2001

Cornell Confronts the End of Mandatory Retirement

Ronald G. Ehrenberg
Cornell University, rge2@cornell.edu

Michael W. Matier
Cornell University

David Fontanella
Cornell University

Cornell Confronts the End of Mandatory Retirement

Abstract

[Excerpt] In July 1995, the first author of this paper was appointed vice president of academic programs, planning and budgeting at Cornell and, at his initiative, a joint faculty-administrative committee was subsequently established, with him as chair, to look into how the university should respond to the elimination of mandatory retirement. In this chapter, we discuss the environment in which the university found itself when the committee was established, the recommendations of the committee, faculty reactions to the recommendations, and the actions that the university ultimately decided to pursue.

Keywords

Cornell University, mandatory retirement, faculty, hiring, academic labor market

Disciplines

Education | Education Economics | Higher Education | Human Resources Management | Labor Economics | Labor Relations

Comments

Suggested Citation

Ehrenberg, R. G., Matier, M. W., & Fontanella, D. (2001). Cornell confronts the end of mandatory retirement [Electronic version]. In R. L. Clark and P. B. Hammond (Eds.), *To retire or not? Retirement policy and practice in higher education* (pp. 81-105). Philadelphia, PA: University of Pennsylvania Press.

Chapter 5
Cornell Confronts the End of Mandatory Retirement

Ronald G. Ehrenberg, Michael W. Matier, and David Fontanella

As a major research university, Cornell University was cognizant of predictions that the ending of mandatory retirement in 1994 might affect its faculty since this type of university has faculty members often so tied to their work that they cannot conceive of leaving their positions unless compelled to do so (National Research Council 1991; Rees and Smith 1991). Consequently, Cornell's faculty and administrators worried about what the change in the law would might for the institution.

Cornell is unique among major American research institutions, in that it is a hybrid of private and publicly assisted colleges. Six of the colleges located on its Ithaca, New York, campus (the Colleges of Art and Sciences, Engineering, Law, Management, Hotel, and Art, Architecture, and Planning) are private colleges that charge tuitions comparable to those of other selective private institutions. Faculty in these six colleges, referred to as the endowed colleges, participate in a defined contribution retirement program. The other four colleges on the Ithaca campus (Agriculture and Life Sciences, Human Ecology, Veterinary Medicine, and Industrial and Labor Relations) are operated by Cornell under contract with the State of New York and, in exchange for state assistance, charge tuitions considerably lower than those charged in the endowed colleges. These statutory colleges are integral parts of Cornell, but many of their benefit programs are part of the benefit programs provided to the State University of New York (SUNY) campuses by the State of New York. As such, faculty members in the statutory colleges have a choice of participating in a state-defined benefit retirement program or an optional defined contribution program. Over time, most new faculty have elected to participate in the defined contribution program and there are currently less than twenty faculty in the statutory colleges who belong to the defined benefit system.[1]

Table 1. New Tenure-Track Appointments, Total University, 1982–83 Through 1997–98

Year	*Full professor*	*Associate professor*	*Assistant professor*	*Instructor*	*Total*
1982–83	15	15	50	2	82
1983–84	5	3	54	0	62
1984–85	11	9	51	0	71
1985–86	7	13	53	0	73
1986–87	15	9	75	0	99
1987–88	20	8	79	1	108
1988–89	10	23	69	0	102
1989–90	6	15	43	0	64
1990–91	11	12	48	2	73
1991–92	12	8	33	0	53
1992–93	10	11	38	2	61
1993–94	4	6	29	1	40
1994–95	9	7	44	0	60
1995–96	6	6	36	0	48
1996–97	8	9	33	1	51
1997–98*	10	8	46	1	65

Source: Authors' calculations from Cornell University Academic Personnel Database.
Faculty (including acting) and instructors are eligible for tenure-track appointment. Health Services, ROTC, and Medical College excluded from this table.
*As of March 24, 1998.

In July 1995, the first author of this paper was appointed vice president of academic programs, planning and budgeting at Cornell and, at his initiative, a joint faculty-administrative committee was subsequently established, with him as chair, to look into how the university should respond to the elimination of mandatory retirement. In this chapter, we discuss the environment in which the university found itself when the committee was established, the recommendations of the committee, faculty reactions to the recommendations, and the actions that the university ultimately decided to pursue.

The Environment at Cornell

In the fall of 1996 when this committee was first established, changes in the age distribution of the Cornell faculty and changes in the economic environment in which both the statutory and endowed colleges operate, had come together to drastically restrict the flow of new faculty into the university. As Table 1 indicates, the total number of new tenure-track faculty appointments in the university peaked at 108 in 1987–88 and had fallen to only 48 in 1995–96. The comparable numbers for the endowed and statutory colleges during the same period, respectively, were 56 to 29 and 52 to 19. Put

Table 2. New Tenure-Track Appointments, Total University, 1982–83 Through 1997–98

Year	*Assistant professors*	*Total*	*Percent assistant*
1982–83	50	82	61.0
1983–84	54	62	87.1
1984–85	51	71	71.8
1985–86	53	73	72.6
1986–87	75	99	75.8
1987–88	79	108	73.1
1988–89	69	102	67.6
1989–90	43	64	67.2
1990–91	48	73	65.8
1991–92	33	53	62.3
1992–93	38	61	62.3
1993–94	29	40	72.5
1994–95	44	60	73.3
1995–96	36	48	75.0
1996–97	33	51	64.7
1997–98*	46	65	70.8

Source: Authors' calculations from Cornell University Academic Personnel Database. Faculty (including acting) and instructors are eligible for tenure-track appointment. Health Services, ROTC, and Medical College excluded from this table.
*As of March 24, 1998.

another way, in the aggregate, new faculty hires at Cornell fell by almost 60 percent during the period.[2]

Fewer new hires meant that fewer faculty with new ideas and new perspectives were coming to the university. Fewer new hires also meant a reduced ability for Cornell to diversify its faculty along gender, racial, and ethnic lines. Finally, fewer new hires had the potential to limit Cornell's ability to remain at the frontier in rapidly changing fields and to shift faculty resources into new and exciting areas of inquiry.

Historically, Cornell has concentrated its faculty hiring at the assistant professor level, provided good opportunities for these new assistant professors to flourish and to receive tenure, and thus grown its own "stars." This strategy is designed to build a faculty who are committed to the institution, as well as to their own disciplines, and who are willing to devote time to doing things that benefit the institution as well as themselves personally. As Table 2 indicates, the strategy of hiring primarily at the assistant professor level has continued in recent years. Over the last fifteen years, approximately 70 percent of all new faculty hires university-wide came at the assistant professor level.

