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Mandatory Retirement Rules and the Earnings and Retirement Decisions of University Professors in Canada*

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Abstract

Estimation of a discrete time hazard model indicates that faculty members at universities with mandatory retirement at age 65 have exit rates at age 65 that are 30 to 35 percentage points higher than those of their counterparts at universities without mandatory retirement. Similar results are found for both men and women; however, the magnitude of this effect is somewhat smaller for women. An analysis of the returns to experience of professors over the age of 50 indicates a lower return to experience for professors at universities without mandatory retirement relative to those at universities with mandatory retirement. This was found to be the case for both men and women with the effect being more pronounced in the case of men. A decline is found in the earnings of younger faculty at universities without mandatory retirement relative to faculty of the same age and birth cohort at universities with mandatory retirement. In addition, professors age 50 to 65 at universities without mandatory retirement have lower earnings and lower returns to experience than faculty of the same age and cohort at universities with mandatory retirement.

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I. Introduction

The aging of the Canadian population has wide ranging implications for the economy. The changing age structure has particularly strong implications for the university sector. The professors, hired initially to teach the baby boom generation, are now reaching retirement age. This aging trend is fuelling an ongoing debate in provinces in which universities are allowed to enforce retirement at 65 about whether such a policy should be abolished. Consequently, it is crucial to have a complete understanding of how mandatory retirement rules affect the age distribution of professors at Canadian universities so as to fully understand the implications of banning mandatory retirement rules in the provinces in which it is currently allowed.

The analysis of this paper uses the existence of inter-provincial variation in the ability of universities to force faculty members to retire to identify the likely effect on retirement behaviour of the elimination of mandatory retirement. The data used to address these issues come from a yearly census of all university professors in Canada collected by Statistics Canada. The data set contains a university identifier as well as a person-specific identifier within a given university which allows us to follow an individual until retirement, unless that person switches employers.

The empirical results of this paper indicate that mandatory retirement rules act as a constraint on the decision to keep working beyond the age of 65 for professors at Canadian universities. The age distributions of professors at universities without mandatory retirement and those at universities with mandatory retirement at age 65 have diverged over time with a higher fraction of professors over the age of 65 being at universities without mandatory retirement. Using the longitudinal nature of the data, we see that faculty members have exit rates from the university at age 64 and 65 that are 30 to 35 percentage

points lower than those of their counterparts at universities with mandatory retirement. Similar results are found for both men and women; however, the magnitude of this effect is somewhat smaller for women. This does not support the view that mandatory retirement is a more severe constraint on the behaviour of female academics who may be more likely to have had career interruptions than their male counterparts.

Estimated survival probabilities indicate that male faculty members employed at a university without mandatory retirement at age 64 only have a 15.8 percent probability of continuing to work at the university until age 72. This indicates that while a significant fraction of professors will work past 65 if allowed to, a relatively small fraction of university professors are likely to stay many years past the usual retirement age of 65. We also examine age-earnings profiles and find that for males, faculty at universities with mandatory retirement have higher returns to experience at ages 50 to 65 than faculty at universities without mandatory retirement, suggesting some evidence of deferred compensation at the universities with mandatory retirement.

II. The relevant literature

The impact of mandatory retirement rules on the retirement behaviour of university faculty members has not been studied to date in Canada. However, a number of Canadian studies have analyzed the importance of mandatory retirement rules in the broader Canadian labour market. A study by Shannon and Grierson (2004) takes advantage of the intertemporal and inter-provincial variation in mandatory retirement laws in Canada. They carry out an analysis of the impact of these rules on the retirement behaviour of older works in the Canadian labour market using Census data from the period 1981 through 1996 and Labour Force Survey data over the period 1976 through 2001. The authors conclude that

making mandatory retirement illegal would have little effect on the size of the workforce over the age of 65. Therefore, the elimination of mandatory retirement is not seen by the authors as a way of alleviating the problems attributed to an aging population.

However, it is important to note that the Shannon and Grierson study did not explicitly look at the university faculty segment of the labour force. They argue that the number of people in the broader labour market who are actually constrained by mandatory retirement rules may be small; therefore, the effects of eliminating mandatory retirement on aggregate employment of older workers may also be small. However, one cannot necessarily extend this argument to individual segments of the Canadian labour market such as the segment of interest in this study, university professors. It may be that characteristics of the employment contracts (tenure, union status, work conditions) as well as the preferences of the professors themselves make employment past the age of 65 attractive leading to a large number of professors being constrained by mandatory retirement rules.

Due to a general lack of suitable data, the retirement decision of university faculty members has not received a great deal of attention in the economics literature. An important exception is the study by Ashenfelter and Card (2002) of US faculty retirement patterns. Ashenfelter and Card (2002) provide an extensive review of the US history and literature on the impact of the elimination of mandatory retirement (at age 70) in the US. They argue that the previous US research had indicated that eliminating mandatory retirement for university faculty would not have a major impact on the age distribution at US universities and colleges. Their research was intended to reevaluate this view in light of newer data and using more appropriate analytical methods. The data employed by Ashenfelter and Card originate from a special survey carried out on 16,000 older faculty in

the US called the Faculty Retirement Survey (FRS). These data combine payroll records from individual institutions with pension information from the TIAA-CREF pension plan. The survey is based upon older faculty at a random sample of four-year colleges and universities in the mid-1980s. The faculty members are followed for 10 to 11 years overlapping the period of the elimination of mandatory retirement in the US in 1994. They find strong evidence that the abolition of mandatory retirement (at the age of 70) in the United States led to a substantial increase in the fraction of university professors still working into their seventies. In particular, the retirement rates of 70 and 71 year olds fell by two thirds to a level comparable with those of 69-year-old faculty members. They conclude that American universities and colleges will experience a rise in the number of older professors in the future due to the elimination of mandatory retirement.

The analysis of this paper follows the approach of Ashenfelter and Card (2002) but employs much of the same variation in mandatory retirement rules in Canada as that used in the Shannon and Grierson (2004) study. The analysis sheds light on the importance of mandatory retirement rules on the retirement behaviour in the Canadian context. Data from the master files of the Full-Time University Teaching Staff Data over the period 1983 to 2001 are employed in the analysis. The data contain records on each full-time teacher at each of the universities in Canada. This allows for an analysis of both the age distribution by university in Canada as well as an analysis of the exit behaviour from the university by age and institution. Given that mandatory retirement rules vary across provinces in Canada, it is possible to identify differences in the age structure and in exit rates by age according to whether a mandatory retirement regime is in place. This provides evidence as to whether mandatory retirement rules act as constraints on the employment behaviour of older

university professors by forcing them to retire at a younger age than they would in the absence of the constraints.

III. Mandatory retirement regimes in Canada

In Canada, the rules related to the retirement of university professors have varied considerably both over time and across institutions. In the university sector, the rules related to retirement fall under provincial jurisdiction allowing for variation across provinces. Gunderson (2003) provides a review of the recent history related to mandatory retirement in Canada and concludes that only two provinces actually ban mandatory retirement, Manitoba and Quebec. In the case of Manitoba, the banning of mandatory retirement in 1982 resulted from a series of court cases (see Flanagan, 1985, for a detailed discussion).[1] In the case of Quebec, mandatory retirement was banned through provincial employment standards legislation in 1983 (see also Kesselman, 2004).

However, these are not the only sources of variation in retirement rules related to age at retirement. In provinces where there is no legislative ban on mandatory retirement, individual institutions and faculty associations or unions can choose to include mandatory retirement rules in their collective agreements. In most cases, these rules stipulate that faculty members must retire before the beginning of the academic year following their 65th birthday. However, exceptions exist. The University of Saskatchewan has had mandatory retirement at age 67 over the period relevant to the data used in this study. Some institutions have had several regime changes over the period. For example, both Carleton University and York University switched from having mandatory retirement at 65 to having

[1] In 1997, universities in Manitoba were allowed to have mandatory retirement at age 65 or older under a special act.

it at age 71 and 70, respectively, to having mandatory retirement at age 65 again by the end of the sample period.

This study focuses on differences in the probability of being employed at a university according to whether the university has either: 1) mandatory retirement at age 65 versus 2) no mandatory retirement. Given the time frame of 1983 through 2001, the main source of variation in mandatory retirement rules across professors in the data is due to inter-provincial variation in mandatory retirement rules. This variation is used to identify differences in retirement decisions between faculty members who have the option of continuing in their positions beyond the age of 65 and those who do not. We also examine the impact that mandatory retirement rules may have on the earnings of professors.

IV. Faculty sample and summary statistics

Data from the master files of the Full-Time University Teaching Staff Data over the period 1983 to 2001 are employed in the analysis.[2] This confidential, administrative data base is collected each year by Statistics Canada from each of the universities in Canada. It contains detailed information on each employee's salary, type of appointment (e.g. tenure and rank), years since first appointment as well as personal information such as age, gender and education.

The data are used both cross-sectionally and longitudinally in the analysis. Each year of data represents a census of all full-time teachers at Canadian universities and is used to estimate the age distribution of different sub-populations with a particular focus on differences in these age distributions across universities with different retirement rules.

Since each record in the database contains both a university identifier as well as an employee identifier, it is possible to track employees across time so long as they do not change institutions. Therefore, it is possible to generate an indicator variable for each professor that equals zero if the person remains at the institution across two adjacent years and equals one if the professor is present at the institution in the first year but is not present at the institution in the second year. This indicator variable is interpreted as capturing the exit decision of the professor. The sample employed in the analysis of these exit decisions is restricted to those full-time teachers age 58 through 71. Given the age restriction, these exits are likely to represent retirement decisions. However, some of these exits represent movements into other jobs (possibly at other Canadian universities).[3] It is important to note that full-time professors may drop down to a reduced teaching load without falling out of the sample. Therefore, the fact that a professor does not appear in the next year of the data does not mean that the faculty member has dropped down to part-time status. In addition, each professor on sabbatical continues to have a record in the database for the following year. Therefore, exit rates do not capture a faculty member's transition from teaching to being on an academic sabbatical.

In Appendix 1, a list of the 52 included institutions is presented. Small institutions were excluded based on having less than 100 full-time faculty members as of 2001/2002. The universities are grouped in Appendix 1 according to whether they are: 1) Medical/Doctoral, 2) Comprehensive or 3) Primarily Undergraduate. These groupings are based on the MacLean's Magazine's annual raking of Canadian universities taken from the

[2] We extend the data back to 1970 when we examine the earning profiles based on cohorts. However, we focus on data from 1983 to 2001 for most of the analysis since consistent individual identifiers are provided over this period allowing us to tract individuals over time.

