

Healthy Economy Yields Even Lower Unemployment Rate for Doctoral Scientists and Engineers

by Kelly Kang

The proportion of doctoral S&Es in the United States who are women is increasing.

Reflecting the robust economy, the overall unemployment rate for U.S. doctoral scientists and engineers (S&Es) in 1997 was estimated at 1.2 percent, a significant decrease from the 1993 rate of 1.6 percent. During the same time period, the overall U.S. unemployment rate also dropped, from 7.1 percent in 1993 to 5 percent in 1997.¹ The low unemployment rate among the doctoral S&Es can be generally seen across most of the science and engineering (S&E) doctorate fields. There were decreases in unemployment rates for doctorate holders in the fields of computer and mathematical sciences, physical sciences, psychology and engineering.

This data brief provides information from the 1997 Survey of Doctorate Recipients (SDR), conducted by the National Opinion Research Center (NORC) for the National Science Foundation (NSF). The SDR is a biennial longitudinal sample survey that collects labor force characteristics on doctoral S&Es who earned their doctoral degree from U.S. universities and colleges.

How many doctoral S&Es are in the United States?

In 1997, there were approximately 582,000 U.S.-educated doctoral S&Es² residing in the

United States, an increase of about 7 percent from the 1995 estimate of 543,000 and about 13 percent from the 1993 estimate of 513,000. About 90 percent of the S&E doctorate holders were active in the labor force; another 8 percent were estimated to be in retirement.

The number of female doctoral S&Es in the United States is increasing, reaching about 133,000 in 1997 (up from 103,000 in 1993). Twenty-three percent of all doctoral S&Es in 1997 were women; women were 26 percent of doctoral scientists and 6 percent of the doctoral engineers (table 1). This is a significant gain from 1993, when 23 percent of doctoral scientists and 4 percent of doctoral engineers were women.³

The representation of Asian or Pacific Islander doctoral S&Es has also increased from 11 percent in 1993 to 13 percent in 1997; engineering remained as the broad field where this group was best represented (27.5 percent). Black doctoral S&Es were best represented in the health sciences (4.3 percent), social sciences (3.7 percent), and psychology (3.2 percent). Although whites represent about 85 percent of science doctorate holders, they were 69 percent of those with an engineering doctorate (table 1).

Approximately a quarter of the computer and information science doctorate holders were under age 35, whereas in other S&E fields, the estimate of doctorate holders under age 35 varied between 3 to 19 percent. About 80 percent of total doctoral S&Es were native-born U.S. citizens; another 11 percent were naturalized citizens. Over a quarter of computer and

Electronic Dissemination

SRS data are available through the World Wide Web (<http://www.nsf.gov/sbe/srs/>). For more information about obtaining reports, contact pubs@nsf.gov or call (301) 947-2722. For NSF's Telephonic Device for the Deaf, dial (703) 306-0090.

¹ Unemployment rates for U.S. civilian workers are from the Bureau of Labor Statistics' (BLS') Current Population Survey and reflect the seasonally adjusted rates in April 1993 and April 1997, which are comparable to the reference month used in the SDR survey cycles.

² For additional components of foreign-earned doctorates, see Scientists and Engineers Statistical Data System (SESTAT), which provides comprehensive information about the employment, educational, and demographic characteristics of scientists and engineers in the United States. Partial coverage of the foreign doctorate data comes from the 1993 National Survey of College Graduates (NSCG). SDR, NSCG, and the National Survey of Recent College Graduates (NSRCG) are the three component surveys of the SESTAT. The SESTAT website is <http://sestat.nsf.gov>.

³ For the 1993 and 1995 numbers, see *Characteristics of Doctoral Scientists and Engineers in U.S.* reports (NSF 96-302 and NSF 97-319) available at <http://www.nsf.gov/sbe/srs/cdse/start.htm>.

Healthy Economy Yields Even Lower Unemployment Rate for Doctoral.....—page 2

Table 1. Doctoral scientists and engineers in the U.S., by field of doctorate, gender and race/ethnicity: 1997