In spite of this emphasis on new young faculty, the decline in the overall number of new hires led to a decline in the number of younger faculty

Table 3. Distribution of Faculty by Age Group, Total University, 1982–83 To 1997–98

Year	*Less than 35*	*35–49*	*50–59*	*60 and older*
1982–83	15.2	45.0	25.3	14.5
1983–84	14.5	45.8	25.8	13.9
1984–85	13.1	47.1	25.6	14.1
1985–86	12.8	48.2	24.3	14.6
1986–87	12.2	49.0	24.3	14.5
1987–88	11.8	49.8	23.6	14.8
1988–89	10.3	51.3	23.3	15.0
1989–90	9.5	51.7	23.5	15.3
1990–91	8.8	51.3	24.3	15.6
1991–92	7.6	50.9	24.4	17.1
1992–93	6.3	50.7	25.7	17.3
1993–94	5.4	50.0	26.2	18.5
1994–95	5.1	48.3	27.8	18.7
1995–96	5.0	47.8	30.2	17.0
1996–97	5.3	44.9	32.5	17.3
1997–98	5.9	42.3	33.9	17.9

Source: Authors' calculations from the Cornell University Academic Personnel Database (February 1 each year).
Faculty include part-time and acting appointments but exclude courtesy, visiting, adjunct, emeritus, Health Services, and ROTC appointments. Age is computed as of June 30 of the academic year.

at Cornell. While over 15 percent of all faculty were under age 35 in 1982–83, by 1996–97, this had fallen to around 5 percent (Table 3). The decline in the endowed colleges was only to 7 to 8 percent, but the decline in the statutory colleges was to 2 percent.

Interestingly, the percentage of faculty over age 60 had risen from roughly 13 to 21 percent in the endowed colleges during the period. In contrast, the percentage of faculty over age 60 in the statutory colleges was lower at the end of the period than it was at the start of the period, primarily because of a number of early retirement incentive programs that the State of New York provided at zero cost to Cornell University during these years. As noted, statutory faculty have the option of choosing to belong to a defined benefit retirement program or to a defined contribution (TIAA-CREF) program.[3] Because the latter option was first permitted in the late 1960s, many of the recently retired statutory faculty were enrolled in the former program. Defined benefit programs can be structured in ways to provide incentives for participants to retire and retirement incentive programs can be developed that enhance these incentives. The retirement incentives provided under the state defined benefit program did appear to be effective in inducing statutory faculty to retire.[4] In contrast, defined contribution programs provide only limited incentives for participants to retire and the effectiveness of

Table 4. Age of Faculty at Retirement, All Faculty, 1982–83 to 1996–97

	Endowed			*Statutory*		
Year	*Number*	*Mean age*	*Median age*	*Number*	*Mean age*	*Median age*
1982–83	7	66.4	65.0	46	63.4	64.0
1983–84	13	66.2	66.0	7	62.6	64.0
1984–85	8	68.5	70.0	19	63.5	64.0
1985–86	11	66.9	67.0	19	64.8	66.0
1986–87	12	67.2	69.0	14	63.4	64.0
1987–88	16	65.3	66.5	25	64.1	65.0
1988–89	15	67.2	69.0	19	64.6	66.0
1989–90	15	66.3	68.0	16	65.6	65.5
1990–91	11	65.4	66.0	14	63.0	64.0
1991–92	12	68.4	70.0	23	64.4	65.0
1992–93	17	64.5	64.0	12	67.4	68.0
1993–94	11	65.7	66.0	8	65.9	65.0
1994–95	10	64.8	66.0	9	63.3	63.0
1995–96	11	66.1	67.0	42	64.9	65.0
1996–97	8	68.4	69.0	19	64.1	65.0

Source: Authors' computations from the Cornell University Academic Personnel Database. Age computed as of retirement date.

retirement incentive programs in inducing retirement under them, is limited by tax law. As of early 1997, only 16 of the 665 statutory faculty were enrolled in the defined benefit retirement system.

How did the elimination of mandatory retirement at age 70 in 1994 influence the ages at which Cornell faculty retire? Table 4 summarizes the mean and median age at retirement for faculty in the endowed and statutory sectors who retired since 1982–83. There is only little evidence in these data of increases in retirement ages after the elimination of mandatory retirement. The endowed mean and median ages at retirement fluctuated without any discernible trend until 1993–94, but since then have increased by about three years. The comparable statutory numbers show virtually no change. On average, the data suggest Cornell faculty members retire well in advance of their seventieth birthdays so that at first glance the elimination of mandatory retirement seems, not to have had a large impact on their retirement behavior.[5]

Means or medians can be deceiving, however. Figure 1 shows the age distribution of endowed faculty at retirement during the 1982–83 to 1996–97 period. Many faculty retired well in advance of their 70th birthdays, but approximately one third retired at age 70 or older (older could occur only after January 1, 1994, when the law changed). Indeed, in February 1998, there were 27 endowed faculty age 70 and above whom were still actively employed. These represent the faculty who turned 70 after January 1, 1994,

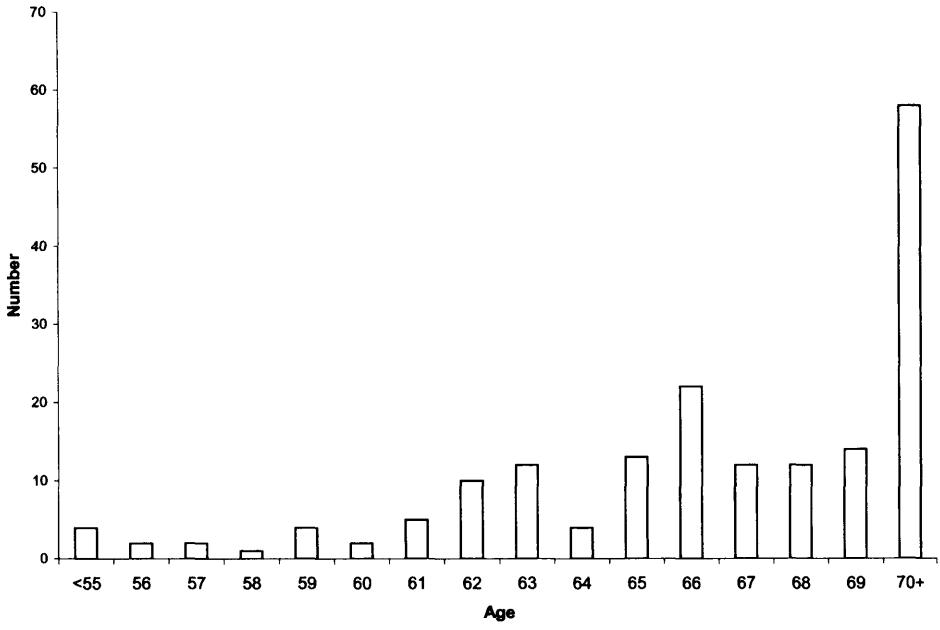

Figure 1. Age of faculty at retirement endowed, 1982–83 through 1996–97. As of February 1, 1998, there were 27 active endowed faculty age 70+. Source: Authors' calculations from Cornell University Academic Personnel Database.

and who still had not retired as of February 1998. Similarly, Figure 2 show that approximately 11 percent of the statutory faculty who retired over the period did so at age 70 or older and seven faculty age 70 or older were still active in February 1998.