[3] An analysis of the propensity for professors to exit their university to be employed at another Canadian university is beyond the scope of this paper is and is left for future research.

2002 publication. The first grouping can be thought of the universities with a large research component with a medical school and extensive doctoral programs. Universities in the second group do not have medical programs and in many cases have smaller graduate programs. The third group of universities includes those with only small graduate programs and with a main focus on undergraduate teaching. The main difference between the Canadian universities covered in the 2002 MacLean's survey and those included in our sample, is the fact that the sample of professors employed in this paper includes the professors from the Université du Québec group of universities. They have been placed in the Comprehensive category since their programs seem to fit best with those of the other universities in this group. In addition, the selection of universities described in the preceding paragraph did lead to a few differences in coverage relative to the MacLean's survey in terms of the primarily undergraduate category. However, given the small number of professors at these institutions, the inclusion or exclusion of these universities is unlikely to have a significant effect on the overall empirical results.

Figures 1-5 contain age distributions for selected years in the sample. In Figure 1, data from 1983/84 are employed to calculate the age distributions of universities in Ontario and Quebec. In this year, all of the universities in Ontario had mandatory retirement at the age of 65 while the universities in Quebec had only eliminated mandatory retirement in that year. Therefore, this comparison is intended to be a benchmark for the comparison of similar figures for future years. We see only small differences in the age distributions. A relatively high proportion of faculty members in the 36 to 45 age range is present in the Quebec graph while Ontario has a higher proportion of faculty members in the 46 to 65 age range. Quebec only has a slightly higher fraction of faculty over the age of 65 relative to

Ontario. One would expect these proportions to be similar given that the Quebec government had only eliminated mandatory retirement in 1983.

The overall patterns of the age distributions of professors at Canadian universities with mandatory retirement at 65 and those at universities without mandatory retirement are very similar to those for Ontario and Quebec, respectively. The mass of each distribution is centered around the age of 45 with only a small fraction of professors near the age of retirement. Also, differences in the post age 65 range by mandatory retirement regime appear to be small. However, given that most of the universities without mandatory retirement had only recently eliminated mandatory retirement (due to legislative changes in Manitoba in 1982 and Quebec in 1983) it is not surprising that clear differences in the post 65 part of the age distribution have not yet emerged.

In Figure 2, the equivalent age densities are presented for the year 1988/89. The aging of the stock of professors at Canadian universities is apparent when the distributions are compared with those of Figures 1 and 2. There is a general shifting to the right of the mass of the distributions. In particular, the fraction of professors near the age of 65 rises over the five year period. The difference in the distributions between the Quebec and Ontario universities at age 66 and older also diverges over the five year period with a greater fraction of professors being over the age of 65 in Quebec compared with in Ontario. The same relationship is present when all universities with mandatory retirement at the age of 65 are compared with those without mandatory retirement. The fraction of professors over the age of 65 in universities without mandatory retirement is larger at 7.8 percent than the equivalent fraction at universities with mandatory retirement at age 65 at 6.5 percent.

In Figure 3, the same estimated distributions are presented for the academic year, 1993/94. The mass of each distribution has continued to shift to the right indicating that the

stock of professors has aged on average over the period. In addition, the difference in the proportion of faculty members over age 65 between the universities in Quebec and the universities in Ontario has risen. A similar increase in the fraction of professors over the age of 65 is apparent in Figure 6 in the age distribution for the universities without mandatory retirement. Therefore, a clear pattern emerges that the relaxation of the mandatory retirement at 65 rules has a significant impact on the fraction of professors over the age of 65. Also, the magnitude of this effect grew over the late 1980s and early 1990s as the fraction of professors over the age of 60 grew.

In Figure 4, the equivalent age distributions are plotted for the 1998/99 academic year. The distributions are generally similar to those in Figure 3. However, each distribution appears to have shifted further to the right with a growing fraction of professors closing in on age 65. The percentage of professors over the age of 65 at universities without mandatory retirement is higher than the equivalent percentage at universities with mandatory retirement at age 65, at 10.7 and 8.0 percent, respectively. However, this difference does not appear to have grown substantially when compared with the equivalent percentages from Figure 3. This raises the possibility that in the absence of mandatory retirement, some professors may stay on past age 65 but the fraction that do is not large or that they do not stay on many years beyond age 65. Given the large number of professors that are on the verge of turning 65 in universities without mandatory retirement, their retirement decisions have the potential to have a huge impact on the age structure of those universities.

In Figure 5, the age distributions are presented for the most recent academic year in the sample, 2001/02. The fraction of professors over the age of 65 is higher in Quebec universities (3.5 percent) than in Ontario universities (1.1 percent) and higher in

universities without mandatory retirement (3.4 percent) compared with those that have mandatory retirement at age 65 (0.9 percent). Of particular interest is the fact that these differences appear to have grown since the 1998/99 year indicating that the proportion of university professors who stay on past age 65 in the absence of mandatory retirement may increase over time.

Taken together, this evidence indicates that the banning of mandatory retirement coupled with the aging of the stock of university faculty in Canada has led to important differences in the age distributions of universities without mandatory retirement relative to those with mandatory retirement at age 65. Also, given that a large fraction of the current stock of university professors will turn 65 in the next ten years, there is the potential for even larger differences in these age distributions in the near future. In order to explore these issues, the next part of the paper reports on the results of the analysis of the exit decisions of university faculty age 58 through 71.

The calculation of exit rates for individual professors relies on the individual identifier being consistent within institutions across subsequent years. Institutions on occasion have changed the definitions of their individual identifiers making it impossible to match faculty members across years. A complete list of the 15 relevant institution/year pairings where it was not possible to generate exit rates for this reason is presented in Appendix 2. The total number of observations excluded is small representing less than two percent of the sample of professor/year observations. In addition, there does not appear to be any pattern in the decision to change the person identifiers in the sense that they appear to be spread fairly evenly over time and across types of institutions. Therefore, it seems unlikely that this selection is an important issue for the analysis and these observations are excluded from the sample used in the analysis of exit rates.

In Table 1, sample means for the exit rates are presented for different age groups and by mandatory retirement regime. Over the entire sample of faculty 58 through 71, exit rates are higher for professors working in institutions with mandatory retirement at age 65 at 14.5 percent compared with 12.7 percent for professors working in institutions without mandatory retirement. At age 64, the exit rates are very similar at the two groups of universities with a slightly lower exit rate of 11.9 percent for faculty at universities with mandatory retirement at 65 relative to 12.3 percent for faculty at universities without mandatory retirement. For each of the other age groups presented, the exits rates are higher at the institutions with mandatory retirement at 65 relative to those without mandatory retirement with the difference being especially large at age 66 at 55.6 percentage points.

These sample means are presented graphically in Figure 6. Exit rates are very similar across the two categories of institutions over the ages 58 through 64 but diverge sharply from age 65 onwards.[4] This is strong preliminary evidence that the mandatory retirement at 65 is a significant constraint on the behaviour of university professors since professors not facing this constraint have much lower exit rates over the age range 65 through 68.

The next stage of the analysis involves the estimation of a discrete time logit model of exit from employment at a university for professors age 58 through 71. Before describing the results of the analysis, sample means of key variables employed are presented in Table 2. For professors age 58 through 71, 61 percent are employed at universities with mandatory retirement at the age of 65, 32.2 percent are employed at universities without mandatory retirement and the remaining professors are employed at

[4] The figures are not presented for the mandatory retirement at age 65 category after the age of 68 due to the sample size dropping below 100.

universities with mandatory retirement at other ages.[5] The average age of professors in the universities without mandatory retirement is approximately six months older than in the universities with mandatory retirement at the age of 65. In addition, the percentage of professors over the age of 65 at universities without mandatory retirement is 13.1 percent while only 4.1 percent of professors are over the age of 65 at universities with mandatory retirement at 65. The percentage of female faculty members is similar across the universities with mandatory retirement at 65 and those without mandatory retirement, at 13.5 and 13.2 percent, respectively. A somewhat higher percentage of professors at universities without mandatory retirement hold a Ph.D. at 73.4 percent relative to 70.6 percent at universities with mandatory retirement at 65. The breakdown by type of university indicates that mandatory retirement at 65 is somewhat more common at universities in the Medical/Doctoral category (55.7 percent versus 55.0 percent) and is much more common in the primarily undergraduate category (15.4 percent versus 2.5 percent). Finally, as discussed above, universities without mandatory retirement are predominantly in Quebec and Manitoba with much smaller representation in Ontario and no universities without mandatory retirement in the Atlantic region and British Columbia over the time period covered by the data.

IV. Econometric specification

The analysis of exit rates follows the method employed by Ashenfelter and Card (2002). A logit model of exit from employment is used that has the general specification:

$$\log[P(i,j,a,t)/(1-P(i,j,a,t))] = X(i,j,a,t)\beta + c_a(j,t) \qquad (1)$$

[5] For example, the University of Saskatchewan had mandatory retirement for faculty members at the age of 67 over the entire sample period.

where *P(i, j, a, t)* is the probability that individual *i* employed at university *j* at age *a* in year *t* exits from employment at the university before the start of the following year, conditional on having remained employed up to age *a*; *X(i, j, a, t)* contains a vector of observed characteristics of individual *i* and university *j*; β is a parameter vector, and $c_a(j, t)$ is a set of baseline exit-probability parameters for individuals at age *a* in year *t* at institution *j*. The baseline retirement probabilities are specified as:

$$c_a(j,t) = d_a + \Delta_a \times I[NMR_j] \qquad (2)$$

where $I[NMR_j]$ equals one if the university does not have mandatory retirement and equals zero otherwise. This specification allows for unrestricted variation by age in exit rates in institutions that have mandatory retirement at the age of 65 (captured by the d_a parameters) as well as age specific deviations from these exit rates for faculty members at institutions without mandatory retirement (captured by the Δ_a parameters).

V. Logit results

In Table 3, parameter estimates are presented from a logit model of the hazard rate of exiting from employment at the university that is consistent with the logistic discrete time duration model based on the method used by Ashenfelter and Card (2002). In the first column, results are presented without controls for personal or university characteristics. The specification includes a full set of unrestricted year dummy variables as well as unrestricted age dummy variables. These age variables are also interacted with a dummy variable for professors at universities without mandatory retirement.

