To Retire or Not?

Retirement Policy and Practice in Higher Education

Edited by
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Chapter 2
Faculty Retirement at Three North Carolina Universities

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The educational community has been concerned about the changing state of the academic labor market for some time. One concern is the projection that the demand for faculty will level off and then begin to decline. This projected decline in the total demand for professors is the result of a reduction in the growth of the college-age population and technological innovation in instructional methods such as the shift from the traditional classroom lecture to computer-assisted learning. More recently, questions regarding changes in the age composition of university faculties have emerged as a serious issue facing many colleges and universities. Improvements in health and longevity combined with amendments to the Age Discrimination in Employment Act (ADEA) may further reduce already low retirement rates among older faculty and limit the employment prospects of new Ph.Ds.

When ADEA was first passed in 1967, it prohibited the use of mandatory retirement prior to the age of 65. Amendments enacted in 1978 raised the permissible age for mandatory retirement to 70; however, an exemption for higher education postponed the effective date of this change to July 1, 1982. In 1986, further amendments to ADEA eliminated the use of mandatory retirement at any age; however, once again the effective date for higher education was delayed until January 1, 1994.[1] Thus, since 1994, U.S. colleges and universities have not been permitted to require faculty members to retire at any specified age. The elimination of mandatory retirement, along with other changes in the academic labor market, could result in an increase in the proportion of scholars in their late sixties and seventies remaining on the job.

Later retirement ages for faculty members have important implications for the financial status of the institutions and the long run quality of fac-

ulty research and teaching. Since older, more experienced faculty are typically paid substantially more than newly hired assistant professors, later retirement which postpones the transition from older to younger faculty will generally be associated with increases in costs to universities. Moreover, older faculty nearing the end of their careers are not perfect substitutes for younger faculty in relation to research, teaching, university service, and interaction with students. To fulfill its educational mission, a vibrant university needs a mix of faculty at various ages. Delayed retirement may adversely alter the desired age composition of faculty. The impact on the hiring of young scholars could be particularly important at a time when total demand for university faculty is declining. Meanwhile, the number of new doctorates earned continues to rise, reaching over 42,000 per year in the 1990s.

Many factors influence a professor's retirement decision, including workload requirements of the academic position, pension benefits, health status, financial obligations, alternative opportunities for research, and the appeal of travel and other leisure-time activities. Continuing in the classroom or the laboratory past the customary age of 65 or 70, however, is a option newly available to the current cohort of older faculty. Relatively little evidence is currently available to indicate how retirement behavior has changed in response to the elimination of mandatory retirement. Analysis of retirement ages at three North Carolina universities (Duke University, North Carolina State University, and University of North Carolina) since 1988 indicates an aging of the faculties and a reduction in the probability of retiring at ages 69 and 70.

During the past decade, the faculties of Duke University, North Carolina State University (NCSU), and the University of North Carolina (UNC) have been aging rapidly. Between 1988 and 1997, the mean age of the combined faculties increased from 46.5 to 49.0 years of age, an increase of more than two years in age over a nine-year period. Figure 1 shows the increase in the average age of the faculty each of the three universities. During this same period, the proportion of the combined faculties at the three universities less than 40 years of age decreased from 27.4 to 17.9 percent, while the proportion of the faculties 55 years and older rose from 23.7 to 29.2 percent. Each of these aging measures indicates that there have been increases in the relative number of older professors and a decline in the proportion of younger entry level faculty members.

The aging of the faculties is the result of lower rates of hiring of new faculty, relatively low quit rates, and much lower retirement rates. Each of these factors have contributed to an increase in the proportion of the faculties composed of older persons. This dramatic aging of the professorate at the triangle universities is consistent with national trends in the academy, and have raised many questions among academic administrators. Specific concerns include further delays in retirement due to the ending of mandatory retirement, the higher cost associated with more senior professors, the re-

