./ computing	Other	No report
Total, all fields	236,900	169,900	442,300	334,700	187,600	142,100
Men	177,700	154,300	408,300	241,600	138,200	131,700
Women	59,200	15,700	34,000	93,100	49,300	10,400
Total scientists	205,400	58,900	106,800	254,200	116,300	32,400
Men	148,300	46,200	85,400	168,600	70,100	25,000
Women	57,100	12,600	21,400	85,700	46,200	7,400
Physical scientists	29,500	3,100	27,000	5,200	4,600	5,500
Men	26,200	2,800	22,800	4,100	3,700	5,100
Women	3,200	300	4,300	1,200	900	400
Chemists	17,500	1,100	23,500	3,400	3,400	3,700
Men	15,100	1,000	19,500	2,700	2,500	3,300
Women	2,400	100	4,100	700	800	400
Physicists/astronomers	9,800	700	1,300	1,000	900	1,100
Men	9,200	700	1,200	700	800	1,100
Women	600	(1)	100	300	100	(1)
Other physical scientists	2,100	1,300	2,200	800	300	700
Men	2,000	1,100	2,100	700	300	700
Women	200	200	100	100	(1)	(1)
Mathematical scientists	32,200	1,700	2,400	15,700	500	1,100
Men	21,300	800	2,000	7,400	300	900
Women	10,800	900	400	8,400	200	200
Mathematicians	29,500	700	1,900	4,800	500	900
Men	19,300	300	1,800	2,700	300	700
Women	10,200	400	100	2,100	200	200
Statisticians	2,600	1,000	500	11,000	(1)	300
Men	2,000	500	200	4,700	(1)	200
Women	600	500	300	6,300	(1)	(1)

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity					
	Teaching	Consulting	Product/ Inspection	Reptg./ stats./ computing	Other	No report
Computer specialists	8,300	19,100	10,200	183,200	6,200	5,900
Men	5,600	14,600	7,600	126,300	4,100	4,700
Women	3,200	4,500	2,600	57,000	2,100	1,200
Environmental scientists	5,900	7,700	9,600	6,300	1,500	2,000
Men	4,700	6,900	8,900	5,000	1,100	1,700
Women	1,200	800	800	1,200	400	300
Earth scientists	5,400	7,200	8,000	3,800	1,200	1,700
Men	4,100	6,500	7,300	2,900	900	1,400
Women	1,200	700	800	1,000	300	300
Oceanographers	100	(1)	200	100	(1)	100
Men	100	(1)	200	100	(1)	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Atmospheric scientists	400	500	1,400	2,300	300	200
Men	400	400	1,400	2,100	200	200
Women	(1)	100	(1)	300	(1)	(1)
Life scientists	50,900	11,300	40,500	10,800	24,000	7,100
Men	38,400	10,100	31,700	7,200	15,400	5,700
Women	12,400	1,200	8,800	3,600	8,600	1,400
Biological scientists	37,000	8,600	23,000	8,400	14,500	4,500
Men	26,800	7,900	19,000	5,500	9,700	3,400
Women	10,200	700	3,900	3,000	4,900	1,100
Agricultural scientists	6,500	2,400	16,800	2,000	6,200	2,200
Men	5,500	2,000	12,300	1,500	3,700	2,000
Women	1,000	400	4,500	500	2,600	200
Medical scientists	7,400	200	700	400	3,200	400
Men	6,100	200	400	200	2,100	300
Woman	1,300	100	300	200	1,100	100

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity					
	Teaching	Consulting	Product/ Inspection	Reptg./ stats./ computing	Other	No report
Psychologists	29,100	7,500	6,200	3,500	51,400	4,900
Men	18,100	4,900	3,800	1,500	27,500	2,400
Women	11,000	2,600	2,300	2,000	23,900	2,500
Social scientists	49,200	8,500	10,900	29,400	28,100	6,000
Men	34,000	6,200	8,700	17,100	17,900	4,600
Women	15,200	2,300	2,200	12,300	10,200	1,400
Economists	17,400	5,800	4,100	19,500	9,000	2,700
Men	15,000	4,500	3,900	12,300	7,300	2,400
Women	2,300	1,300	200	7,200	1,700	300
Sociologists/anthropologists	15,700	1,000	3,100	4,500	8,200	1,700
Men	8,500	900	1,700	2,000	4,600	1,200
Women	7,100	100	1,400	2,500	3,700	500
Other social scientists	16,200	1,700	3,800	5,400	10,800	1,600
Men	10,500	800	3,100	2,800	6,000	1,000
Women	5,700	900	700	2,600	4,800	600
Total engineers	31,500	111,100	335,500	80,400	71,300	109,600
Men	29,400	108,000	322,900	73,000	68,200	106,600
Women	2,100	3,000	12,600	7,500	3,100	3,000
Aeronautical/astronautical	1,200	900	8,300	4,700	1,100	4,300
Men	1,100	900	7,900	4,500	1,100	4,200
Women	100	(1)	400	100	(1)	(1)

See footnotes at end of table.

Table B-11. Scientists and engineers by field, sex, and primary work activity: 1983-Continued

Field and sex	Primary work activity					
	Teaching	Consulting	Product/ Inspection	Reptg./ stats./ computing	Other	No report
Chemical	1,500	2,700	19,800	3,300	2,400	4,600
Men	1,400	2,600	18,000	2,900	2,100	4,400
Women	100	100	1,800	500	300	200
Civil	3,600	42,000	55,300	11,200	4,300	15,600
Men	3,400	41,400	54,400	10,700	4,100	15,200
Women	200	600	900	500	100	300
Electrical/electronics	8,100	16,100	69,300	16,300	8,000	25,000
Men	7,600	15,900	67,700	15,500	7,600	24,500
Women	400	200	1,500	800	400	400
Industrial	2,000	3,800	31,400	8,900	3,000	6,800
Men	1,900	3,600	30,100	7,900	2,800	6,600
Women	(1)	200	1,300	1,000	200	200
Materials	900	1,700	8,800	700	600	1,700
Men	900	1,700	8,200	600	600	1,600
Women	(1)	(1)	600	100	(1)	100
Mechanical	6,100	13,600	52,200	7,300	6,100	18,200
Men	5,900	13,400	51,200	7,000	5,900	18,000
Women	300	200	1,000	300	100	200
Mining	400	1,500	3,600	1,400	200	300
Men	300	1,500	3,500	1,300	200	300
Women	(1)	100	200	100	(1)	(1)
Nuclear	300	900	3,300	1,000	300	1,100
Men	200	900	3,300	900	300	1,100
Women	(1)	100	(1)	200	(1)	(1)
Petroleum	300	2,400	8,200	1,300	1,100	2,500
Men	300	2,400	7,800	1,100	1,000	2,500
Women	(1)	(1)	400	200	100	(1)
Other engineers	7,200	25,400	75,200	24,400	44,300	29,600
Men	6,300	23,900	70,700	20,600	42,500	28,200
Women	900	1,500	4,500	3,800	1,800	1,400

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-12a. Employed doctoral scientists and engineers by field and type of employer: 1973, 1981, and 1983

Field	Business/industry			Educational institutions		
	1973	1981	1983	1973	1981	1983
Total, all fields	53,400	99,100	113,500	129,300	187,000	196,100
Total scientists	35,600	67,300	79,000	116,300	169,000	175,700
Physical scientists	19,700	27,400	28,700	22,000	28,200	27,900
Mathematical scientists	900	1,600	2,000	10,500	12,700	13,200
Computer specialists	1,000	5,200	6,800	1,400	3,000	4,000
Environmental scientists	2,200	4,700	5,200	5,200	6,700	6,700
Life scientists	7,100	13,100	16,400	38,200	55,800	58,900
Psychologists	3,100	10,100	13,000	15,000	21,700	22,200
Social scientists	1,700	5,100	6,800	24,000	40,800	42,800
Engineers	17,800	31,800	34,500	13,000	18,000	20,300
Percent Distribution						
Total, all fields	100.0	100.0	100.0	100.0	100.0	100.0
Total scientists	66.7	67.9	69.6	89.9	90.4	89.6
Physical scientists	36.9	27.6	25.3	17.0	15.1	14.2
Mathematical scientists	1.7	1.6	1.8	8.1	6.8	6.7
Computer specialists	1.9	5.2	6.0	1.1	1.6	2.0
Environmental scientists	4.1	4.7	4.6	4.0	3.6	3.4
Life scientists	13.3	13.2	14.4	29.5	29.8	30.0
Psychologists	5.8	10.2	11.5	11.6	11.6	11.3
Social scientists	3.2	5.1	6.0	18.6	21.8	21.8
Engineers	33.3	32.1	30.4	10.1	9.6	10.4

See footnotes at end of table.