Field of doctorate	Total	Gender		Race/ethnicity 1/				
		Male	Female	White	Black	Asian or Pacific Islander	Hispanic	American Indian/Alaskan Native
	[Number]	[Percent]						
Total 2/.....	582,080	77.2	22.8	82.7	2.1	12.6	2.2	0.3
Sciences.....	484,600	73.8	26.2	85.4	2.3	9.6	2.2	0.4
Computer and mathematical sciences...	35,060	85.9	14.1	77.9	1.5	18.1	2.3	S
Computer/information sciences.....	8,080	82.9	17.1	67.0	1.5	29.0	2.4	S
Mathematical sciences.....	26,980	86.7	13.3	81.2	1.5	14.9	2.3	S
Biological and agricultural sciences.....	142,100	74.1	25.9	85.5	1.8	10.6	1.9	0.3
Agricultural/food sciences.....	18,530	85.9	14.1	85.3	1.6	10.9	2.1	S
Biological sciences.....	118,580	71.6	28.4	85.3	1.8	10.8	1.9	0.3
Environmental life sciences.....	4,990	89.4	10.6	90.6	1.4	5.8	1.2	S
Health sciences.....	18,940	47.8	52.2	84.0	4.3	8.8	2.3	0.5
Physical and related sciences.....	120,960	88.1	11.9	83.2	1.3	13.3	2.0	0.3
Chemistry except biochemistry.....	63,730	84.9	15.1	81.8	1.7	13.9	2.2	0.3
Earth/atmos/ocean sciences.....	17,240	87.5	12.5	90.2	S	7.5	1.8	S
Physics and astronomy.....	39,990	93.5	6.5	82.2	1.1	14.8	1.7	0.2
Social sciences.....	80,690	71.9	28.1	85.9	3.7	7.2	2.6	0.6
Economics.....	23,140	84.8	15.2	84.4	2.6	10.8	2.0	0.2
Political and related sciences.....	17,700	79.7	20.3	88.1	4.8	4.6	2.1	0.3
Sociology.....	15,020	63.2	36.8	87.5	4.8	4.3	2.8	0.4
Other social sciences.....	24,840	59.6	40.4	84.6	3.4	7.4	3.3	1.3
Psychology.....	86,850	55.8	44.2	91.4	3.2	2.0	2.8	0.5
Engineering.....	97,480	94.0	6.0	69.2	1.3	27.5	1.9	0.1
Aerospace/aeronautical engineering...	4,220	98.6	1.4	77.7	S	19.8	1.6	S
Chemical engineering.....	14,010	94.0	6.0	71.6	1.1	25.8	1.6	S
Civil/architectural engineering.....	8,620	94.2	5.8	67.1	2.6	27.7	2.6	S
Electrical/computer engineering.....	26,010	95.3	4.7	67.2	1.2	29.3	2.0	0.3
Materials/metallurgical engineering.....	9,370	89.3	10.7	66.4	0.7	30.6	2.2	S
Mechanical engineering.....	11,950	96.7	3.3	65.1	1.2	31.6	1.9	S
Other engineering.....	23,310	92.3	7.7	72.4	1.6	24.3	1.6	S

1/ Race/ethnicity shown does not reflect citizenship status.

2/ Total includes "other race" not shown separately due to too few cases.

NOTE: Numbers are rounded to the nearest ten, and may not add to total because of rounding.

Data includes science and engineering doctorate holders from U.S. educational institutions only.

KEY: S=Suppressed for reasons of confidentiality and/or data reliability.

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

information science doctorates and about 17 percent of engineering doctorates were not U.S. citizens.⁴

Employment of doctoral S&Es

Low unemployment among the doctoral S&Es does not imply that they are working in their preferred field. An involuntarily out-of-field

⁴ For these numbers and additional information on the 1997 SDR, see *Characteristics of Doctoral Scientists and Engineers: 1997 Early Release Tables* at <<http://www.nsf.gov/sbe/srs/srs99412/start.htm>>.

rate provides some measure of this perception, but this rate has remained unchanged at around 4 percent⁵ while the unemployment rate has decreased. Unemployment rate changes since 1993 varied somewhat depending on the doctorate field. For most of the doctoral S&Es, the 1997 unemployment rate was lower than 1993, except for doctorates in the biological

⁵ For the involuntarily out-of-field rates by doctorate field and definition, see table 2, *Characteristics of Doctoral Scientists and Engineers: 1997 Early Release Tables*.

Healthy Economy Yields Even Lower Unemployment Rate for Doctoral.....—page 3

The academic sector continues to be the major employer of doctoral S&Es.

and agricultural sciences, and social sciences.⁶ The rate for the biological and agricultural science doctorates remained constant around 1.5 percent since 1993. The 1997 unemployment rates for the computer and mathematical science doctorates, as well as engineering doctorates, were lower than the 1993 and 1995 rates (figure 1). For the psychology doctorates, the unemployment rate appears to have dropped in 1995 and held constant through 1997.

Where are the doctoral S&Es working?

The academic sector continues to be the major employer of doctoral S&Es: 48 percent were employed in educational institutions in 1997.⁷ The doctorates in mathematical sciences, biological sciences, health sciences and most of the social sciences were more likely to work in educational institutions than the doctorates in other S&E disciplines.

Educational institutions, however, were not the major employer for doctoral S&Es in some

