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The End of Mandatory Retirement for Doctoral Scientists and Engineers in Postsecondary Institutions: Retirement Patterns 10 Years Later

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Mandatory retirement in postsecondary educational institutions ended in 1994. In this paper, examination of retirements in 1993 (just before the end of this practice) and again 10 years later shows that by 2003, the age distribution of doctoral scientists and engineers working in postsecondary institutions had shifted, with a larger proportion being older than 56 years of age, compared with 1993. However, this is not solely due to changes in the propensity of the older age groups to retire.

Retirement among scientists and engineers with doctoral degrees has important consequences for the science, engineering, and health (SEH) labor force. Retirements can mean loss of significant amounts of human capital, depleting an organization's ability to carry out its work; however, retirement of older individuals opens opportunities for younger scientists and engineers. Debates over the pros and cons of later retirement have been particularly evident within higher education. Federal legislation prohibiting mandatory retirement was passed in 1986, but postsecondary institutions were given a special allowance to maintain the practice for tenured faculty aged 70 and older until 1994 (Clark and Hammond 2001).[2] This allowance was sought by many leaders in higher education because of concern that the tight academic labor market of the late 1980s would become even more severe, with a resulting loss of new hires from deferred retirements as well as increased salary costs (Ehrenberg 2001). More than a decade after the end of mandatory retirement, the concern persists—rightly or wrongly—that retirement ages have increased while the proportions of new doctorate recipients taking postdoctoral or temporary faculty appointments have grown (Beckham 2003, Fogg 2005).

Tracking retirement is a challenge because many individuals continue to work in another capacity after officially retiring from one job, and others move in and out of retirement in the same type of job. In this report, *retired individuals* are those whose most recent employment was in a postsecondary institution and are not working because they have retired, and those who have retired but are working part time in any sector.[3] It does not include individuals who retired from a postsecondary institution and later returned to full-time employment in any sector.

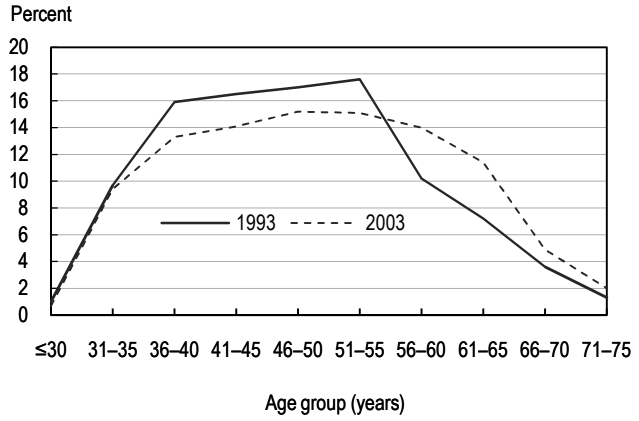
Age Distribution and Retirement Trends in Postsecondary Institutions

The number of SEH doctorate recipients employed by postsecondary institutions increased by 26% (from 221,790 to 279,550) between 1993 and 2003. As shown

in figure 1, this growth was accompanied by a change in the age distribution such that the 2003 doctoral labor force in the education sector had higher percentages in the oldest age levels (age 56 and older), with an offsetting reduction in the middle-age levels (ages 36 to 55).

The greater representation of older doctorate recipients reflects both growth in their numbers and changes in their propensity to retire. Retirement rates among those aged 56–75 are shown in table 1.[4] Among individuals 70 years old and younger, the retirement rates in each age cohort group since 1993 have fluctuated but have generally edged upward. In contrast, for those aged 71–75 the retirement rate dropped about 4 percentage points between 1993 and 1995 (the end of mandatory retirement was in 1994) and stayed between 82% and 85% from 1995 to 2003.

FIGURE 1. Age distribution of SEH doctorate holders employed in postsecondary institutions: 1993 and 2003



SEH = science, engineering, and health.

NOTE: Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes.

