Demography of the Academic Career

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THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine
National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

What Have the National Academies Done?

- Strengthen the scientific workforce in specific institutions or fields
- Strengthen research and teaching institutions
- Create viable STEM learning pathways
- Encourage women and minorities in STEM

Relevant NAS, NAE, NRC, & IOM Studies

- Disciplines, e.g., biomedical, behavioral, and clinical research sciences.
- Industries, e.g., the health care work force
- Credentials, e.g., master's degrees for science professionals
- Institutions, e.g., Department of Defense

What's Missing?

- Ours is not the research, scholarly, and teaching workforce of the past.
- It would be useful to take a comprehensive look at the recent, emerging, and likely future trends in entry to, mobility within, and exit from that workforce in light of likely **institutional and population** changes.

Define the Population

- Persons who hold an advanced degree in an academic and/or scientific field **and** others who work as researchers, scholars, or teachers at post-secondary educational or research institutions.
- (Is this too broad? Should, for example, non-doctorates be excluded?)

Components of Change

- Entry (hiring)
- Exit (death, retirement, and other exits from the defined population, e.g., movement to purely administrative roles, to other countries, to non-research or teaching institutions, or to K12 schools)
- Social mobility (among like or different institutions and among like or different roles within those institutions)

Some Big Issues

- Faculty retirement
- Flexible careers (for women and for men)
- Academic career entry
- Tenure and "adjunctification"
- Compensation
- Postdocs, age at first award
- Changes in institutional landscape

Faculty Retirement

- 1986 amendments to the Age Discrimination in Employment Act
- Eliminated mandatory retirement for most workers (exc. protective service workers, CEOs, and academics)
- Maintained 70 as permissive mandatory retirement age for tenured college and university faculty, pending an NRC study

Ending Mandatory Retirement for Tenured Faculty (1991)

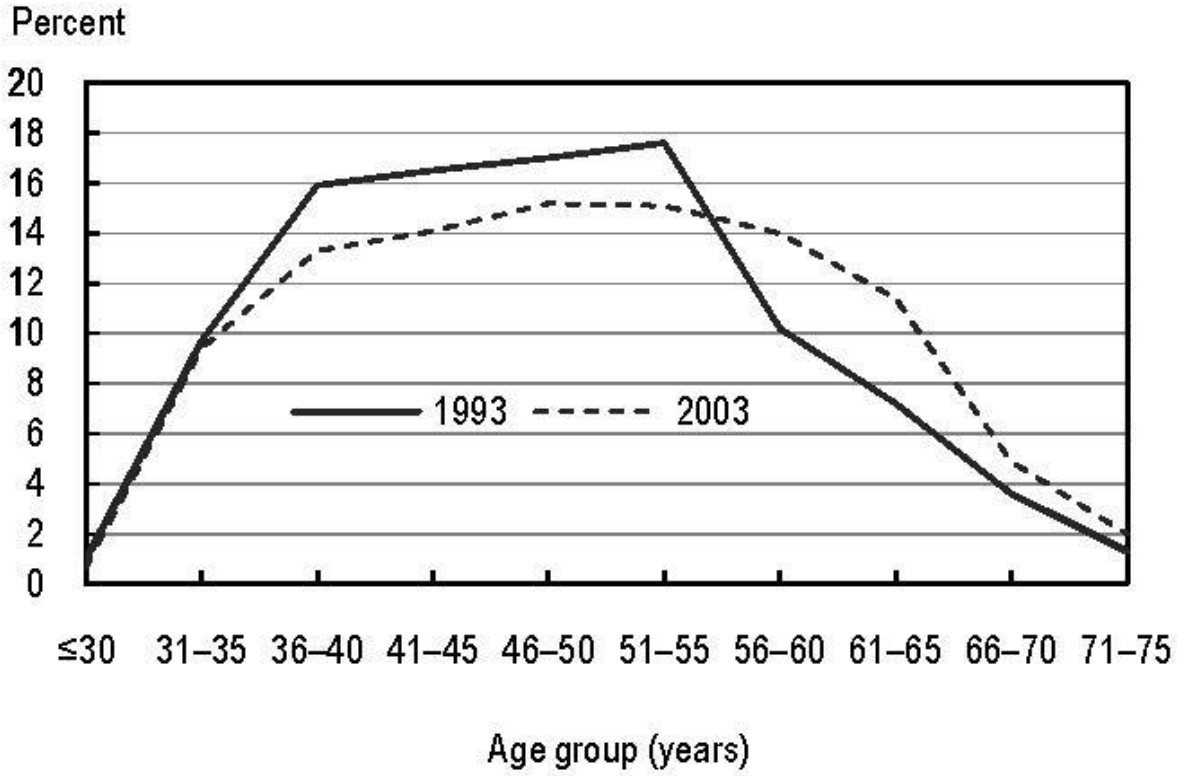
- "At most colleges and universities, few tenured faculty would continue working past age 70 if mandatory retirement is eliminated."
- "At some research universities, a high proportion of faculty would choose to work past age 70 if mandatory retirement is eliminated. … some research universities are likely to suffer adverse effects from low faculty turnover."