Inspection of data on the annual percentage of faculty retirees who were age 70 showed no upward trend over time. However, this masks what statisticians and economists call the truncated sample problem. Here the data on retirees ignore the people continuing in active faculty status. For example, while the mean retirement age of the 11 endowed faculty who retired in 1995–96 was 66.1, there were also 10 endowed faculty who turned age 70 that year and remained active. Moreover, of the 21 endowed faculty who were 70 to 73 years old in 1995–96, all 21 were still active faculty at the start of the 1996–97 academic year. In contrast, the mean retirement age of the 42 statutory faculty who retired in 1995–96 was 64.9 and only 5 statutory faculty turned age 70 that year and remained active.[6,7]

A number of the faculty who are age 70 and above remain employed under part-time phased retirement agreements. Nonetheless, the inescapable conclusion is that the abolition of mandatory retirement for faculty is

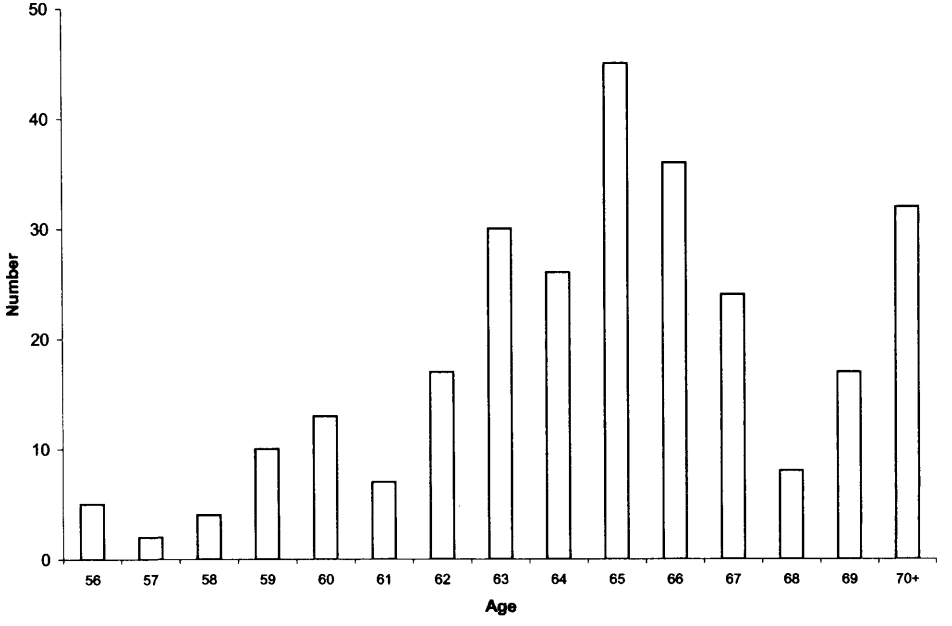

Figure 2. Age of faculty at statutory retirement, 1982–83 through 1996–97. As of February 1, 1998, there were 7 active faculty age 70+. Source: Authors' calculations from Cornell University Academic Personnel Database.

leading to an increase in retirement ages for endowed Cornell faculty. To the extent that faculty retire at later ages, this reduces the flow of new faculty into the university. To take a simple numerical example, suppose a university employs 1,750 faculty, each is initially employed at the university at age 30 and each retires at age 65. In this case, an average of 50 faculty a year will be hired. If, however, faculty retire at age 70 instead of age 65, annual hiring of new faculty will fall by one-seventh to about 43.

Thirty-five percent of the Cornell faculty in 1996–97 had been hired prior to 1978, when the mandatory retirement age for faculty was raised from 65 to 70, and these faculty all began their careers at Cornell with the expectation that they would retire no later than age 65. The Cornell retirement and benefits packages as well as the tenure system had been designed with this retirement age in mind. Twenty-seven percent of all faculty as of 1996–97 were hired between 1978 and 1987, when the law eliminating mandatory retirement for faculty was enacted (although it did not become effective until 1994). All of these faculty began employment at Cornell with the expectation that they would retire from Cornell no later than age 70. Thus, the majority of faculty at Cornell at the time our committee began its deliberations

had received the opportunity to remain employed for longer than they or the university expected at their time of hire.

Most faculty nearing retirement ages at Cornell are highly productive. Their contributions to the university are numerous, and the fact that some now choose to retire after age 70 means that the university is benefiting from their skills for a longer number of years. These extra benefits must be balanced, however, against the costs to the institution of the limitation on new faculty hires that later faculty retirement ages induce, as well as the impact of delayed retirements on faculty salaries.[8]

The Preliminary Report of the Committee

The preliminary report of the joint faculty-administration committee on the transition of faculty to emeritus status (henceforth the "transition committee") was circulated to the Cornell community in April of 1997.[9] The committee had been instructed to rule out the option of expensive buy-out plans because evidence from a number of campuses suggested that such plans are often not cost effective.[10] Indeed, Table 4 and Figures 1 and 2 indicated that the majority of Cornell faculty are currently retiring before their 70th birthdays and hence any plan that paid people to retire before age 70 would be paying the vast majority of faculty for doing what they would have done without extra compensation anyway.

The committee's first set of recommendations dealt with financial planning over the life cycle. The committee wanted financial resources not to be a constraint for those faculty members who wished to contemplate retirement at age 70 or younger. In the absence of additional resources to increase the university's contribution into faculty retirement plans, a cost-efficient strategy is to provide financial planning assistance to faculty over their life cycles to ensure that they make informed investment decisions with respect to the assets in their retirement accounts. The committee was also concerned that only about half of Cornell's faculty participated in tax-deferred supplementary retirement accounts (SRAs) and only 20 percent contributed the maximum amount into such accounts that they were legally permitted. Hence, the transition committee also recommended that information should be provided to faculty on the importance of taking advantage of tax-deferred savings opportunities and that faculty be fully informed that, due to the power of compound interest, saving early in the career would have a greater impact on wealth at retirement than savings later in the career.

A second set of recommendations viewed retirement planning from the perspective of the academic unit, and urged faculty to discuss with chairs or college officials what their plans were as they approached what typically were seen as the latter years of the faculty life cycle. The ability of an academic unit to plan for its future depends on its having a sense of when its

faculty members plan to retire, and the recruitment of replacement faculty is often a multiyear process. These discussions should take place, of course, in full recognition that retirement is a decision protected under federal and state law.

Still viewing things from the perspective of academic units, the committee felt that the abolition of mandatory retirement increased the importance of making sure that tenure does not imply a lack of accountability. Hence it recommended that steps be taken to ensure that faculty workloads be equitably distributed across all departmental faculty and that annual salary increases be awarded judiciously throughout a faculty member's life cycle to match the individual's productivity.

A third set of recommendations dealt with allowing faculty to "phase" into retirement. The university had a long established phased retirement program that allowed faculty in the endowed part of the university to move to half-time appointments, typically for five years, during which time they would receive half salary but full health benefits and full retirement system contributions. On signing an agreement to enter into such a program, the faculty member voluntarily agrees to give up tenure and retire at of the end of the period. This plan dated back to a time when age 65 was the mandatory retirement age and it had be revised to conform to the new federal law. It also needed to be extended to faculty in the statutory part of the university.[11]

The transition committee recommended extension of the program with a five-year maximum term specified to the half-time appointments. In addition, it specified that after an initial period during which all faculty would be eligible to participate in such agreements if they were at least age 55 and had 10 years of service at the institution, eligibility for the plan should be restricted to faculty who were below the age of 70. The motivation for such a restriction, which it believed to be legal under the law, is that this would provide an incentive for faculty to begin the retirement process prior to age 70.

