FEATURE ARTICLES

# The Impact of Uncapping of Mandatory Retirement on Postsecondary Institutions

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The Federal Age Discrimination in Employment Act passed by Congress in 1986 eliminated mandatory age-related retirement at age 70. Initially, all postsecondary institutions were exempt from the Act. Based on a report by the National Research Council (NRC), which forecast only a minimal impact of this Act on higher education, the federal government allowed the exemption to lapse; effective December 31, 1993, faculty would no longer be subject to mandatory retirement for age. Our results of an empirical analysis on nearly four decades of faculty data (from 1981 to 2009) from a large private metropolitan research university in the northeast contradicts that forecast and shows the extent to which faculty retirement behavior has changed following the enactment of the Act and the lapse of the exemption for higher education faculty. Although only 11% of faculty who were subject to mandatory retirement remained after age 70 (perhaps those with special arrangements), we find after the law changed that 60% of faculty no longer subject to mandatory retirement are expected to remain employed beyond age 70 and 15% will retire at age 80 or over. This is a dramatic shift in retirement behavior, one that was not forecast by the NRC committee. Our results also show how many years after the prior mandatory retirement age of 70, faculty now remain at their institutions. We also offer suggestions as to some of the potential reasons (consistent with the literature) why, since the change in the law, some faculty wait longer than others to retire, but we do so primarily to spur discourse, as these factors are based on our understanding of this institution. Our findings are limited to this single institution and do not imply a general trend for all postsecondary institutions. Additional studies are recommended to determine whether uncapping has had a similar effect at other postsecondary institutions.

**Keywords:** higher education; law/legal; longitudinal studies; program evaluation

The Federal Age Discrimination in Employment Act passed by Congress in 1986 eliminated mandatory age-related retirement at age 70. After a hard-fought battle, resting on the argument that "mandatory retirement was needed to maintain a steady inflow of young faculty" (Ashenfelter and Card, 2002, p. 957), and to increase opportunities for diversifying the faculty through the hiring of women and underrepresented ethnic and racial minorities, postsecondary institutions were given a temporary exemption from this Act. In particular, and as quoted by Ashenfelter and Card (2002, p. 959), the exemption stated that "nothing in this Act shall be construed to prohibit compulsory retirement of any employee who has attained 70 years of age, and who is serving under a contract of unlimited tenure (or similar arrangement providing for unlimited tenure) at an institution of higher education (as defined by Sec. 1201(a) of the Higher Education Act of 1965)." To determine whether this temporary exemption should lapse, Congress requested the National Academy of Science/National Research Council (NRC) to analyze the likely impact of uncapping mandatory retirement on higher education. The report, based on this review, and edited by Hammond and Morgan (1991), persuaded Congress to allow the exemption to expire, which it did on December 31, 1993. Accordingly, full-time tenured faculty at postsecondary institutions, which receive federal funding, would, as of December 31, 1993, be subject to the same Age Discrimination in Employment Act passed for federal institutions in 1986; they would no longer be subject to mandatory retirement for age after December 31, 1993. Under some university bylaws, including the one under study in this paper, an additional consideration allowed some faculty not to be subject to mandatory retirement even though they turned 70 before December 31, 1993. In particular, because tenure rights contractually terminate at the end of an academic year, on August 31, any full-time tenured faculty member who turned 70 on or after September 1, 1993, was not subject to the mandatory retirement rule. That is, in such cases, mandatory retirement

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Educational Researcher, Vol. 42 No. 6, pp. 338–348
DOI: 10.3102/0013189X13497993

could only be applied to those full-time tenured faculty reaching their 70th birthday on or before August 31, 1993, because those whose birthdays fell after August 31, 1993, had a contractual right to continue their tenured status beyond the statutory date of December 31, 1993.

Although the report of the NRC predicted that the uncapping of mandatory retirement at postsecondary institutions would have minimal, if any, impact on higher education, now nearly two decades after the effective date of this Act on postsecondary institutions, it is reasonable to question whether the NRC forecast was correct. Do faculty subscribe to the same pattern of retirement behavior now as they did prior to the enactment of the uncapping law? If not, how long after the prior mandatory retirement age of 70 do faculty wait before retiring?

A study by Ashenfelter and Card (2002) is relevant as it provides a comprehensive analysis of the impact of the uncapping of mandatory retirement on faculty retirement patterns using data from the Faculty Retirement Survey (FRS), collected over the time span from the mid-1980s to 1996, as well as data from the TIAA-CREF pension program from the same time period. According to their empirical findings with respect to the age at which professors retired, the uncapping of mandatory retirement law

> substantially reduced the retirement rates of 70 and 71-year-old professors. In the mandatory era, about 75 percent of faculty who reached the age of 70 retired within a year. The retirement rate of 71-year-olds was also over 60 percent. Immediately after the prohibition of mandatory retirement both rates fell to under 30 percent. These reductions have led to a marked increase in the fraction of faculty who continue working into their seventies. While before less than 10 percent of 70-year-old faculty were still working at age 72, after the prohibition, close to one-half were still teaching two years later. (p. 958)

Considering other factors that could contribute to a decision to retire, Ashenfelter and Card (2002) also found that those "with higher salaries were less likely to retire at any given age" (p. 958), and that controlling for actual salary amounts, faculty whose salary relative to others within their own institutions was higher were also less likely to retire at any given age. On the basis of this latter finding, the authors suggest that "nonpecuniary factors play a quantifiable role in retirement decisions" (p. 958).

A key limitation of the Ashenfelter and Card (2002) study, however, as noted by the authors themselves, is that the time span they studied extended only until 1996, only 3 years after the elimination of mandatory retirement. Accordingly, one may question to what extent their estimates of projected future faculty retirement rates by age hold beyond this 3-year period, especially given new retirement incentives and other factors that have been implemented since 1996. The current study is an attempt to answer that question by empirically analyzing faculty retirement data collected over a 28-year period that extends from 14 years prior to 16 years following the enactment of uncapping of mandatory retirement for postsecondary institutions. By documenting the shifts in faculty retirement patterns following uncapping of mandatory retirement and the number of years after the prior mandatory retirement age of 70 faculty wait before retiring, this study can help to provide insights as to the magnitude of the potentially adverse effects on an institution associated with the consequences of uncapping, including diminished new hiring opportunities and increased financial costs. Without growth in faculty size, "retirements provide the major opportunities for new hiring" (Clark & Hammond, 2001, p. 17), and new hiring allows universities "to revitalize teaching and research, reallocate faculty resources, reduce labor costs, and stay on the cutting edge of rapidly changing educational opportunities" (Clark & Hammond, 2001, p. 17). New hiring also allows universities to increase the gender and racial/ethnic diversity of faculty to reflect the changing demographics of doctoral recipients (Weinberg, 2008). With an increase in the retirement age, however, faculty careers lengthen, and new hiring opportunities decline. Financial costs also increase by virtue of the fact that older faculty are presumably better paid (Ehrenberg, 2000) and retirement incentive programs, which are used to encourage faculty to retire (Conley, 2007, 2009), are "very expensive" (Smith, 2001, p. 145).