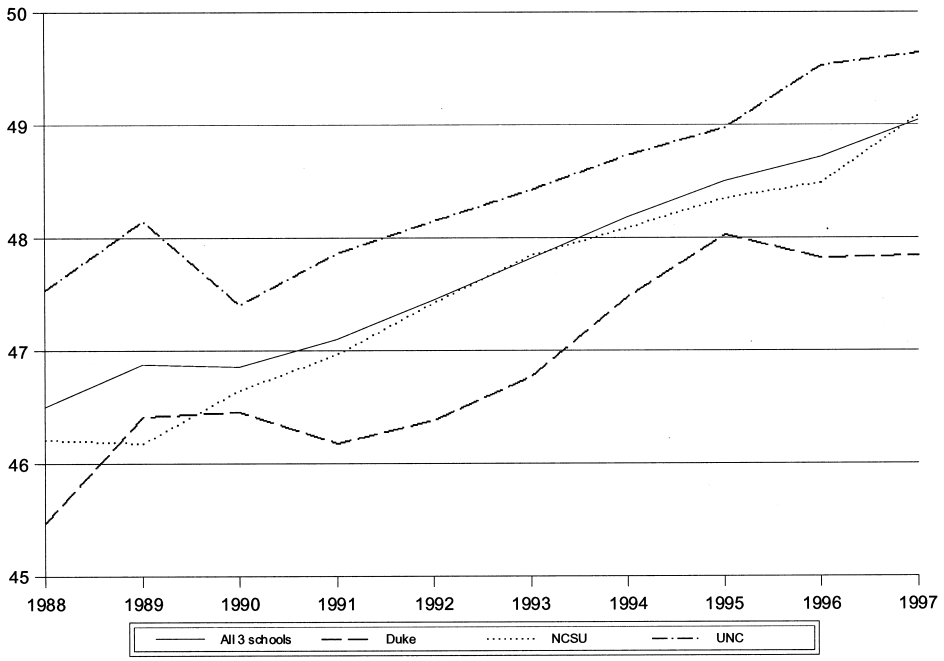

Figure 1. Mean age of faculty, 1988–97. Source: Authors' calculations based on employment records provided by Duke University, North Carolina State University, and the University of North Carolina.

duced ability to hire new Ph.D.s into entry level positions, and the potential for some older professors to remain past their most productive years. This analysis seeks to document the aging of the faculties of the three universities, to examine the prospects for further aging, and to determine the impact of the ending of mandatory retirement on retirement rates and hence the age structure of the faculty.

Faculty Age Structure

The age structure of a university faculty at a point in time depends on an initial age structure in an earlier year, age-specific hiring rates, and age-specific exit rates including quits, retirements, and deaths. In large measure, the current age structure and the recent aging of faculties reflect hiring patterns in the 1960s and 1970s, along with the rather low quit and retirement rates associated with the current state of the academic labor market. The elimination of mandatory retirement at age 70 has exacerbated this aging process by increasing the expected age of retirement.

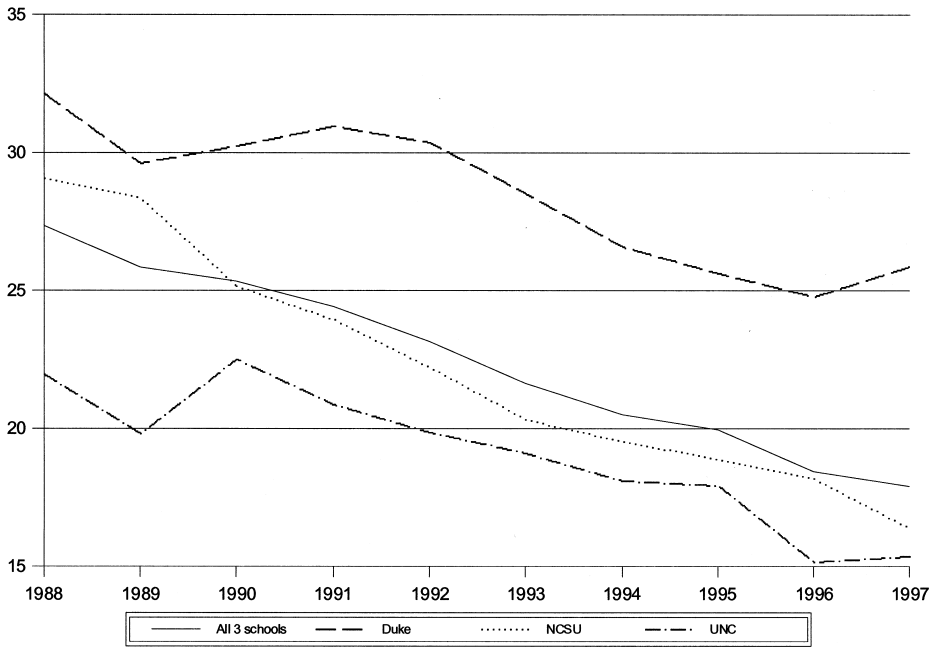

Figure 2. Percent of faculty under age 40, 1988–97. Source: Authors' calculations based on employment records provided by Duke University, North Carolina State University, and the University of North Carolina.

To examine the age structure of the faculties, employment records for the three universities were obtained for the years 1988 to 1997, the data are for tenure-track faculty members not in medical schools. The employment records include information on the date of birth and the date of first employment. This information enables us to calculate age and length of service for each person at each university. Figures 2 and 3 show the dramatic aging of these faculties as reflected in the proportion of the total faculty less than age 40 and the proportion age 55 and older. In each of the universities, the proportion of faculty less than age 40 decline by over 6 percentage points in seven years while the proportion age 55 and over increases between 3.8 and 8.0 percentage points. NCSU has the largest decline in young faculty and the smallest increase in older faculty among the three universities. The age structure for the combined faculties between 1988 and 1997 is shown in Table 1 while the faculty age structure for the three universities separately is presented in Appendix Tables A1–A3.