Table B-12a. Employed doctoral scientists and engineers by field and type of employer: 1973, 1981, and 1983-Continued

Field	Federal government		
	1973	1981	1983
Total, all fields	18,200	25,100	25,800
Total scientists	15,500	21,300	22,000
Physical scientists	4,100	4,300	4,300
Mathematical scientists	500	900	800
Computer specialists	100	400	500
Environmental scientists	2,000	3,100	3,100
Life scientists	5,800	7,200	7,800
Psychologists	1,200	1,200	1,200
Social scientists	1,700	4,300	4,300
Engineers	2,700	3,800	3,800
Percent Distribution			
Total, all fields	100.0	100.0	100.0
Total scientists	85.2	84.9	85.3
Physical scientists	22.5	17.1	16.7
Mathematical scientists	2.7	3.6	3.1
Computer specialists	.5	1.6	1.9
Environmental scientists	11.0	12.4	12.0
Life scientists	31.9	28.7	30.2
Psychologists	6.6	4.8	4.7
Social scientists	9.3	17.1	16.7
Engineers	14.8	15.1	14.7

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983

Field and sex	Primary work activity					
	Total		Research and development			
			Total		Research	
	1973	1983	1973	1983	1973	1983
Total, all fields	220,300	369,300	70,400	121,600	63,000	104,500
Men	203,400	320,500	65,800	107,200	58,500	91,100
Women	16,900	48,800	4,600	14,400	4,500	13,400
Total scientists	184,600	307,800	57,900	98,900	54,700	89,500
Men	167,800	260,000	53,300	85,000	50,200	76,500
Women	16,800	47,800	4,600	13,900	4,500	13,100
Physical scientists	48,500	64,000	19,800	28,900	18,000	25,600
Men	46,600	59,800	19,200	26,900	17,400	23,800
Women	1,900	4,200	600	1,900	600	1,700
Chemists	30,800	41,300	11,700	18,000	10,400	15,500
Men	29,300	37,800	11,300	16,400	10,000	14,100
Women	1,500	3,500	400	1,500	400	1,400
Physicists/Astronomers	17,800	22,700	8,100	10,900	7,600	10,000
Men	17,300	22,000	8,000	10,500	7,400	9,700
Women	400	700	200	400	200	400
Mathematical scientists	12,100	16,400	2,600	3,400	2,500	2,900
Men	11,400	15,000	2,500	3,100	2,400	2,700
Women	800	1,400	100	300	100	200
Mathematicans	10,700	13,600	2,300	2,800	2,200	2,400
Men	10,000	12,500	2,200	2,600	2,100	2,200
Women	700	1,100	100	200	100	200
Statisticians	1,500	2,800	300	600	300	500
Men	1,400	2,500	300	500	300	400
Women	100	300	(1)	100	(1)	100

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Total		Research and development			
			Total		Research	
	1973	1983	1973	1983	1973	1983
Computer specialists	2,700	12,200	1,000	4,700	500	1,500
Men	2,600	10,900	1,000	4,300	500	1,400
Women	100	1,300	(1)	400	(1)	100
Environmental scientists	10,300	16,500	3,700	6,700	3,500	6,400
Men	10,100	15,600	3,600	6,300	3,400	6,000
Women	300	900	100	400	100	400
Earth scientists	8,600	12,500	2,800	4,300	2,700	4,100
Men	8,300	11,900	2,700	4,100	2,600	3,900
Women	200	600	100	200	100	200
Oceanographers	1,100	1,700	500	1,000	500	1,000
Men	1,100	1,600	500	900	500	900
Women	(1)	200	(1)	100	(1)	100
Atmospheric scientists	600	2,200	300	1,300	300	1,300
Men	600	2,100	300	1,300	300	1,200
Women	(1)	100	(1)	100	(1)	100
Life scientists	56,700	92,800	23,200	40,900	22,800	39,500
Men	50,600	76,600	20,400	33,400	20,000	32,100
Women	6,100	16,200	2,800	7,600	2,800	7,400
Biological scientists	36,800	55,200	15,900	28,000	15,800	27,400
Men	31,900	44,600	13,600	22,100	13,500	21,700
Women	4,900	10,600	2,300	5,900	2,300	5,800
Agricultural scientists	9,200	14,500	4,000	6,200	3,900	5,900
Men	9,100	13,900	4,000	5,900	3,800	5,600
Women	100	700	100	300	100	300
Medical scientists	10,700	23,100	3,300	6,700	3,200	6,200
Men	9,600	18,100	2,900	5,300	2,700	4,900
Women	1,100	4,900	400	1,400	400	1,300

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Total		Research and development			
			Total		Research	
	1973	1983	1973	1983	1973	1983
Psychologists	24,800	46,600	3,300	4,900	3,200	4,700
Men	20,000	33,000	2,800	3,600	2,700	3,400
Women	4,800	13,700	500	1,300	500	1,300
Social scientists	29,400	59,300	4,300	9,400	4,200	8,900
Men	26,500	49,300	3,900	7,400	3,800	7,000
Women	2,900	10,100	400	2,000	400	1,900
Economists	9,700	17,000	2,000	5,900	2,000	3,800
Men	9,200	15,500	1,900	3,500	1,900	3,400
Women	500	1,400	100	400	100	400
Sociologists/Anthropologists	6,500	12,100	1,000	1,800	1,000	1,800
Men	5,300	8,600	800	1,200	800	1,200
Women	1,200	3,500	200	700	200	700
Other social scientists	13,200	30,300	1,300	3,700	1,200	3,400
Men	12,000	25,200	1,200	2,700	1,100	2,500
Women	1,200	5,100	100	900	100	900
Total engineers	35,800	61,500	12,500	22,700	8,300	15,000
Men	35,600	60,500	12,400	22,200	8,200	14,600
Women	100	1,100	(1)	500	(1)	300
Aeronautical/astronautical	1,700	3,700	500	1,700	400	1,000
Men	1,700	3,600	500	1,700	400	1,000
Women	(1)	100	(1)	(1)	(1)	(1)
Chemical	4,500	7,000	1,500	2,800	900	2,100
Men	4,500	6,900	1,500	2,800	900	2,000
Women	(1)	100	(1)	100	(1)	100
Civil	3,100	5,300	500	600	400	600
Men	3,100	5,200	500	600	400	600
Women	(1)	100	(1)	(1)	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Total		Research and development			
			Total		Research	
	1973	1983	1973	1983	1973	1983
Electrical/electronics	7,100	12,700	2,700	4,500	1,400	2,500
Men	7,000	12,500	2,700	4,400	1,400	2,400
Women	(1)	200	(1)	100	(1)	100
Mechanical	5,300	5,700	1,000	1,700	600	800
Men	3,300	5,600	1,000	1,700	600	800
Women	(1)	100	(1)	(1)	(1)	(1)
Nuclear	1,300	2,300	400	900	200	600
Men	1,300	2,300	400	900	200	600
Women	(1)	(1)	(1)	(1)	(1)	(1)
Other engineers	15,000	24,900	5,800	10,400	4,300	7,500
Men	14,900	24,400	5,800	10,100	4,300	7,300
Women	100	500	(1)	300	(1)	200

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Research and development		Mgt. of R & D		Management of other than R & D	
	Development					
	1973	1983	1973	1983	1973	1983
Total, all fields	7,400	17,100	32,900	31,400	13,200	30,400
Men	7,300	16,100	31,900	30,000	12,500	26,500
Women	100	1,000	1,000	1,400	800	3,800
Total scientists	3,200	9,400	24,600	20,900	11,000	25,400
Men	3,100	8,600	23,600	19,600	10,200	21,600
Women	100	900	1,000	1,300	800	3,800
Physical scientists	1,800	3,300	8,800	8,800	2,200	3,100
Men	1,800	3,100	8,600	8,500	2,100	2,900
Women	(1)	200	100	300	100	200
Chemists	1,300	2,400	6,500	6,500	1,700	1,700
Men	1,300	2,300	6,500	6,300	1,600	1,600
Women	(1)	200	100	200	100	100
Physicists/Astronomers	500	900	2,200	2,300	500	1,300
Men	500	900	2,200	2,200	500	1,300
Women	(1)	(1)	(1)	(1)	(1)	(1)
Mathematical scientists	100	500	500	500	500	1,000
Men	100	400	500	500	400	900
Women	(1)	(1)	(1)	(1)	(1)	100
Mathematicans	100	400	400	300	400	900
Men	100	400	400	200	400	800
Women	(1)	(1)	(1)	(1)	(1)	100
Statisticians	(1)	100	100	300	(1)	100
Men	(1)	100	100	300	(1)	100
Women	(1)	(1)	(1)	(1)	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Research and development		Mgt. of R & D		Management of other than R & D	
	Development		1973	1983	1973	1983
	1973	1983				
Computer specialists	500	3,200	400	1,100	200	900
Men	500	3,000	400	1,000	200	800
Women	(1)	300	(1)	100	(1)	100
Environmental scientists	100	300	2,000	1,800	600	1,300
Men	100	300	1,900	1,800	600	1,300
Women	(1)	(1)	(1)	100	(1)	100
Earth scientists	100	200	1,600	1,300	500	1,200
Men	100	200	1,600	1,200	500	1,200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Oceanographers	(1)	(1)	300	300	(1)	100
Men	(1)	(1)	300	200	(1)	100
Women	(1)	(1)	(1)	(1)	(1)	(1)
Atmospheric scientists	(1)	100	100	300	(1)	(1)
Men	(1)	100	100	300	(1)	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Life scientists	400	1,400	8,200	6,200	2,600	6,800
Men	400	1,200	7,800	5,800	2,400	5,700
Women	(1)	200	400	400	200	1,100
Biological scientists	100	600	3,900	2,800	1,300	3,000
Men	100	500	3,600	2,600	1,200	2,600
Women	( )	100	300	200	100	400
Agricultural scientists	100	300	2,000	1,600	400	1,200
Men	100	300	2,000	1,600	400	1,200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Medical scientists	100	500	2,300	1,700	900	2,500
Men	100	400	2,200	1,600	800	1,900
Women	(1)	100	100	200	100	700