Ending Mandatory Retirement for Tenured Faculty (1991), cont.

- Several recommendations to encourage retirement and make continued employment financially neutral.
- "The committee recommends that the ADEA exemption permitting the mandatory retirement of tenured faculty be allowed to expire at the end of 1993."
- And so it was. So, what happened?

Retirement Patterns 10 Years Later (Hoffer, et al., NSF, 2010)

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



Retirement Patterns 10 Years Later (Hoffer, et al., NSF, 2010)

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

	All ages, 56–75 years		56–60 years		61–65 years		
Year	Number	%retired	Number	%retired	Number	%retired	Nu
1993	61,970	34.7	21,540	4.5	18,000	24.0	1
1995	65,770	31.9	24,100	3.4	17,650	21.2	1
1997	77,610	33.0	30,020	5.0	19,900	24.0	1
1999	94,190	31.9	38,490	5.0	23,370	20.8	1
2001	91,230	34.8	36,700	6.1	25,150	29.7	1
2003	101,570	35.0	36,570	7.1	31,500	28.1	1

SEH = science, engineering, and health.

NOTES: Postsecondary institutions include 2-year and 4-year colleges and universities, medical sch
%retired includes individuals not working because they have retired and those who have retired but
include individuals who retired from a postsecondary institution and later returned to full-time employ

Retirement Patterns 10 Years Later (Hoffer, et al., NSF, 2010)

aged 56 and older whose most recent employment was in a postsecondary institution and group: selected years, 1993–2003

56–60 years		61–65 years		66–70 years		71–75 years	
umber	% retired	Number	% retired	Number	% retired	Number	% retired
1,540	4.5	18,000	24.0	13,070	61.4	9,360	87.5
4,100	3.4	17,650	21.2	13,440	56.8	10,590	83.2
0,020	5.0	19,900	24.0	15,510	59.5	12,180	82.9
3,490	5.0	23,370	20.8	17,970	63.6	14,360	82.2
6,700	6.1	25,150	29.7	16,830	67.9	12,550	84.7
6,570	7.1	31,500	28.1	19,440	64.4	14,070	82.5

de 2-year and 4-year colleges and universities, medical schools, and university-affiliated research institutes.
because they have retired and those who have retired but are working part-time in any sector. It does not
tsecondary institution and later returned to full-time employment in any sector. Detail may not add to total

Retirement Patterns 10 Years Later

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

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

SEH = science, engineering, and health.

NOTES: Postsecondary institutions include 2-year and 4-year colleges and universities, medical schools, and university-affiliated r

Retirement Patterns 10 Years Later

and older whose most recent employment was in a postsecondary institution and percentage classification of employer: 1993 and 2003

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

Retirement Patterns 10 Years Later

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

Year and broad field of doctorate	All ages, 56–75 years		56–65 years	
	Number	% retired	Number	% retire
1993				
All research and doctorate-granting university employees	36,900	33.2	23,460	11.6
Physical, math, computer sciences, and engineering	14,770	28.4	9,800	9.9
Biological, agricultural, and health sciences	10,750	39.8	6,680	16.0
Social sciences and psychology	11,380	33.2	6,980	9.7
2003				
All research and doctorate-granting university employees	58,450	32.7	38,730	14.2
Physical, math, computer sciences, and engineering	23,830	30.4	16,800	13.2
Biological, agricultural, and health sciences	13,970	33.7	9,280	16.6
Social sciences and psychology	20,650	34.7	12,650	13.9

SEH = science, engineering, and health.