SOURCE: National Science Foundation, Division of Science Resource Statistics, Survey of Doctorate Recipients: 1993 and 2003.

Retirement and Type of Postsecondary Institution

Individuals' decisions about when to retire are likely to be affected by various aspects of their current employment situation, future prospects, and the type of institution where they are employed. The most widely used classification system for colleges and universities is the Carnegie classification,[5] which defines a distinct class of such institutions based on institutional mission and organization.

Work demands, particularly the balance of research and teaching responsibilities, generally differ among institutional types. Salary and benefits also have been shown to vary among types of institutions (Cataldi, Fahimi, and Bradburn 2005). These differences likely factor into individuals' retirement decisions and may show up in retirement-rate differences among types of institutions.

One hypothesis is that the end of mandatory retirement in higher education would have the greatest impact on retirements among faculty at research universities. This is based on the idea that faculty who tend to be the most

TABLE 1. SEH doctorate recipients aged 56 and older whose most recent employment was in a postsecondary institution and percentage currently retired, by age group: selected years, 1993–2003

	All ages, 56–75 years		56–60 years		61–65 years		66–70 years		71–75 years	
Year	Number	% retired	Number	% retired	Number	% retired	Number	% retired	Number	% retired
1993	61,970	34.7	21,540	4.5	18,000	24.0	13,070	61.4	9,360	87.5
1995	65,770	31.9	24,100	3.4	17,650	21.2	13,440	56.8	10,590	83.2
1997	77,610	33.0	30,020	5.0	19,900	24.0	15,510	59.5	12,180	82.9
1999	94,190	31.9	38,490	5.0	23,370	20.8	17,970	63.6	14,360	82.2
2001	91,230	34.8	36,700	6.1	25,150	29.7	16,830	67.9	12,550	84.7
2003	101,570	35.0	36,570	7.1	31,500	28.1	19,440	64.4	14,070	82.5

SEH = science, engineering, and health.

NOTES: Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes. % retired includes individuals not working because they have retired and those who have retired but are working part-time in any sector. It does not include individuals who retired from a postsecondary institution and later returned to full-time employment in any sector. Detail may not add to total because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Doctorate Recipients.

engaged in autonomous research work and its reward system, tied to publication, would be the most likely to continue working beyond the usual retirement age (Clark and Hammond 2001, p. 4). On the other hand, faculty at research universities tend to be the highest paid members of academia and would be the best able to afford retirement (Cataldi, Fahimi, and Bradburn 2005).

Age-specific retirement rates for the doctoral SEH labor force from the three largest types of academic institutions and all other postsecondary institutions are shown in table 2. In both 1993 and 2003, SEH doctorate recipients currently or previously employed in research universities had lower retirement rates within each age grouping than did their counterparts in other institutions, but the differences were generally not statistically significant at the 5% significance level. Among the 71–75 age group, the 2003 retirement rate was lower than in 1993. There were no significant differences between 1993 and 2003 for the 71–75 age group by type of institution.

Retirements by Doctoral Fields of Study

Another aspect of academic employment relevant to retirement decisions is likely to be the individual's field of doctorate. Fields have different labor markets, compensation levels, and mobility options. They also differ in the organization and technical infrastructure required to conduct research, and such differences could be factors in retirement decisions. Scientific fields not requiring large teams and laboratory equipment may be more conducive to rewarding participation by older individuals.

Retirement rates by field of doctorate are examined here only for individuals currently or most recently employed in research and doctorate-granting universities and only for 1993 and 2003. The results indicate that the overall decline from 1993 to 2003 in retirement rates among the 71–75 age group was not concentrated within one or another of these broad disciplinary groupings (table 3). Among all retired individuals between

TABLE 2. SEH doctorate recipients aged 56 and older whose most recent employment was in a postsecondary institution and percentage currently retired, by age group and Carnegie classification of employer: 1993 and 2003