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Research and development		Mgt. of R & D		Management of other than R & D	
	Development					
	1973	1983	1973	1983	1973	1983
Psychologists	100	200	2,400	900	2,500	4,700
Men	100	200	2,100	800	2,200	3,600
Women	(1)	100	300	100	400	1,100
Social scientists	100	400	2,400	1,600	2,500	7,700
Men	100	400	2,200	1,300	2,400	6,500
Women	(1)	100	200	300	100	1,200
Economists	(1)	100	1,000	500	800	2,000
Men	(1)	100	900	500	800	1,800
Women	(1)	(1)	100	(1)	(1)	100
Sociologists/Anthropologists	(1)	(1)	400	100	400	1,200
Men	(1)	(1)	300	(1)	400	800
Women	(1)	(1)	100	(1)	(1)	300
Other social scientists	(1)	300	1,100	1,000	1,300	4,600
Men	(1)	200	1,000	800	1,200	3,800
Women	(1)	100	100	200	100	800
Total engineers	4,200	7,700	8,300	10,500	2,200	5,000
Men	4,200	7,500	8,300	10,400	2,200	4,900
Women	(1)	200	(1)	100	(1)	(1)
Aeronautical/astronautical	100	700	600	800	100	200
Men	100	700	600	800	100	200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Chemical	600	800	1,000	1,100	400	600
Men	600	800	1,000	1,100	400	600
Women	(1)	(1)	(1)	(1)	(1)	(1)
Civil	100	100	400	200	300	600
Men	100	100	400	200	300	600
Women	(1)	(1)	(1)	(1)	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Research and development		Mgt. of R & D		Management of other than R & D	
	Development					
	1973	1983	1973	1983	1973	1983
Electrical/electronics	1,300	2,100	1,600	2,800	300	1,100
Men	1,200	2,000	1,600	2,800	300	1,100
Women	(1)	100	(1)	(1)	(1)	(1)
Mechanical	400	900	600	600	200	500
Men	400	900	600	600	200	500
Women	(1)	(1)	(1)	(1)	(1)	(1)
Nuclear	100	300	400	300	100	300
Men	100	300	400	300	100	300
Women	(1)	(1)	(1)	(1)	(1)	(1)
Other engineers	1,500	2,900	3,800	4,700	800	1,700
Men	1,500	2,800	3,700	4,700	800	1,700
Women	(1)	100	(1)	100	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Teaching		Consulting		Sales/ professional services	
	1973	1983	1973	1983	1973	1983
Total, all fields	79,900	108,200	4,100	12,700	8,100	29,800
Men	72,500	92,700	3,700	11,600	6,400	21,900
Women	7,500	15,500	300	1,200	1,600	8,000
Total scientists	71,100	96,400	2,900	9,000	7,800	28,600
Men	63,600	81,000	2,600	7,900	6,200	20,600
Women	7,400	15,400	300	1,100	1,600	7,900
Physical scientists	14,300	14,700	400	900	600	1,600
Men	13,400	13,500	400	900	500	1,500
Women	900	1,200	(1)	(1)	(1)	100
Chemists	8,200	9,000	300	700	500	1,200
Men	7,500	8,000	300	600	400	1,000
Women	700	1,000	(1)	(1)	(1)	100
Physicists/Astronomers	6,100	5,700	200	300	100	500
Men	5,900	5,500	200	300	100	500
Women	200	200	(1)	(1)	(1)	(1)
Mathematical scientists	8,000	9,700	100	600	100	300
Men	7,400	8,800	100	500	100	200
Women	600	900	(1)	100	(1)	(1)
Mathematicans	7,200	8,300	(1)	300	(1)	200
Men	6,700	7,500	(1)	300	(1)	200
Women	600	800	(1)	(1)	(1)	(1)
Statisticians	800	1,400	100	300	(1)	(1)
Men	800	1,200	100	300	(1)	(1)
Women	(1)	100	(1)	(1)	(1)	(1)
Computer specialists	900	2,400	100	700	(1)	400
Men	900	2,200	100	600	(1)	300
Women	(1)	200	(1)	100	(1)	100

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Teaching		Consulting		Sales/ professional services	
	1973	1983	1973	1983	1973	1983
Environmental scientists	3,100	3,400	300	1,200	(1)	200
Men	3,000	3,300	300	1,100	(1)	200
Women	100	200	(1)	100	(1)	(1)
Earth scientists	2,700	2,900	300	1,100	(1)	200
Men	2,700	2,800	300	1,000	(1)	200
Women	100	100	(1)	100	(1)	(1)
Oceanographers	200	200	(1)	(1)	(1)	(1)
Men	200	200	(1)	(1)	(1)	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Atmospheric scientists	100	300	(1)	100	(1)	(1)
Men	100	300	(1)	100	(1)	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Life scientists	17,800	22,500	600	2,000	1,500	6,200
Men	15,600	18,000	600	1,700	1,400	5,200
Women	2,200	4,500	100	300	100	1,000
Biological scientists	13,700	15,200	300	900	300	1,100
Men	11,800	12,200	300	800	300	900
Women	1,900	3,000	(1)	100	(1)	200
Agricultural scientists	1,600	2,500	200	500	300	600
Men	1,500	2,400	200	500	300	600
Women	(1)	100	(1)	(1)	(1)	(1)
Medical scientists	2,500	4,800	100	600	900	4,500
Men	2,200	3,500	100	500	900	3,700
Women	300	1,300	(1)	100	100	800
Psychologists	9,300	12,700	900	2,100	5,300	18,500
Men	7,500	9,300	700	1,600	3,900	12,100
Women	1,800	3,500	200	500	1,500	6,400

See footnotes at end of table.

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Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Teaching		Consulting		Sales/ professional services	
	1973	1983	1973	1983	1973	1983
Social scientists	17,700	31,100	500	1,500	300	1,300
Men	15,800	26,100	400	1,300	200	1,100
Women	1,900	5,000	(1)	200	(1)	300
Economists	5,000	7,800	200	800	100	400
Men	4,700	7,100	200	700	100	400
Women	300	700	(1)	100	(1)	(1)
Sociologists/Anthropologists	4,400	7,600	(1)	100	(1)	200
Men	3,600	5,500	(1)	100	(1)	200
Women	900	2,100	(1)	(1)	(1)	100
Other social scientists	8,300	15,700	200	600	100	700
Men	7,500	13,500	200	500	100	600
Women	700	2,200	(1)	100	(1)	200
Total engineers	8,900	11,800	1,100	3,700	300	1,300
Men	8,800	11,700	1,100	3,700	300	1,200
Women	(1)	200	(1)	(1)	(1)	(1)
Aeronautical/astronautical	300	500	(1)	100	(1)	100
Men	300	500	(1)	100	(1)	100
Women	(1)	(1)	(1)	(1)	(1)	(1)
Chemical	700	1,100	200	200	100	200
Men	700	1,100	200	200	100	200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Civil	1,300	2,100	300	900	(1)	100
Men	1,300	2,100	300	900	(1)	100
Women	(1)	(1)	(1)	(1)	(1)	(1)
Electrical/electronics	2,000	2,400	100	400	(1)	200
Men	2,000	2,400	100	400	(1)	200
Women	(1)	(1)	(1)	(1)	(1)	(1)
Mechanical	1,300	1,900	100	300	(1)	100
Men	1,300	1,800	100	300	(1)	100
Women	(1)	(1)	(1)	(1)	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity					
	Teaching		Consulting		Sales/ professional services	
	1973	1983	1973	1983	1973	1983
Nuclear	200	300	100	200	(1)	(1)
Men	200	300	100	200	(1)	(1)
Women	(1)	(1)	(1)	(1)	(1)	(1)
Other engineers	3,000	3,500	500	1,500	100	500
Men	3,000	3,400	500	1,500	100	500
Women	(1)	100	(1)	(1)	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity	
	Other	
	1973	1983
Total, all fields	11,700	35,100
Men	10,700	30,600
Women	1,000	4,500
Total scientists	9,300	28,500
Men	8,300	24,200
Women	1,000	4,300
Physical scientists	2,400	6,100
Men	2,300	5,600
Women	200	400
Chemists	1,900	4,300
Men	1,700	3,900
Women	100	400
Physicists/Astronomers	600	1,800
Men	600	1,700
Women	(1)	100
Mathematical scientists	300	1,000
Men	300	900
Women	(1)	100
Mathematicans	300	800
Men	200	800
Women	(1)	(1)
Statisticians	(1)	100
Men	(1)	100
Women	(1)	(1)
Computer specialists	100	2,000
Men	100	1,600
Women	(1)	300

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity	
	Other	
	1973	1983
Environmental scientists	600	1,800
Men	600	1,600
Women	(1)	100
Earth scientists	600	1,500
Men	600	1,400
Women	(1)	100
Oceanographers	(1)	100
Men	(1)	100
Women	(1)	(1)
Atmospheric scientists	(1)	100
Men	(1)	100
Women	(1)	(1)
Life scientists	2,800	8,200
Men	2,500	6,800
Women	300	1,400
Biological scientists	1,300	4,100
Men	1,100	3,300
Women	200	800
Agricultural scientists	700	1,900
Men	700	1,800
Women	(1)	100
Medical scientists	800	2,200
Men	700	1,700
Women	100	500
Psychologists	1,100	2,800
Men	800	2,000
Women	300	800

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity	
	Other	
	1973	1983
Social scientists	1,800	6,800
Men	1,600	5,600
Women	200	1,100
Economists	600	1,600
Men	600	1,500
Women	100	100
Sociologists/Anthropologists	300	1,100
Men	200	800
Women	(1)	300
Other social scientists	900	4,100
Men	800	3,300
Women	100	800
Total engineers	2,500	6,500
Men	2,500	6,300
Women	(1)	200
Aeronautical/astronautical	100	300
Men	100	300
Women	(1)	(1)
Chemical	500	1,000
Men	500	1,000
Women	(1)	(1)
Civil	300	700
Men	300	700
Women	(1)	(1)
Electrical/electronics	400	1,100
Men	400	1,100
Women	(1)	(1)
Mechanical	100	600
Men	100	600
Women	(1)	(1)

See footnotes at end of table.