A final, and probably the most important, set of committee recommendations was to greatly enhance the status of emeritus professors so that becoming an emeritus professor would be seen as a natural and desirable stage of one's career rather than as being "put out to pasture." Recommendations here included providing small research stipends ($2,000/year) for five years, guaranteeing emeritus professors at least shared office space, allowing them to maintain virtually all of the privileges of active faculty members, increasing their use in part-time postretirement teaching, enhancing the status of the emeritus professors' association, and encouraging emeritus faculty to get involved in volunteer activities on the campus and in the local community.

Inasmuch as the university was facing tight financial circumstances, there was the issue of where the funds for the emeritus professor research stipends would be found. The committee suggested capping university contributions into the defined contribution retirement plan after some point in a faculty

Table 5. Age of New Assistant Professor to Tenure Track, 1982–83 to 1997–98

	Endowed			*Statutory*		
Year	*Number*	*Mean age*	*Median age*	*Number*	*Mean age*	*Median age*
1982–83	23	31.1	30.0	27	32.3	33.0
1982–84	29	31.3	29.0	25	31.0	30.0
1984–85	26	31.1	30.0	24	31.1	31.0
1985–86	28	32.7	32.0	25	33.3	33.0
1986–87	39	30.8	30.0	36	33.9	33.5
1987–88	38	31.4	31.5	41	34.0	34.0
1988–89	43	32.1	31.0	26	34.5	34.0
1989–90	34	33.7	32.5	9	34.6	31.0
1990–91	22	33.4	33.5	26	34.9	33.5
1991–92	22	33.4	33.0	11	36.5	37.0
1992–93	24	33.9	31.5	14	37.8	36.5
1993–94	17	33.8	33.0	12	37.7	36.5
1994–95	29	32.9	31.0	15	35.6	33.0
1995–96	21	33.1	31.0	15	37.2	36.0
1996–97	18	30.7	30.0	15	38.0	38.0
1997–98*	38	34.0	34.0	8	36.1	36.5

Source: Authors' calculations from Cornell University Academic Personnel Database.
*As of March 24, 1998.

member's career as a way of helping to free up the funds. One proposal was to cap university contributions after 37 years. This mimics the maximum years of service credit that faculty members can accrue under the statutory college defined benefit plan. As Table 5 indicates, the typical assistant professor began his or her career between the ages of 30 and 35 and the mean age of retirement in the university for faculty has been in the range of 65 to 68. Hence, the only faculty who would see the university's contributions stopped would be those who started careers early at the university and/or postponed retirement until later ages.

An alternative way of accomplishing the same objective is to effectively convert the defined contribution retirement system into a form of defined benefit system, as both Yale and Chicago have done. Each caps the university's contributions into a faculty member's retirement account, when the cumulative university's contributions during the faculty member's career (assumed to have been invested in a conservative manner) are deemed sufficient to provide the individual with an annuity equal to a specified percentage of the individual's final salary. If the stock market falls, and hence the value of the individual's hypothetical account, university contributions are again resumed until the required annuity is again attainable. In practice, only a small number of faculty at either Chicago or Yale have been affected by such provisions and they tend to be in their late 60s or 70s.

Cornell's endowed retirement plan was established in July 1976; it pro-

vides for the university to contribute 10 percent of the faculty member's salary each year into the faculty member's retirement account. At the time the plan was adopted, faculty members were compelled to retire at age 65, which was also the age at which full social security benefits could be received. The presence of mandatory retirement meant that there was a de facto cap on the total number of years of contributions that the university would make.

The increase in the mandatory retirement age to 70 in 1978, and then its subsequent abolition (effective January 1, 1994) meant that Cornell now contributes to its faculty retirement plan for more years than framers of the retirement plan originally intended. To the extent that faculty members retire at later ages, retirement benefits will be higher as a percentage of final salary than was anticipated. Of course, the age at which full social security benefits can be received is gradually being increased and will reach age 67 within 20 years. Hence, some increase in the number of years of Cornell contribution would be required to maintain the same level of expected retirement income for faculty who retire prior to the age at which full social security benefits can be received. However, to achieve this does not require contributions to be made indefinitely by the university.

Faculty Responses and Cornell's Change of Policies

The faculty response to the transition committee report was one of indignation. The report's mention of matching productivity and salary increases over the life cycle was assumed to be a statement disparaging senior faculty and to be "ageist." The committee quickly dropped this recommendation from its final report.

The faculty also felt that the "carrots" that had been proposed were too small; Congress had made tenure truly indefinite and, from their perspective, the university had to "buy out" their property rights if it wanted them to retire. While they were correct that Congress had given them a new property right, the notion that the university in its role as an employer could take actions to try to offset the effects of the change in the law was foreign to many of them. Economists who evaluate the effects of changes in federal policies such as the minimum wage often argue about what the magnitudes of employer responses actually are; however, no economist questions the right of employers to respond (see, for example, the recent debate on the effects of changes in the minimum wage in Card and Krueger 1995; Neumark and Wascher 1995). In general, all faculty do not think like economists and some faculty even asserted that if the university tried to pursue policies to encourage voluntary retirement it would be violating the intent of the federal law.

Indeed, faculty response to the one remaining "stick" in the interim report, limitations on retirement contributions, is instructive. Many saw it as

an attempt to cut total faculty compensation, even though it was explicit that any money saved would be used to provide benefits for emeritus faculty. Most did not comprehend that the contribution rates chosen by universities to make to their faculty members' retirement accounts were based on a number of assumptions including the expected age of retirement. To the extent that faculty are retiring later, a smaller contribution rate would be required to fund any desired level of annuity because the annuity would be paid out over a smaller number of years, and because savings in the account would experience compound earnings tax-free over a longer number of years. Rather, faculty saw the contribution rate, rather than the implied annual pension benefit, as something that was "due" to them. Ultimately, given faculty perceptions that their salaries were too low, which the Cornell administration actually agreed with, the committee backed off this proposal in its final report.[12]

The administration had agreed that the faculty senate would also get a chance to comment on the committee's final report, and comment it did. It argued that rather than a phased retirement program, in which one had to agree to voluntarily relinquish tenure at the end of the period, it preferred the option of going to part-time tenured appointments indefinitely. The committee patiently explained to them that such appointments, while possible at any time if deans agreed, were not retirement programs. It stressed that it believed such an option would prolong active faculty careers rather than shortening them, and it would not aid departments in planning for replacements. The provost also made it clear that he did not support such an option.

The faculty senate then urged the provost to eliminate the upper age limit for eligibility for the phased retirement program arguing that it was discriminatory and would discourage rather than encourage the use of phased retirement. The committee did not believe that voluntary retirement incentive programs that have age restrictions of the type proposed above are in violation of the law—many institutions already have, for example, retirement incentive programs in which the magnitude of the "retirement bonus" that a faculty member receives varies inversely with the age at retirement and falls to zero at a specified upper age.

In fact, there was some ambiguity as to whether age-based incentives to encourage retirement are legal. Because of this, since 1994 the college and university community has sought legislation that would explicitly recognize the legality of such incentive plans. A provision to accomplish this was part of the 1998 bill to extend the Higher Education Act. In late April 1998, the American Association of Retired Persons (AARP) and House staff members reached a compromise under which the AARP agreed to drop its opposition to the provision (see Lederman 1998). Given that the AARP has dropped its opposition to the provision, it was expected that it would be approved by Congress and enacted into law as part of the Higher Education Act ex-

tension. In October 1998, Congress did approve the bill and the president signed it into law.