The coefficient on the 'age 64'/'no mandatory retirement' interaction variable is near zero and statistically insignificant indicating that the exit rates are similar between

professors at this age at universities without mandatory retirement and those at university with mandatory retirement at 65. The other coefficients on the age interaction terms are statistically significant and indicate a lower rate of exit from employment at the university for professors at universities without mandatory retirement relative to professors at universities with mandatory retirement. The logit coefficients range from -1.14 to -2.66. Near the bottom of the column, the estimated retirement rates are presented indicating that at age 65 the exit rate is 28.2 percentage points lower for professors at universities without mandatory retirement compared with those at universities with mandatory retirement at age 65.[6] At age 66, the difference in the retirement probabilities is even larger at 33.9 percentage points. These estimates are similar in magnitude to those found by Ashenfelter and Card (2002) in terms of the effect on retirement rates of university professors in the US at the age of 70 and 71 of the elimination of mandatory retirement at age 70.

In the second column of Table 3, results are presented from an equivalent logit model of exit from employment at the university, but where controls for personal characteristics and university characteristics are also included. In particular, a set of seven subject area dummy variables are included[7] as well controls for region.[8] In addition, controls are included for the three types of universities: 1) Medical/Doctoral, 2) Comprehensive and 3) Primarily Undergraduate, and these controls are also included as interactions with a female indicator variable. Finally, a dummy variable is included to control for whether the faculty member has a Ph.D.

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[6] Following Ashenfelter and Card (2002), the retirement rates are generated using the approximation $\Delta_a \times P_a \times (1-P_a)$ where P_a is the average probability of exit at age a for individuals at universities with mandatory retirement at age 65.

[7] The subject areas are: 1) arts, 2) mathematics and science, 3) health, 4) humanities, 5) social science, 6) agriculture and 7) engineering.

[6] The regions are: 1) British Columbia, 2) Alberta, 3) Manitoba, 4) Saskatchewan, 5) Ontario, 6) Quebec, and 7) the four Atlantic provinces.

In general, the pattern of results for the exit by age parameters are similar to those found in column (1). Exit rates are lower for professors at age 65 and older for faculty at universities without mandatory retirement and this effect is especially large at age 66. At the bottom of the table, the estimated mean retirement rates are also similar to those of column (1) at 29.2 and 34.6 percentage points for professors age 65 and 66, respectively. The coefficient on the interaction between the female variable and the Medical/Doctoral category are more likely to exit from employment than are men at the same category of university. Also worth noting is the fact that holding a Ph.D. is associated with a lower probability of exiting employment at the university with a coefficient of –0.3.

In column (3) of Table 3, the equivalent logit model is estimated with the inclusion of log earnings from the previous year.[9] The coefficient on the earnings variable is negative and significant implying a lower exit rate for professors with higher earnings. The coefficient, -0.63, has the same sign as that found by Ashenfelter and Card (2002) in a similar specification of their retirement hazard model. The other coefficients are for the most part similar to those from column (2). The coefficients on the age/no-mandatory-retirement variables are very similar to those in column (2). However, some differences are present. The coefficient on the interaction of the female variable with the Medical/Doctoral variable is no longer significant once the earnings variable is included. Also, the coefficient on the Ph.D. dummy variable drops from –0.3 to –0.25.

In Table 4, results are presented that are equivalent to those of Table 3 but for the case of male faculty members. The estimated parameters are generally similar to those found in Table 3. The same pattern of lower exit rates for professors at universities without mandatory retirement relative to universities with mandatory retirement at age 65 are found

for each age group from age 64 through 68. The mean exit rates are 29 to 36 percentage points lower for male professors at universities without mandatory retirement relative to male professors at universities with mandatory retirement at age 65.

An additional column is included in Table 4 which contains the estimates from a model equivalent to that used in generating the Column (3) numbers but estimated over the sample of faculty members who received their highest degree at age 34 or older (39.4 percent of the original sample). This group is of interest because age specific exit rates for faculty at universities without mandatory retirement may be lower for professors who graduated later in life and have relatively fewer years after graduation in which to earn a return on their human capital investments. In general the results in column (4) are very close to those found in column (3). There are differences in the point estimates; however, the magnitudes of these differences are generally small. The estimated difference in mean exit rates between faculty at universities without mandatory retirement and those with mandatory retirement at age 65 are very close to those found in column (3) at -30.1 percent versus -31.4 percent for age 65 and -35.0 percent and -37.6 percent for age 66.

In Table 5, equivalent results to those in Table 3 are presented but the exit rate hazard model is estimated over the sample of female professors. Due to the smaller sample size, it was not possible to get reliable estimates for each of the age-specific exit rate parameters. Therefore, the estimated parameters are only presented if at least 100 female faculty members are present in the sample at the relevant age. The results are generally similar to those found in Tables 3 and 4. The coefficients on the age/no-mandatory-retirement variables are generally similar in sign and magnitude to the corresponding

[9] The earnings variables are converted into year 2000 dollars using the CPI.

estimates in each of the columns of Tables 3 and 4. The estimated mean exit rates at the bottom of the table imply 23.3 to 30.6 percentage points lower exit rates at age 65 and 66 for female faculty members at universities without mandatory retirement relative to their female counterparts at universities with mandatory retirement at age 65. These estimates are generally smaller in magnitude than those found in Table 4 indicating that mandatory retirement may have a smaller impact on the exit behaviour of female faculty members relative to male faculty members. This is an important finding since one of the arguments often made against mandatory retirement is that it may be an especially large constraint for women who may spend years out of the labour market in the early part of their careers caring for young children. The results from Tables 4 and 5 indicate that this may not be the case on average since the differences in exit rates between faculty at universities without mandatory retirement and those with mandatory retirement at age 65 are smaller in magnitude for female faculty relative to their male counterparts.

One possibility is that a subset of female faculty (those who finished their highest degree relatively late in their career are greatly affect by mandatory retirement constraints while most female faculty are not. In order to explore this possibility, it is useful to compare the results of column (4) in both Table 5 and Table 4 since the sample in each case is restricted to faculty who received their highest degree at age 34 or older. The point estimates in column (4) of Table 5 are very similar to those of column (3) of Table 5 indicating that women who received their highest degree later in their working lives are not more sensitive to the presence of mandatory retirement rules relative to those women who received their highest degrees relatively early in their careers. In fact, the estimated mean exit rates at the bottom of each column are very similar in Table 5 as is also the case for the mean exit rates by age across columns (3) and (4) of Table 4. Therefore, focusing on

faculty who completed their highest degree later in their career does not affect the overall finding that the exit rates of female faculty at the age of 64 and 65 do not appear to be more sensitive to the absence of mandatory retirement rules than is the case for male faculty members.

In order to gain a fuller understanding of the estimated hazard rates derived from the estimates of Tables 4 and 5, discrete hazard rates for men and women are presented in Figure 7 and the associated survival probabilities are presented in Figure 8. The results are based on the estimated hazard models of column (2) of Tables 4 and 5. In Figure 7, male and female faculty members at institutions without mandatory retirement have much lower exit rates than their counterparts at universities with mandatory retirement at age 66. Once again, the estimated hazard rate is only plotted if at least 100 observations are available in the data to calculate the statistic; therefore, only the curve for men at universities without mandatory retirement extends beyond age 68. The survival probabilities in Figure 7 are derived from the hazard rates of Figure 12 and represent the probability of continuing employment at the same university for professors employed there at age 64. The survival probabilities are much higher for both men and women employed at universities without mandatory retirement. For men at universities without mandatory retirement the sample size of men over the age of 65 is large enough to allow for the calculation of the survival probability through age 72. While these men have much lower exit rates than their counterparts at universities with mandatory retirement at age 65, the survival probability to age 72 is 15.8 percent. This is somewhat surprising given the fact that Ashenfelter and Card (2002) found much lower retirement rates for university faculty at age 70 and 71 after the elimination of mandatory retirement at age 70. In the Canadian case, a significant proportion of faculty will work past age 65 in the absence of mandatory retirement but a

relatively small fraction of faculty will work into their early seventies. This is an important difference that deserves further investigation. It may be that other differences in institutional features between the American and Canadian academic settings lead to much earlier exit from employment in Canada relative to in the United States.

VII. Deferred Compensation and Returns to Experience

Given the large impact that the existence of mandatory retirement rules has been found to have on the exit behavior of workers close to age 65, it may be the case that the removal of mandatory retirement may have an impact on salary offers and negotiated settlements from collective bargaining. In particular, universities may be prepared to pay salaries to faculty members that are above their productivity if they are close to retirement; however, if the mandatory retirement rule is replaced then the same universities may be unwilling to continue to pay older faculty salaries above their productivity level if there is no clear end in sight. This would likely be the case if there were significant costs associated with either lowering the level (or perhaps growth) of a faculty member's salary in the context of a collective bargaining agreement. Another argument in favour of an effect on salaries of the absence of mandatory retirement was made by Lazear (1979). He argued that deferred compensation may be more difficult to achieve in the absence of mandatory retirement and consequently, there may not exist as high of a return to experience for older workers in the absence of mandatory retirement.

In this section of the paper, we investigate the relationship between salaries and age for university faculty according to whether their university had mandatory retirement or not. To the best of our knowledge this type of analysis has not been carried out before. Ashenfelter and Card (2002) did not report results of this kind and this may be due to the

fact that their data sets were designed to overlap fairly closely to the timing of the removal of mandatory retirement. Hence, in the US data it would be difficult to identify the impact on the age-salary profiles of the academics affected by the change in rules. In the Canadian data, there are many more years of observations on universities both with and without mandatory retirement being in place. This means that we can investigate the impact on the returns to experience for a large group of Canadian faculty.

In Figures 9 and 10, predicted age-earnings profiles are presented for the case of women and men. The predictions are generated from regression models with the following specification

$$E_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + NMR_{jt}(\beta_3 + \beta_4 Age_{it} + \beta_5 Age_{it}^2) + \varepsilon_{it} \qquad (3)$$

where E_{it} is the individual's annual earnings, Age_{it} is the individual's age and NMR_{it} is an indicator variable for whether the individual works at a university that does not have mandatory retirement.[10] This regression model was estimated separately for men and women over the pooled sample using all of the years of the data. In each figure, separate profiles are presented for the case of professors at universities with and without mandatory retirement. For both men and women, the returns to an additional year of work experience are lower after the age of 50 for professors at universities without mandatory retirement than for professors of the same gender at universities with mandatory retirement. The magnitude of this effect is more pronounced for the case of men than for women. For the case of women, the two profiles are close together but there is evidence of higher earnings for female professors at universities without mandatory retirement during the middle of their careers but virtually no difference at age 30 and at age 65. For the case of men, the

[10] The age variable was defined as Age-30 in order to allow for easier interpretation of the β_0 and β_3 parameters.

two profiles are very close together over the age range of 30 to 50 but a significant divergence occurs at older ages.