Table B-12b. Employed doctoral scientists and engineers by field, sex, and selected primary work activity: 1973 and 1983-Continued

Field and sex	Primary work activity	
	Other	
	1973	1983
Nuclear	200	400
Men	200	400
Women	(1)	(1)
Other engineers	1,000	2,500
Men	1,000	2,400
Women	(1)	100

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-13. Employed scientists and engineers by primary activity and type of employer: 1976 and 1983

Primary work activity	Total		Business/industry		Educational institutions		Federal Government	
	1976	1983	1976	1983	1976	1983	1976	1983
Total	2,331,200	3,465,900	1,456,500	2,330,200	287,700	415,500	219,200	306,100
Research and development	655,500	1,066,000	451,700	764,600	59,500	114,200	73,200	107,500
Basic research	69,500	113,800	8,500	16,100	36,100	67,000	12,800	17,000
Applied research	147,700	233,900	77,000	117,100	17,000	39,000	29,600	45,900
Development	438,400	718,300	366,100	631,400	6,400	8,200	30,800	44,600
Management/administration	687,100	886,400	478,900	643,700	38,900	42,000	73,700	97,000
Of R&D	220,000	288,200	154,800	211,500	12,200	14,000	31,000	38,100
Other than R&D	467,100	598,300	324,100	432,200	26,700	28,000	42,600	58,900
Teaching	163,300	236,900	5,200	11,700	151,000	211,400	1,600	2,200
Production/ inspection	253,000	442,300	182,800	343,000	4,900	6,700	26,100	41,500
Reporting/ statistical work/computing	107,700	334,700	66,200	237,600	4,300	13,800	18,300	43,300
Other (1)	464,700	499,500	271,700	329,500	29,100	27,400	26,300	14,700

(1) Includes no report.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-14. Employed doctoral scientists and engineers by primary work activity and type of employer: 1973, 1981, and 1983

Primary work activity	Business/industry			Educational institutions		
	1973	1981	1983	1973	1981	1983
Total	53,400	99,100	113,500	129,300	187,000	196,100
Research and development	23,800	43,600	46,500	30,700	52,600	54,700
Basic research	3,500	6,300	6,700	22,500	37,800	39,500
Applied research	13,200	21,800	23,500	7,600	13,700	13,600
Development	7,000	15,400	16,300	600	1,000	1,500
Management/administration	17,700	24,300	25,500	10,700	6,400	20,700
Of R&D	14,200	18,500	20,100	4,500	4,400	3,000
Other than R&D	3,500	5,800	5,500	6,200	2,000	17,700
Teaching	200	500	1,300	78,900	104,100	105,900
Other (1)	11,700	30,700	40,100	9,000	24,000	14,800
Percent Distribution						
Total	100.0	100.0	100.0	100.0	100.0	100.0
Research and development	44.6	44.0	41.0	23.7	28.1	27.9
Basic research	6.6	6.4	5.9	17.4	20.2	20.1
Applied research	24.7	22.0	20.7	5.9	7.3	6.9
Development	13.1	15.5	14.4	.5	.5	.8
Management/administration	33.1	24.5	22.5	8.3	3.4	10.6
Of R&D	26.6	18.7	17.7	3.5	2.4	1.5
Other than R&D	6.6	5.9	4.8	4.8	1.1	9.0
Teaching	.4	.5	1.1	61.0	55.7	54.0
Other (1)	21.9	31.0	35.3	7.0	12.8	7.5

See footnotes at end of table.

Table B-14. Employed doctoral scientists and engineers by primary work activity and type of employer: 1973, 1981, and 1983-Continued

Primary work activity	Federal government		
	1973	1981	1983
Total	18,200	25,100	25,800
Research and development	10,000	13,700	13,900
Basic research	4,700	6,100	6,400
Applied research	4,800	6,800	6,500
Development	500	800	1,000
Management/administration	5,500	7,500	7,200
Of R&D	4,500	5,900	5,400
Other than R&D	1,000	1,700	1,800
Teaching	200	100	200
Other (1)	2,400	3,800	4,500
Percent Distribution			
Total	100.0	100.0	100.0
Research and development	54.9	54.6	53.9
Basic research	25.8	24.3	24.8
Applied research	26.4	27.1	25.2
Development	2.7	5.2	3.9
Management/administration	30.2	29.9	27.9
Of R&D	24.7	23.5	20.9
Other than R&D	5.5	6.8	7.0
Teaching	1.1	.4	.8
Other (1)	13.2	15.1	17.4

(1) Includes consulting, sales/professional services, other, and no report.

SOURCE: National Science Foundation.
NOTE: Detail may not add to total because of rounding.

Table B-15. Selected employment characteristics of scientists and engineers by field: 1983

Field	Labor force participation rate	Unemployment rate	S/E Employment rate	S/E Underemployment rate	S/E Underutilization rate
Total, all fields	94.9	2.2	88.0	1.9	4.1
Total scientists	95.1	2.6	81.5	3.6	6.1
Physical scientists	93.5	2.5	92.6	1.1	3.5
Chemists	92.7	2.7	92.2	1.0	3.6
Physicists/astronomers	94.9	1.9	94.3	1.4	3.3
Other physical scientists	95.7	2.4	92.0	1.2	3.5
Mathematical scientists	94.0	2.1	86.3	2.1	4.2
Mathematicians	93.7	2.2	84.6	2.2	4.3
Statisticians	95.0	1.9	91.6	1.8	3.7
Computer specialists	97.7	1.1	72.3	2.3	3.4
Environmental scientists	94.1	2.8	94.9	1.7	4.5
Earth scientists	94.2	2.7	94.9	1.8	4.5
Oceanographers	97.3	8.7	90.6	.2	8.9
Atmospheric scientists	92.9	1.7	95.8	1.4	3.0
Life scientists	94.5	2.5	88.4	3.8	6.2
Biological scientists	94.4	2.5	89.8	4.2	6.7
Agricultural scientists	94.5	2.9	84.4	3.7	6.5
Medical scientists	95.6	1.0	87.0	.4	1.4
Psychologists	95.6	3.2	76.2	6.2	9.1
Social scientists	94.5	4.9	70.1	7.0	11.5
Economists	94.6	4.2	72.8	4.0	8.1
Sociologists/anthropologists	95.1	4.7	65.8	12.5	16.6
Other social scientists	93.9	6.0	69.5	7.0	12.6

See footnotes at end of table.

Table B-15. Selected employment characteristics of scientists and engineers by field: 1983-Continued

Field	Labor force participation rate	Unemployment rate	S/E Employment rate	S/E Underemployment rate	S/E Underutilization rate
Total engineers	94.8	1.9	93.1	0.6	2.5
Aeronautical/astronautical	94.5	1.8	95.5	.4	2.2
Chemical	92.9	2.9	93.8	.9	3.8
Civil	94.9	1.9	94.4	.7	2.6
Electrical/electronics	95.9	1.2	94.5	.4	1.7
Industrial	94.2	2.5	88.8	1.1	3.5
Materials	93.5	2.6	92.2	.7	3.2
Mechanical	94.0	2.1	93.4	.5	2.5
Mining	92.5	2.7	88.3	1.4	4.1
Nuclear	97.4	2.4	96.9	.3	2.8
Petroleum	96.5	1.3	90.5	.0	1.4
Other engineers	95.0	2.0	91.1	.6	2.6

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-16. Selected employment characteristics of doctoral scientists and engineers: 1983

Field	Labor force participation rate	Unemployment rate	S/E Employment rate
Total, all fields	94.4	1.0	88.6
Total scientists	93.9	1.1	88.1
Physical scientists	93.1	1.2	88.1
Chemists	92.0	1.4	89.4
Physicists/Astronomers	95.3	.9	85.7
Mathematical scientists	95.0	.6	87.2
Mathematicans	94.6	.7	86.2
Statisticians	96.7	.0	92.1
Computer specialists	98.9	(1)	98.6
Environmental scientists	96.7	.6	95.0
Earth scientists	96.3	.5	94.7
Oceanographers	98.2	1.4	97.1
Atmospheric scientists	97.6	.5	95.4
Life scientists	92.7	1.3	92.6
Biological scientists	92.2	1.7	91.5
Agricultural scientists	91.7	1.0	92.4
Medical scientists	94.7	.5	95.2
Psychologists	94.9	1.1	89.4
Social scientists	94.1	1.1	76.4
Economists	94.1	.5	79.0
Sociologists/Anthropologists	92.1	2.5	78.7
Other social scientists	95.0	.8	73.5

See footnotes at end of table.

Table B-16. Selected employment characteristics of doctoral scientists and engineers: 1983-Continued

Field	Labor force participation rate	Unemployment rate	S/E Employment rate
Total engineers	96.9	0.4	91.3
Aeronautical/astronautical	99.0	.1	91.1
Chemical	92.7	2.3	86.6
Civil	96.6	(1)	93.7
Electrical/electronics	97.3	.3	90.1
Materials	97.7	.0	94.4
Mechanical	96.3	.8	90.3
Nuclear	100.0	.1	96.0
Systems design	98.2	(1)	93.0
Other engineers	97.3	.2	91.3

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding
SOURCE: National Science Foundation.