## Methodology

### *The Data and Setting*

The faculty retirement data analyzed in this study are based on approximately 3,000 full-time, tenured faculty from a large private, highly selective research university located in a major metropolitan city in the northeast, collected over the time period from 1981 to 2009. In addition to having this rich set of longitudinal data, extending for over a decade on either side of 1993, because this particular university is organized around a number of different schools, each with its own set of teaching loads, average base salaries, and so on, it also provides an opportunity to explore other individual determinants that could influence a faculty member's retirement decision-making process. Taken together, the university under case study provides a highly appropriate setting for exploring a range of issues that could potentially inform policies relevant to the private university sector concerning retirement and its effect on goals central to higher education.

### *Defining Those Eligible to Retire*

The following retirement policy, called, respectively, the Rule of 70 and the Rule of 25, for this university applies to all employees, faculty included, who want to retire as a benefit-eligible retiree. An employee is eligible to retire as a benefit-eligible retiree if

- His/her age plus years of continuous, full-time service equals 70 or more and he/she is at least age 55, with at least ten years of service; or
- He/she completed ten years of continuous, full-time service as of September 1, 1991, and he/she retires with 25 years of continuous full-time service.

If the service requirement above is met but the age requirement is not met, an employee must remain in active, continuous service until the age requirement is met in order to be a benefit-eligible retiree of this university.

Faculty who retired during this time period of study who met the above criteria were given as benefit-eligible employees a continuation of medical benefits coverage and University facility usage, such as email, library, and sports facilities memberships. In the case where a faculty member was living in University housing and did not own or rent a non-University residential property, the faculty member also was allowed to continue to reside in a downsized University studio apartment. Additional monetary incentives, discussed in more detail later in this paper, also have been introduced at various times and at different schools at this University. As a result, new and additional costs relating to providing incentives to faculty to retire have become part of this University's budget in varying amounts and at varying times. As noted earlier in this article, this University is not unique in this regard in that it has "become accepted practice among institutions of higher education since the end of mandatory retirement" (Conley, 2009, p. 47) to incur such additional costs based on the introduction of retirement packages to incentivize faculty to retire earlier than they might have otherwise. Such costs, which, in general, did not exist pre-uncapping, have served to increase, by largely unreported amounts, the expenditure side of a university's post-uncapping budget.

### *Defining the Cohorts for Comparison: Cohorts A and B*

In order to compare a faculty member's probability of retiring at a given age during the time in which mandatory retirement was the rule with the probability of retiring during the time in which mandatory retirement no longer was the rule, two cohorts, labeled A and B, were defined for this study. Cohort A consists of those tenured and tenure-track faculty who worked at the University for some continuous interval within the time from when this study began (in 1981) to the time the mandatory retirement rule was repealed (in 1993). Cohort B consists of those tenured and tenure-track faculty who worked at the University for some continuous interval within the time from when the mandatory retirement rule was repealed (in 1993) to the time this study ended (2009). Because individuals can join the University at any point in the designated intervals, cohorts were defined in this manner rather than as those active in a single baseline year. In addition, Cohorts A and B are not mutually exclusive in that there are those in Cohort A who, by virtue of not retiring in 1993, continue as members of Cohort B. The underlying rationale for having defined Cohorts A and B as we have relates to the fact that we are using survival analysis to determine and compare for each age the probability that a faculty member from each group will retire.

### *Survival Analysis: The Kaplan-Meier Approach*

As noted by Singer and Willett (2003), a study must contain three methodological features in order for it to be a candidate for survival analysis: (a) a *target event*, which represents an individual's transition from one state to another; (b) a definition of the *beginning of time*, which is an initial starting point when no one under study has yet experienced the target event; and (c) a *metric for clocking time*, which is a meaningful scale in which event occurrence is recorded. In our study, a faculty member is actively employed (which we define as state 1) until he or she retires and transitions to state 2. The act of retiring is therefore the target event in this study. An individual becomes "at risk" for the retirement event upon arrival at the University. Strictly speaking, for some individuals, the rules of the University prohibit their retirement during some phase of our study (e.g., no one can retire at age 50 having just begun employment at the University). However, we wish to examine the *age* of retirement, not the time since becoming retirement eligible, so our definition of "at risk" is broadened to uncover the complete age distribution via the rate of retirement at any given age.[1] Thus, addressing the third methodological feature, age was used as the metric for clocking time as our interest is in estimating the probability distribution of retiring *by age* for each cohort and making comparisons between them. Note that individuals who leave the University without retiring are censored at the age they attained in that year (we will discuss censoring in more detail shortly).[2]

For this study, we use the Kaplan-Meier (K-M) approach to survival analysis (Kaplan & Meier, 1958; Cox & Oakes, 1984). The K-M approach allows us to take into account a potential methodological complication in our data that was not emphasized in the previous section, which is that some faculty will never experience the target event (e.g., they will leave the university for reasons other than retirement) and others will experience the target event but not within the time frame of the study (e.g., they will retire sometime after 2009). Because of this situation, it would be meaningless to simply calculate, as we might otherwise, the probability that a faculty member retires as a proportion of those who did retire at each age over those eligible to retire at each age for each year under study. As noted previously, for the purposes of this study, *eligible* is defined as currently employed at the University. Were we to have data that tracked faculty until retirement, we could compute the age-specific rates of retirement under the condition that for each age, the sample consists only of those who have not left by that age for other reasons. Because, as noted, faculty may move away, die, or leave the university before they retire, the denominator must take into account these cases with unknown outcomes during the time frame of the study by excluding them at the point they become no longer eligible to retire (i.e., they leave the university before they retire). Such cases are defined as "censored" and are considered as such by the K-M estimation approach. Censored cases also include those who have not retired by the time the study terminates (in this case, 2009), but who are still actively employed at the university. Furthermore, because we wish to capture the probability of retiring for cohorts that are subject to different mandatory retirement laws, any faculty member still active in Cohort A in 1993 is censored at that point relative to Cohort A, and enters Cohort B at risk for retirement beginning in 1994. The K-M approach is considered to be a descriptive, as opposed to modeling, technique as it is not designed to model simultaneously the effects of multiple covariates such as age, gender, race/ethnicity, and school on time to retirement. Another way to understand the K-M approach is that it is density estimation in the context of time-to-event data, in which, necessarily, one is not guaranteed to observe the event in every subject.