Duke University. There were 610 faculty employed at Duke University in 1988. The faculty increased to 656 in 1991 and remained relatively stable in

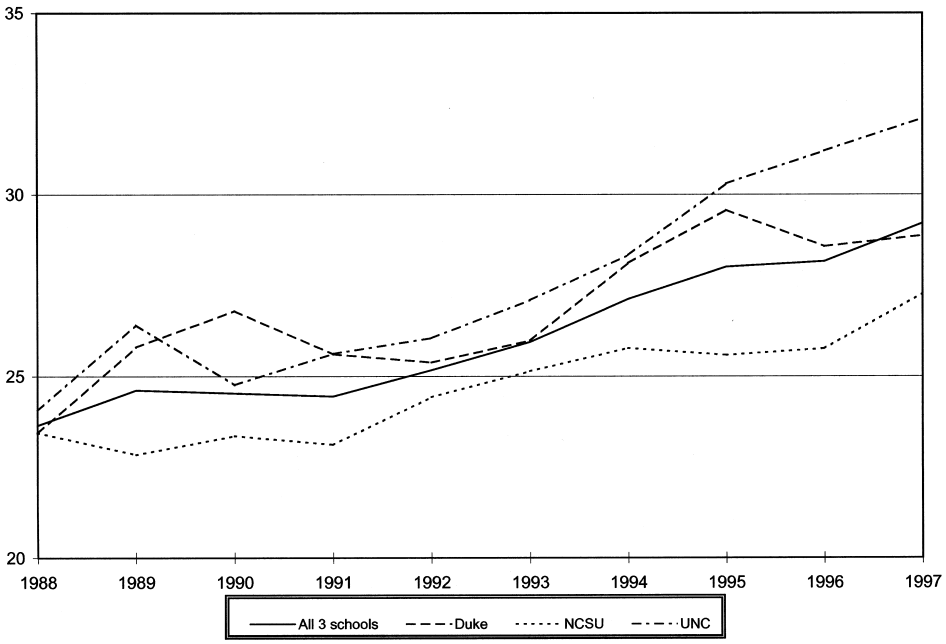

Figure 3. Percent of faculty age 55 or older, 1988–97. Source: Authors' calculations based on employment records provided by Duke University, North Carolina State University, and the University of North Carolina.

size during the following years, before declining in 1996. Until 1994, Duke maintained a strict mandatory retirement policy at age 70; as a result, there was only one faculty member age 70 or older at the beginning of any academic year prior to 1994. After the elimination of mandatory retirement, people begin to delay retirement past age 70. The proportion of the faculty less than 40 years of age declined from 32.1 percent in 1988 to 25.9 percent in 1997 while the proportion of the faculty age 55 and older increased from 23.4 percent in 1988 to 28.5 percent in 1997.

North Carolina State University. There were 1,420 individuals on the faculty at NCSU in 1988. Faculty size remained relatively constant during the sample period reaching a high of 1,506 in 1996. Although NCSU had a policy of mandatory retirement at age 70, there were four or five persons on the faculty over age 70 in each year prior to 1993. In 1988, 29.1 percent of the faculty were less than age 40. The proportion of young faculty declined sharply to only 16.4 percent in 1997. In contrast, the proportion of the faculty age 55 and older rose more modestly from 23.5 percent to 27.3 percent. Reflecting past hiring patterns, a large increase occurred in the proportion

Table 1. Age Structure of Faculty, All Three Schools, 1988–97

Age group	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
< 30	1.84	1.90	2.04	1.43	1.17	0.94	0.72	0.93	0.77	0.56
30–34	9.25	8.74	8.59	8.20	7.76	7.16	6.70	5.89	5.72	5.95
35–39	16.70	16.04	15.21	14.75	14.21	13.53	13.06	13.12	11.94	11.40
40–44	18.14	18.23	18.39	18.28	18.23	17.88	17.07	16.11	17.05	15.88
45–49	17.36	17.72	17.94	18.38	18.11	17.75	18.48	18.73	18.72	19.12
50–54	13.29	13.29	13.97	14.50	15.35	16.81	16.85	17.20	17.64	17.88
55–59	12.66	12.42	12.57	12.15	11.84	11.97	12.46	12.93	13.30	14.01
60–64	7.09	7.84	7.89	8.74	9.78	10.25	10.08	10.16	9.65	9.44
65–69	3.51	3.68	3.25	3.37	3.32	3.31	4.01	4.18	4.30	4.95
70 +	0.16	0.13	0.16	0.19	0.22	0.41	0.56	0.75	0.90	0.81
N	3048	3099	3143	3145	3159	3200	3193	3209	3232	3211

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.

of the faculty ages 45 to 54. This group increased from 28.2 percent of the faculty in 1988 to 39.6 percent in 1997.

University of North Carolina. There were 993 faculty employed at UNC in 1988 and the faculty increased in size throughout the period reaching 1,099 in 1995 before declining somewhat in 1996 and 1997. In 1988, 22.0 percent of the UNC faculty were less than age 40. This age group declined to only 15.4 percent by 1997. The aging of this faculty is shown by the large increase in the proportion of faculty age 55 and older from 24.1 percent in 1988 to 32.1 percent in 1997.