Table B-17. Average annual salaries of scientists and engineers by field and sex/race/ethnic group: 1982

Field	Total	Men	Women	White	Black	Asian	Native American	Hispanic
Total, all fields	$34,000	$35,000	$26,300	$34,100	$29,900	$34,200	$34,000	$31,400
Total scientists	31,700	33,400	25,800	31,800	28,500	32,400	32,600	27,600
Physical scientists	34,700	35,500	26,400	34,900	30,100	32,500	42,500	33,600
Chemists	33,600	34,600	25,500	33,900	29,500	30,400	42,300	29,800
Physicists/astronomers	37,900	38,100	32,600	37,900	34,600	40,500	43,500	40,500
Other physical scientists	35,000	35,700	26,300	34,900	33,400	37,100	42,100	39,800
Mathematical scientists	34,800	37,500	29,100	35,000	31,600	34,500	31,200	25,400
Mathematicians	35,400	37,700	29,500	35,600	31,800	36,200	31,200	30,000
Statisticians	32,800	36,700	28,100	33,000	30,900	28,600	(1)	17,200
Computer specialists	32,200	33,500	28,800	32,300	31,100	32,000	33,000	30,600
Environmental scientists	36,800	38,000	29,900	36,700	30,700	37,200	46,600	38,500
Earth scientists	37,600	39,000	30,300	37,500	31,200	38,100	42,200	39,800
Oceanographers	34,600	36,500	22,300	33,400	28,200	30,000	56,400	22,400
Atmospheric scientists	32,700	33,100	28,500	32,600	29,400	33,600	(1)	31,400
Life scientists	28,900	30,400	22,500	29,000	27,700	28,100	30,800	25,600
Biological scientists	28,200	29,500	22,500	28,300	28,000	27,400	25,800	24,100
Agricultural scientists	27,500	28,800	17,900	27,400	26,300	28,100	35,700	27,600
Medical scientists	38,900	42,600	28,200	39,300	27,100	32,000	34,500	30,700
Psychologists	28,800	31,700	23,900	29,000	25,900	28,400	23,300	20,400
Social scientists	30,600	33,000	24,300	30,700	26,400	34,300	29,000	24,100
Economists	34,700	35,900	29,600	34,700	31,100	37,200	28,700	31,000
Sociologists/anthropologists	24,900	27,000	21,600	24,900	23,800	26,700	28,500	18,100
Other social scientists	29,200	32,100	22,700	29,500	26,700	29,000	32,000	25,900

See footnotes at end of table.

Table B-17. Average annual salaries of scientists and engineers by field and sex/race/ethnic group: 1982-Continued

Field	Total	Men	Women	White	Black	Asian	Native American	Hispanic
Total engineers	$35,800	$36,000	$29,000	$35,900	$31,700	$35,100	$35,000	$33,700
Aeronautical/astronautical	38,500	38,900	27,800	38,700	33,400	36,900	28,300	34,000
Chemical	39,200	39,700	31,100	39,700	30,900	35,400	26,300	33,900
Civil	33,500	33,700	26,100	33,600	30,800	33,700	35,500	30,500
Electrical/electronics	36,400	36,500	29,800	36,500	33,200	36,200	35,700	35,600
Industrial	32,700	33,000	26,900	32,900	27,900	31,600	33,200	32,100
Materials	36,900	37,300	28,600	37,200	32,000	32,400	41,000	31,600
Mechanical	36,300	36,400	29,300	36,400	32,400	35,400	38,000	35,800
Mining	37,500	38,000	24,900	37,800	25,500	33,600	28,000	27,900
Nuclear	38,400	38,600	30,200	38,600	36,100	34,700	(1)	31,800
Petroleum	44,600	45,200	35,300	44,800	34,600	46,300	32,800	40,800
Other engineers	34,400	34,900	29,100	34,700	31,000	35,100	33,600	33,000

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.
SOURCE: National Science Foundation.

Table B-18. Average annual salaries of doctoral scientists and engineers by field and sex/race/ethnic group: 1983

Field	Total	Men	Women	White	Black	Asian	Native American
Total, all fields	$39,200	$40,500	$30,900	$39,300	$36,300	$39,300	$36,100
Total scientists	37,900	39,200	30,700	38,000	35,700	36,700	35,000
Physical scientists	41,400	42,000	32,800	41,700	38,700	39,300	32,900
Chemists	41,000	41,800	32,300	41,300	38,100	38,600	32,300
Physicists/Astronomers	42,200	42,400	35,200	42,300	39,900	40,900	33,900
Mathematical scientists	37,500	38,000	32,000	37,600	34,900	36,700	27,500
Mathematicans	37,200	37,700	31,300	37,200	34,900	37,700	23,200
Statisticians	38,900	39,500	34,400	39,600	35,500	34,500	31,800
Computer specialists	40,000	40,700	33,800	40,100	40,400	39,400	58,300
Environmental scientists	40,800	41,200	32,600	40,600	33,700	43,600	38,600
Earth scientists	41,500	41,900	33,700	41,300	34,400	45,500	37,800
Oceanographers	36,500	37,200	29,600	36,500	(1)	37,000	(1)
Atmospheric scientists	40,300	40,700	30,900	40,900	28,000	34,200	42,000
Life scientists	36,400	38,000	29,300	36,700	30,000	33,800	33,700
Biological scientists	34,900	36,500	28,200	35,100	33,600	32,700	30,600
Agricultural scientists	38,100	38,500	28,800	38,400	33,100	33,800	37,800
Medical scientists	39,400	41,700	31,700	39,600	39,900	37,200	26,500
Psychologists	35,600	37,500	30,700	35,600	33,600	33,500	37,500
Social scientists	37,000	38,100	31,500	37,000	35,400	36,400	35,000
Economists	42,000	42,500	36,500	42,100	37,600	41,500	42,200
Sociologists/Anthropologists	33,100	34,500	29,500	33,300	31,200	32,000	27,500
Other social scientists	36,000	36,900	31,600	36,200	36,600	32,700	23,500

See footnotes at end of table.

Table B-18. Average annual salaries of doctoral scientists and engineers by field and sex/race/ethnic group: 1983-Continued

Field	Total	Men	Women	White	Black	Asian	Native American
Total engineers	$46,100	$46,200	$38,200	$46,700	$43,200	$43,900	$45,100
Aeronautical/astronautical	46,000	46,100	41,500	47,100	46,900	39,500	63,800
Chemical	48,300	48,400	38,400	49,800	42,200	43,900	33,000
Civil	42,900	43,000	32,900	42,800	41,000	43,300	(1)
Electrical/electronics	47,700	47,900	38,500	47,700	38,400	48,400	(1)
Materials	45,900	46,000	39,200	47,200	48,800	40,800	36,800
Mechanical	44,900	45,000	37,500	45,500	42,200	43,100	(1)
Nuclear	47,900	48,000	41,400	48,600	39,700	44,000	(1)
Systems design	47,500	47,700	41,600	47,900	43,600	46,000	54,700
Other engineers	44,800	45,000	36,100	45,100	47,600	42,800	51,000

See footnotes at end of table.

Table B-18. Average annual salaries of doctoral scientists and engineers by field and sex/race/ethnic group: 1983-Continued

Field	Hispanic
Total, all fields	$37,700
Total scientists	37,100
Physical scientists	40,900
Chemists	40,300
Physicists/Astronomers	42,600
Mathematical scientists	40,300
Mathematicans	40,300
Statisticians	36,000
Computer specialists	36,800
Environmental scientists	40,000
Earth scientists	41,500
Oceanographers	32,200
Atmospheric scientists	37,300
Life scientists	33,000
Biological scientists	33,300
Agricultural scientists	31,400
Medical scientists	34,200
Psychologists	36,800
Social scientists	37,800
Economists	38,700
Sociologists/Anthropologists	33,100
Other social scientists	39,300

See footnotes at end of table.

Table B-18. Average annual salaries of doctoral scientists and engineers by field and sex/race/ethnic group: 1983-Continued

Field	Hispanic
Total engineers	$40,700
Aeronautical/astronautical	59,300
Chemical	41,300
Civil	37,300
Electrical/electronics	36,500
Materials	39,300
Mechanical	36,600
Nuclear	54,000
Systems design	52,000
Other engineers	37,300

(1) Too few cases to estimate.

NOTE: Detail may not add to total because of rounding

SOURCE: National Science Foundation.

TABLE B-19

HIGH TECHNOLOGY RECRUITMENT INDEX (HTRI):
1970-1983

Year	(1961=100) Index
1970	60
1971	43
1972	63
1973	97
1974	101
1975	68
1976	88
1977	115
1978	139
9179	144
1980	138
1981	135
1982	104
1983	102

SOURCE: Deutsch, Shea, and Evans, "High Technology Recruitment Index Year End Review and Forecast," (New York, 1983).