## Results

### *Faculty Compositional Trends Over Time*

One of the early objections to applying the 1986 amendments of the Age Discrimination in Employment Act prohibiting mandatory age-related retirement was its potentially adverse impact on the ability to diversify a faculty by gender and race/ethnicity. Table 1 provides information on the age, gender, and race/ethnic composition of the full-time tenured faculty at this university over the time frame of this study, 1981–2009.

Not unlike at other research universities, the size of the tenure track and tenured full-time faculty over this time period has increased dramatically. By 2009, the size of this faculty was nearly 50% larger than it was in 1981. Perhaps, one could argue that in addition to serving as a response to an increasing student enrollment and a desire to maintain high faculty/student ratios, such expansion in the size of the faculty was a price that had to be paid to counteract the more limited outflow of older faculty because of the uncapping rule. That is, with an aging faculty, the only way to make room for the new hiring of experts in cutting-edge and emerging fields, and to remain in the top tier of research universities, is to embark on a path of faculty expansion.

As reported by Conley (2007) and June (2012), and consistent with a national trend, the following are indications that the faculty at this university was aging over this time span: their mean age increased 6 years, from 46 to 52, the number eligible to retire increased from 232 to 519, the percentage eligible to retire increased from 22.3% to 37.5%, and the mean age at retirement increased from 63.3 years to over 70 in years 2007 and 2008, with larger numbers of faculty retiring at 75 years or older beginning in 1999, 6 years after uncapping went into effect. The concurrent expansion of the size of the faculty, at this university, also led to an increase in the diversity by gender and racial/ethnicity. Although in 1981 the percentage of male full-time faculty was 76.7%, by 2009 some progress toward diversity had been made, as that percentage was now at 64.9%. Likewise, the percentage of underrepresented minority (URM) faculty (including Native American, Asian, Black/African American, and Latino/a) increased monotonically from only 6.6% in 1981 to over 17% in 2009, representing a nearly threefold increase.

### *A Comparison of Retirement Rates by Age for Cohorts A and B*

The results of our K-M analyses comparing Cohorts A and B overall are given in column 2 of Table 2 and in Figures 1 and 2. Figures 1 and 2 include a reference axis at age 70 given the significance of age 70 for these analyses. As noted in Table 2, the number of full-time tenured and tenure track faculty in this study who together define Cohorts A and B are 4,196, with 1,907 in Cohort A and 2,288 in Cohort B. Of the 1,907 in Cohort A, 249 (or 14.1%) retired prior to 1993 and 1,658 were censored relative to the 1981–1993 time frame. That is, either they left the university but did not retire within the 1981–1993 time frame or they continued to stay at the university beyond 1993. Of the 2,289 in Cohort B, 313 (or 13.7%) retired within the 1993–2009 time frame and 1,976 were censored relative to the 1993–2009. That is, either they left the university but did not retire during the 1993–2009 time frame or they continued to stay at the university beyond the end of the study, in 2009. Note that the at-risk periods are slightly longer for Cohort B. Given our interest in age of retirement and the methodological approach, the extra time eligible to enter the cohort or to retire should not bias our estimation of the target survival density.[3]

From Table 2, we may note that the estimated median age (50th percentile) at which faculty retire in Cohort A, those who were at the university before the repeal of mandatory retirement in 1993, adjusted for the time-to-event nature of this data, is 69 years with standard error .062, whereas for faculty in Cohort B, those who were at the university after the repeal of mandatory retirement, it is 73 years with standard error .479. Given that the two 95% median confidence intervals based on these standard errors are nonoverlapping, the two medians may be said to be statistically significantly different from one another, suggesting that as one would expect, the median age of retirement, on average, is higher for those who were at the university subsequent to the repeal of mandatory retirement than for those who were at the university prior to the repeal of this ruling.

Although these medians estimate the age at which 50% of each cohort retires, somewhat more detail may be obtained by examining also the 25th and 75th percentiles. These are given in Table 2. Because percentiles in a survival distribution reflect an ordering from low age to high age, the 75th percentile is the age at which 75% of the population has yet to retire. We note from the 75th percentile that 75% of the faculty did not yet retire by the time they reached the age of 65 for Cohort A or by the time they reached the age of 68 for Cohort B, and from the 25th percentile that it is estimated that 25% of the faculty did not yet retire by the time they reached age 69 for Cohort A or by the time they reached age 78 for Cohort B (those not subject to mandatory retirement). Thus, one place in which the effects of uncapping appear to play out strongly is in the right tail of the distribution.

Finally, we may generate for each cohort, across the full time span of the study, the probability distribution of not retiring by a particular age. This can be understood mathematically as one minus the distribution function of the age of retirement density; this form of the estimate of the distribution is called a survival curve. We may use such curves to examine to what extent the distribution for each cohort shares a similar shape, and to test inferentially the chance that the two distributions come from the same population. Figure 1 gives the survival curves for the two cohorts, and the last row of Table 2 gives the results of the log-rank (Mantel-Cox) inferential test designed to test whether the two probability distributions come from the same population and, therefore, are not different from each other. According to the results of this test, we may infer that the survival curves for the two cohorts are indeed different from each other ($p < .0005$).[4]

Figure 1 suggests that of those included in Cohort A, about 11% will continue their employment past age 70. It is possible that this 11% includes those who turned 70 in the year retirement was uncapped, and thus we cannot say what would have happened to them had the law not been changed (they are censored in that year). It also is possible that this 11% includes those who were given a special arrangement, more commonly made