Next, we investigate whether these differences in the age-earnings profiles of men and women, according to the mandatory retirement status of the university, vary across time. Equation (3) was estimated using a single cross-section of data taken from selected years of the data: 1983, 1989, 1995 and 2001. Rather than present the actual age-earnings profiles, we present the difference in the profiles across institutions without mandatory retirement and those with mandatory retirement. If no differences existed across these types of institutions in terms of the gender-specific age-earnings profiles, then the predicted curves would be horizontal with a vertical intercept at zero. For the case of female professors, the trend in these curves indicates a relative decline in the earnings of professors at universities without mandatory retirement (relative to universities with mandatory retirement) over the period 1983 through 2001. These differences are most pronounced at the younger and older ages with a very large drop off at older ages in the 2001 survey. One possible explanation for the sharp shifting down of these curves is that institutions may have offered lower salaries to faculty younger than age 65 so as to be able to finance the relatively higher salaries of faculty choosing to stay on beyond age 65.

A similar pattern is found in Figure 12 for the case of male professors. The general pattern of a downward decline in these curves for most recent cross-sections of data indicate that the male professors at universities without mandatory retirement have not kept up with the professors at universities with mandatory retirement in terms of salaries. As was suggested above, this may result from universities needing to hold some funds back that could have gone towards higher salaries so as to pay the relatively high salaries of faculty who have stayed on past age 65. However, other possible explanations exist such as

heterogeneity across the universities with and without mandatory retirement in terms of their overall budgets. Unlike what was found in Figure 11 for women, the position of male professors over the age of 55 does not appear to decline for the last cross-sectional year. The general shape of these curves appears to be very similar across each of the survey years.

The final part of the earnings analysis extends equation (3) to allow for the age–earnings relationship for faculty at both groups of universities to vary by birth cohort. The rationale for this approach is to investigate whether each cohort of professors had a different age-earnings profile at universities without mandatory retirement when compared with the same cohort at universities with mandatory retirement. We extend the data back to 1970 in order to cover a larger number of cohorts. In Figures 13 and 14, predicted age-earnings profiles are presented for male professors at each of the two groups of universities. In both cases, a pattern of cross cohort decline in earnings over the age range of 30 through 50 is apparent. This indicates that earnings at the same age have been lower in real terms for more recent birth cohorts than for earlier birth cohorts. At the older ages, a different cross-cohort pattern emerges. For faculty at universities with mandatory retirement, the slope of the earnings-age profile is positive and similar to the slope at earlier ages and for the more recent birth cohorts. However, in Figure 13, we see that the age-earnings profiles for these earlier cohorts are flatter over the age range of 50-65 and in the case of two earliest cohorts dip and have a negative slope between age 60 and age 65. In Figure 15, the differences between each curve in Figure 13 and the corresponding curve in Figure 14 are plotted by birth cohort in order to highlight these differences in the age-earnings profiles across the two groups of institutions. While the patterns are not simple, two general relationships emerge. First, for more recent birth cohorts, professors at universities without

mandatory retirement have lost ground for more recent birth cohorts when compared to the earnings predicted earnings of professors from the same birth cohort at universities with mandatory retirement. Second, the returns to experience of professors aged 50 to 65 have declined for more recent birth cohorts of professors at universities without mandatory retirement relative to professors from the same birth cohort at universities with mandatory retirement. This can be seen by the shifting down and the increase in the magnitude of the downward sloping curves for birth cohort 1935-39 relative to 1930-34. In Figures 16, 17 and 18, equivalent profiles are presented for female professors. While differences exist, the overall patterns are very similar to what was found for male professors.

VIII. Conclusions

The implications of mandatory retirement rules on the retirement behaviour of university faculty members have been analyzed using administrative data from Statistics Canada. The age distributions of professors at universities without mandatory retirement and those at universities with mandatory retirement at age 65 have diverged over time with a higher fraction of professors over the age of 65 at universities without mandatory retirement.

An analysis of a discrete time hazard model indicates that faculty members have exit rates at age 64 and 65 that are 30 to 35 percentage points lower than those of their counterparts at universities with mandatory retirement. Similar results are found for both men and women; however, the magnitude of this effect is somewhat smaller for women. This does not support the view that mandatory retirement is a more severe constraint on the behaviour of female academics who may be more likely to have had career interruptions than their male counterparts. Equivalent results were found by gender group when the

sample was restricted to faculty members who received their highest degree at age 34 or older indicating that duration of the remainder of the career does not appear to be an important determinant of the exit rates of either male or female faculty members over the age of 64 at universities without mandatory retirement rules.

It is important to know not only whether professors will continue to work after the age of 65 in the absence of mandatory retirement, but how long they will continue to work. At age 69, virtually no professors are employed at universities with mandatory retirement at the age of 65. For universities without mandatory retirement, close to 40 percent of professors who were employed at the age of 64 remain employed at the university.

However, for older professors at universities without mandatory retirement, the probability of continuing to work is lower. Estimated survival probabilities indicate that male faculty members employed at the age of 64 at a university without mandatory retirement only have a 15.8 percent probability of continuing to work at the university until age 72. This indicates that while many university professors will work past the age of 65 if allowed, the vast majority of them will retire by the age of 72.

An analysis of the returns to experience of professors over the age of 50 indicates a lower return to experience for professors at universities without mandatory retirement relative to those at universities with mandatory retirement. This was found to be the case for both men and women with the effect being more pronounced in the case of men.

Looking across time, the salary position of both male and female professors in universities without mandatory retirement declined relative to those at universities without mandatory retirement over the age range 30 to 65. This may be due to lower salaries being offered to faculty prior to the age of 65 so as to ensure adequate funds are available to pay the salaries of professors working beyond the age of 65.

Finally, an analysis by birth cohort indicates a decline in the earnings of younger faculty at universities without mandatory retirement relative to faculty of the same age and birth cohort at universities with mandatory retirement. In addition, faculty age 50 to 65 at universities without mandatory retirement have lower earnings and lower returns to experience than faculty of the same age and cohort at universities with mandatory retirement.

Table 1
Exit rates of university professors by age (%):
1983/84 through 2000/01

	Mandatory retirement at 65	No mandatory retirement
Age 58 to 71	14.5 (0.02)	12.7 (0.18)
Age 64	11.9 (0.44)	12.3 (0.67)
Age 65	54.8 (0.73)	28.8 (0.99)
Age 66	84.6 (0.81)	29.0 (1.18)
Age 67	51.6 (2.82)	21.3 (1.28)
Age 68	58.4 (3.90)	28.7 (1.62)
Age 69	--	28.3 (1.97)
Age 70	--	35.7 (2.54)
Age 71	--	28.1 (3.03)

Note: Standard errors are in parentheses.

Table 2
Sample means of key variables for professors age 58 to 71:
1983/84 through 2001/02

	All universities	Universities with mandatory retirement at 65	Universities with no mandatory retirement
Mandatory retirement at 65	61.0 (0.15)	100	0
No mandatory retirement	32.2 (0.15)	0	100
Age (years)	61.4 (0.01)	61.1 (0.01)	61.7 (0.02)
Over age 65	7.67 (0.08)	4.10 (0.08)	13.1 (0.19)
Female	13.3 (0.11)	13.5 (0.14)	13.2 (0.19)
Holds a Ph.D.	71.6 (0.14)	70.6 (0.18)	73.4 (0.24)
Medical/Doctoral university	56.7 (0.15)	55.7 (0.20)	55.0 (0.27)
Comprehensive university	32.2 (0.15)	28.5 (0.18)	41.4 (0.27)
Primarily undergraduate university	10.5 (0.10)	15.4 (0.14)	2.49 (0.09)
Newfoundland and Labrador, PEI, Nova Scotia and New Brunswick	9.33 (0.09)	15.3 (0.14)	0
Quebec	23.9 (0.13)	0	74.1 (0.24)
Ontario	39.4 (0.15)	59.3 (0.20)	5.63 (0.13)
Manitoba	5.32 (0.07)	0	10.9 (0.17)
Saskatchewan	4.63 (0.07)	1.84 (0.05)	0
Alberta	7.64 (0.08)	7.56 (0.11)	9.40 (0.16)
British Columbia	9.77 (0.09)	16.1 (0.15)	0
Sample size	103,427	63,067	33,314

Note: Means presented as percentages unless otherwise noted. Standard errors are in parentheses. The percentage of universities without mandatory retirement and those with mandatory retirement do not add up to 100 percent because of the universities with other mandatory retirement ages.

Table 3
Parameter estimates for pooled logistic hazard model of exit from the university

Variables	(1) No controls	(2) Controls	(3) Controls and earnings
No mandatory retirement/Age interaction variables			
Age 64	0.02 (0.08)	0.06 (0.09)	-0.03 (0.91)
Age 65	-1.14 (0.06)	-1.18 (0.08)	-1.23 (0.08)
Age 66	-2.66 (0.09)	-2.71 (0.10)	-2.76 (0.10)
Age 67	-1.53 (0.14)	-1.59 (0.15)	-1.57 (0.15)
Age 68	-1.38 (0.18)	-1.43 (0.19)	-1.43 (0.19)
Personal/university characteristics			
Primarily undergraduate	—	0.05 (0.04)	-0.02 (0.04)
Comprehensive	—	-0.06 (0.03)	-0.07 (0.03)
Female at medical/doctoral	—	0.08 (0.04)	-0.01 (0.04)
Female at comprehensive	—	0.06 (0.05)	-0.01 (0.05)
Female at primarily under.	—	0.06 (0.08)	-0.01 (0.08)
Hold Ph.D.	—	-0.30 (0.03)	-0.25 (0.03)
log earnings in previous year	No	No	-0.64 (0.05)
Controls for region and subject	No	Yes	Yes
Implied change in mean exit behaviour (%)			
At age 65	-28.2 (1.5)	-29.2 (2.0)	-30.4 (2.0)
At age 66	-33.9 (1.2)	-34.6 (1.3)	-35.2 (1.3)
Pseudo-R^2	0.19	0.20	0.20
Sample size	96,913	96,381	95,704

Notes: Standard errors are in parentheses. Models are fit to retirement probabilities for ages 58 to 71 for the period 1983/84-2000/01. Individuals at universities with mandatory retirement ages other than 65 have been excluded from the sample. All models include unrestricted year dummy variables, as well as unrestricted age dummy variables on their own and interacted with the 'no mandatory retirement' dummy variable.