The compromise language makes clear that the legality of age-based incentives to encourage retirement would apply only to tenured college professors. Typically age 70 is specified as the maximum age of eligibility under such incentive programs, and the bill also requires that all professors over age 70 at the time of the bill's enactment will have six months to decide if they wanted to take advantage of such an incentive. Finally, it requires that any professor who turns age 70 and who was ineligible to take advantage of such an incentive before that age because of the failure to have met a minimum service requirement, will become eligible for a six month period as soon as he or she reaches the minimum service requirement, regardless of his or her age at that time.

Cornell's provost issued his "Provost's Policy Statement on the Transition of Faculty to Emeritus Status" on May 8, 1998. The university policy that was spelled out in this statement closely followed the recommendations of the committee. In particular, it included the phased retirement policy recommended by the committee because this policy already met all of the conditions required in the congressional bill. However, because the bill had yet to be passed, and nothing in life is certain, all faculty were made eligible for phased retirement for the first two years after the policy begins (July 1, 1998, in the endowed colleges at Cornell). The initial two-year open window was chosen by the university to facilitate the transition to the new policy and to give the legislation time to be enacted by Congress.

Postscript 2000 (Ronald Ehrenberg)

It is still too early to tell how successful Cornell's policy will to be in helping the university maintain an adequate flow of new faculty and a sufficient pool of funds for salary increases for continuing faculty. The median age of endowed faculty at retirement remained 66 during the 1997–98 and 1998–99 period. During that period, 26 percent of the faculty retirements took place at age 70 or greater, and most of the latter took place at ages over 70. Indeed by July 1999, the number of active endowed faculty ages 70 and above had increased to 30. Of the latter total 4 were 73, 1 was 74, and 3 were 75.

Lest one be discouraged by these numbers, there are indications that the program is providing real benefits to Cornell's present and retired faculty members. For example, one of my responsibilities as an administrator was space planning. So I negotiated for, and obtained, an office for the Cornell Association of Professors Emeritus (CAPE). This office was needed to symbolize the importance of emeritus professors to the university and to provide a work space for CAPE. The office is to be adjacent to the dean of faculty, who is an elected faculty leader, to stress the connection of the emeritus faculty to the faculty as a whole.

It has been a joy for me to watch the speed with which CAPE has begun working to help both emeritus and nonemeritus faculty. The association has compiled a list of volunteer opportunities on and off campus and developed information on finances and other matters that faculty need to know as they contemplate retirement. Indeed, the emeritus professors have begun to assume the role of peer retirement counselors. An emeritus professor lecture series has even been started on campus and in a local retirement community.

In a program initiated by my wife, who is an assistant superintendent of the Ithaca City School System, several groups of Cornell retirees (staff as well as faculty) now serve as volunteers in our local schools. The impact of their efforts on Ithaca's elementary school students, and the influence of the students on them is extraordinary. Few families have three generations living in Ithaca, so benefits besides academic progress accrue from having volunteers in local schools. The students serve as surrogate grandchildren for the retirees, and the retirees as surrogate grandparents for the students.

Not every element of the new program evokes enthusiasm. For example, although compensation for part-time teaching by emeritus faculty is negotiated individually, it is usually lower than the professors would have received on a per-course basis if they had not retired. Some faculty have threatened to postpone retiring because they view the compensation as inadequate.

I have tried to persuade colleagues who have raised this issue with me that they should consider their cut in salary as analogous to the gifts that alumni make to Cornell each year. Certainly, those of us who have been fortunate enough to spend most of our academic lives at institutions like Cornell should feel extremely lucky to have had such wonderful careers. While many of us lack the financial wealth that the university's alumni often have, we do have extraordinary amounts of human capital. Our time as emeritus professors gives us an opportunity to donate that capital to the university, whether it be in the form of advising graduate students, teaching, serving on committees, or continuing our research. The reduced payments that emeritus professors get for teaching do not seem "out of line" when viewed in this way.

Perhaps Cornell's situation is somewhat unique. Its faculty members, like their peers at other research universities, are motivated mainly by the love of what they do, not by money. In addition, Cornell represents the type of institution to which faculty members can easily become attached. Its location in a small community in which faculty can easily walk or drive to campus made it possible and important for us to design a mutually beneficial program that enables emeritus professors to remain vigorous parts of the community.

A successful program must offer retiring professors an opportunity to continue to do what they love. Thus the effectiveness of Cornell's response to the end of mandatory retirement will depend on whether the institution shows that it truly values emeritus professors and creates an environment in

which they can remain professionally active. Whether Cornell's policies can be applied to other institutions is unclear. An institution that differs from Cornell in having many faculty members who are not as eager to continue their research, as satisfied with their relationship with the institution, or as interested in continuing to reside near it may need to stress different things than we did.

Appendix A. Defined Benefit and Defined Contribution Retirement Plans

A *defined benefit* retirement plan provides a retiree with an annual retirement benefit that is specified to be a function of the individual's salary and years of service. A simple form of defined benefit plan is

$$B = kts, \tag{1}$$

where B is the individual's annual retirement benefit, k is a measure of the generosity of the plan, t is the individual's years of service, and s is the individual's average salary over some specified period of time. Under the defined benefit retirement plan in effect for statutory college faculty at Cornell, k is 0.02 and s is the average of the individual's three highest annual salaries. Hence, a statutory faculty member who retired after 30 years of service would receive an annual pension equal to 60 percent of the average of his or her three highest years of salary.

Defined benefit plans provide incentives for retirement because the later one retires, the smaller the number of years that the retirement benefit payments will be made. Ignoring issues relating to salary increases, after some age, the increase in the annual benefit level the faculty member would get from working one more year is more than offset by the loss of one year's retirement benefits from delaying retirement. Thus, after some age, failing to retire reduces the individual's lifetime value of retirement benefits. In addition, maximum percentage benefit levels can be specified that, after some point, eliminate the increase in annual retirement benefits that comes from working one more year. For example, the maximum benefit percentage under the statutory defined benefit plan is 75 percent of salary, which means that once the faculty member reaches 37.5 years of service, working additional years does not increase his or her annual retirement benefit level.

Retirement incentive programs can be straightforwardly developed within defined benefit systems. For example, several retirement incentive programs in Cornell's statutory colleges provided a faculty member with an additional month's service credit for each year worked, if the individual retired within a prescribed period of time. Hence, faculty members who had been employed for 24 years received an additional two years of credit. For an individual with an "average salary" of $80,000, this would lead to an increase in annual re-

tirement benefits of $3,200 a year ((.02)(2)$80,000). If the faculty member turned down the retirement incentive, in the absence of salary increases, the faculty member would have to work two more years before he or she could receive the same annual retirement benefit, which he or she would then collect for two fewer years. Thus, the programs provided a strong incentive to retiree.

Under *defined contribution* retirement systems, the employer contributes a specified percentage of the employee's salary each year to a fund, which is then invested to provide benefits at retirement for the employee. The fund "belongs" to the employee so that as long as the market return on the assets in the fund are positive, the value of the fund is larger the later the age at which an employee retires. Pure defined contribution plans thus do not provide strong economic incentives to retire for faculty members, because delaying retirement leaves the faculty member with a larger retirement fund.