## Table 1
## Age, Gender, and Racial/Ethnicity Distribution by Year

| Year | Total no. of faculty | % males in total faculty | % underrepresented minority in total faculty | *M* age | *SD* age | Total no. eligible to retire | % eligible to retire of total faculty | No. of women eligible to retire of total faculty | No. of men eligible to retire of total faculty | No. of men eligible to retire of total no. eligible to retire | Total no. who retired of those eligible | % who retired of those eligible to retire | No. of men who retired of those eligible to retire | % men who retired of those eligible to retire | Retirement age (*M*) | No. aged <65 years | No. aged 65–69 years | No. aged 70–74 years | No. aged ≥75 years |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1981 | 1040 | 76.7 | 6.6 | 46.2 | 10.5 | 232 | 22.3 | 46 | 186 | 80.2 | 10 | 4.3 | 10 | 5.4 | 63.3 | 6 | 4 | 0 | 0 |
| 1982 | 1044 | 76.9 | 6.4 | 46.5 | 10.6 | 259 | 24.8 | 54 | 205 | 79.2 | 14 | 5.4 | 10 | 4.9 | 63.1 | 8 | 6 | 0 | 0 |
| 1983 | 1048 | 76.9 | 6.4 | 47.1 | 10.7 | 279 | 26.6 | 57 | 222 | 79.6 | 9 | 3.2 | 9 | 4.1 | 64.8 | 2 | 5 | 2 | 0 |
| 1984 | 1066 | 76.3 | 6.3 | 47.2 | 10.9 | 305 | 28.6 | 64 | 241 | 79.0 | 16 | 5.2 | 9 | 3.7 | 65.5 | 6 | 4 | 5 | 0 |
| 1985 | 1085 | 76.3 | 6.6 | 47.5 | 11.0 | 326 | 30.0 | 67 | 259 | 79.4 | 22 | 6.7 | 14 | 5.4 | 66.4 | 5 | 8 | 7 | 0 |
| 1986 | 1098 | 76.1 | 7.1 | 47.5 | 11.0 | 324 | 29.5 | 62 | 262 | 80.9 | 21 | 6.5 | 16 | 6.1 | 64.4 | 7 | 7 | 5 | 0 |
| 1987 | 1096 | 76.1 | 7.2 | 47.9 | 11.0 | 324 | 29.6 | 58 | 266 | 82.1 | 25 | 7.7 | 22 | 8.3 | 64.6 | 7 | 4 | 10 | 0 |
| 1988 | 1091 | 75.4 | 8.4 | 48.1 | 11.0 | 319 | 29.2 | 56 | 263 | 82.4 | 22 | 6.9 | 16 | 6.1 | 66.6 | 5 | 5 | 10 | 0 |
| 1989 | 1107 | 74.6 | 9.6 | 48.2 | 11.1 | 328 | 29.6 | 58 | 270 | 82.3 | 13 | 4.0 | 12 | 4.4 | 67.8 | 2 | 2 | 6 | 0 |
| 1990 | 1131 | 74.3 | 10.5 | 48.3 | 11.1 | 344 | 30.4 | 64 | 280 | 81.4 | 26 | 7.6 | 22 | 7.9 | 66.8 | 6 | 6 | 12 | 0 |
| 1991 | 1113 | 73.6 | 11.0 | 48.6 | 10.9 | 338 | 30.4 | 67 | 271 | 80.2 | 20 | 5.9 | 15 | 5.5 | 67.8 | 4 | 2 | 14 | 0 |
| 1992 | 1121 | 73.4 | 11.1 | 48.7 | 10.9 | 349 | 31.1 | 67 | 282 | 80.8 | 18 | 5.2 | 14 | 5.0 | 67 | 5 | 5 | 9 | 0 |
| 1993 | 1108 | 73.2 | 11.5 | 49.2 | 10.8 | 354 | 31.9 | 69 | 285 | 80.5 | 9 | 2.5 | 6 | 2.1 | 66.9 | 1 | 7 | 1 | 0 |
| 1994 | 1132 | 72.2 | 12.1 | 49.3 | 11.0 | 361 | 31.9 | 69 | 292 | 80.9 | 14 | 3.9 | 11 | 3.8 | 64.5 | 5 | 6 | 1 | 0 |
| 1995 | 1153 | 71.7 | 12.8 | 49.7 | 11.0 | 378 | 32.8 | 74 | 304 | 80.4 | 21 | 5.6 | 16 | 5.3 | 66.4 | 6 | 9 | 6 | 0 |
| 1996 | 1147 | 70.6 | 13.3 | 49.9 | 11.1 | 387 | 33.7 | 75 | 312 | 80.6 | 11 | 2.8 | 10 | 3.2 | 65.2 | 6 | 1 | 4 | 0 |
| 1997 | 1176 | 70.2 | 14.0 | 50.3 | 11.2 | 407 | 34.6 | 82 | 325 | 79.9 | 13 | 3.2 | 13 | 4.0 | 66.9 | 4 | 4 | 5 | 0 |
| 1998 | 1183 | 69.9 | 15.1 | 50.5 | 11.5 | 421 | 35.6 | 91 | 330 | 78.4 | 12 | 2.9 | 11 | 3.3 | 67.7 | 3 | 4 | 5 | 0 |
| 1999 | 1214 | 69.6 | 15.3 | 50.7 | 11.6 | 437 | 36.0 | 98 | 339 | 77.6 | 14 | 3.2 | 12 | 3.5 | 66.3 | 4 | 4 | 4 | 1 |
| 2000 | 1245 | 69.7 | 15.4 | 50.7 | 11.8 | 438 | 35.2 | 105 | 333 | 76.0 | 19 | 4.3 | 12 | 3.6 | 67.6 | 5 | 4 | 5 | 3 |
| 2001 | 1277 | 68.9 | 15.8 | 51.0 | 11.9 | 456 | 35.7 | 112 | 344 | 75.4 | 25 | 5.5 | 22 | 6.4 | 67.3 | 6 | 8 | 5 | 2 |
| 2002 | 1296 | 68.3 | 15.3 | 51.0 | 12.0 | 465 | 35.9 | 114 | 351 | 75.5 | 23 | 4.9 | 17 | 4.8 | 67.8 | 6 | 8 | 4 | 3 |
| 2003 | 1303 | 67.3 | 16.0 | 51.3 | 12.0 | 462 | 35.5 | 113 | 349 | 75.5 | 18 | 3.9 | 8 | 2.3 | 64.9 | 8 | 6 | 2 | 1 |
| 2004 | 1308 | 67.4 | 16.1 | 51.5 | 12.2 | 475 | 36.3 | 120 | 355 | 74.7 | 19 | 4.0 | 14 | 3.9 | 69.4 | 3 | 3 | 5 | 5 |
| 2005 | 1331 | 66.4 | 17.0 | 51.7 | 12.3 | 482 | 36.2 | 124 | 358 | 74.3 | 24 | 5.0 | 18 | 5.0 | 70.2 | 4 | 5 | 9 | 5 |
| 2006 | 1380 | 66.2 | 17.8 | 51.4 | 12.5 | 498 | 36.1 | 132 | 366 | 73.5 | 25 | 5.0 | 17 | 4.6 | 66.8 | 7 | 6 | 2 | 5 |
| 2007 | 1381 | 65.3 | 17.6 | 51.7 | 12.5 | 493 | 35.7 | 134 | 359 | 72.8 | 19 | 3.9 | 14 | 3.9 | 71.9 | 4 | 2 | 2 | 3 |
| 2008 | 1410 | 64.8 | 17.3 | 51.8 | 12.7 | 511 | 36.2 | 144 | 367 | 71.8 | 32 | 6.3 | 19 | 5.2 | 70.3 | 5 | 10 | 10 | 9 |
| 2009 | 1385 | 64.9 | 17.3 | 52.1 | 12.6 | 519 | 37.5 | 148 | 371 | 71.5 | 5 | 1.0 | 4 | 1.1 | 66.4 | 2 | 2 | 1 | 4 |