TABLE B-20

AVERAGE MONTHLY SALARY OFFERS TO BACHELOR'S DEGREE CANDIDATES IN SELECTED FIELDS: 1976/1977 - 1982/1983

Curriculum	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Business	$ 927	$ 993	$1,102	$1,218	$1,356	$1,477	$1,486
Humanities	810	871	983	1,074	1,204	1,283	1,380
Social sciences	863	930	1,020	1,131	1,246	1,391	1,432
Engineering:							
Chemical	1,389	1,513	1,642	1,801	2,030	2,256	2,228
Civil	1,185	1,288	1,402	1,554	1,775	1,925	1,869
Electrical	1,245	1,367	1,520	1,690	1,882	2,064	2,128
Mechanical	1,286	1,404	1,536	1,703	1,908	2,098	2,096
Petroleum	1,512	1,653	1,793	1,987	2,221	2,539	2,568
Agricultural sciences	924	965	1,046	1,192	1,287	1,391	1,375
Biological sciences	882	1,036	1,017	1,159	1,268	1,375	1,419
Chemistry	1,102	1,191	1,332	1,459	1,637	1,751	1,712
Computer sciences	1,123	1,266	1,401	1,558	1,726	1,908	1,941
Mathematics	1,073	1,185	1,324	1,475	1,624	1,777	1,799

SOURCE: College Placement Council

TABLE B-21

AVERAGE NUMBER OF MONTHLY SALARY OFFERS TO BACHELOR'S DEGREE CANDIDATES IN SELECTED FIELDS: 1976/1977 - 1982/1983

Curriculum	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
Business	3,649	4,565	4,796	4,805	4,376	4,175	3,272
Humanities	1,018	1,010	658	581	675	651	715
Social sciences	1,275	2,008	1,947	1,783	1,629	1,517	1,387
Engineering:							
Chemical	4,026	5,293	6,310	7,029	7,428	3,986	1,156
Civil	2,178	3,529	4,424	4,181	4,416	2,326	892
Electrical	6,106	8,599	10,742	11,120	10,768	9,976	8,285
Mechanical	5,446	8,082	10,030	10,637	10,673	7,338	3,883
Petroleum	506	663	717	762	1,445	1,090	307
Agricultural sciences	652	657	257	551	490	469	297
Biological sciences	238	313	244	222	215	169	149
Chemistry	331	340	379	427	409	262	147
Computer sciences	1,323	1,803	2,268	2,569	2,876	3,227	2,572
Mathematics	554	679	756	823	729	708	517

SOURCE: College Placement Council

TABLE B-22

NUMBER OF MATHEMATICS AND SCIENCE COURSES ATTEMPTED BY 1980 HIGH SCHOOL SOPHOMORES WHO GRADUATED IN 1982 BY CURRICULUM
(percent)

Curriculum	Number of Courses Attempted					
	0	1	2	3	4	5+
Mathematics						
Total	0.4	7.9	22.3	28.0	28.6	12.8
General	0.5	10.9	30.2	31.3	19.7	7.4
Academic	0.1	2.1	11.0	27.1	41.2	18.5
Vocational	0.9	15.1	34.9	27.2	14.7	7.1
Science						
Total	2.0	18.8	33.7	24.4	14.8	6.3
General	2.5	24.5	40.1	20.5	9.4	2.9
Academic	0.6	10.1	26.2	30.5	22.8	9.8
Vocational	4.0	28.7	41.4	17.2	5.7	3.1

SOURCE: National Center for Education Statistics, Department of Education.

TABLE B-23

MATHEMATICS AND SCIENCE COURSES ATTEMPTED BY
1980 HIGH SCHOOL SOPHOMORES WHO GRADUATED IN 1982
BY CURRICULUM
(percent)

Curriculum	Algebra I	Algebra II	Geometry	Trigo-nometry	Analysis	Cal-culus
Mathematics						
Total	67.7	34.3	54.2	22.9	8.9	6.9
General	64.1	22.1	38.1	11.1	2.5	0.9
Academic	76.4	50.7	77.3	37.9	6.3	13.4
Vocational	56.3	16.5	28.3	7.0	1.3	0.7

Curriculum	Physical science	Biology	Advanced Biology	Chemistry	Physics	Chemistry II
Science						
Total	2.0	18.8	33.7	24.4	14.8	6.3
General	2.5	24.5	40.1	20.5	9.4	2.9
Academic	0.6	10.1	26.2	30.5	22.8	9.8
Vocational	4.0	28.7	41.4	17.2	5.7	3.1

SOURCE: National Center for Education Statistics, Department of Education.

TABLE B-24

CHANGES IN MEAN PERFORMANCE ON MATHEMATICS AND SCIENCE ASSESSMENTS BY AGE LEVEL
(percent)

	9 year old	13 year old	17 year old
Mathematics[1]			
Total Score	56.4	60.5	60.2
Change	+1.0	+3.9[3]	-0.2
Knowledge	68.3	73.8	74.9
Change	+1.4	+4.5[3]	+0.2
Skills	50.6	57.6	60.0
Change	+0.8	+4.0[3]	+0.3
Understanding	41.2	60.5	61.5
Change	-0.4	+3.9[3]	-0.3
Applications	39.6	45.6	42.4
Change	+0.5	+2.2[3]	-1.1
Science[2]			
Inquiry	52.6	58.0	69.6
Change	-1.0	-0.6	-2.6[3]
Science-Technology Society	59.9	57.4	67.0
Change	+2.8[3]	+0.6	-0.5
Attitude	66.4	50.1	47.7
Change	-0.6	-2.6[3]	+0.9
Content	(4)	52.4	59.7
Change		-0.4	-2.0[3]

[1]The mathematics assessments were administered in 1978 and 1982 to all age groups.

[2]The science assessments were administered in 1977 and 1982 to 9 and 17 year olds and in 1976 and 1981 to 13 year olds.

[3]Change is significant at the 0.05 level.

[4]A content component was not administered at the 9 year old level.

SOURCE: National Assessment for Educational Progress.

TABLE B-25

SCHOLASTIC APTITUDE TEST (SAT) SCORE AVERAGES FOR COLLEGE-BOUND SENIORS BY SEX: 1973-1983

Year	Verbal			Mathematics		
	Total	Male	Female	Total	Male	Female
1973	445	446	443	481	502	460
1974	444	447	442	480	501	459
1975	434	437	431	472	495	449
1976	431	433	430	472	497	446
1977	429	431	427	470	497	445
1978	429	433	425	468	494	444
1979	427	431	423	467	493	443
1980	424	428	420	466	491	443
1981	424	430	418	466	492	443
1982	426	431	421	467	493	443
1983	425	430	420	468	493	445

SOURCE: Admissions Testing Program of the College Entrance Examination Board.

TABLE B-26

SCORES FOR COLLEGE-BOUND SENIORS ON ACHIEVEMENT TESTS IN MATHEMATICS AND SCIENCE: 1981-1983

	1981	1982	1983
Mathematics Level I	539	545	543
SAT-M	550	552	556
Mathematics Level II	654	661	655
SAT-M	643	646	649
Chemistry	571	575	569
SAT-M	615	619	624
Biology	546	548	544
SAT-M	561	564	570
Physics	595	592	595
SAT-M	638	642	647

SOURCE: Admissions Testing Program of the College Entrance Examination Board.

TABLE B-27

INTENDED AREA OF UNDERGRADUATE MAJOR FOR COLLEGE-BOUND SENIORS BY FIELD AND SAT MATHEMATICS SCORE: 1981-1983

	1981		1982		1983	
	Percent	SAT-M Score	Percent	SAT-M Score	Percent	SAT-M Score
Total	100.0	466	100.0	467	100.0	468
S/E	36.1	--	38.4	--	40.3	--
Biological sciences	3.3	507	3.2	503	3.1	511
Agriculture	1.5	435	1.3	430	1.2	429
Computer science	5.6	496	7.7	490	10.1	483
Engineering	11.8	541	12.6	546	12.5	544
Mathematics	1.1	584	1.1	573	1.1	580
Physical sciences	2.0	565	1.9	561	1.8	565
Social sciences	7.4	473	7.2	477	7.2	474
Psychology	3.4	444	3.4	439	3.3	443
Non-S/E	63.9	--	61.6	--	59.7	--
Health	14.4	467	14.2	464	14.7	460
Business	18.5	442	18.7	440	18.5	438
Education	5.7	415	5.0	413	4.5	411
Other	25.3	--	23.7	--	22.0	--

SOURCE: Admissions Testing Program of the College Entrance Examination Board.

TABLE B-28

GRADUATE RECORD EXAMINATION (GRE) SCORES
BY UNDERGRADUATE MAJOR:
1979-1983

		1979	1980	1981	1982	1983
All test-takers						
	V	488	487	485	482	486
	Q	514	516	520	525	535
	A	503	508	511	508	516
All S/E test-takers						
	V	495	493	490	486	491
	Q	543	547	551	556	567
	A	517	522	524	521	531
Physical science						
	V	519	509	509	501	508
	Q	630	627	628	625	628
	A	557	553	556	551	558
Mathematical science						
	V	505	497	493	485	492
	Q	665	661	658	656	659
	A	567	566	564	570	578
Engineering						
	V	468	456	449	447	463
	Q	654	657	656	657	666
	A	526	522	520	529	542
Biological science						
	V	492	511	509	508	509
	Q	555	563	566	567	574
	A	521	545	545	542	549
Behavioral science						
	V	507	504	502	498	503
	Q	500	499	502	504	510
	A	511	514	518	507	515
Social science						
	V	454	451	451	448	450
	Q	474	475	476	476	479
	A	471	474	476	477	482

SOURCE: Educational Testing Service.