Retirement Patterns 10 Years Later

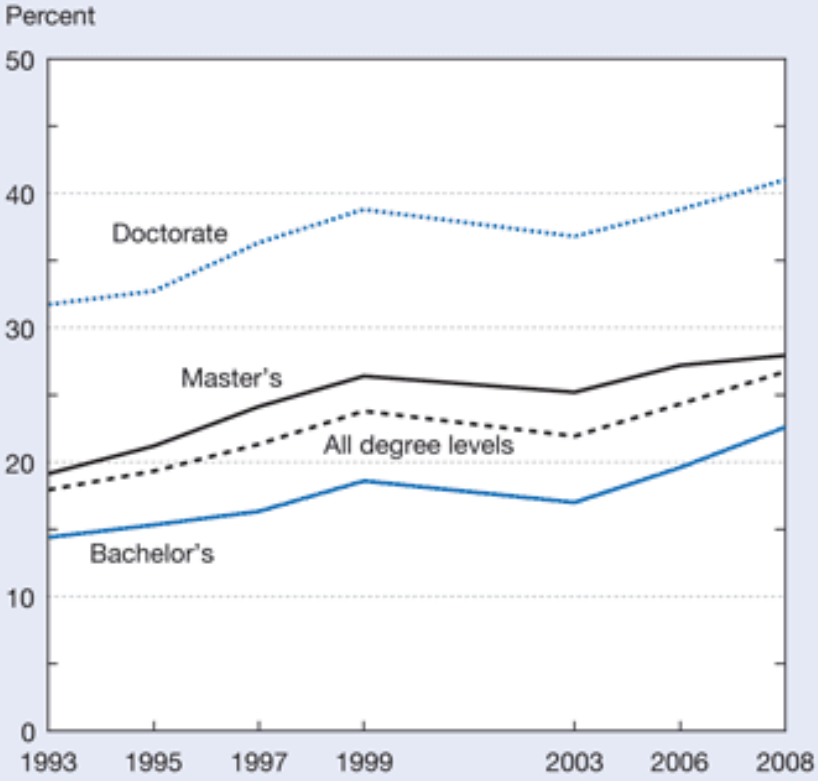
t recent employment was at a research or doctorate-granting university and percentage and 2003

l ages, 56–75 years		56–65 years		66–70 years		71–75 years	
lumber	% retired	Number	% retired	Number	% retired	Number	% retired
36,900	33.2	23,460	11.6	7,620	58.9	5,830	86.8
14,770	28.4	9,800	9.9	2,860	50.2	2,110	85.1
10,750	39.8	6,680	16.0	2,320	68.3	1,750	92.7
11,380	33.2	6,980	9.7	2,440	60.3	1,960	83.3
58,450	32.7	38,730	14.2	11,490	61.4	8,230	79.4
23,830	30.4	16,800	13.2	4,050	63.9	2,980	81.7
13,970	33.7	9,280	16.6	2,820	57.1	1,860	83.2
20,650	34.7	12,650	13.9	4,630	61.8	3,380	75.3

So, retirement above 70 has declined modestly from 1993 to 2003

- Is there an issue of obsolescence?
- Is there not enough room for younger cohorts?
- Are the older faculty too expensive?
- Is there an effect of changing gender composition?
- What about **mortality**?
- And what since 2003?

Figure 3-41
Workers older than age 50 in S&E occupations, by highest degree level and year: 1993–2008