Trends in Faculty Retirement

It is important for academic administrators to understand the effect of eliminating mandatory retirement on the retirement rates of university faculty. The following analysis represents an initial assessment of the impact of this important change on retirement patterns at the triangle universities. These findings illustrate the impact of amendments to ADEA on the age structure of the faculties in the 1990s and enable the projection of future retirement patterns in the presence of the larger cohorts of faculty approaching retirement in the next two decades. It is highly likely that the implications of the elimination of mandatory retirement on faculty age structure in the first decade of the twenty-first century will far outstrip those shown in the last decade of the twentieth century.

Using the employment records, age-specific retirement rates were calculated for the three universities separately and for the combined faculties for each year between 1988 and 1997.[2] The employment records are for the aca-

demic year, beginning in the year shown. The 1988 data pertain to the 1988–89 academic year while the 1997 data indicate employment at the beginning of the 1997–98 academic year. Faculty retirement is determined by comparing the employment records of successive years. The retirement rates discussed in this analysis indicate the proportion of the faculty of a specific age that were on the payroll in September of one year who were not still employed the next September. For example, the 1988 retirement rate for persons 65 years of age indicates the proportion of persons age 65 employed in September 1988 who were not employed in September 1989. At the older ages, the number of faculty at each individual age is very small. In order to provide more meaningful information on the age-specific probability of retiring, the years before the elimination of mandatory retirement (1988 to 1993) were combined as were the years after the ending of compulsory retirement (1993 to 1997).[3] These retirement patterns are shown in Table 2.

One method of determining the direct impact of eliminating mandatory retirement is to observe the change in the retirement rates for persons reaching ages 69 and 70 before and after January 1, 1994.[4] Retirement rates for people reaching the age of mandatory retirement at the three universities dropped sharply after 1994. Retirement rates for persons aged 70 at the beginning of the academic year declined from 77 percent when mandatory retirement was still being used to 13 percent after it was eliminated while retirement rates for those 69 years of age at the beginning of the academic year dropped from 61 percent with mandatory retirement, to 38 percent without this policy. Although the number of faculty reaching the ages of 69 and 70 during this period is relatively small (81 prior to 1994 and 80 after), the substantial decline in the retirement rate certainly suggests that the ending of mandatory retirement has had a pronounced effect on the retirement rates of faculty at these ages.

Mandatory retirement might also have an indirect effect on the retirement rates of somewhat younger faculty. Persons in their early and mid 60s consider the number of possible remaining years of work when they are deciding whether to continue in their faculty position or retire. Thus, the elimination of mandatory retirement at age 70 could alter the retirement rates of faculty in their 60s. The data for the triangle universities indicate no clear pattern of change in retirement rates at these younger ages. Retirement rates increased slightly after the elimination of mandatory retirement at four ages and declined at three ages. In general, the retirement rates for Duke are lower than those for NCSU and UNC.

Another method of illustrating the changing retirement patterns is to follow only those faculty who were already employed in the first year for which we have data, 1988, and to observe their retirement patterns. Limiting the sample to those employed in 1988 eliminates older faculty who have been newly employed by one of the universities. These newly hired faculty could be expected to have different retirement probabilities than existing faculty.

Table 2. Retirement Patterns by Age

	1988–92			*1993–96*		
	Employed	*Retired*	*Retirement rate*	*Employed*	*Retired*	*Retirement rate*
Age 62						
All	250	14	5.6	272	16	5.9
Duke	51	1	2.0	61	3	4.9
NCSU	109	8	7.3	123	6	4.9
UNC	90	5	5.6	88	7	8.0
Age 63						
All	230	27	11.7	240	32	13.3
Duke	52	6	11.5	56	8	14.3
NCSU	94	13	13.8	105	12	11.4
UNC	84	8	9.5	79	12	15.2
Age 64						
All	180	31	17.2	220	34	15.5
Duke	46	2	4.3	40	3	7.5
NCSU	70	16	22.9	101	22	21.8
UNC	64	13	20.3	79	9	11.4
Age 65						
All	162	41	25.3	171	26	15.2
Duke	43	5	11.6	36	4	11.1
NCSU	63	19	30.2	68	12	17.6
UNC	56	17	30.4	67	10	14.9
Age 66						
All	136	20	14.7	127	29	22.8
Duke	36	3	8.3	28	3	10.7
NCSU	52	11	21.2	52	14	26.9
UNC	48	6	12.5	47	12	25.6
Age 67						
All	119	22	18.5	95	23	24.2
Duke	30	6	20.0	26	1	3.8
NCSU	43	5	11.6	36	9	25.0
UNC	46	11	23.9	33	13	39.4
Age 68						
All	95	30	31.6	64	14	21.8n
Duke	19	12	63.2	25	41	6.0
NCSU	41	9	22.0	24	7	29.2
UNC	35	9	25.7	15	3	20.0
Age 69						
All	59	36	61.0	50	19	38.0
Duke	5	5	100.0	16	7	43.8
NCSU	30	17	56.6	21	7	33.3
UNC	24	14	58.3	13	5	38.5

Table 2. Continued

	1988–92			*1993–96*		
	Employed	*Retired*	*Retirement rate*	*Employed*	*Retired*	*Retirement rate*
Age 70						
All	22	17	77.3	30	4	13.3
Duke	0	0	—	6	0	0.0
NCSU	10	7	70.0	15	3	20.0
UNC	12	10	83.3	9	1	11.1

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.