Table 2
Cohort A and B Retirement Age Distribution Comparisons by Overall, Gender, and URM

| | Overall | Males | Females | Non-URM | URM |
|---|---|---|---|---|---|
| Cohort A | | | | | |
| Total *n* | 1,907 | 1,371 | 536 | 1,684 | 217 |
| 25th percentile | 69 (0.062) | 69 (0.066) | 69 (0.167) | 69 (0.063) | 69 (–) |
| 50th percentile | 69 (0.062) | 69 (0.066) | 68 (0.315) | 69 (0.063) | 69 (–) |
| 75th percentile | 65 (0.394) | 65 (0.453) | 65 (0.561) | 65 (0.410) | 64 (0.608) |
| Cohort B | | | | | |
| Total *n* | 2,288 | 1,532 | 756 | 1,722 | 364 |
| 25th percentile | 78 (0.824) | 78 (1.033) | 77 (0.997) | 78 (0.900) | 69 (0.062) |
| 50th percentile | 73 (0.479) | 73 (0.531) | 73 (0.980) | 73 (0.478) | 69 (0.062) |
| 75th percentile | 68 (0.467) | 68 (0.505) | 67 (0.984) | 68 (0.475) | 65 (0.394) |
| Log-rank test | 88.72 ($p$ = .000) | 77.31 ($p$ = .000) | 13.60 ($p$ = .000) | 77.47 ($p$ = .000) | 16.94 ($p$ = .000) |

*Note.* Values within parentheses are standard errors. Dashes indicate that the standard error is not estimable. URM = underrepresented minority.

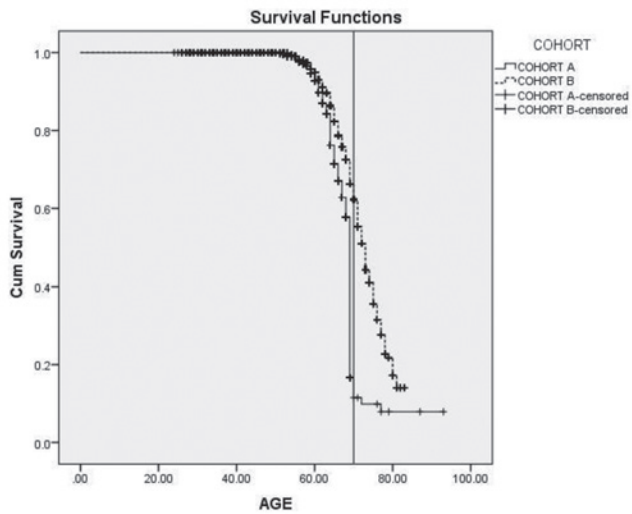


FIGURE 1. *Cumulative survival curves by age for Cohorts A and B*

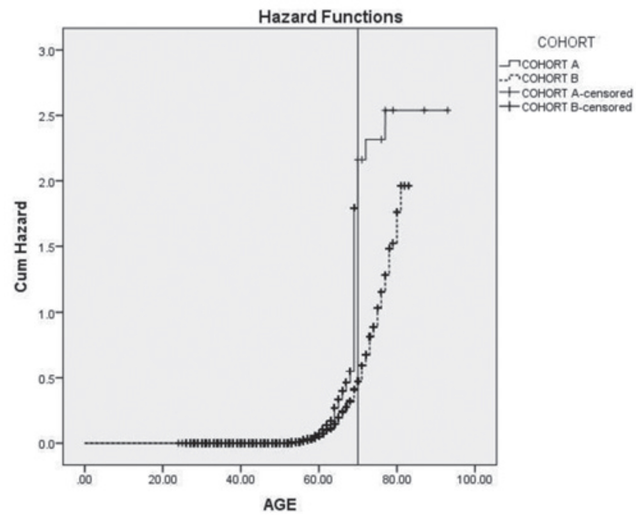


FIGURE 2. *Cumulative hazard risk curves by age for Cohorts A and B*

with those who held an administrative position. By contrast, in Cohort B, 60% are expected to remain employed beyond age 70. For Cohort B, the K-M curves also estimate that 15% of faculty who were working at the university during the interval 1993–2009, after the repeal, will retire at age 80 or over.

In addition to survival curves, we may assess the risk of retiring for each age through the use of a cumulative hazard function, depicted in Figure 2. The hazard can be understood as the risk of the event given that it has yet to occur, analogous to a conditional probability but evaluated continuously for any age greater than zero.[5] Cumulative hazard is a measure of cumulative risk, analogous to the cumulative probability of the event occurring within the interval.[6] When the cumulative hazard is large, the probability of survival is small.[7] The cumulative hazard for each age depicted in Figure 2 is a measure of the risk that a faculty member will retire by that age. Because survival relates to staying and hazard to retiring, they are complementary concepts. As such, in concert with the precipitous drop in survival (in Figure 1) at the approximate age of 69 for Cohort A as compared to Cohort B, which shows a more gradual decrease in survival around that age, there is, similarly, a precipitous rise in the hazard or risk of retiring at age 69 for Cohort A. Cohort B displays a more gradually increasing hazard curve from that point forward.