Table 4
Parameter estimates for pooled logistic hazard model of exit from the university: Results for men

Variables	(1) No controls	(2) Controls	(3) Controls and earnings	(4) Graduated age 34 or older
No mandatory retirement/Age interaction variables				
Age 64	0.004	-0.04	-0.07	-0.03
	(0.08)	(0.10)	(0.10)	(.015)
Age 65	-1.17	-1.23	-1.27	-1.21
	(0.06)	(0.08)	(0.08)	(0.12)
Age 66	-2.68	-2.75	-2.80	-2.48
	(0.09)	(0.11)	(0.11)	(0.15)
Age 67	-1.57	-1.64	-1.62	-1.38
	(0.15)	(0.16)	(0.16)	(0.22)
Age 68	-1.32	-1.39	-1.39	-1.61
	(0.19)	(0.20)	(0.20)	(0.28)
Personal/university characteristics				
Comprehensive	—	-0.08	-0.08	-0.10
		(0.03)	(0.03)	(0.44)
Primarily undergraduate	—	0.03	-0.04	-0.003
		(0.04)	(0.04)	(0.06)
Hold Ph.D.	—	-0.29	-0.25	-0.35
		(0.03)	(0.03)	(0.05)
log earnings in previous year	No	No	-0.66	-0.54
			(0.05)	(0.09)
Controls for region and subject	No	Yes	Yes	Yes
Implied change in mean exit behaviour (%)				
At age 65	-29.0	-30.4	-31.4	-30.1
	(1.5)	(2.0)	(2.0)	(3.0)
At age 66	-36.0	-37.0	-37.6	-35.0
	(1.2)	(1.5)	(1.5)	(1.7)
Pseudo-R^2	0.19	0.20	0.20	0.21
Sample size	83,893	83,452	82,896	32,059

Notes: Standard errors are in parentheses. Models are fit to retirement probabilities for ages 58 to 71 for the period 1983/84-2000/01. Individuals at universities with mandatory retirement ages other than 65 have been excluded from the sample. All models include unrestricted year dummy variables, as well as unrestricted age dummy variables on their own and interacted with the 'no mandatory retirement' dummy variable.

Table 5
Parameter estimates for pooled logistic hazard model of exit from the university: Results for women

Variables	(1) No Controls	(2) Controls	(3) Controls and earnings	(4) Graduated age 34 or older
No Mandatory retirement/Age interaction variables				
Age 64	0.17 (0.21)	0.31 (0.25)	0.30 (0.25)	0.03 (0.32)
Age 65	-0.94 (0.16)	-0.84 (0.21)	-0.90 (0.21)	-0.87 (0.26)
Age 66	-2.54 (0.25)	-2.46 (0.28)	-2.51 (0.29)	-2.62 (0.37)
Age 67	-1.20 (0.42)	-1.23 (0.45)	-1.18 (0.45)	—
Personal/university characteristics				
Comprehensive	—	0.01 (0.07)	-0.0003 (0.07)	-0.13 (0.09)
Primarily under.	—	0.12 (0.10)	0.08 (0.10)	-0.02 (0.12)
Hold Ph.D.	—	-0.35 (0.06)	-0.29 (0.06)	-0.32 (0.08)
log earnings in previous year	No	No	-0.56 (0.11)	-0.47 (0.15)
Controls for region and subject	No	Yes	Yes	Yes
Implied change in mean exit behaviour (%)				
At age 65	-23.3 (4.0)	-20.8 (5.2)	-22.3 (5.2)	-21.0 (6.3)
At Age 66	-30.6 (3.0)	-29.6 (3.4)	-30.2 (3.5)	-31.5 (4.5)
Pseudo-R^2	0.16	0.18	0.18	0.18
Sample size	13,020	12,929	10,573	7,915

Notes: Standard errors are in parentheses. Models are fit to retirement probabilities for ages 58 to 71 for the period 1983/84-2000/01. Individuals at universities with mandatory retirement ages other than 65 have been excluded from the sample. All models include unrestricted year dummy variables, as well as unrestricted age dummy variables on their own and interacted with the 'no mandatory retirement' dummy variable.

Figure 1
Age distributions of professors at Canadian universities
by region and retirement rule type: 1983/84

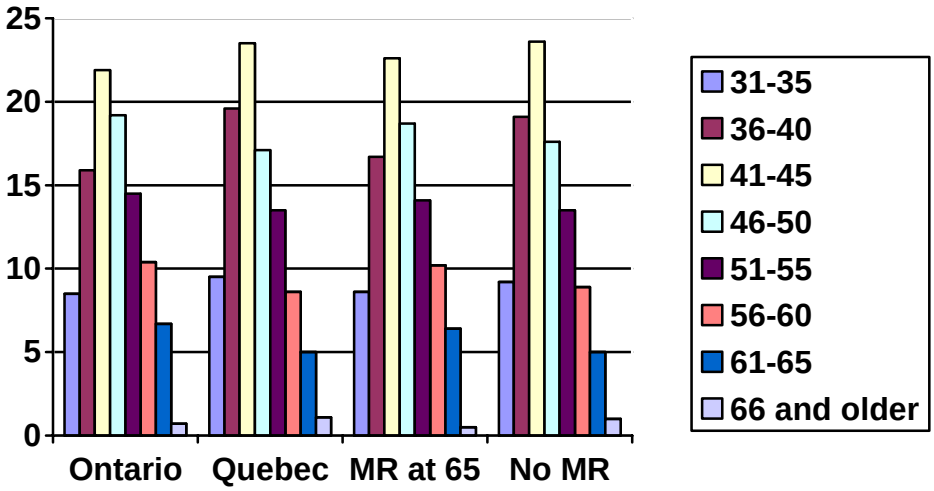


Figure 2
Age distributions of professors at Canadian universities
by region and retirement rule type: 1988/89

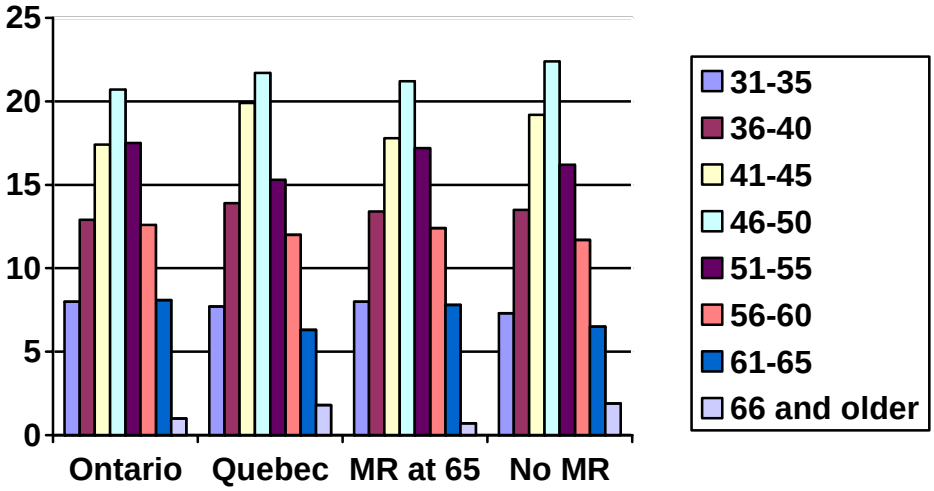


Figure 3
Age distributions of professors at Canadian universities
by region and retirement rule type: 1993/94

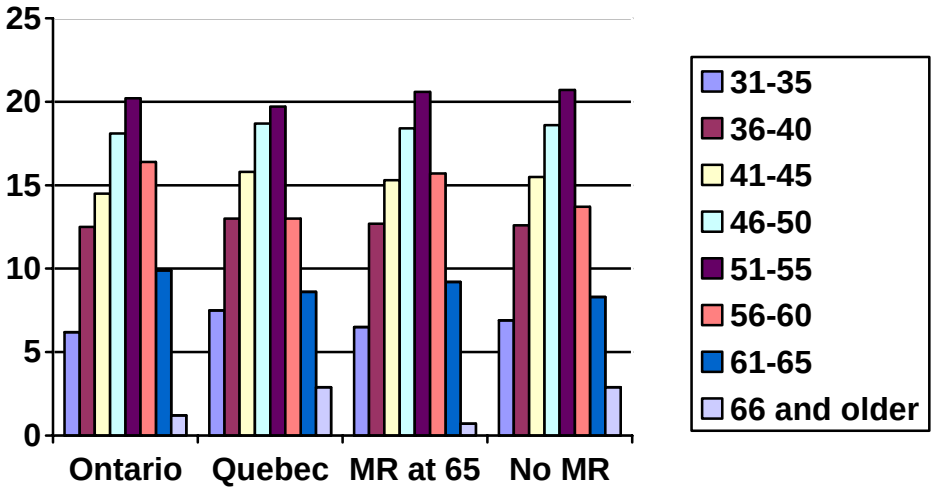


Figure 4
Age distributions of professors at Canadian universities
by region and retirement rule type: 1998/99

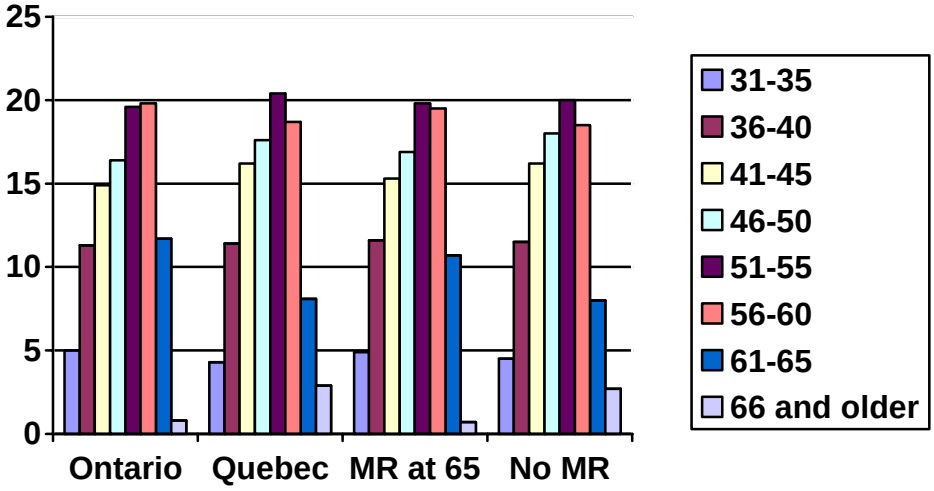


Figure 5
Age distributions of professors at Canadian universities
By region and retirement rule type: 2001/02