Table 3. Retirement Rates, 1988 Faculty Cohort

Age	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
62	2.2								
63	7.9	8.9							
64	11.1	14.3	26.9						
65	23.7	25.0	33.3	13.3					
66	10.0	13.8	16.7	10.0	19.2				
67	12.0	11.1	32.0	30.0	11.1	14.3			
68	0.0	22.7	58.3	41.2	21.4	31.3	22.2		
69	40.0	41.7	70.6	80.0	70.0	54.6	36.4	53.9	
70	66.7	100.0	71.4	80.0	100.0	0.0	20.0	0.0	33.3

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.

The first column of Table 3 shows the proportion of persons at each age who retired prior to the start of the 1989 academic year. The second column of the table shows the proportion of those persons who were employed in 1988 and continued on to work during 1989 who retired prior to the 1990 academic year.

These data show that retirement rates at age 70 were over 65 percent for each year between 1988 and 1992. All total, 17 of 20 persons who began an academic year at age 70 retired prior to the next year. In contrast, the retirement rates in the years after 1993 for persons aged 70 at the beginning of the year was much lower, as only 3 of 21 faculty retired. For persons aged 69 at the beginning of the academic year who turned 70 during the year, 34 of 54 faculty retired between 1988 and 1992, while only 17 of 41 retired after mandatory retirement was eliminated.

This analysis of faculty behavior at the three universities reveals that retirement rates are very low for all persons aged 62 and over. In addition, a clear impact of lower retirement rates for persons 69 and 70 is found after

the elimination of mandatory retirement. If these patterns continue to hold in the coming years, the faculty at these institutions will become much older.

Duke University. Retirement rates at Duke were extremely low throughout the sample period, except during the year that they became 70 when faculty were required to retire. The number of retirements by persons age 62 to 70 averaged only 8 per year between 1988 and 1997. The retirement rate for persons between ages 62 and 67 was only 9 percent before and after the end of mandatory retirement. In contrast, the retirement rate for persons age 68 and older was 71 percent with mandatory retirement and 23 percent after its elimination. Prior to the elimination of mandatory retirement (1988 to 1993), five individuals reached age 69 and then all five were forced to retire. After the elimination of mandatory retirement (1993 to 1997), six people reached age 70 and none retired. These data clearly show the importance of mandatory retirement as a human resource policy at Duke.

North Carolina State University. Retirement rates prior to age 70 tend to be higher at NCSU than at Duke. When mandatory retirement was in effect, retirement rates for persons age 69 and 70 averaged 60 percent at NCSU; thus, some individuals were allowed to continue employment past the compulsory retirement age. In contrast, the retirement rate for persons of these ages was 28 percent after mandatory retirement was eliminated. Retirement rates for persons aged 66 to 68 were up slightly (from 18 to 27 percent) during the latter period, while the rates for persons 62 to 65 fell slightly (from 17 to 13 percent).

University of North Carolina. Fourteen of 24 people age 69 at the beginning of the academic year retired between 1988 and 1993 and 10 of 12 persons age 70 retired. After the elimination of mandatory retirement only 5 of 13 persons aged 69 and one of nine persons age 70 retired. Retirement rates for persons age 66 to 68 went up between the two periods (from 20 to 29 percent), while retirement rates declined for those age 62 to 65 (from 15 to 12 percent).

Faculty Retirement Decisions

In order to estimate faculty retirement rates, a sample including all faculty age 62 and over at the three universities was constructed. The sample included all faculty meeting this age restriction in each of the years for which we have data, producing a total sample of 2,637 observations.[5] To further investigate the change in retirement rates in response to the ending of mandatory retirement, the sample was also divided into the years before and after academic year 1993–94. This produced a sample of 1,472 observations during the period when mandatory retirement was being used and a sample of 1,165 observations after its elimination. Sample means are presented in Appendix Table A4.

Table 4. Mean Retirement Age of Faculty, 1988–96

	1988	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*
All 3 schools	65.71	66.36	65.92	66.20	66.17	65.98	66.06	65.64	65.86
Duke	—	66.38	66.38	66.58	65.86	66.13	66.00	65.55	—
NCSU	65.45	66.26	66.31	65.82	66.35	66.13	66.36	65.95	66.18
UNC	66.38	66.47	65.42	66.41	66.07	65.64	65.70	64.92	65.61

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.

The dependent variable (Retirement) in the analysis is a dichotomous variable indicating whether the person retired prior to the start of the subsequent year (Retirement = 1) or remained employed (Retirement = 0). Retirement is estimated using a probit procedure. The probability of retirement is estimated as a function of gender (Male = 1, Female = 0), race (White = 1, Other = 0), salary (in $10,000s), number of years at current university, dichotomous variables indicating rank, participation in the state pension plan, university where employed, and a series of dichotomous variables indicating the age of the faculty member in September of the relevant year.