Retirement incentive programs under defined contribution systems typically provide for additional employer payments to the employee if the employee retires within a prescribed interval of time. These additional payments are subject to federal and state income taxes, however, in the year they are made. The retirement incentive programs for statutory college faculty provided for an additional payment of 0.15 of one month's salary for each year of service.[13] Continuing with the example above, a faculty member with 24 years of service and an $80,000 annual salary, would get a payment of $24,000 ((.15)(24)(80,000/12)). After federal and state income taxes were deducted, which we assume would average 23 percent, the faculty member would have about $16,000 to invest in an annuity.[14] However, if he or she worked one more year, the university's retirement contribution for the year, plus the earnings that would occur on all the assets already in the employee account, would far exceed the value of the lump sum payment.[15] In addition, working one more year delays the withdrawal of any of the assets for a year. Not surprisingly, very few eligible statutory faculty enrolled in the defined contribution program participated in the statutory college retirement incentive program.

Appendix B. Tenure Probabilities, Retirement Ages, Hiring, and Faculty Salaries at Cornell

This appendix presents some simple steady state models to illustrate how Cornell's faculty retirement age influences average faculty salaries, the number of faculty that we can hire each year, and the annual salary increase available for continuing faculty. We begin with a baseline model that is meant to represent endowed Ithaca prior to the abolition of mandatory retirement. We then show how changes in faculty retirement ages influence faculty members' salaries and the new hire rate.

The initial model assumes that the university is in a steady state in which it hires the same number of faculty each year, and faculty size remains constant over time. Salaries in each rank are assumed not to vary with age and each faculty member in the model receives the current average endowed salary for his or her rank. Finally, only assistant professors are hired and there is no turnover other than when people are turned down for tenure or retire.[16] The model is then generalized in to allow for salary growth in the full professor rank and we illustrate how changes in retirement ages affect Cornell's ability to increase continuing faculty salaries. This model is a steady state model and assumes a uniform distribution of faculty by age, which is not the situation Cornell actually faces. Consequently, Appendix C presents analyses from a more complex tenure flow simulation approach that permit us to analyze how endowed Cornell's actual faculty flows and faculty salaries over the next twenty years will likely depend on changes in retirement behavior.

A Simple Baseline Model

Suppose the university hires 6 new assistant professors each year who are 30 years old. After 6 years 2/3 (4 of the 6) are promoted to associate professor.[17] These 4 individuals stay as associate professors for 6 years and then in turn are all promoted to professor. Professors each work for another 24 years until they all retire at age 66. There is no other turnover or hiring in this model.

Under these assumptions, at any point in time the university will employ 6×6 or 36 assistant professors, 4×6 or 24 associate professors and 4×24 or 96 full professors. There will be 156 faculty employed and the tenure rate will be 120/156 or 0.77. Each year the number of new faculty hired, 6, will represent 3.8 percent of the faculty (6/156). The faculty salary bill is constructed by assuming that all faculty in each rank earn the 1996–97 endowed Ithaca salaries. Thus, the salary bill will be $36 \times \$50{,}800$, or \$1,828,800, $24 \times \$62{,}100$, or \$1,490,400, and $96 \times \$85{,}600$, or \$8,217,600, for a total of \$11,536,800.

In actuality, we note that the current endowed Ithaca faculty size is roughly 900. Thus one could multiply all of the numbers presented above by roughly 6 if one wanted to scale up to current endowed totals. For simplicity, we do not do this until the final section.

Changing the Retirement Age

Suppose now that the career of a full professor lasted 29 years rather than 24. Put another way, each faculty member retires at age 71 rather than age 66. Under these assumptions, if we hired 6 new assistant professors each year, our total faculty would consist of 6×6 or 36 assistant professors, 4×6

or 24 associate professors, and 4 × 29 or 116 full professors. This would yield a total of 176 faculty and a tenure rate of 140/176 or 0.80. This faculty level is too high, however, since we are assuming that we need 156 faculty to run the university. Hence, the number of newly hired faculty each year, as well as the number present at each age, would have to be reduced by 156/176 or 0.886. Put another way, the number of newly hired faculty members each year would fall to 5.318, a decline of roughly 11 percent from the base scenario. Under this new scenario, we would therefore have 5.318 × 6 or 30.828 assistant professors, 3.546 × 6 or 21.276 associate professors, and 3.546 × 29 or 102.834 full professors, for a total faculty size of 155.938 (which differs from 156 only because of rounding error).

Our total faculty salary bill in this case would be 30.828 × $50,800 (or $1,566,062), 21.276 × $62,100 (or $1,321,240), and 102.834 × 85,600 (or $8,802,590), for a total of $11,689,892. This is $153,092 higher than the total salary bill in the base scenario. One could get back to that total salary bill by cutting each faculty member's salary by $982, or by 1.3 percent. Alternatively, one could cut only full professors' salaries by an average of $1,489, or 1.7 percent of the average full professor salary level.

Salary Growth for Full Professors

The models presented so far assume that there is no salary growth within a rank. To illustrate the impact of changes in the retirement age on salary growth, in this section we relax this assumption for full professors.

The current endowed tenured faculty average salary for individuals in the age range 40–44 is $71,600. Allowing this to be the starting salary for a 42-year-old professor and assuming that each full professor receives an annual "seniority-related" salary increase of $1,165, and that each retires at each 66 when his or her salary is $99,600, yields an average full professor salary of $85,600, which is the current average endowed full professor salary.

Note that in this stylized world, the average percentage salary increase that each full professor receives each year simply because he or she ages one year is (1165/85600) × 100 or 1.36 percent. Put another way, even if there were no general salary pool increase, the average salary increase for full professors each year would be 1.36 percent. This occurs because each year faculty who retire do so at salaries that are $28,000 more than the young full professors that replace them and this difference is available to distribute to all other full professors in the form of seniority-related salary increases.[18]

Now suppose that we increase the retirement age by 5 years to 71. If we continue to assume that all full professors receive the same seniority-related increase each year and keep the average full professor salary at $85,600, the annual increment in salary will fall to 24/29 of $1,165 or $965.50 a year. As a percentage of the average professor salary, the raise will be 1.12 per-

cent. Hence, the increase in the retirement age has led to a decline in the seniority-related increment that professors can receive each year.

Alternatively, suppose that the increment remains at $1,165 a year. In this case, professors will retire at age 71 at an annual salary of $105,425 and the average full professor salary will be $88,012.50. Thus, the average costs of full professors will have risen by 2.8 percent. Unless compensating action is taken (e.g., fewer faculty or lower salaries for associate or assistant professors), total faculty costs will have increased above and beyond the baseline increase.

Extensions

We have shown that, if faculty salaries are assumed to be constant within rank, an increase in the retirement age of 5 years will lead to about an 11 percent decrease in annual faculty hiring, as well as a 1.3 percent decrease in the average faculty member's salary. The model can be generalized to allow full professors' salaries to increase with age. Here we found that an increase in the retirement age of 5 years would reduce the average seniority-related increase that full professors can receive annually from 1.36 to 1.12 percent. Are these effects of changes in the mandatory retirement age large enough to warrant the university's concern? They assume a constant overall faculty size and, to the extent that there will be further shrinkage of its faculty size, hiring will be less in each case. The issue then, is what number of new hires is needed by the university each year to maintain the intellectual vigor of the university and to diversify the faculty?