### *Considering Other Covariates in the Comparison of Cohort A and B Retirement Rates by Age*

The results presented in the previous section indicate an overall statistically significant difference in the survival curves for Cohorts A and B and, as such, suggest that the repeal of the mandatory retirement law in 1993 has had a measurable impact on the retirement age of faculty. To determine whether this impact varies by gender, race/ethnicity, and school in which a faculty has his/her primary appointment, a number of additional analyses were conducted making use of the K-M approach and

**Table 3**
**Cohort A and B Retirement Age Distribution Comparisons by Five Largest Schools**

| | School 1 | School 2 | School 3 | School 4 | School 5 |
|---|---|---|---|---|---|
| Cohort A | | | | | |
| Total *n* | 786 | 290 | 324 | 186 | 108 |
| 25th percentile | 69 (0.078) | 69 (0.127) | 69 (0.162) | 70 (–) | 69 (0.887) |
| 50th percentile | 69 (0.078) | 65 (0.849) | 69 (0.162) | 69 (0.280) | 69 (0.887) |
| 75th percentile | 66 (0.747) | 62 (0.655) | 68 (0.929) | 64 (0.865) | 66 (1.48) |
| Cohort B | | | | | |
| Total *n* | 1,086 | 309 | 310 | 186 | 146 |
| 25th percentile | 81 (–) | 75 (0.928) | 73 (0.909) | 80 (2.53) | 78 (2.41) |
| 50th percentile | 73 (0.809) | 70 (0.712) | 70 (1.15) | 74 (1.72) | 74 (1.11) |
| 75th percentile | 69 (0.761) | 65 (0.834) | 65 (1.28) | 68 (1.83) | 70 (2.32) |
| Log-rank test | 45.33 ($p < .001$) | 28.38 ($p < .001$) | 1.41 ($p = 1.000$) | 6.27 ($p = .060$) | 4.28 ($p = .195$) |

*Note.* Values within parentheses are standard errors. Dashes indicate that the standard error is not estimable.

estimating survival and hazard curves by strata. In these analyses, strata were defined in turn by gender, race/ethnicity as denoted by the two categories, non-URM (Caucasian) versus URM (Native American, Asian, Black/African American, and Latino/a), and school in which a faculty has his/her primary appointment. Only the five largest schools in the university were included, those with more than 100 full-time tenure-track or tenured faculty in both Cohorts A and B.

The results of the K-M analysis by gender are given in columns 3 and 4 of Table 2.[8] Based on the log-rank test given in Table 2, one may conclude that controlling for gender, a clear cohort difference remains. Said differently, no matter which gender one considers, we obtain a cohort effect similar to the overall effect discussed in the previous section; namely, regardless of gender, those in Cohort B retire at an older age than in Cohort A. Furthermore, because as shown in Table 2, the retirement ages represented by the 25th, 50th, and 75th percentiles within each cohort are quite close (e.g., males and females in Cohort A are indistinguishable as they are in Cohort B), one may infer that both before and after the repeal of mandatory retirement, men and women take comparably similar actions with respect to their age of retirement. For both females and males, there is a precipitous drop in survival at approximately 69 years for Cohort A and a more gradual decrease in survival for Cohort B that extends beyond Cohort A's precipitous drop. K-M survival analyses also were carried out to compare males and females under each cohort condition separately, and differences between genders within each cohort were all nonsignificant, further substantiating that retirement behavior for males and females is not different under either the mandatory retirement or uncapping scenario.

Results of the analysis by race/ethnicity as measured by URM (non-URM = Caucasian; URM = non-Caucasian) are given also in Table 2 in columns 5 and 6. Analogous to our results by gender, results by race/ethnicity also suggest that controlling for race/ethnicity, a clear *cohort* difference remains, and that the cohort differences do not vary as a function of race/ethnicity. For both non-URM and URM groups, the cohort differences are similar, showing, in general, an increase in the age of retirement for those in Cohort B relative to Cohort A.

Our final comparisons control for school and, in particular, the five largest schools at the university as defined previously. We chose only schools with samples greater than 100 so that we would have a power of 80% to detect a large effect (hazard ratio of 2, roughly understood as twice the odds of the event in very short time intervals) with an initial alpha level of 0.05, Bonferroni-corrected (see Collett, 1994). Because each school at the university has its own culture, with different average teaching loads, salaries, and retirement package incentives, differences that emerge have the potential to inform whether such factors, taken collectively, influence the age at which a faculty member retires in this post-uncapping era.

Results with respect to school appear in Table 3. A Bonferroni-adjusted alpha level was applied to these analyses to guard against an inflated Type I error that could result from making multiple comparisons (among the five schools) following the overall significant difference between Cohorts A and B with all schools combined. Results from these Bonferroni-adjusted analyses suggest a clear statistically significant difference between the retirement behaviors of Cohorts A and B for Schools 1 and 2, but not for the remaining three, Schools, 3, 4, and 5. It should be noted that Schools 1 and 2, combined, contain two thirds of the total faculty in the five schools under consideration and contain 60% of the faculty in the University overall.

A follow-up analysis considered whether *within each cohort*, Schools 1 and 2 differed significantly from each other with respect to their patterns of retirement by age. According to Table 4, log-rank test results suggest that Schools 1 and 2 do in fact differ significantly from one another in terms of their patterns of retirement by age ($p < .001$) in both periods. We may note that prior to uncapping, the median age for retirement at School 2 was, at 65, 4 years younger than the median retirement age of 69 at School 1. Following uncapping, we note an equal increase of 4 years in the median age of retirement for both schools. For School 1, the median age of retirement following uncapping is 73 and for School 2 it is 69. When we compare the right tails of these distributions (the 25th as opposed to the 50th percentiles), however, we notice a more dramatic change in their pattern of retirement by age relative to each other. Before uncapping, the

**Table 4**
**School 1 and 2 Retirement Age Distribution Comparisons by Cohort**

| | Cohort A | Cohort B |
|---|---|---|
| School 1 | | |
| Total *n* | 786 | 1,086 |
| 25th percentile | 69 (0.078) | 81 (–) |
| 50th percentile | 69 (0.078) | 73 (0.809) |
| 75th percentile | 66 (0.684) | 69 (0.761) |
| School 2 | | |
| Total *n* | 290 | 309 |
| 25th percentile | 69 (0.184) | 75 (0.929) |
| 50th percentile | 65 (0.871) | 69 (0.704) |
| 75th percentile | 61 (0.817) | 65 (0.837) |
| Log-rank test | 47.75 ($p$ = 0.000) | 19.92 ($p$ = 0.000) |

*Note.* Values within parentheses are standard errors. Dashes indicate that the standard error is not estimable.

age at which the top 25 percent retire is 69 years for both schools; following uncapping, this figure jumps to 81 years for School 1 and to 75 years for School 2, suggesting that differences in the cultural factors present at each school are likely contributors to the retirement behavior differences observed between schools.