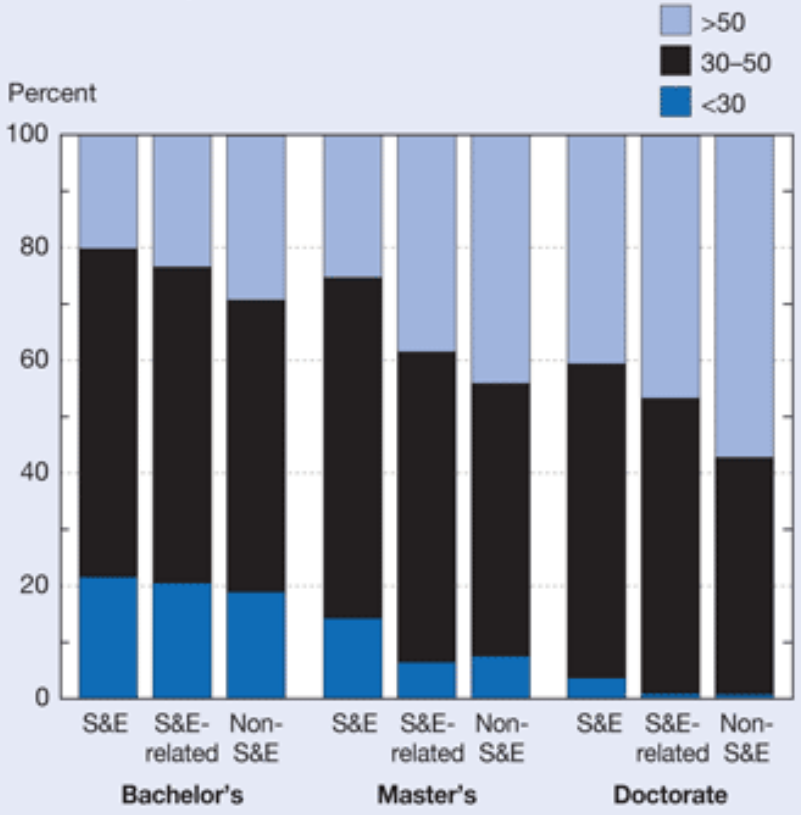


NOTES: Total includes professional degrees not broken out separately. National estimates not available from Scientists and Engineers Statistical Data System (SESTAT) in 2001.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, SESTAT (1993–2008), http://sestat.nsf.gov.

Science and Engineering Indicators 2012

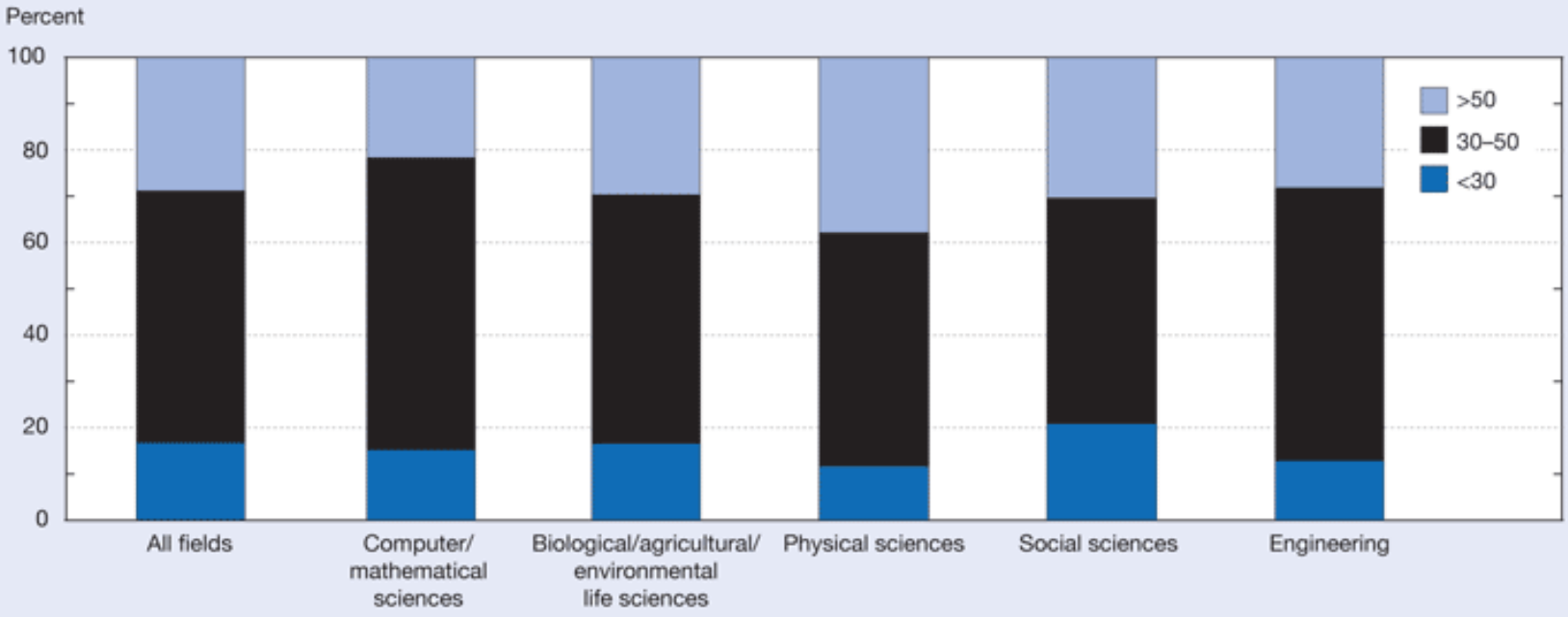
Figure 3-42
Age distribution of employed individuals with highest degree in S&E, by degree level and broad occupational area: 2008



SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Scientists and Engineers Statistical Data System (SESTAT) (2008), http://sestat.nsf.gov.

Science and Engineering Indicators 2012

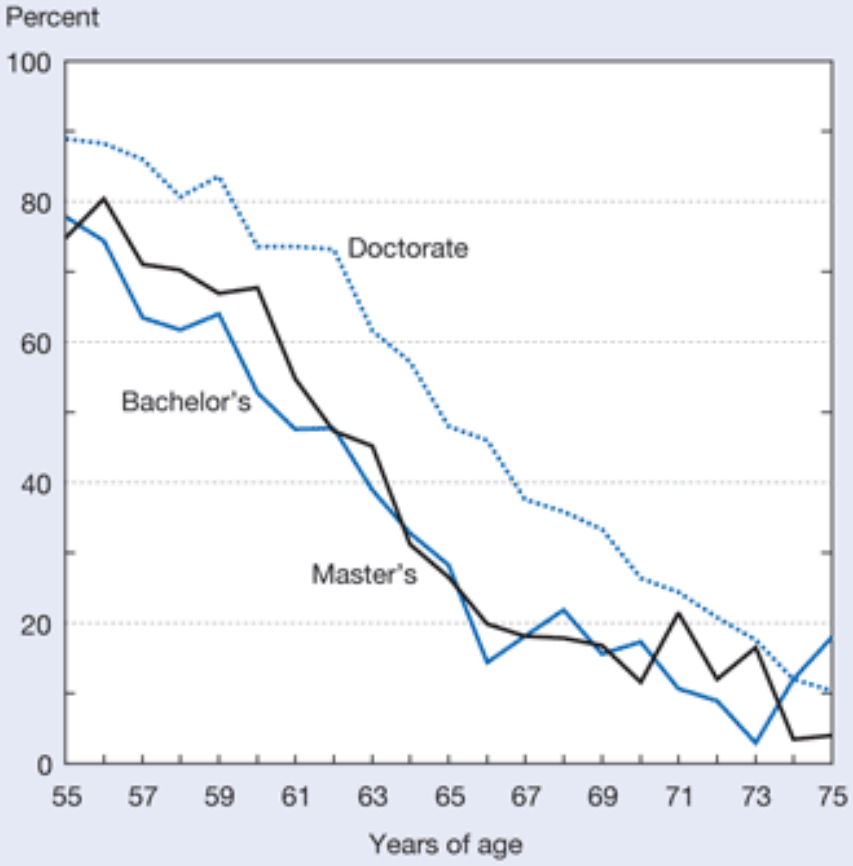
Figure 3-43
Age distribution among employed individuals with highest degree in S&E, by degree field: 2008



SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Scientists and Engineers Statistical Data System (SESTAT) (2008), http://sestat.nsf.gov.

Science and Engineering Indicators 2012

Figure 3-44
Older individuals with highest degree in S&E who work full time, by age and degree level: 2008



SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, Scientists and Engineers Statistical Data System (SESTAT) (2008), http://sestat.nsf.gov.

Science and Engineering Indicators 2012

Recent Studies of Faculty Retirement Plans #1

- Examining trends at a large private university from 1981 to 2009, the study finds faculty members are likely to take much longer to retire. … The dates in the study come before and after 1993, the last year in which colleges and universities were permitted to enforce a mandatory retirement age of 70. (*Inside Higher Ed*, 8/2/2013)
- Sharon L. Weinberg and Marc A. Scott, "The Impact of Uncapping of Mandatory Retirement on Postsecondary Institutions," *Educational Researcher* (2013).
- Problem: Fatal flaw in study design. A comparison of retirement in two periods where most of those at risk in the later period could have, but did not retire in the earlier period.