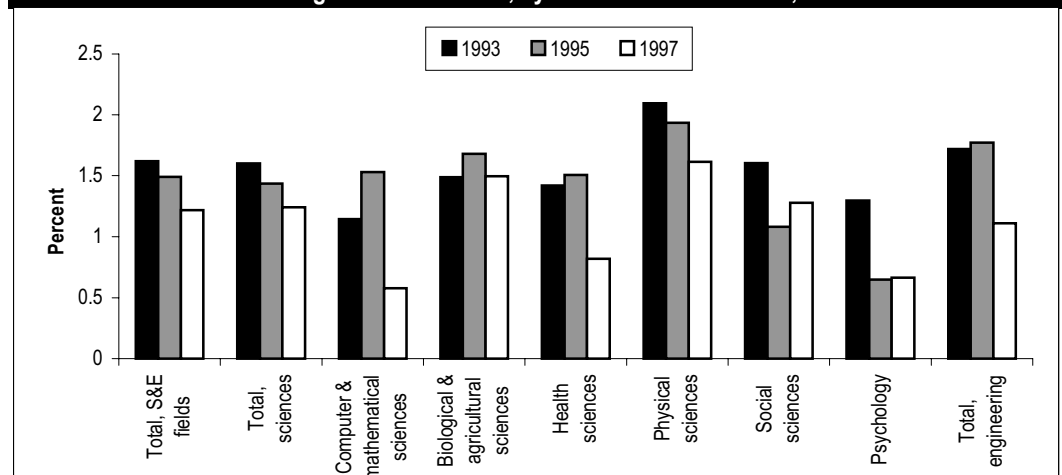
fields. Over a third of doctoral S&Es were employed in industry (private for-profit or non-profit) with another 10 percent working for Federal, state, and local government and about 5 percent working as self employed. Chemistry, computer and information science, and engineering doctorate holders were more often employed in industry than any other sector (table 2).

More detailed data will be available in the forthcoming report, *Characteristics of Doctoral Scientists and Engineers in the United States: 1997*. Early release tables from the 1997 SDR are available on the SRS website <<http://www.nsf.gov/sbe/srs/stats.htm>>.

This Data Brief was prepared by:

Kelly Kang
 Division of Science Resources Studies
 National Science Foundation
 4201 Wilson Boulevard, Suite 965
 Arlington, VA 22230
 (703) 306-1774, ext 6943
kkang@nsf.gov

Figure 1. Unemployment rate of doctoral scientists and engineers in the U.S., by field of doctorate: 1993, 1995 & 1997



NOTE: Data includes science and engineering doctorate holders from U.S. educational institutions only.

SOURCE: National Science Foundation/Division of Science Resources Studies, Survey of Doctorate Recipients

⁶ Although the unemployment rates for the social science doctorates between 1993 and 1997 may appear to show a decrease, this was not a statistically significant change.

⁷ Educational institutions include primary/secondary schools, 2-year colleges, universities/4-year colleges, medical schools, university-affiliated research institutes and other. However, most of the S&E doctorate holders in this sector are working in universities and 4-year colleges.

Healthy Economy Yields Even Lower Unemployment Rate for Doctoral.....—page 4

Table 2. Employed doctoral scientists and engineers in the U.S., by field of doctorate and sector of employment: 1997

Field of doctorate	Total 1/	Educational institutions	Private industry 2/	Self-employed	Government
Total.....	518,440	246,830	191,370	25,100	53,520
	[Percent distribution]				
Sciences.....	100.0	51.1	32.6	5.4	10.7
Computer/information sciences.....	100.0	42.3	52.2	1.6	3.4
Mathematical sciences.....	100.0	65.9	27.0	1.6	5.5
Agricultural/ food sciences.....	100.0	49.3	35.1	4.3	11.1
Biological sciences.....	100.0	59.5	27.5	2.2	10.7
Environmental life sciences.....	100.0	38.1	27.0	1.6	31.9
Health sciences.....	100.0	56.2	29.7	3.4	10.6
Chemistry except biochemistry.....	100.0	31.6	58.7	3.1	6.5
Earth/atmos/ocean sciences.....	100.0	49.4	26.7	3.3	20.5
Physics and astronomy.....	100.0	41.7	40.9	2.2	15.0
Economics.....	100.0	57.7	21.8	2.2	13.9
Political and related sciences.....	100.0	70.5	14.5	3.6	11.3
Sociology.....	100.0	75.4	13.8	3.4	7.1
Other social sciences.....	100.0	67.5	18.6	4.5	9.1
Psychology.....	100.0	39.8	32.0	16.9	11.2
Engineering.....	100.0	30.8	58.2	2.4	8.3
Aerospace/aeronautical engineering.....	100.0	29.9	54.0	3.5	12.1
Chemical engineering.....	100.0	21.4	71.6	2.4	4.2
Civil/architectural engineering.....	100.0	44.2	42.2	2.0	11.6
Electrical/computer engineering.....	100.0	29.7	61.9	2.1	6.0
Materials/metallurgical engineering.....	100.0	18.5	68.3	3.2	9.8
Mechanical engineering.....	100.0	29.6	61.5	2.4	5.9
Other engineering.....	100.0	37.9	47.5	2.2	11.8

1/ Includes "other sector" not shown separately due to too few cases.

2/ Includes "self-employed in own incorporated business or professional practice".

NOTE: Numbers may not add to total because of rounding and "other sector" not shown separately. Data includes science and engineering doctorate holders from U.S. educational institutions only.

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

NSF 99-340

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

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE \$300

NATIONAL SCIENCE FOUNDATION
ARLINGTON, VA 22230

**BULK RATE
POSTAGE & FEES PAID
National Science Foundation
Permit No. G-69**