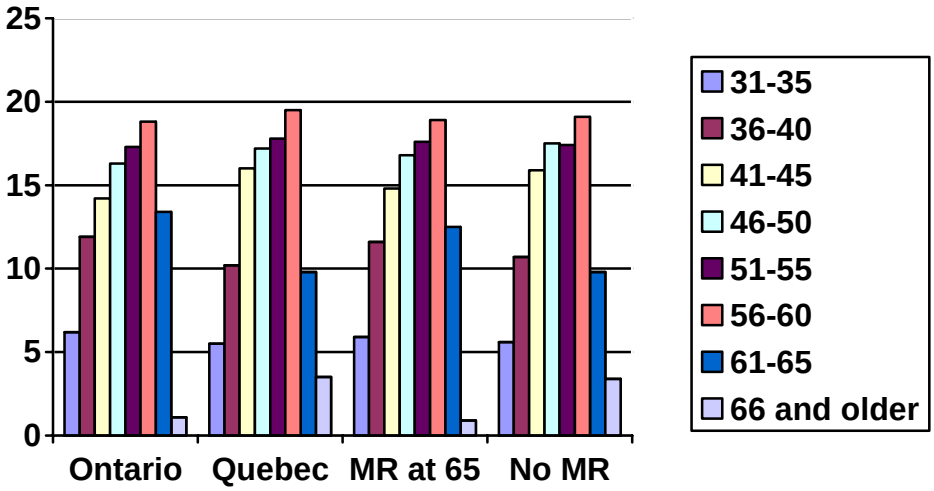


Figure 6
Exit rates of full-time professors in Canadian universities
by age and retirement rule
1983/84 through 2000/01

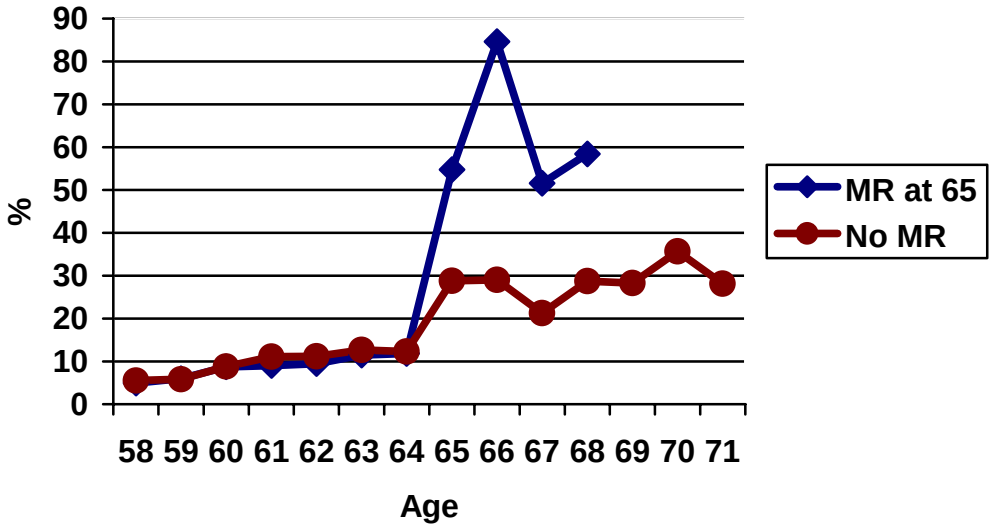


Figure 7
Discrete hazard rates for men and women:
1983/84 through 2000/01

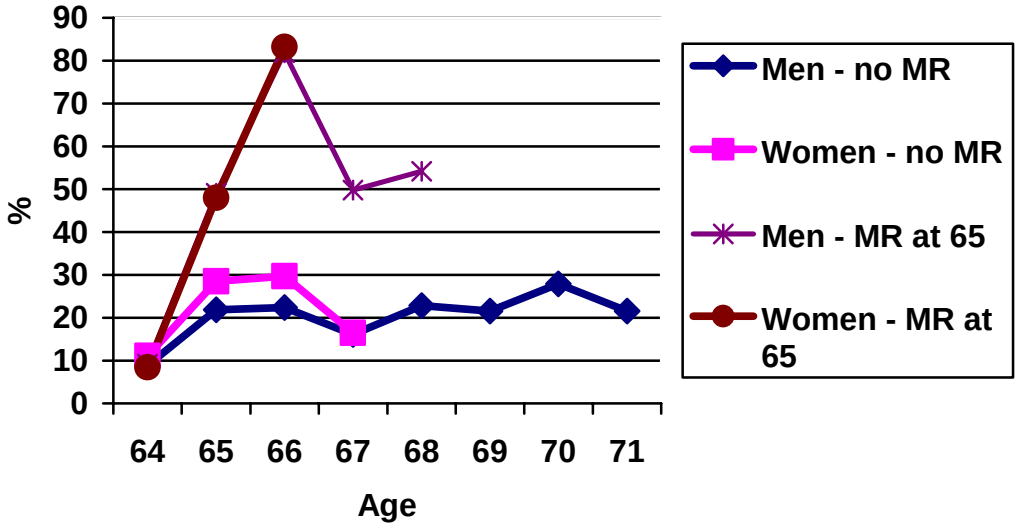
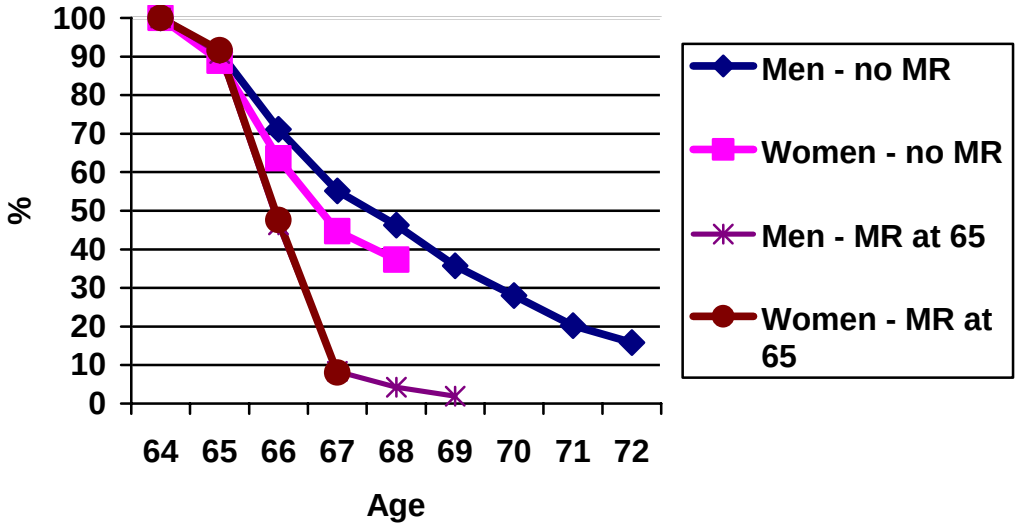


Figure 8
Survival probabilities for men and women:
1983/84 through 2000/01



Notes: Calculated using derived hazard rates using the estimated parameters of Column (2) of Table 3 and Table 4 for women and men, respectively. The survival probabilities are based on full-time employment at the institution at age 64.

Figure 9
Age-Earnings Profiles of Female Faculty:
Universities with and without Mandatory Retirement

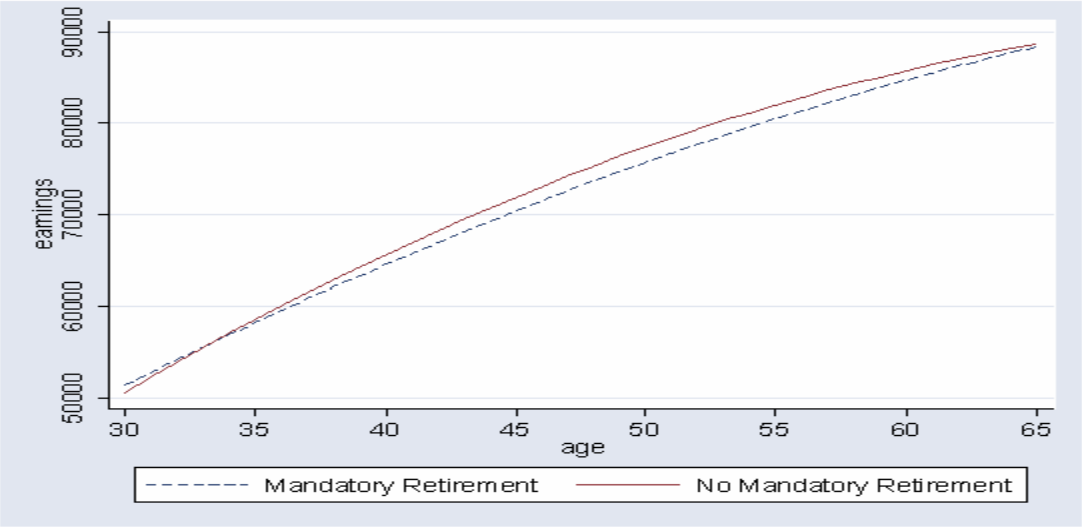


Figure 10
Age-Earnings Profiles of Male Faculty:
Universities with and without Mandatory Retirement