TABLE B-29

BACHELOR'S AND FIRST-PROFESSIONAL DEGREES AWARDED BY FIELD: 1960-1982

Year	All fields	Science and engineering fields						All other fields[4]
		Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	
1960	394,889	120,937	16,057	37,808	11,437	24,141	31,494	273,952
1961	401,784	121,660	15,500	35,866	13,127	23,900	33,267	280,124
1962	420,485	127,469	15,894	34,735	14,610	25,200	37,030	293,016
1963	450,592	135,964	16,276	33,458	16,128	27,801	42,308	314,628
1964	502,104	153,361	17,527	35,226	18,677	31,611	50,320	348,743
1965	538,930	164,936	17,916	36,795	19,668	34,842	55,715	373,994
1966	555,613	173,471	17,186	35,815	20,182	36,964	63,424	382,142
1967	594,862	187,849	17,794	36,188	21,530	39,408	72,929	407,013
1968	671,591	212,174	19,442	37,614	24,084	43,260	87,774	459,417
1969	769,683	244,519	21,591	41,553	28,263	48,713	104,399	525,164
1970	833,322	264,122	21,551	44,772	29,109	52,129	116,561	569,200
1971	884,386	271,176	21,549	45,387	27,306	51,461	125,473	613,210
1972	937,884	281,228	20,887	45,003	27,250	51,484	135,604	656,656
1973	980,707	295,391	20,809	46,989	27,528	59,486	140,579	685,316
1974	1,008,654	305,062	21,287	43,530	26,570	68,226	145,449	703,592
1975	987,922	294,920	20,896	40,065	23,385	72,710	137,864	693,002
1976	997,504	292,174	21,559	39,114	21,749	77,301	132,451	705,330
1977	993,008	288,543	22,618	41,581	20,729	78,472	125,143	704,465
1978	997,165	288,167	23,175	47,411	19,925	77,138	120,518	708,998
1979	1,000,562	288,625	23,363	53,720	20,670	75,085	115,787	711,937
1980	1,010,777	291,983	23,661	59,240	22,686	71,617	114,779	718,794
1981	1,019,237	294,867	24,175	64,068	26,406	68,086	112,132	724,370
1982	1,036,594	302,118	24,372	67,791	32,139	65,041	112,775	734,479
		As a percent of fields						
1960	100	31	4	10	3	6	8	69
1961	100	30	4	9	3	6	8	70
1962	100	30	4	8	4	6	9	70
1963	100	30	4	7	4	6	9	70
1964	100	31	4	7	4	6	10	69
1965	100	31	3	7	4	7	10	69
1966	100	31	3	6	4	7	11	69
1967	100	32	3	6	4	7	12	68
1968	100	32	3	6	4	6	13	68
1969	100	32	3	5	4	6	14	68
1970	100	32	3	5	4	6	14	68
1971	100	31	2	5	3	6	14	69
1972	100	30	2	5	3	6	14	70
1973	100	30	2	5	3	6	14	70
1974	100	30	2	4	3	7	14	70
1975	100	30	2	4	2	7	14	71
1976	100	29	2	4	2	8	13	71
1977	100	29	2	4	2	8	13	71
1978	100	29	2	5	2	8	12	71
1979	100	29	2	5	2	8	12	71
1980	100	29	2	6	2	7	11	71
1981	100	29	2	6	3	7	11	71
1982	100	29	2	7	3	6	11	71

[1] Including environmental sciences.

[2] Including statistics and computer specialties.

[3] Excluding history and including psychology.

[4] Including first-professional degrees such as M.D., D.D.S., D.V.M., and J.D. degrees.

NOTE: Percents may not add to 100 because of rounding.

SOURCES: National Center for Education Statistics, Department of Education; and National Science Foundation.

TABLE B-30

MASTER'S DEGREES AWARDED BY FIELD:
1960-1982

Year	All fields	Science and engineering fields						All other fields[4]
		Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	
1960	74,497	20,012	3,387	7,159	1,765	3,751	3,950	54,485
1961	78,269	22,786	3,799	8,178	2,238	4,085	4,486	55,483
1962	84,889	25,146	3,929	8,909	2,680	4,672	4,956	59,743
1963	91,418	27,367	4,132	9,635	3,323	4,718	5,559	64,051
1964	101,122	30,271	4,567	10,827	3,603	5,357	5,917	70,851
1965	112,195	33,835	4,918	12,056	4,294	5,978	6,589	78,360
1966	140,772	38,083	4,992	13,678	5,610	6,666	7,737	102,689
1967	157,892	41,800	5,412	13,885	5,733	7,465	9,305	116,092
1968	177,150	45,425	5,508	15,188	6,081	8,315	10,333	131,725
1969	194,414	48,425	5,911	15,243	6,735	8,809	11,727	145,989
1970	209,387	49,318	5,948	15,597	7,107	8,590	12,076	160,069
1971	231,486	50,624	6,386	16,347	6,789	8,320	12,782	180,862
1972	252,774	53,567	6,307	16,802	7,186	8,914	14,358	199,207
1973	264,525	54,234	6,274	16,758	7,146	9,080	14,976	210,291
1974	278,259	54,175	6,087	15,393	7,116	9,605	15,974	224,084
1975	293,651	53,852	5,830	15,434	6,637	9,618	16,333	239,799
1976	313,001	54,747	5,485	16,170	6,466	9,823	16,803	258,254
1977	318,241	56,731	5,345	16,889	6,496	10,707	17,294	261,510
1978	312,816	56,237	5,576	17,105	6,421	10,711	16,514	256,579
1979	302,075	54,456	5,464	16,193	6,101	10,719	15,979	247,619
1980	299,095	54,391	5,233	16,846	6,515	10,278	15,519	244,704
1981	296,798	54,811	5,300	17,373	6,787	9,731	15,620	211,987
1982	296,580	57,025	5,526	18,594	7,666	9,824	15,415	239,455
		As a percent of fields						
1960	100	27	5	10	2	5	5	73
1961	100	29	5	10	3	5	6	71
1962	100	30	5	11	3	6	6	70
1963	100	30	5	11	4	5	6	70
1964	100	30	5	11	4	5	6	70
1965	100	30	4	11	4	5	6	70
1966	100	27	4	10	4	5	6	73
1967	100	26	3	9	4	5	6	74
1968	100	26	3	9	3	5	6	74
1969	100	25	3	8	4	5	6	75
1970	100	24	3	7	3	4	6	76
1971	100	22	3	7	3	4	6	78
1972	100	21	3	7	3	4	6	79
1973	100	21	2	6	3	3	6	79
1974	100	19	2	6	3	3	6	81
1975	100	18	2	5	2	3	6	82
1976	100	17	2	5	2	3	5	83
1977	100	18	2	5	2	3	5	82
1978	100	18	2	5	2	3	5	82
1979	100	18	2	5	2	4	5	82
1980	100	18	2	6	2	3	5	82
1981	100	18	2	6	2	3	5	82
1982	100	19	2	6	3	3	5	81

[1] Including environmental sciences.

[2] Including statistics and computer specialties.

[3] Excluding history and including psychology.

[4] Including first-professional degrees such as M.D., D.D.S., D.V.M., and J.D. degrees.

NOTE: Percents may not add to 100 because of rounding.

SOURCES: National Center for Education Statistics, Department of Education; and National Science Foundation.

TABLE B-31

DOCTORAL DEGREES AWARDED BY FIELD:
1960-1983

Year	All fields	Science and engineering fields						All other fields[4]
		Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	
1960	9,733	6,263	1,861	794	291	1,660	1,657	3,470
1961	10,413	6,721	1,993	940	352	1,682	1,774	3,692
1962	11,500	7,438	2,097	1,216	388	1,867	1,870	4,062
1963	12,728	8,219	2,427	1,357	483	1,976	1,976	4,509
1964	14,325	9,224	2,527	1,664	588	2,219	2,226	5,101
1965	16,340	10,476	2,865	2,074	685	2,539	2,313	5,864
1966	17,9'9	11,458	3,059	2,301	769	2,711	2,618	6,491
1967	20,403	12,982	3,503	2,604	830	2,966	3,079	7,421
1968	22,936	14,448	3,681	2,855	971	3,511	3,430	8,488
1969	25,743	16,039	3,935	3,265	1,070	3,815	3,954	9,704
1970	29,498	17,743	4,403	3,434	1,225	4,165	4,516	11,755
1971	31,867	18,948	4,501	3,498	1,238	4,556	5,155	12,919
1972	33,043	19,009	4,257	3,503	1,281	4,454	5,514	14,034
1973	33,755	19,001	4,078	3,364	1,233	4,503	5,823	14,754
1974	33,047	18,313	3,765	3,147	1,211	4,304	5,886	14,734
1975	32,951	18,358	3,710	3,002	1,147	4,402	6,097	14,593
1976	32,946	17,864	3,506	2,834	1,003	4,361	6,160	15,082
1977	31,718	17,418	3,415	2,643	964	4,266	6,130	14,300
1978	30,873	17,048	3,234	2,423	959	4,369	6,063	13,825
1979	31,235	17,245	3,320	3,490	979	4,501	5,95,	13,990
1980	31,013	17,197	3,149	2,479	962	4,715	5,892	13,816
1981	31,342	17,634	3,210	2,528	960	4,786	6,150	13,708
1982	31,048	17,614	3,348	2,644	940	4,840	5,842	13,434
1983	31,190	17,924	3,438	2,780	986	4,747	5,973	13,266
		As a percent of fields						
1960	100	64	19	8	3	17	17	36
1961	100	65	19	9	3	16	17	35
1962	100	[illegible]	18	11	3	16	16	35
1963	100	65	19	11	4	16	16	35
1964	100	64	18	12	4	15	16	36
1965	100	64	18	13	4	16	14	36
1966	100	64	17	13	4	15	14	36
1967	100	64	17	13	4	15	15	36
1968	100	63	16	12	4	15	15	37
1969	100	62	15	13	4	15	15	38
1970	100	60	15	12	4	14	15	40
1971	100	59	14	11	4	14	16	41
1972	100	58	13	11	4	13	17	42
1973	100	56	12	10	4	13	17	44
1974	100	55	11	10	4	13	18	45
1975	100	56	11	9	3	13	18	44
1976	100	54	11	9	3	13	19	46
1977	100	55	11	8	3	13	19	45
1978	100	55	10	8	3	14	20	45
1979	100	55	11	8	3	14	19	45
1980	100	55	10	8	3	15	19	45
1981	100	56	10	8	3	15	20	44
1982	100	57	11	9	3	16	19	43
1983	100	57	11	9	3	15	19	43

[1] Including environmental sciences.

[2] Including statistics and computer specialties.

[3] Excluding history and including psychology.

[4] Including first-professional degrees such as M.D., D.D.S., D.V.M., and J.D. degrees.