Perhaps one way to address this question is to scale these numbers up to what the endowed portion of Cornell really looks like. With 900 endowed faculty rather than 156 in steady state, endowed Cornell would be hiring roughly 36 new faculty a year in the first scenario. An 11 percent decrease (the second scenario) would decrease this number to below 32. Whether 32 is sufficiently smaller than 36 is the crux of the concern over whether the elimination of mandatory retirement should concern the university.

Finally, this model assumed all hiring is at the new assistant professor level and that there is no turnover of faculty save at retirement. To the extent that tenured faculty members do leave the university prior to retirement, this leaves open the possibility of hiring some new senior faculty to replace them.[19] If our tenured faculty turnover rate prior to retirement was 2 percent (0.02) a year, we would have roughly 2.4 (120 × .02) senior faculty vacancies a year in the first scenario. Scaled up to the size of the current endowed faculty, this would equal roughly fourteen senior vacancies a year. If our tenured faculty turnover rate prior to retirement were closer to 0.015, the number of senior vacancies we could fill each year would be closer to 10.8.[20] Indeed, staying with the first scenario, our fraction of senior hires would

be 10.8/43 or 0.16. Historically, Cornell has filled over 30 percent of its endowed faculty positions at the senior level. The model suggests this is too high a percentage for a steady state.

Appendix C. Simulations Using the Faculty Flow Model

Appendix B reported steady state simulations assuming a uniform distribution of tenured faculty across age groups. It also implicitly assumed that any tenured faculty member that leaves prior to retirement is replaced by another tenured faculty member of the same age and salary, and that no other external tenured appointments are made. Since none of these assumptions is accurate, it is useful to use a faculty flow model developed by Cornell's Office of Institutional Planning and Research (IPR) ago to simulate what is likely to occur over the next 20 years.[21]

This faculty flow model divides the faculty into first through seventh year assistant professors and thirteen age categories of tenured faculty. For each category, the proportions of people who leave the university, who stay in the same category, or who move to each other category each year are calculated using actual data for the endowed colleges for the October 1994–October 1997 period.[22] These "transition probabilities" are initially assumed to remain stable in the future.

The average salaries of faculty in each of the 20 categories are calculated and also are assumed to remain unchanged over time. Put another way, we ignore general increases in the salary pool that may occur each year. Finally, when vacancies occur due to departures or retirements, replacements are assigned to each of the 20 categories by using the proportion of external hires that occurred in each of the categories during the last 4 years. This assumption also means that the size of the endowed faculty is assumed to remain constant at 870 during the period and thus that no further contractions in faculty size will occur.[23]

Baseline Scenario

Using the actual numbers of endowed faculty in each of the 20 categories in 1997–98, the various transition probabilities and the distribution of external hires across categories, the simulation model is "run" for 20 periods to take us out to the year 2018. The oldest endowed faculty member is currently 74 years old and some assumptions must be made about the "continuation rate" for faculty this age and older. It is assumed in these analyses that the probability of continuing as an active faculty member in the next year is 0.75 for 74-year-olds and that this probability drops to 0.5, 0.25, and 0 during the next three years. This implies that all faculty will be fully retired from the university at age 77.

Panel I of Appendix Table C1 summarizes the results from this simulation. New faculty hires rise from a predicted 35 in the current year to 47 in 2018 as the "bulge" of professors currently in the 40 to 60 age range begin to retire. The number of faculty age 60 and higher increases for 10 years but then begins to fall. The percent of endowed Cornell faculty that is tenured falls gradually from its current level of 83.7 percent to 76.6 percent because of the relative large number of retirements that eventually occur. After 5 years, the faculty salary bill begins to decline as the fraction of full professors declines due to retirements. Indeed, 20 years from now, the faculty salary bill is predicted to be about 1.8 percent lower in constant dollars than it is this year. The saved funds would be available to redistribute back to faculty in the form of one-time larger salary increases. If all of the savings were given to full professors, their salaries would be 2.7 percent higher.

Changing Retirement Rate Parameters of the Model

Panel II of Appendix Table C1 reports the result of simulations in which a key parameter of the model is changed. The simulations that underlie panel II assume going forward that all faculty retire no later than age 70. This is achieved by having all faculty currently older than age 70 retire next year and changing the retirement probability for faculty age 70 to 1.0 for future years. Otherwise, all of the other assumptions of the model are assumed to continue to hold. The results show that, if all faculty were to retire no later than age 70, there would be a big effect on the number of new hires that could be made initially (as those currently above age 70 retire and are replaced) but only a smaller long-run effect. Contrasting rows B of panels I and II, over the 20-year period we could hire a total of 959 new faculty rather than the 881 faculty that would be hired if current retirement practices continue. This represents an increase in faculty hiring of roughly 9 percent over the period. This is somewhat less that than the 11 percent change predicted by the steady state model presented in Appendix B for a 5-year change in the average retirement age because the change in the average retirement age being simulated in this appendix is actually smaller than 5 years.

The reduction in retirement ages would have a significant effect on the faculty salary bill. Five years out, the faculty salary bill would be 1.8 percent lower under this scenario than under the base scenario (67,267/68,496). These funds could be redistributed to all continuing faculty in the form of one-time salary increases. In the longer run (20 years), the differential is somewhat smaller, but still in the 1.3 percent range.

Appendix Table C2 provides a more detailed summary of the differences in annual faculty hiring, cumulative faculty hiring, number of faculty age 60+, percent tenured and total faculty salary bill between the two scenarios. Reducing the retirement age will further reduce the overall tenure rate, but

the additional reductions that they would lead to are never larger than 2 percentage points. The drop due to the changing age structure of the faculty that Cornell can expect over the next twenty years is considerably larger.

Finally, Appendix Table C3 presents estimates of the average annual salary increase that faculty members can expect each year as they age, even if there is no general increase in the salary pool. This is computed by taking all of the continuing faculty each year, computing the increase for those people who move between any two categories of faculty each year as the difference between the average salaries in the two categories, summing these increases across all faculty, and then dividing by the current average endowed faculty salary.

These average increases range between roughly 1.0 and 1.2 percent across years. These numbers are less than the 1.36 percent predicted using the steady state model Appendix B because that model assumed that fraction of external faculty hires that occur at the tenure level would be less than actually has been the case, and that such newly hired tenured faculty would receive salaries equal to those of the people that they replaced. Often these newly hired tenured faculty are paid more.