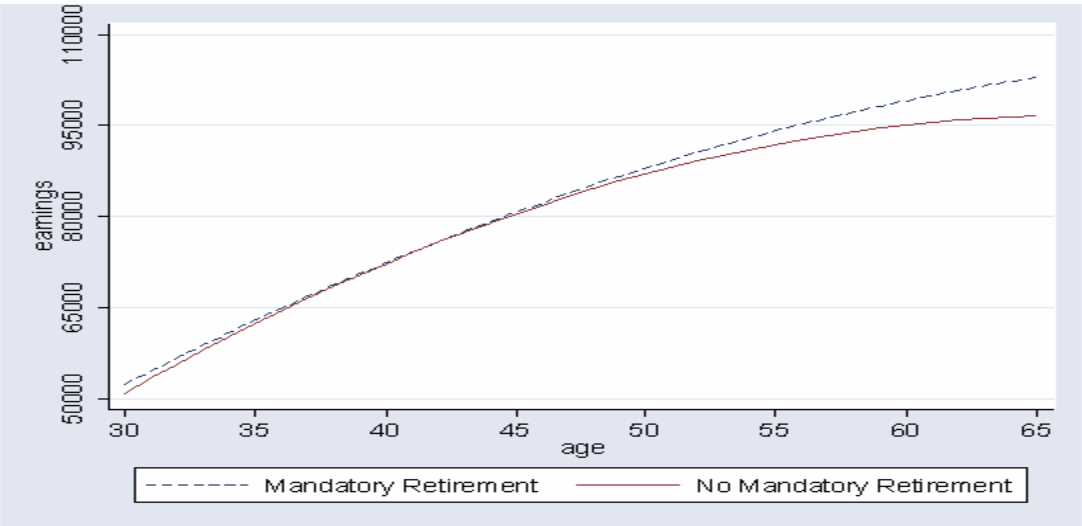


Figure 11
Differences in Predicted Earnings for Female Faculty between Universities without Mandatory Retirement and those with Mandatory Retirement: Cross-sectional Estimates for Selected Years

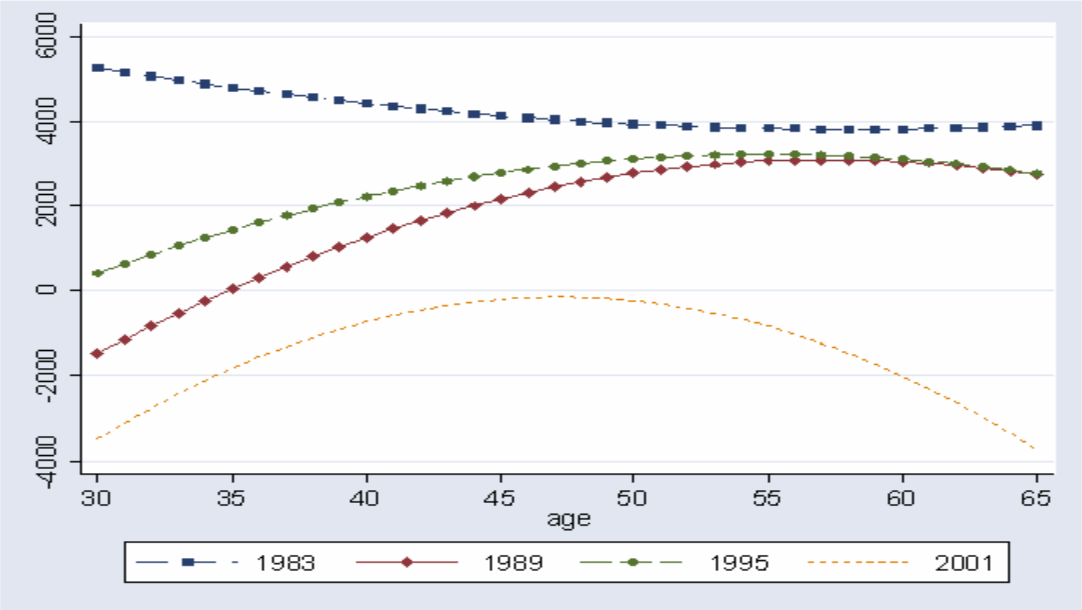


Figure 12
Differences in Predicted Earnings for Male Faculty between Universities without Mandatory Retirement and those with Mandatory Retirement: Cross-sectional Estimates for Selected Years

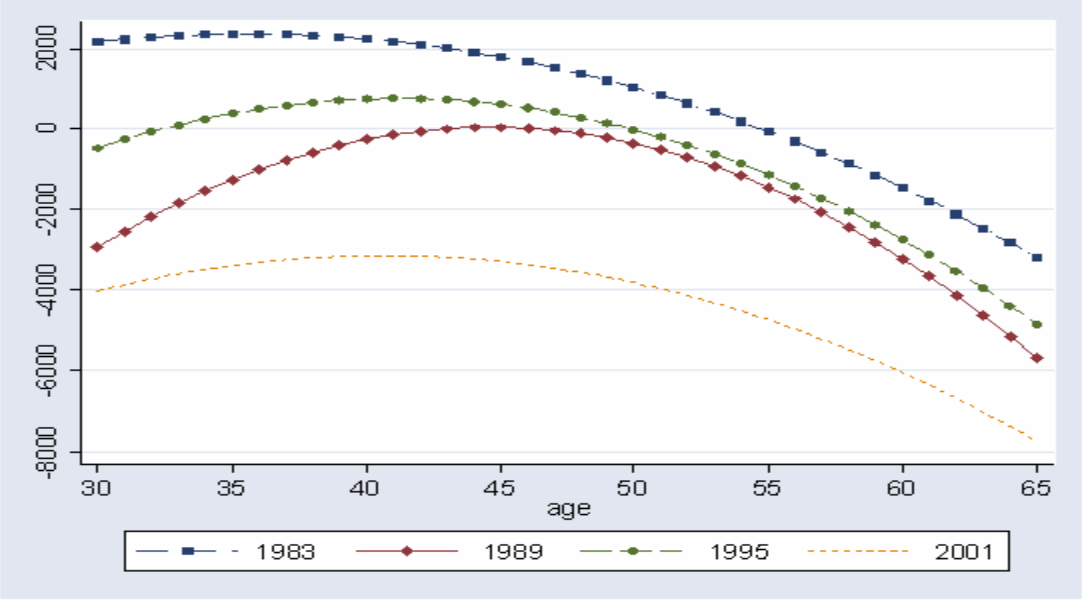
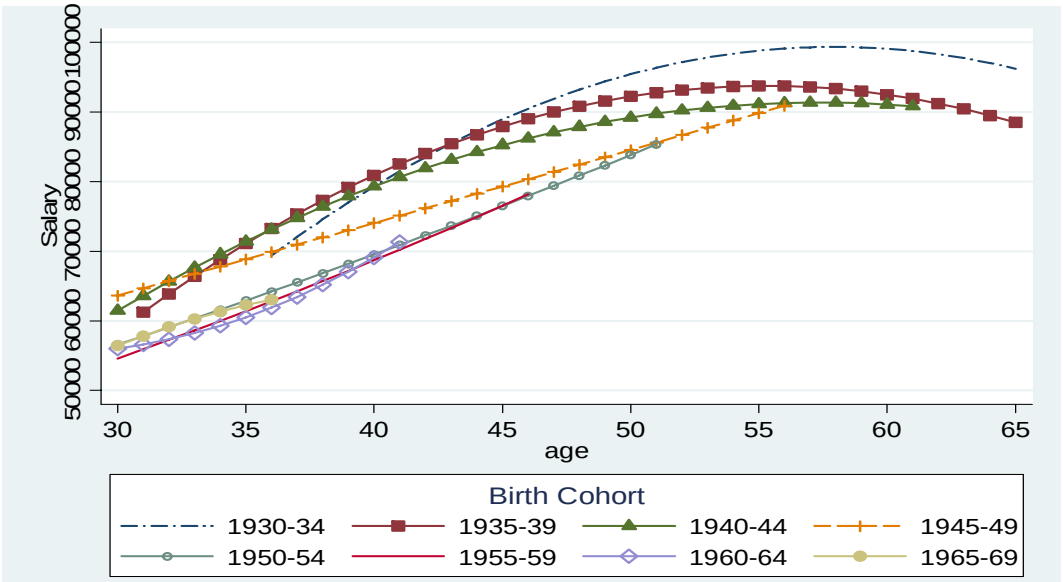
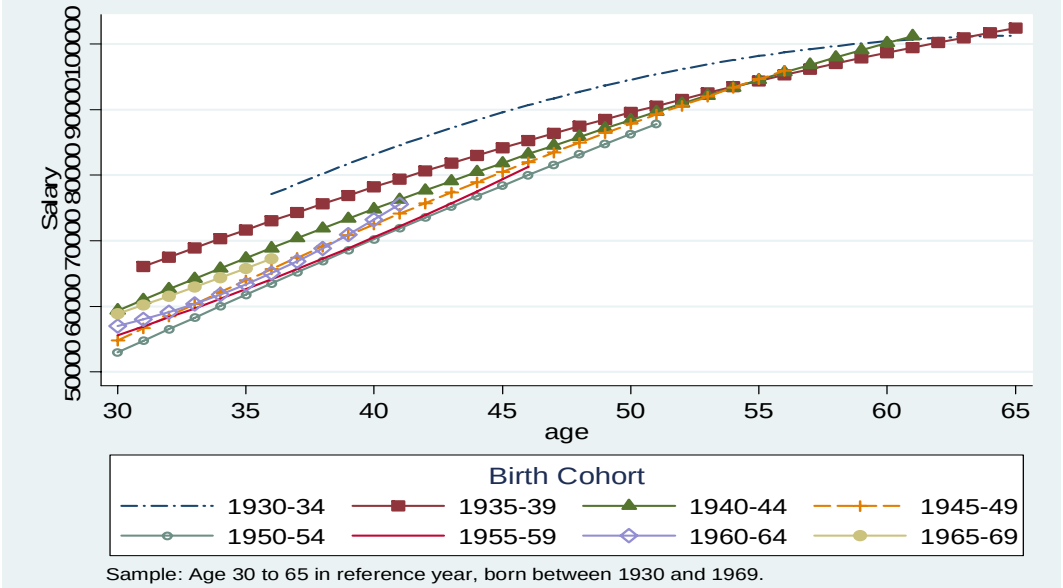


Figure 13
Age-Earnings Profiles of Male Faculty by Birth Cohort:
Universities without Mandatory Retirement