Recent Studies of Faculty Retirement Plans #2

- Headline: "Three-Fourths of Baby Boomer Faculty Members Plan to Delay Retirement, or Never Retire at All"
- "Fidelity Investments®, a leading provider of workplace retirement plans in the not-for-profit higher education market, today announced results of its Higher Education Faculty Study, which examined the behaviors and attitudes of baby boomer (ages 49-67) faculty members at higher education institutions. The research found that 74 percent of these boomers plan to delay retirement past the age of 65, or never retire at all. When asked the reasons for this delay, they not only cited professional reasons (81 percent), but also economic concerns (69 percent) – suggesting a need for more financial guidance." (06/17/2013)
- Problem: Fatal flaw in study design. The population covered in the sample is currently employed, not all current or former faculty… some are too young to anticipate retirement, while many of those at older ages are already retired.

So, what about mortality?

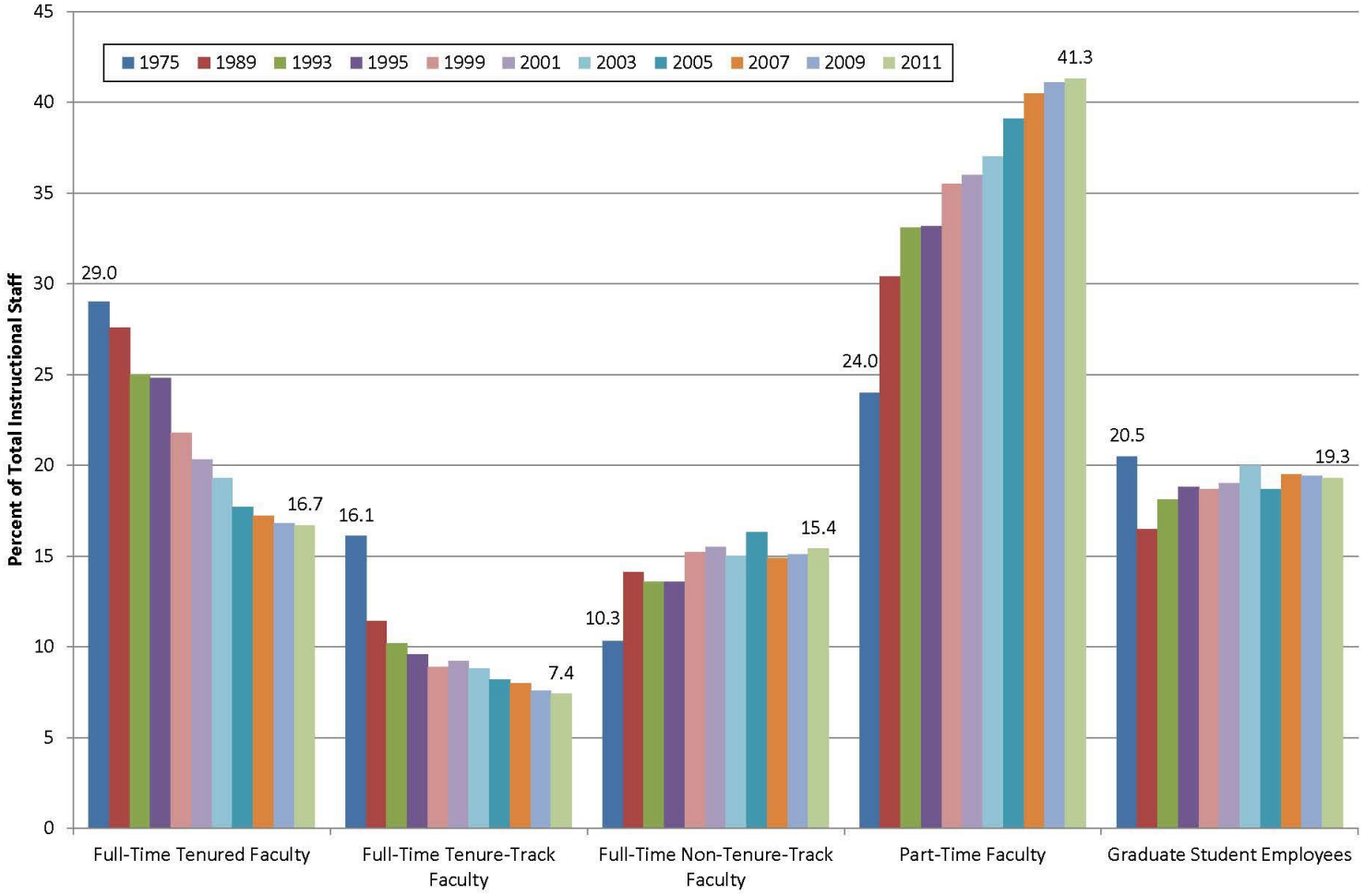
- James Vaupel (2012 NAS meetings) and David Wise (international comparisons of expectation of life at older ages)
- We have pushed back the onset of age-related disabilities:
  - 60 is the new 50
  - 70 is the new 60
  - 80 is the new 70
  - And 85 is the new 80
- Zeke Emmanuel – raise the age of SSA eligibility
- Should we not expect faculty to work longer?