	All ages, 56–75 years		56–65 years		66–70 years		71–75 years	
Year and institution type	Number	% retired	Number	% retired	Number	% retired	Number	% retired
1993								
All postsecondary institutions	60,460	34.5	38,430	12.9	12,790	60.6	9,250	87.8
Research universities	28,650	31.7	18,320	10.2	5,740	56.5	4,590	86.4
Doctorate-granting institutions	8,250	38.5	5,130	16.3	1,880	66.3	1,240	88.3
Comprehensive institutions	13,510	37.2	8,730	17.0	2,830	62.8	1,950	90.3
Other postsecondary institutions	10,050	35.3	6,250	12.3	2,340	63.5	1,470	88.4
2003								
All postsecondary institutions	100,340	34.5	67,620	16.5	19,170	64.2	13,550	82.0
Research universities	45,940	31.8	30,120	13.3	9,380	59.4	6,430	78.1
Doctorate-granting institutions	12,510	35.8	8,610	17.3	2,110	70.3	1,800	84.0
Comprehensive institutions	23,520	38.9	16,100	19.6	4,520	73.7	2,910	91.5
Other postsecondary institutions	18,370	34.5	12,790	19.7	3,160	60.7	2,420	79.1

SEH = science, engineering, and health.

NOTES: Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes; total includes institutions not broken out separately because of missing institutional identifiers. Institutions designated by 1994 Carnegie classification code. Freestanding schools of engineering and technology included under comprehensive institutions. For information on Carnegie classification taxonomy, see http://classifications.carnegiefoundation.org. % retired includes individuals not working because they have retired and those who have retired but are working part-time in any sector. It does not include individuals who retired from a postsecondary institution and later returned to full-time employment in any sector. Detail may not add to total because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Doctorate Recipients.

TABLE 3. SEH doctorate holders aged 56 and older whose most recent employment was at a research or doctorate-granting university and percentage currently retired, by age group and broad field of doctorate: 1993 and 2003

	All ages, 56–75 years		56–65 years		66–70 years		71–75 years	
Year and broad field of doctorate	Number	% retired	Number	% retired	Number	% retired	Number	% retired
1993								
All research and doctorate-granting university employees	36,900	33.2	23,460	11.6	7,620	58.9	5,830	86.8
Physical, math, computer sciences, and engineering	14,770	28.4	9,800	9.9	2,860	50.2	2,110	85.1
Biological, agricultural, and health sciences	10,750	39.8	6,680	16.0	2,320	68.3	1,750	92.7
Social sciences and psychology	11,380	33.2	6,980	9.7	2,440	60.3	1,960	83.3
2003								
All research and doctorate-granting university employees	58,450	32.7	38,730	14.2	11,490	61.4	8,230	79.4
Physical, math, computer sciences, and engineering	23,830	30.4	16,800	13.2	4,050	63.9	2,980	81.7
Biological, agricultural, and health sciences	13,970	33.7	9,280	16.6	2,820	57.1	1,860	83.2
Social sciences and psychology	20,650	34.7	12,650	13.9	4,630	61.8	3,380	75.3

SEH = science, engineering, and health.

NOTES: Institutions designated by 1994 Carnegie classification code. Freestanding schools of engineering and technology included under comprehensive institutions. For information on Carnegie classification taxonomy, see http://classifications.carnegiefoundation.org. % retired includes individuals not working because they have retired and those who have retired but are working part-time in any sector. It does not include individuals who retired from a postsecondary institution and later returned to full-time employment in any sector. Detail may not add to total because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Doctorate Recipients.

56–75 years of age, there was a statistically significant drop in the retirement rate between 1993 and 2003 only for biological, agricultural, and health sciences doctorate recipients (from 39.8% to 33.7%).[6]

Retirements by Sex

Another possible source of difference in retirement rates among scientists and engineers working in educational institutions is their sex. From a financial standpoint, women may find it more difficult to retire due to having average career earnings lower than those of men (National Science Foundation 2006). Some women also may delay retirement relative to men because of better health and longer life expectancies, or because they have a later schedule for career goals than their male counterparts as a result of family-related commitments made at earlier career stages (Mason and Goulden 2004).