The sample is comprised almost entirely of whites (95 percent) and males (93 percent). There are very few faculty members in this sample who are not full professors (11 percent) and 56 percent of the sample observations are enrolled in the state retirement plan. The mean age of the sample is 65. Of the 2,637 observations from the entire sample period, only 15 percent retired. For the most part, the sample means do not differ much between the 1988 to 1992 period and the period following the end of mandatory retirement. As expected from the retirement rates presented in Table 2, the percentage of observations indicating retirement between 1988 and 1992 is larger than that for the sample period of 1993 to 1996.

However, the mean retirement age of the sample has not varied much over the nine year sample period. Table 4 presents the mean retirement age for the sample included in this analysis by year. The mean retirement age is also reported for each university separately. Of the faculty members age 62 or older, the average age of retirement fluctuated between 65 and 66 for all of the years of this study.

The data on faculty members ages 62 and older will be used to examine the differences in retirement patterns by personal and professional characteristics. Retirement studies of the general labor force typically find significant differences in the probability of retiring based on these characteristics. A variable indicating whether the observation is from an academic year between 1993 and 1996 is also included in the estimation equation in order to determine the effect of eliminating mandatory retirement. This variable is

interacted with a dichotomous variable representing age 70 to allow for the expected effect of the elimination of mandatory retirement on the probability of retiring at age 70.

Economic research has shown that pension coverage, the type of pension, and the monetary incentives associated with each type of pension are important determinants of the timing of retirement (Kotlikoff and Wise 1989; Quinn, Burkhauser, and Myers 1990). For faculty at NCSU and UNC, the records indicate the whether the faculty member is enrolled in the Teachers and State Employees Retirement Plan (the state plan) or an optional retirement plan (ORP). The state plan is a defined benefit plan with considerable early retirement incentives while the ORPs are defined contribution plans.[6] In 1988, over 80 percent of the faculty age 62 and over at NCSU and 84 percent of the faculty age 62 and older at UNC were enrolled in the state retirement plan. All faculty at Duke are enrolled in some type of defined contribution plan. Understanding the effects of pensions on the retirement decisions of older faculty may be central to the future planning of academic administrators.

The results of the estimated retirement equation are shown in Appendix Table A5. The first column reports the results based on the entire sample, while columns 2 and 3 report the results from each sample time period separately. The estimates indicate that (holding other factors constant) gender, race, salary, and length of employment do not have a statistically significant effect on the probability of older faculty at these universities retiring. Faculty holding the rank of assistant professor have a retirement rate that is 18 percentage points higher than the rate for full professors. In addition, the retirement rates are not significantly different among the faculty at the three universities. Given the data presented in Tables 2 and 3, this finding was somewhat surprising; however, differences in pension plan participation examined below explain this seeming contradiction.

An important finding is that participation in the state retirement plan increases the retirement rate by 10 percentage points. Since none of the Duke faculty are eligible to participate in this plan, this finding helps to explain the lower retirement rates observed for the Duke faculty in the data presented in Table 2. The effect of participation in the state retirement plan on retirement rates has important implications for North Carolina State University and the University of North Carolina. In the future, a lower proportion of their faculties in their 60s and 70s will be in the state plan.[7] These results indicate that the decline in enrollment in the state retirement plan will further decrease the retirement rate at NCSU and UNC.

The dichotomous age variables can be used to show the change in the probability of retiring with advancing age. The age effects show that relative to the probability of retiring at age 62, the retirement rate is 11 percentage points higher for someone age 63. With the exception of age 66, the

Table 5. Estimated Retirement Probabilities by Age, 1988–92

Age	*State Plan*	*ORP*	*State Plan*	*ORP*
62	9.33	2.11	6.75	4.28
63	18.64	5.46	15.62	10.84
64	21.65	6.75	14.07	9.65
65	27.48	9.53	15.73	10.93
66	19.23	5.71	19.81	14.16
67	25.52	8.55	24.15	17.72
68	35.24	13.80	23.25	16.97
69	54.23	27.28	37.64	29.48
70	50.20	24.03	7.89	5.08
71+	36.42	14.51	32.46	24.84

Source: Authors' calculations using faculty personnel data records from University of North Carolina.
Probabilities are estimated using a base case. This base case is a white male full professor at the University of North Carolina, with 25 years of service at UNC and earning $75,000 per year.

probability of retiring increases each year up to age 69. Finally, the analysis indicates that the age 70 retirement rate was 13 percentage points lower in the years after the elimination of mandatory retirement than for the years during which this policy was allowed. The remainder of the retirement age profile was not affected by the elimination of mandatory retirement.

For the most part, the results from both before and after the end of mandatory retirement are quite similar; however, there are three important changes between the two time periods. The first is the sharp decline in the size of the effect of participation in the state plan from an estimated effect of 15 percentage points in the presence of mandatory retirement to only a 4 percentage point effect after its elimination. This finding could indicate that the retirement incentives of a defined benefit plan like the state plan are stronger when the older worker must select a retirement age of 70 or younger. Thus, the ending of mandatory retirement may have weakened the ability of universities to encourage older faculty to retire.