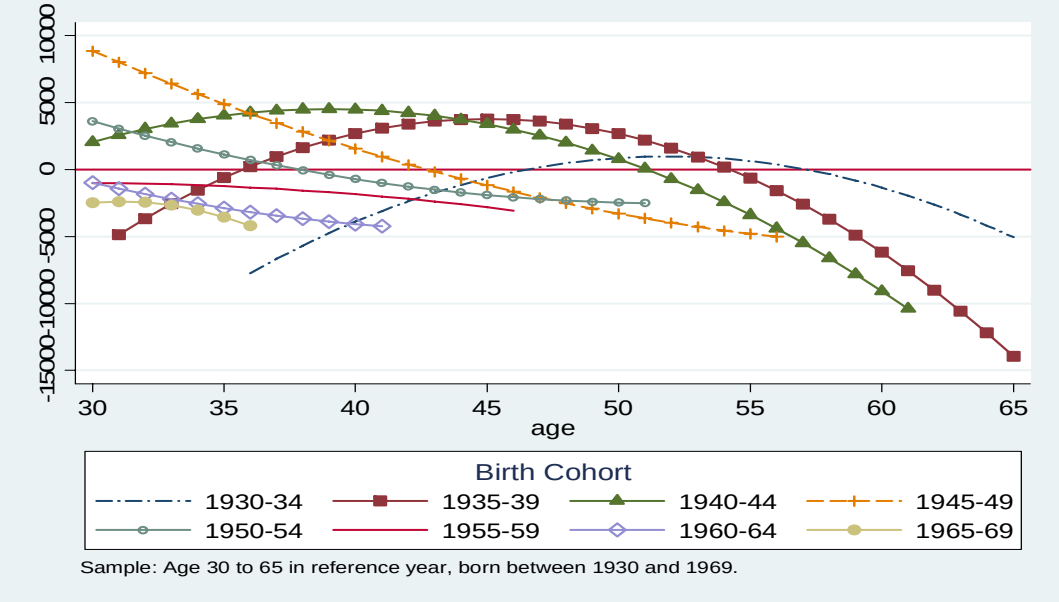
Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Figure 14
Age-Earnings Profiles of Male Faculty by Birth Cohort:
Universities with Mandatory Retirement



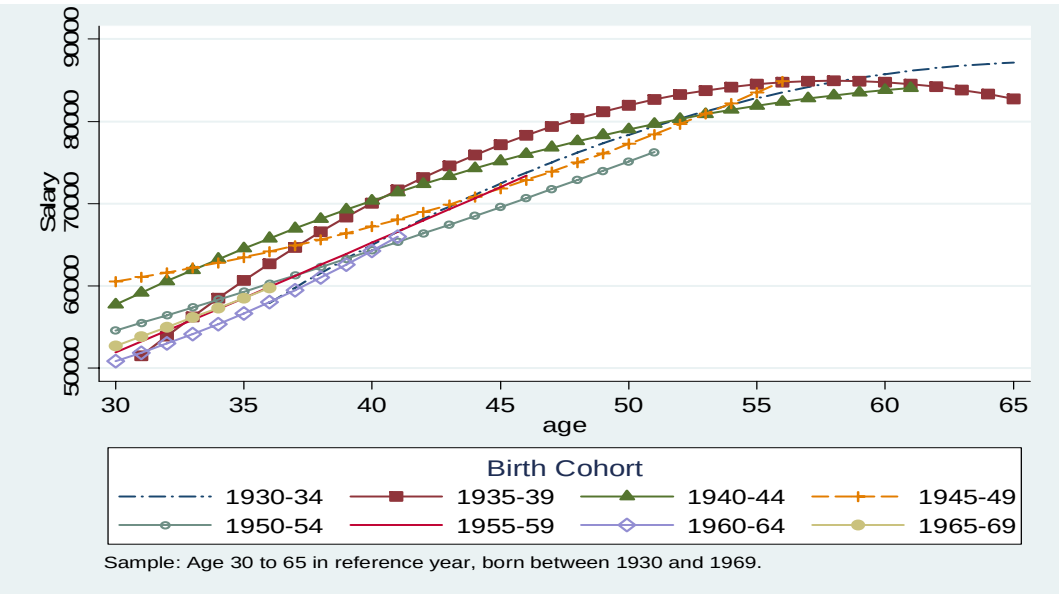
Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Figure 15
Differences in Predicted Earnings by Birth Cohort for Male Faculty between Universities without Mandatory Retirement and those with Mandatory Retirement



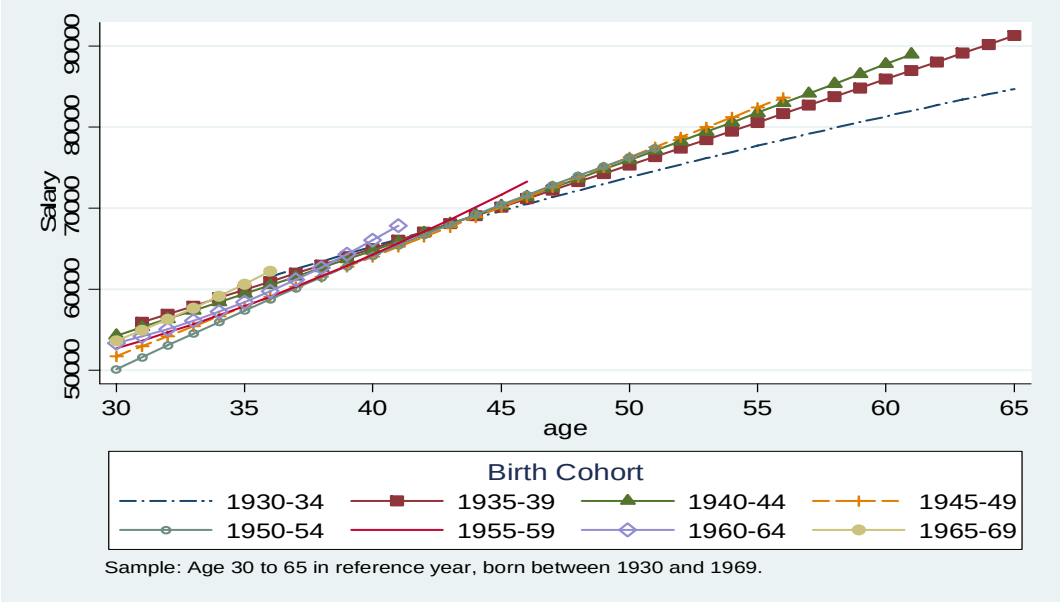
Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Figure 16
Age-Earnings Profiles of Female Faculty by Birth Cohort: Universities without Mandatory Retirement



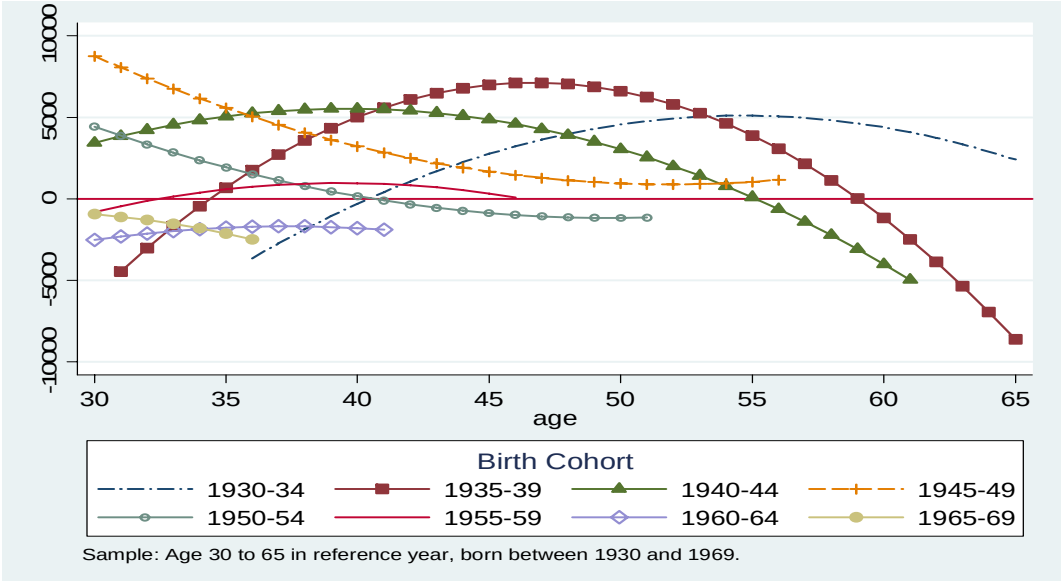
Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Figure 17
Age-Earnings Profiles of Female Faculty by Birth Cohort: Universities with Mandatory Retirement



Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Figure 18
Differences in Predicted Earnings by Birth Cohort for Female Faculty between Universities without Mandatory Retirement and those with Mandatory Retirement



Sample: Age 30 to 65 in reference year, born between 1930 and 1969.

Appendix 1

List of Universities:

Medical/Doctoral:
Dalhousie University
McGill University
Université de Montréal
Université Laval
Université de Sherbrooke
McMaster University
University of Ottawa
Queen's University
University of Toronto
University of Western Ontario
University of Manitoba
University of Saskatchewan
University of Alberta
University of Calgary
University of British Columbia

Comprehensive:
Memorial University of Newfoundland
University of New Brunswick
École polytechnique
École des hautes études commerciales
Université du Québec à Montréal
Concordia University
Carleton University
University of Guelph
University of Waterloo
University of Windsor
York University
University of Regina
Simon Fraser University
University of Victoria

Primarily Undergraduate:
University of Prince Edward Island
Acadia University
Mount St. Vincent University
St. Francis Xavier University
Saint Mary's University
University College of Cape Breton
Mount Allison University
Université de Moncton
Bishop's University
Université du Québec à Chicoutimi
École De Technologie Superieure
Université du Québec à Trois-Rivieres
Université du Québec à Rimouski
Brock University
Lakehead University
Laurentian University
Trent University
Wilfrid Laurier University
Ryerson Polytechnic University
Brandon University
University of Winnipeg
University of Lethbridge
University of Northern British Columbia

Appendix 2

University/Year combinations in which person identifier not consistent across adjacent years:

Brock University	1984/85 – 1985/86
Dalhousie University	1999/00 – 2000/01
Guelph University	1993/94 – 1995/96
Laurentian University	1992/93 – 1993/94
University of Lethbridge	1992/93 – 1993/94
University of Ottawa	1996/97 – 1997/98
University of Regina	1996/97 – 1997/98
University of Victoria	1984/85 – 1985/86
University of Victoria	1994/95 – 1995/96
University of Western Ontario	1997/98 – 1998/99
University of Windsor	1999/00 – 2000/01
University of Winnipeg	1990/91 – 1991/92
University of Winnipeg	2000/01 – 2001/02
York University	1984/85 – 1985/86
York University	1985/86 – 1986/87

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