In 2003 the percentage of men over the age of 55 who had retired was about 10 percentage points higher than the comparable percentage of women (table 4). In 1993 the difference was 4 percentage points. The larger difference in 2003 compared with 1993 between men and women in the over-55 age group reflected in part a higher representation of women in the youngest age cohort, where retirement rates are lower.

Data Sources

This InfoBrief uses data from the National Science Foundation's Survey of Doctorate Recipients (SDR). The SDR is a biennial survey of doctoral recipients in science, engineering, and health that began in 1973. The focus of this panel survey is on the labor force experiences of this population and how those experiences change over the course of individual careers and across historical cohorts.

The 1993–2003 SDR surveys were administered to a nationally representative sample of about 40,000–50,000 science, engineering, and health doctorate recipients from U.S. universities who were residing in the United States. The sample frame for the SDR is built from the Doctorate Records File (DRF), which includes all research doctorate recipients and information on their educational and demographic characteristics from U.S. universities from 1920 to the present. Since 1958 the DRF has been updated annually with data from the Survey of Earned Doctorates (SED), a census of new doctorate recipients sponsored by NSF and other federal agencies. The SDR sample is augmented every 2 years with members of the new U.S. doctorates cohorts surveyed by the SED, and sample members are retired

TABLE 4. SEH doctorate recipients aged 56 and older whose most recent employment was in a postsecondary institution and percentage currently retired, by age group and sex: 1993 and 2003

Year and respondent sex	All ages, 56–75 years		56–65 years		66–70 years		71–75 years	
	Number	% retired	Number	% retired	Number	% retired	Number	% retired
1993								
Both sexes	61,970	34.7	39,540	13.4	13,070	61.4	9,360	87.5
Male	54,770	35.2	34,630	13.5	11,650	61.9	8,490	87.0
Female	7,200	31.1	4,910	12.5	1,420	57.8	870	92.2
2003								
Both sexes	101,570	35.0	68,070	16.8	19,440	64.4	14,070	82.5
Male	82,910	36.8	53,900	17.4	16,840	65.2	12,170	83.8
Female	18,660	27.0	14,170	14.7	2,590	59.0	1,900	74.7

SEH = science, engineering, and health.

NOTES: Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes. % retired includes individuals not working because they have retired and those who have retired but are working part-time in any sector. It does not include individuals who retired from a postsecondary institution and later returned to full-time employment in any sector. Detail may not add to total because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Survey of Doctorate Recipients.

from the study after age 75. The 1993–2003 SDR surveys had response rates between 80% and 87%. More detailed information on the SDR can be found at http://www.nsf.gov/statistics/srvydoctoratework/. Some data from the 1973–1991 SDR surveys were incorporated into this analysis, in order to find and identify postsecondary employment information on individuals who reported being retired in the 1993–2003 SDR surveys.

Notes

1. Thomas B. Hoffer is a principal research scientist, Scott Sederstrom is a research scientist, and Deborah Harper is a survey specialist at the National Opinion Research Center at the University of Chicago, Chicago, IL. For further information, contact Nirmala Kannankutty, Division of Science Resources Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230 (nkannank@nsf.gov, 703-292-7797).

2. Universities were not forced to impose mandatory retirement on tenured faculty aged 70 and older, but the special allowance permitted it. Some universities opted not to use the allowance, and many implemented incentive programs to encourage voluntary retirement among older faculty (Clark and Hammond 2001).

3. Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes.

4. Past employment sector of those currently retired was determined on the basis of the last job reported before retirement, obtained from earlier rounds of the SDR.

5. There are multiple versions of the Carnegie Classification system available (see http://classifications.carnegiefoundation.org/). This analysis uses the 1994 classification.

6. The tests of statistical significance for the 1993 to 2003 differences by field of study used the Bonferroni adjustment for multiple comparisons.

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