The second major finding in the estimated retirement rates is the difference in the retirement rate at age 70. Prior to the elimination of mandatory retirement, the retirement rate at age 70 was 46 percentage points higher than at age 62. After the elimination of mandatory retirement, the retirement rates for age 62 and age 70 are statistically the same. The third key observation is that, in the post-mandatory retirement period, assistant professors and associate professors are more likely to retire than full professors.

To further illustrate changes in retirement rates, predicted age-specific retirements rates are calculated for faculty members before and after the ending of mandatory retirement based on the estimated effects from the retirement equation (see Appendix Table A5). Table 5 shows the predicted

probability of retiring for a white, male full professor at the University of North Carolina earning $75,000. The entries in the table show the predicted age-specific retirement rates for persons in the state plan and those for faculty who are participants in one of the defined contribution plans offered by the universities. In both cases, the age-specific retirement rates are shown before and after the ending of mandatory retirement.

The first column illustrates that the predicted retirement rate for a person age 62 enrolled in the state retirement plan was only 9 percent, prior to the elimination of mandatory retirement. The retirement rate increased to 27 percent for persons age 65, and it was 50 percent for persons aged 69 and 70. At every age, the retirement rates for persons in one of the optional retirement plans were one-half to one-third of those in the state retirement plan.

After the elimination of mandatory retirement, retirement rates declined for persons between the ages of 62 and 65 who are in the state plan. The predicted retirement rate at age 62 in the post-mandatory retirement period is only 7 percent and for persons aged 65 is only 16 percent. Although there is a slight increase in the retirement rate for persons 66, all other retirement rates are lower and the predicted retirement rate for persons aged 70 declines from 50 percent before 1993 to only 8 percent in the more recent years. For persons in a defined contribution plan, the predicted retirement rates are higher for those aged 62 to 69 but are much lower for persons aged 70. Ashenfelter and Card (1998) report a similar increase in retirement rates for TIAA-CREF participants during the 1990s.

Conclusions

The analysis of employment records of three North Carolina universities reveals that the faculties of these institutions have aged considerably in the last decade. The aging of the faculty is the result of past hiring patterns; slow growth in total faculty size, which along with low turnover has lead to relatively few new hires; and a decline in the rate of retirement among older faculty.

Age-specific retirement rates were examined before and after the ending of mandatory retirement at age 70. The results clearly indicate that the age-specific probability of retiring declined following the elimination of mandatory retirement. The decline in retirement rates implies an older faculty and fewer hiring opportunities in the future. Another significant finding is that pension plans influence retirement patterns with participants in defined benefit plans having higher retirement rates than those in defined contribution plans. These results have important implications for developing human resource policies of colleges and universities in the twenty-first century.

Table A1. Age Structure of Faculty, Duke, 1988–97

Age group	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
< 30	4.43	3.18	3.45	3.05	2.72	2.26	0.77	0.92	1.43	0.79
30–34	11.97	10.19	11.29	13.28	11.78	10.23	10.14	8.09	9.21	10.09
35–39	15.08	15.61	14.26	13.59	15.41	15.79	14.44	15.42	14.13	14.98
40–44	14.43	14.81	16.14	16.34	15.56	15.19	15.67	14.20	15.71	14.51
45–49	17.54	16.56	14.26	14.20	13.60	14.29	16.13	17.71	18.10	17.67
50–54	12.62	12.90	13.48	13.59	14.50	14.89	14.13	13.13	12.86	13.09
55–59	12.13	13.54	13.32	12.06	11.78	11.88	11.67	12.21	12.54	13.41
60–64	8.20	8.44	8.46	8.85	10.12	10.68	11.52	11.76	10.16	9.15
65–69	3.61	4.78	5.33	5.04	4.53	4.81	5.22	5.65	5.08	5.36
70 +	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.92	0.79	0.95
N	610	628	638	655	662	665	651	655	630	634

Source: Authors' calculations using faculty personnel data records from Duke University.

Table A2. Age Structure of Faculty, NCSU, 1988–97

Age group	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
< 30	1.74	1.97	1.77	1.07	0.53	0.53	0.73	0.81	0.66	0.47
30–34	9.95	9.44	8.14	7.73	7.21	6.61	5.93	4.86	4.85	4.14
35–39	18.96	18.35	16.60	16.46	15.23	13.67	13.53	13.23	12.68	11.76
40–44	19.36	19.99	20.67	19.72	20.17	19.62	18.60	17.27	17.60	16.78
45–49	15.69	16.32	17.98	19.05	19.10	19.35	20.20	20.99	19.72	20.72
50–54	11.62	11.73	12.07	13.32	13.56	15.59	15.93	17.61	18.73	18.85
55–59	12.75	11.73	11.68	11.26	10.96	10.77	11.07	11.40	12.15	12.57
60–64	6.21	6.95	7.68	8.33	9.62	10.11	9.67	9.24	9.10	9.09
65–69	3.40	3.15	2.95	2.60	3.14	2.97	3.40	3.58	3.52	4.68
70 +	0.33	0.39	0.46	0.47	0.47	0.79	0.93	1.01	1.00	0.94
N	1498	1526	1524	1501	1497	1514	1500	1482	1506	1496

Source: Authors' calculations using faculty personnel data records from North Carolina State University.