## Discussion

Our results, based on a series of K-M life events analyses on data from more than 1,000 faculty collected over a 28-year time frame contradict the predictions of the 1996 National Academy of Sciences report that uncapping of mandatory retirement at postsecondary institutions would have minimal, if any, impact on higher education. By contrast, our results support the projections of Ashenfelter and Card (2002) based on data that extended to only 3 years after the elimination of mandatory retirement. Like Ashenfelter and Card (2002), we find marked changes in the retirement behavior of faculty following uncapping, especially in the right tail of the age distribution. In particular, using the K-M method, we estimate that for faculty who were actively employed prior to uncapping, 25% did not yet retire by the time they reached age 69, yet for those actively employed post-uncapping, during the interval from 1993 to 2009, we estimate that 25% did not yet retire by the time they reached age 78 and that 15% will retire at age 80 or over. We find also that considered separately, men and women were not distinguishable from each other in terms of the age at which they chose to retire, and likewise for race/ethnicity defined in terms of URM versus non-URM faculty. Interesting differences emerged with respect to the school in which a faculty member has primary affiliation. In particular, of the largest five schools at this university, only two had retirement age distributions post-uncapping that were significantly different from those prior to uncapping. For School 1, the more extreme case, the median age of retiring shifted upward post-uncapping by approximately 5 years and the retirement age at the 25th percentile shifted upward post-uncapping by more than 10 years. The retirement age distributions post-uncapping for the remaining three schools were not significantly different from what they were before uncapping once we control for multiple comparisons.

Several school-specific reasons may be proposed to explain why the pre- and post-uncapping retirement age distributions were not significantly different for three of the schools but were markedly and statistically significantly different for two of the schools. The three schools in question are all highly esteemed professional schools with strong ties to their high-paying fields of professional practice As such, faculty in these three schools are afforded many opportunities to engage in external consulting and in other forms of affiliation with the practice side of their health care, legal, or business professions. As a result, in addition to having the capacity to increase their compensation beyond their base salaries while actively employed as faculty members, faculty in these three schools have opportunities for gainful employment following retirement. The situation at the other two schools is quite different. Faculty in these two schools collectively have expertise in the humanities, arts, natural, physical, and social sciences, and education, areas that do not link well to independent, highly paid professional practice and, as such, would have far fewer prospects for increasing their earnings beyond what their retirement plans would provide. Because average salaries at these two schools are also substantially lower than those at the other three schools, it is likely that the amounts set aside in the retirement plans of faculty at the two schools are lower than those of faculty at the three better-paying schools, adding another reason why faculty at the two schools perhaps chose not to retire by the age of 70 following uncapping. Although Ashenfelter and Card (2002) noted in their study that faculty with higher salaries were less likely to retire at any given age, they also noted that controlling for actual salary amounts, faculty whose salary relative to others within their own institutions was higher also were less likely to retire at any given age. Because the schools at this University act in many ways autonomously of one another, "within their own institutions" may be viewed, in this study, to mean within their own schools. It is beyond the scope of this study to analyze within school retirement patterns relative to different salary levels. With respect to our schoolwide aggregate analysis, however, it appears that for faculty in the three professional schools, whose retirement behavior was not different post-uncapping from what it was pre-uncapping, the opportunities for increased compensation from connections with the practice side of their fields may serve to offset the fact of having an overall higher salary than the other schools at this University as a reason not to retire.

As noted earlier in this article, following the enforcement of the uncapping rule, this University has, as have other universities (Conley, 2007, 2009), created financial and other incentives to encourage faculty to retire at an appropriate time. In most cases at this University, such incentives are individually negotiated with the exception of one school, which is in the set of three schools identified as unaffected by uncapping. In this school, there is a uniform policy in place that treats faculty consistently and gives each a cash payment equal to a percentage of their base salary on retirement. Negotiated agreements in the other two of the three schools have been too infrequent to establish a pattern.

By contrast, agreements in Schools 1 and 2 have been frequent, although individually negotiated to adjust to the needs of the individual. For some, cash payments are given at the time of retirement, for others it may be a year's leave with pay, and for still others, there is a period of reduced service and pay prior to retirement. That two schools, within the set of three, infrequently have used such incentives, yet their faculty continue to retire under post-uncapping at the same rates by age as they did under pre-uncapping, suggests that such financial and other incentives may be needed differentially depending upon other circumstances in place, such as those discussed earlier in this section.

Without as many opportunities (as the faculty from the set of three schools) for external consulting and other gainful employment following retirement, we propose two reasons for why the probability of retiring at an older age is greater in School 1 than in School 2 under both pre- and post-uncapping. Faculty at School 1 earn higher salaries, on average, than faculty at School 2, and their later retirement ages may relate to Ashenfelter and Card's (2002) observation in their study that faculty with higher salaries were less likely to retire at any given age. The second explanation, a nonpecuniary one, may relate to what June (2012) in *The Chronicle of Higher Education* labels as a problem that "is more pronounced at some places, particularly at elite research institutions like Cornell, where professors often have particular freedom to shape their academic pursuits to fit their interests. At other kinds of institutions where the workload isn't as flexible, studies have shown, faculty members are more inclined to retire" (p. 2). In School 1, an expected senior faculty member's full-year teaching load consists typically of two courses, whereas in School 2, it consists typically of four courses. Furthermore, the greater availability of graders and teaching assistants in School 1 than in School 2 increases the flexibility of those in School 1 relative to School 2 by reducing substantially the daily workload associated with teaching in School 1 than in School 2. As June (2012) suggests, these results support the idea that a more onerous set of daily teaching responsibilities may, in fact, persuade an individual to retire sooner rather than later, all things being equal.

Widespread evidence for the aging of the college professoriate also has been reported by June (2012). "According to data from the Bureau of Labor, the number of professors ages 65 and up has more than doubled between 2000 and 2011. At some institutions, including Cornell, more than one in three tenured or tenure-track professors are now 60 or older. At many others—including Duke and George Mason Universities and the Universities of North Carolina at Chapel Hill, Texas at Austin, and Virginia—at least one in four are 60 or older" (June, 2012, p. 1). At the institution under study in this article, from the perspective of retirement eligibility, we find similar results. In particular, and as noted in Table 1, in 1981 one in 4.5 (22.3%) tenured or tenure-track professors were eligible to retire, yet in 2009, that number jumped to approximately one in 2.5 (37.5%).