NOTE: Percents may not add to 100 because of rounding.

SOURCES: National Center for Education Statistics, Department of Education; and National Science Foundation.

TABLE B-32

GRADUATE DEGREE ATTAINMENT RATES:
1971-1983

Bachelor's Degrees		Master's Degrees			Bachelor's Degrees		Doctorates		
Year	Number	Year	Number	RATE	Year	Number	Year	Number	RATE
1969	244,159	1971	50,624	20.7	1965	164,936	1972	19,009	11.5
1970	264,122	1972	53,567	20.3	1966	173,471	1973	19,001	11.0
1971	271,176	1973	54,234	20.0	1967	187,849	1974	18,313	9.7
1972	281,228	1974	54,175	19.3	1968	212,174	1975	18,358	8.7
1973	295,391	1975	53,852	18.2	1969	244,159	1976	17,864	7.3
1974	305,062	1976	54,747	17.9	1970	264,122	1977	17,418	6.6
1975	294,920	1977	56,731	19.2	1971	271,176	1978	17,048	6.3
1976	292,174	1978	56,237	19.2	1972	281,228	1979	17,245	6.1
1977	288,543	1979	54,456	18.9	1973	295,391	1980	17,197	5.8
1978	288,167	1980	54,391	18.9	1974	305,062	1981	17,634	15.8
1979	288,625	1981	54,811	19.0	1975	294,920	1982	17,614	6.0
1980	291,983	1982	57,025	19.5	1976	292,174	1983	17,924	6.1

SOURCES: National Center for Education Statistics, Department of Education; National Academy of Sciences; and National Science Foundation.

TABLE B-33

NUMBER AND PERCENT DISTRIBUTION OF EMPLOYED 1980 SCIENCE AND ENGINEERING GRADUATES BY FIELD, LEVEL OF DEGREE, AND FIELD OF EMPLOYMENT IN 1982

Field of Degree	Total employed	Chemistry	Physics and astronomy	Other physical sciences	Mathematical sciences	Computer specialties	Environmental sciences	Engineering	Life sciences	Psychology	Social sciences	Non-science/ engineering
	Field of Employment[1]											
Total	198,300	4,600	500	300	4,100	20,100	3,200	55,000	17,400	2,600	11,400	79,100
	Percent											
Chemistry	6,200	52.2	-	-	2.4	1.0	3.1	2.5	1.7	-	-	2.0
Physics/ astronomy	1,800	-	80.0	-	-	1.0	3.1	1.1	-	-	-	0.6
Other physical sciences	800	2.2	-	66.7	-	0.5	-	0.2	-	-	-	0.6
Mathematical sciences	9,700	-	-	-	39.0	22.4	-	2.2	-	-	0.9	2.9
Computer specialties	10,100	-	-	-	4.9	41.8	-	1.1	-	-	-	1.1
Environmental sciences	4,200	2.2	-	33.3	-	-	81.3	0.9	0.6	-	-	0.9
Engineering	54,600	-	-	-	24.4	10.4	-	80.4	2.3	-	0.9	8.1
Life sciences	35,100	43.5	20.0	-	7.3	4.0	9.4	4.0	86.8	-	1.7	17.7
Psychology	25,500	-	-	-	2.4	2.0	-	2.2	4.0	88.5	15.8	23.9
Social sciences	50,300	-	-	-	19.5	16.4	3.1	4.7	5.2	7.7	78.9	42.1
	Master's degrees											
Total	31,100	600	300	200	1,300	4,400	1,000	8,600	3,400	1,100	2,200	7,900
	Percent											
Chemistry	11,000	66.7	-	-	-	-	-	1.2	2.9	-	-	5.1
Physics/ astronomy	600	-	66.7	-	-	-	-	2.3	-	-	-	2.5
Other physical sciences	300	-	-	50.0	-	-	-	-	-	-	-	2.5
Mathematical sciences	2,200	-	-	-	69.2	15.9	-	1.2	-	-	-	5.1
Computer specialties	3,200	-	-	-	-	59.1	-	3.5	-	-	-	3.8
Environmental sciences	1,000	-	-	-	-	-	80.0	-	-	-	-	1.3
Engineering	9,800	16.7	-	-	23.1	13.6	10.0	87.2	-	-	-	15.2
Life sciences	5,200	16.7	-	50.0	-	4.5	-	3.5	91.2	-	-	17.7
Psychology	3,000	-	-	-	-	4.5	-	-	-	100.0	-	20.3
Social sciences	4,800	16.7	-	-	7.7	4.5	-	-	2.9	-	100.0	27.8

[1]Does not include full-time graduate students.

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

SOURCE: National Science Foundation

TABLE B-34

OCCUPATIONAL MOBILITY OF 1972 SCIENTISTS AND ENGINEERS AS EMPLOYED IN 1978

1972 occupation	1978 occupation										
	Total	Engineers	Computer specialists	Mathematical scientists	Physical scientists	Environmental scientists	Biological scientist	Psychologists	Social scientists	Administration/ management	Non-science/ engineering
Total, all fields	831,000	48.9	6.2	2.2	7.8	2.4	6.4	2.5	2.7	14.1	6.9
Engineers	510,000	77.1	1.1	0.1	0.7	0.1	0.2	0.1	-	15.1	5.5
Computer specialists	67,000	7.2	64.9	1.1	0.5	0.5	0.1	0.2	0.3	19.7	5.7
Mathematicians	28,000	7.8	6.8	58.4	1.3	0.4	0.5	0.1	1.8	12.5	10.5
Physical scientists	80,000	5.2	1.2	0.3	70.8	1.8	3.0	-	0.1	11.3	6.4
Environmental scientists	21,000	3.3	0.5	0.2	3.7	78.6	3.1	0.1	0.3	6.8	3.4
Biological scientists	68,000	1.2	0.1	0.3	3.9	0.9	71.7	0.2	0.7	9.0	12.0
Psychologists	24,000	0.1	0.1	0.3	0.1	-	0.6	79.6	1.5	7.1	10.6
Social scientists	32,000	0.5	0.3	1.3	0.1	0.2	0.7	1.9	62.8	15.3	17.0

SOURCE: National Science Foundation.

TABLE B-35

OCCUPATIONAL MOBILITY OF 1973 DOCTORAL SCIENTISTS AND ENGINEERS AS EMPLOYED IN 1981

1981 occupation	1973 occupation									
	Total	Engineers	Computer specialists	Mathematical scientists	Physical scientists	Environmental scientists	Life scientists	Psychologists	Social scientists	Non-science/engineering
Total, all fields	77,100	8,300	1,100	5,100	12,100	5,300	25,400	9,000	7,700	3,100
Engineers	9,000	86.2	14.5	3.5	7.1	4.1	0.6	0.1	0.2	7.7
Computer specialists	1,500	2.1	68.6	4.3	1.0	0.5	0.2	0.5	0.8	2.4
Mathematicians	4,600	1.0	6.0	83.3	0.2	-	5.3	-	0.3	2.8
Physical scientists	12,000	3.6	1.4	0.7	81.8	2.1	-	0.1	0.1	10.6
Environmental scientists	5,300	1.6	1.5	0.3	2.4	84.8	1.0	-	0.5	3.5
Life scientists	24,800	1.5	1.0	2.2	3.8	4.9	90.1	2.5	2.8	16.2
Psychologists	8,700	0.1	0.2	0.4	-	-	0.2	92.2	1.8	4.7
Social scientists	7,100	0.1	-	0.7	0.1	1.3	0.5	1.0	85.0	7.1
Non-S/E	4,000	3.7	6.9	4.5	3.6	2.2	2.1	3.5	8.6	45.0

SOURCE: National Science Foundation.

other science resources publications

	NSF No.	Price
Science Resources Studies Highlights		
R&D Funds		
"7% Real Growth Expected in 1985 National R&D Expenditures: Defense and Economy Major Factors"	85-304	----
"Defense and Space Research and Development Emphasized in 1985 Budget"	84-333	----
"Plans for Company-Funded Research and Development Show 12% Annual Increases Through 1985"	84-329	----
"1983 Plant Biology Research Expenditures Totaled $200 Million and Were Concentrated in Land-grant Institutions"	84-327	----
"Despite Recession, Companies' Own R&D Funding Rose 13% During 1982"	84-314	----
"Non-Federal Funding for Academic R&D Activities Increased at Faster Pace Than Federal Funding in Fiscal Year 1982"	84-307	----
"Federal Academic Obligations Increased by 13% in 1982, 5% in Real Dollars"	84-305	----
"Real Growth in Federal R&D Funds Estimated at 12% in 1984--Largest Increase Since Midsixties"	84-302	----
S/E Personnel		
"Women and Non-U.S. Citizens Responsible for Increase in Production of Science and Engineering Doctorates in 1983"	84-328	----
"Science and Engineering Employment in Academia Grew 3% in 1983"	84-317	----
"Graduate Science/Engineering Enrollment Grew by 2% Between Fall 1981 and 1982, With Computer Sciences, Up 20%, Leading Growth"	84-313	----
"One-fourth of Academic Research Equipment Classified Obsolete"	84-312	----
Detailed Statistical Tables		
R&D Funds		
Federal Funds for Research and Development, Fiscal Years 1983, 1984, and 1985, Volume XXXIII	84-336	----
Research and Development in Industry, 1982. Funds, 1982; Scientists and Engineers, January 1983	84-325	----
Academic Science/Engineering: R&D Funds, Fiscal Year 1982	84-308	----
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The 1982 Postcensal Survey of Scientists and Engineers	84-330	----
Scientists, Engineers, and Technicians in Trade and Regulated Industries: 1982	84-320	----
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Science and Technology Data Book	84-331	----
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