Table C1. Simulations from the Faculty Flow Model for Endowed Ithaca Faculty

	1997–98	*2002–3*	*2007–8*	*2012–13*	*2017–18*
I. Baseline scenario					
Number faculty hires	35	40	45	47	47
Cumulative faculty hires	35	190	410	643	881
Number faculty age 60+	191	236	247	240	225
Percent tenured	83.7	81.3	78.7	77.1	76.6
Faculty salary bill (000s)	$68,304	$68,496	$68,022	$67,489	$67,096
II. Induce all faculty to retire by age 70					
Number faculty hires	57	44	48	49	49
Cumulative faculty hires	57	233	469	714	959
Number faculty age 60+	191	199	207	199	189
Percent tenured	83.7	78.3	77.0	75.9	75.8
Faculty salary bill (000s)	$68,304	$67,267	$66,881	$66,462	$66,231

Source: Authors' calculations using Cornell faculty flow model described in Appendix C.
I: Actual transition probabilities during the last 4 years with assumed continuation rates of .75 for 50- and .25 for 74-, 75-, and 76-year-olds.
II: Same as case I, except all individuals who have not retired by age 70 are assumed to retire at age 70.

Table C2. Percentage Differences from the Baseline Scenario

	1997–98	*2002–3*	*2007–8*	*2012–13*	*2017–18*
Number of faculty hires					
RRA	62.9	10.0	6.7	4.3	4.3
Cumulative faculty hires					
RRA	62.9	22.6	14.4	11.0	8.9
Number faculty age 60+					
RRA	0.0	-15.7	-16.2	-18.1	-16.0
Percent tenured (% point difference)					
RRA	0.0	-2.0	-1.7	-1.2	-0.8
Faculty salary bill					
RRA	0.0	-1.8	-1.7	-1.5	-1.3

Source: Authors' calculations.
Where: RRA = Reduced Retirement Age.

Table C3. Average Annual Percentage Faculty Salary Increase Due to Normal Progression Through the System

	1997–98	*2002–3*	*2007–8*	*2012–13*	*2017–18*
Percentage increase	1.08	0.96	1.11	1.14	1.17

Source: Authors' calculations.
Baseline model save that all faculty are assumed to retire by age 74.

Notes

1. The Cornell University Medical College, located in New York City, has a separate retirement program, not discussed here.

2. Interestingly, new faculty hiring rebounded back up to 65 in 1997–98, with new endowed faculty appointments increasing to 54, the third highest annual level during the 1982–83 to 1997–98 period. This spurt of hiring in the endowed colleges partially reflected an inflow of endowment funds to the university that resulted from an endowment campaign concluded several years earlier and partially "prefills" in anticipation of future faculty retirements. The reader should view this increase as a temporary "blip," rather than a steady state increase in endowed faculty hiring. Faculty hiring in the statutory colleges continued to decline through 1997–98 because of state funding cutbacks described below.

3. Appendix A explains the difference between defined benefit and defined contribution pension plans and elaborates on the points made in this paragraph.

4. Due to funding cutbacks from the State of New York, the number of statutory tenure-track and tenured faculty fell from 717 in 1988–89 to 631 in 1997–98. It is believed that many statutory faculty retired during the period to avoid seeing younger colleagues laid off. Hence, it is difficult to estimate what the impacts of the early retirement programs, per se, were on statutory faculty retirement behavior.

5. Prior to the elimination of mandatory retirement, Cornell rigorously enforced its mandatory retirement policies. Retired faculty were nevertheless eligible to be hired back for specified terms on a part-time basis, at a renegotiated (usually lower) salary.

6. A reasonable conjecture is that because the vast majority of statutory faculty is now enrolled in the TIAA-CREF system, retirement ages will move closer to the endowed faculty retirement ages over time.

7. More generally, during the 1994–95 to 1996–97 period, universitywide, 80 percent of all faculty who had not retired by age 70 continued on active status the next academic year. The comparable percentages for faculty turning ages 71 and 72 were 70 percent and 100 percent, respectively.

8. Appendices B and C analyze these two issues using a steady state and a Markov process faculty flow model, respectively.

9. A copy of this report is available at <www.ipr.cornell.edu/emeritus/transrpt.html>.

10. The recent retirement incentive plan at the University of California (UC), analyzed by Switkes (this volume), did induce substantial faculty retirements. However, the UC faculty were covered by a defined benefit plan and the cost of "sweetening" their benefits was borne by the state retirement system, not the university. For a discussion of why it is more difficult to "encourage" retirement when faculty are covered by a defined contribution retirement system rather than a defined benefit system, see Appendix A.

11. The plan is actually more complicated and allows for less than half-time employment.

12. The November 1997 final report is available at <www.ipr.cornell.edu/Faculty_to_Emeritus/FinalReport.html>.

13. This is a slight simplification of the actual formula. Annual benefits are reduced if the faculty member retires before age 65 and also if similar benefits are guaranteed to the faculty member's spouse.

14. This was payable in three installments and capped at 45 percent of salary.

15. To see this, note that if the individual's salary had averaged $60,000 and that if 10 percent had been contributed by the state to his or her retirement account each year, after twenty-four years, the value of the account (ignoring investment returns) would be $144,000. If the investment return in this tax-sheltered account were 10 percent in the next year, the earnings of $14,400 would almost equal the value of the incentive. After one factors in tax-sheltered investment earnings on contributions to the account over the previous 24 years, as well as the next year's payment by the state into the individual's account of $8,000, one realizes how ineffective this defined contribution retirement incentive was.

16. We drop these two assumptions in the final section.

17. The actual proportion of newly hired assistant professors during the 1982–83 to 1990–91 period who ultimately were awarded tenure was 63.7 percent.

18. In this model, all new faculty hires still occur at the new assistant professor level. The "young full professors" who replace retirees are newly promoted associate professors.

19. If all tenured faculty who leave prior to retirement are replaced by externally-hired tenured faculty of the same age and salary, none of the other results are altered.

20. The actual number of nonretirement related departures of tenured faculty at Cornell is quite low. In the endowed colleges, they averaged 11.2 a year over the 1992–93 to 1996–97 period on a base averaging 722 tenured faculty, or 0.016

21. See IPR (1994) for an earlier use of the faculty flow model.

22. Endowed college data are used throughout because, as explained in the text, funding cutbacks in the statutory colleges coupled with various retirement incentive programs make it difficult for us to compute stable transition probabilities for statutory faculty.

23. The endowed Cornell actual faculty size exceeds 870 because these analyses

refer only to tenured and tenure-track faculty who are not on leave in a given year and are not administrators. The actual number of endowed faculty in 1997–98 was over 900.

References

Card, David E. and Alan B. Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage.* Princeton, N.J.: Princeton University Press.

Lederman, Douglas. 1998. "Senior-Citizens Group and Colleges Compromise on Early-Retirement Measure." *Chronicle of Higher Education,* April 29 (Internet version).

National Research Council, Committee on Ending Mandatory Retirement in Higher Education. 1991. *Ending Mandatory Retirement for Tenured Faculty: The Consequences for Higher Education,* ed. P. Brett Hammond and Harriet P. Morgan. Washington, D.C.: National Academy Press.

Neumark, David and William L. Wascher. 1995. "Reconciling the Evidence on Employment Effects of Minimum Wages: A Review of Our Research Findings." Board of Governors of the Federal Reserve System, Finance and Economics Discussion Paper 95/53, December.

Office of Institutional Planning and Research. 1994. "Uncapping Faculty Retirement Age." Occasional Report 1, March.

Rees, Albert and Sharon P. Smith. 1991. *Faculty Retirement in the Arts and Sciences.* Princeton, N.J.: Princeton University Press.

Switkes, Ellen. This volume. "The University of California Voluntary Early Retirement Incentive Programs."