Table A3. Age Structure of Faculty, UNC, 1988–97

Age group	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
< 30	0.50	0.59	1.08	0.85	1.05	0.66	0.64	0.82	0.55	0.56
30–34	7.45	6.09	7.44	6.64	5.63	5.64	5.52	5.55	4.93	6.01
35–39	14.00	13.16	13.99	13.38	13.17	12.79	11.96	11.56	9.67	8.79
40–44	18.83	17.98	17.81	17.55	16.98	16.75	15.92	16.01	17.06	15.45
45–49	18.63	19.45	19.67	19.26	19.18	17.78	18.12	17.02	17.70	17.76
50–54	16.52	16.31	15.26	16.70	17.94	19.29	19.50	18.74	18.89	19.33
55–59	12.29	12.67	12.72	12.52	12.69	13.92	14.17	15.65	15.33	16.37
60–64	7.15	8.55	8.22	9.68	10.21	10.07	9.94	10.01	10.13	10.08
65–69	4.33	4.91	3.82	3.32	2.96	3.01	3.96	4.19	4.93	5.09
70 +	0.30	0.29	0.00	0.09	0.19	0.09	0.28	0.45	0.82	0.56
N	993	1018	1022	1054	1048	1063	1087	1099	1096	1081

Source: Authors' calculations using faculty personnel data records from University of North Carolina.

Table A4. Sample Means

Variable name	*1988–96 Sample*	*1988–92 Sample*	*1993–96 Sample*
Male	0.93	0.92	0.93
White	0.95	0.96	0.94
Salary	$65,503	$61,235	$70,896
Job tenure	27.65	27.10	28.35
Asst. professor	0.02	0.02	0.02
Assoc. professor	0.09	0.08	0.10
Full professor	0.89	0.90	0.88
Duke	0.25	0.23	0.29
NCSU	0.37	0.43	0.30
UNC	0.37	0.34	0.41
Age	64.99	65.02	64.95
State retirement plan	0.56	0.58	0.54
Retirement	0.15	0.17	0.14
N	2637	1472	1165

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.

Table A5. Estimated Effects from Probit Model

Variable Name	*Full Model*	*1988–92*	*1993–96*
Male	–2.61	–1.21	–2.78
White	3.98	3.19	4.47
Salary / 10,000	–0.10	–0.21	0.05
Job Tenure	–0.10	–0.15	–0.00
Asst. Professor	18.93*	11.18	27.38*
Assoc. Professor	3.50	–0.53	7.16*
Duke	1.45	6.62*	–3.05
NCSU	–1.95	–1.17	–2.45
Age 63	11.12*	11.35*	11.64*
Age 64	12.00*	14.81*	9.83*
Age 65	16.45*	21.11*	12.94*
Age 66	14.19*	12.29*	16.97*
Age 67	20.64*	19.38*	22.12*
Age 68	26.62*	29.80*	21.44*
Age 69	43.89*	48.82*	37.14*
Age 70	25.05*	45.63*	1.72
Age 71 +	31.23*	31.97*	31.95*
State Retirement Plan	10.45*	15.44*	4.47
After 1993	–2.20	—	—
After 1993*Age 70	–12.72*	—	—
N	2637	1472	1165
Log likelihood	–1055.98	–608.79	–434.34

Source: Authors' calculations using faculty personnel data records from Duke University, University of North Carolina, and North Carolina State University.
* • < 0.10

Notes

1. A useful summary of the changes in the ADEA is provided in National Research Council (1991).

2. The employment records for NCSU and UNC are based on faculty censuses that are compiled in September of each year in accordance with a directive from the Board of Governors of the University of North Carolina. The data for Duke are similar, but the actual employment information is compiled each January. The employment refers to persons on the university payroll at the beginning of an academic year.

3. This division produces five observations for retirement prior to the elimination of mandatory retirement beginning with the retirement rate in the 1988–89 academic year and ending with the rate in the 1992–93 academic year. There are four observations after the end of mandatory retirement for the years starting with the 1993–94 academic year and ending with the 1996–97 academic year.

4. In most cases, faculty were not required to retire on the day of reaching age 70. A more standard rule at most universities was that the faculty could complete the academic year in which they attained the age of 70.

5. This process implies that a person who remains employed during the entire sample period will be in the sample a total of nine times.

6. All faculty hired after 1971 by the University of North Carolina system have had

the option of enrolling in either the state plan or one of several approved optional retirement plans. Over time, more and more faculty have opted for one of the ORPs (Clark, Harper, and Pitts 1997).

7. Clark and Pitts (1999) show that the more recently hired faculty at NCSU have a greater likelihood of being enrolled in one of the ORPs than they do of participating in the state retirement plan.

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