In addition to the potential of an aging faculty, and as noted earlier in this article, one of the other early objections to repealing the uncapping ruling was its potential negative impact on the ability of a university to diversify its faculty by gender and race. That this University began to witness an aging faculty following uncapping is amply represented in Table 1. According to Table 1, the percentage eligible to retire had increased from 22.3% in 1981 to 37.5% in 2009; the mean age at retirement increased from 63.3 years to over 70 years in 2007 and 2008, with larger numbers of faculty retiring at 75 years or older beginning in 1999, 6 years after uncapping went into effect. In order to continue to represent cutting-edge and emerging fields and remain competitive as a top-tier research university in the face of such aging, this university embarked on a path of faculty expansion. By 2009, the full-time tenure track and tenured faculty was 50% larger than it was in 1981. With this expansion, diversification by gender and race/ethnicity also increased. Although in 1981 the percentage of male tenure track and tenured full-time faculty was 76.7%, by 2009 that percentage had decreased to 64.9%. Likewise, the percentage of underrepresented minority (URM) faculty increased monotonically from 6.6% in 1981 to over 17% in 2009, representing a nearly threefold increase. Thus, for this University at least, expanding the faculty served to achieve a number of its goals,[9] including its ability to counteract the potential negative effects of uncapping on faculty diversity.

For some time now, concerns about the rising costs of higher education and the factors that contribute to it have been the focus of many articles, books, and reports. In one report, it is stated that with respect to tuition increases, "private colleges have continued to become less affordable when compared to median household income" and that "four-year private college tuition and fees increased 31 percent in the 5 years ending in academic year 1999-2000, a faster rate than median household income and the CPI" (United States General Accounting Office Health, Education, and Human Services Division, 198R, September 26, 2000, p. 2). The book by Archibald and Feldman (2011) analyzes reasons why college tuition and the cost of attendance have exceeded overall inflation over the past century, accelerating in recent years. Included in their list of reasons are increases in financial aid budgets and the pace and type of technological progress, which they argue serve not to reduce costs as in other industries but to increase them through the need for colleges to provide technologically advanced resources for faculty research and cutting-edge curricula for student learning. Among these reasons and others, future research should begin to question to what extent the cost of college attendance has been impacted by the uncapping of mandatory retirement in 1993. In particular, and as noted earlier in this article, in the face of an aging faculty, it would be worth exploring the extent to which programs that encourage faculty to retire through cash payments and other financial incentives contribute to materially increasing a university's operating budget and, in turn, to the spiraling cost of tuition and attending college.

Our findings are limited to this single institution and do not imply a general trend for all postsecondary institutions. Echoing the recommendation of Clark and Hammond (2001), "in order to understand the full impact of the end of mandatory retirement and faculty aging on colleges and universities, better data is needed both for the academic labor market and individual institutions" (p. 18). Accordingly, it would be interesting to compare our findings with data from other postsecondary institutions. We also recommend, as does Conley (2009, p. 48), that further studies at this university and other postsecondary institutions include the analysis of "data related to retirement planning" so that we may determine the effectiveness of the variety of existing post-uncapping policies, programs, and practices on turnover rates. A detailed description of the variety of such policies, programs, and practices may be found in a report by Ehrenberg (2000) based on a survey administered to a large national sample of colleges and universities. From a broader perspective, new studies also should consider overarching factors such as longer life spans and macro-economic and stock market cycles to see how they may correlate with differences in the probability of retiring at a given age.[10] Finally, consideration should be given to developing programs to encourage senior faculty who are not otherwise as fully engaged in research and grant-writing as they were in earlier years to focus their activities on classroom teaching, advising undergraduates and graduates, and mentoring junior faculty. These efforts may not only serve to avoid or reduce the costs of preretirement packages but also may serve to meet the increased demands for improved teaching, advising, and mentoring without having to hire additional faculty or otherwise expend additional resources.

## NOTES

[1]To see how retirement eligibility is not useful for determining the age distribution, consider the case of a "prodigy" who completes her PhD at age 20 in 1980, begins working at the University, and thus under the second rule could retire at age 45 in 2005. If she retires, the rate of *retirement-eligible* faculty retiring at age 45 is probably 100%, because she is the only one, but clearly the overall rate of retirement at age 45 is quite low. It is the latter that provides us with the information needed to reconstruct the distribution of ages at which faculty retire.

[2]An alternative, competing risks approach could be used with these data; there are at least two ways other than retirement that employment may be terminated: denial of tenure and employee resignation. However, the questions addressed by this type of approach were not central to this study. Scott and Kennedy (2005) describe situations in education research in which questions addressed by a competing risks approach are central to the study.

[3]The K-M procedure is designed specifically to address this. Observing the faculty for slightly longer after uncapping allows more of the cohort to retire, compensating somewhat for prolonged employment trends under uncapping.

[4]We use the log-rank test statistic as it weighs all portions of the distribution equally and is not sensitive to extensive censoring, as the alternative, Breslow test, is known to be (Cox, 1972; Mantel, 1966; Tarone & Ware, 1977).

[5]Realistically, age of retirement has support in the range 55–90, although there may be highly extreme exceptions.

[6]Technically, cumulative hazard is the integral from start to current time, of the hazard function, which tracks the instantaneous event rate. Hazard and cumulative hazard may exceed 1 in the continuous case.

[7]In fact, if $H(t)$ represents the cumulative hazard at age $t$, the survivor function $S(t) = \exp(-H(t))$. From this formula it is clear that large $H(t)$ implies small $S(t)$; in our application, the retirement event is likely to have occurred.

[8]Because the information presented in Tables 2 through 4 contain all relevant information, for brevity, additional figures, analogous to Figures 1 and 2, have not been included. The interested reader may request these figures from the first author.

[9]With an increasing student body, expanding the faculty served to maintain its student–faculty ratio in a nationally competitive environment. In addition, as per national labor market trends, with the increasing numbers of minorities and women who were graduating with doctorates from U.S. institutions over this time period (Weinberg, 2008), the pool of applicants was becoming more diverse, enabling the University to increase its progress toward inclusion through faculty expansion. It also should be noted that the perhaps unique ability of this University to embark on a program of faculty expansion was achieved, in large part, through major funding approved by its Board of Trustees.

[10]We note that both periods examined in this study included several national recessions, although the timing was not exactly parallel.

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Manuscript received July 24, 2012
Revisions received November 19, 2012, and June 24, 2013
Accepted June 24, 2013