Trends in PhD Completion, 1987-88 to 2008-09

- SEE TABLE (selected from *Digest of Education Statistics*, but the source is the NSF Survey of Earned Doctorates)

Trends in Instructional Staff Employment Status, 1975-2011

All Institutions, National Totals



Notes: Figures for 2011 are estimated. Figures from 2005 have been corrected from those published in 2012. Figures are for degree-granting institutions only, but the precise category of institutions included has changed over time. Graduate student employee figure for 1975 is from 1976. Percentages may not add to 100 due to rounding.

Source: US Department of Education, IPEDS Fall Staff Survey. Tabulation by AAUP Research Office, Washington, DC. Released April 2013.

Compensation

- Data from Yu Xie and Sasha Killewald, ***Is American Science in Decline?*** (Harvard University Press, 2012)
- Look for "The Henry and Bryna David Lecture 2013: www.nationalacademies.org

Table 5.2 Estimated ratios in earnings between professionals and scientists, by degree and decade (male workers only)

	1960	1970	1980	1990	2000	2006-08
Bachelor's degree						
Scientists (bio., math, phys.)	1.00	1.00	1.00	1.00	1.00	1.00
Engineers	1.09	1.17	1.13	1.29	1.21	1.20
Computer scientists	-	1.10	1.08	1.19	1.26	1.22
Nurses	*0.81*	*1.12*	*0.83*	1.01	0.98	1.01
Teachers	0.68	0.70	0.69	0.77	0.71	0.67
Social scientists	*0.73*	*1.41*	*1.17*	1.06	*1.12*	1.19
Master's degree						
Scientists (bio., math, phys.)	1.00	1.00	1.00	1.00	1.00	1.00
Engineers	1.18	1.17	1.17	1.18	1.28	1.25
Computer scientists	-	1.20	1.09	1.07	1.32	1.27
Nurses	*0.74*	*0.57*	*0.86*	*0.98*	*1.08*	1.24
Teachers	0.73	0.76	0.77	0.78	0.77	0.74
Social scientists	*1.11*	1.16	*1.10*	1.00	*1.07*	1.22
Doctorate (PhD & professional)						
Scientists (bio., math, phys.)	1.00	1.00	1.00	1.00	1.00	1.00
Engineers	1.07	1.06	1.07	1.21	1.31	1.24
Computer scientists	-	1.02	0.93	*1.01*	1.35	1.22
Social scientists	*1.03*	1.08	1.02	0.98	1.19	1.11
Doctors	1.51	1.70	1.73	1.91	2.15	1.98
Lawyers	1.11	1.30	1.25	1.40	1.52	1.53

Note: Analysis is restricted to full-time, full-year workers.

Ratios are computed using scientists' earnings as the benchmark.

Estimates based on fewer than 100 cases are presented in italics.

Changes in the Terrain

- Growth of 2-year colleges
- On-line and blended instruction
- Increasing cost
- Decreasing public support
- Changes in population composition
- Changes in occupational composition and career lines

Again, the Big Issues

- Faculty retirement
- Flexible careers (for women and for men)
- Academic career entry
- Tenure and "adjunctification"
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- Postdocs, age at first award
- Changes in institutional landscape