Pathways to Retirement, Well-Being, and Mandatory Retirement Rules: Evidence from Canadian Reforms[*]

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Abstract

Amid the aging workforce, a better understanding of the retirement transition patterns of older workers has implications for public policy. Such transitions are often characterized as complex trajectories involving multiple stages and alternative pathways which, in turn, depend on labor market regulations. This study investigates the factors affecting bridge employment and partial retirement and their subsequent effects on health, well-being and financial security, using micro-level data from a national healthy aging survey and augmented with personal income tax records. The analysis exploits policy-induced changes in retirement status arising from the elimination of mandatory retirement rules in Canada—which occurred at different times across provinces—in an instrumental variables design.

The results indicate, first, that mandatory retirement is not used often by employers even when it is permissible: only approximately 7 percent of current retirees report that their first retirement occurred for this reason. This finding is consistent with limited international evidence on how employers use these rules. Second, we find supportive evidence that the elimination of mandatory retirement reduced the likelihood of individuals being retired by approximately 7–16 percent but raised the likelihood of subjective partial retirement by 5–6 percent. Most notably, the reforms reduced the incidence of work after retirement as workers become permitted to stay in their incumbent jobs longer, this finding being very robust across several statistical estimators commonly used in the related literature. No discernible effects are observed on individuals' health, well-being or future financial security.

These findings suggest that costs of mandatory retirement are limited to adjustment frictions among individuals searching for new work or entering retirement earlier than desired under the prevailing wage.

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1 Introduction

Increases in life expectancy and developments in health-care are improving the health capacity of individuals to work at older ages (Coile et al. 2016; Milligan and Schirle 2016). Alongside these trends, declining birth rates and aging populations put pressure on the solvency of public and private retirement income systems (OECD 2012, 2013). Governments have begun responding to these pressures by raising retirement ages, strengthening work incentives for older workers, taxing pension income, and generally re-designing their systems with the goal of keeping individuals in the workforce longer. A major pillar of these changes is the abolishment of mandatory retirement, pioneered in Canada by a few provinces and federally for public-sector workers during the 1980s and in the United States in 1986, and then done more recently by other countries. For example, Australia prohibited compulsory retirement in 2004; the United Kingdom raised its minimum mandatory retirement age in 2006 and abolished it completely in 2011; France, Germany, and other European Union (EU) countries raised their minimum mandatory retirement ages following a 2000 EU Council Directive for equal treatment in employment and occupation (Wood et al. 2010; Coppola and Wilke, 2014).

There have also been structural changes in the pathways to retirement used by workers in recent decades. Labor market participation rates of older workers are rising (OECD 2018) and many individuals—approximately 25 percent in the United Kingdom and United States—choose to return to work after their first full retirement (Maestas 2010; Platts et al., 2017). It is estimated that approximately half of retirees in such countries as Australia and the United States transition to retirement via post-retirement employment ("bridge employment") or partial retirement (Schultz 2003; Thomson 2007), and that the use of these pathways will continue to rise (Rabaté 2017; Kondo and Shigeoka 2017; Mergenthaler et al. 2017).

Despite the large literature documenting retirement transitions of older workers, little is known about the causal effects of mandatory retirement rules on pathways to retirement used or the health, well-being and future financial security of retirees. The aim of this paper is to fill this gap by assessing the effects of employer-imposed mandatory retirements on these outcomes of interest based primarily on self-reports. To this end, the analysis uses the 2009 Healthy Aging module of the Canadian Community Health Survey

(CCHS). The CCHS is an annual, cross-sectional national household survey administered by Canada's central statistical agency with the goal of gathering detailed health-related data at provincial and sub-provincial levels of geography. The Healthy Aging module, in turn, provides unique information about the factors, influences and processes that contribute to healthy aging—including work decisions, savings, retirement goals, retirement pathways used, retirement status, health, and subjective well-being—with a focus on middle-aged and older Canadians 45 years old and over. In addition, to consider long-term effects of mandatory retirement on future financial security, we linked the CCHS to income data from a panel of personal income tax records obtained from the central tax authority.

Mandatory retirement is imposed in an employment contract by employers rather than determined by workers, hence exposure is potentially exogenous from the workers' perspective such that estimating the direct effect of retiring mandatorily on labor market outcomes and well-being is plausibly well-identified. However, mandatory retirement is part and parcel of an internal labor market that enables deferred wages; gives finality to existing contractual arrangements; creates employment opportunities for younger workers; and facilitates planning for new staffing, pension obligations, and medical expenditures by employees (Gunderson and Pesando 1988; Pesando and Gunderson 1988; Gomez et al. 2002; Lahey 2010). Deferred wages are common in the government sector and larger firms in certain industries in the private sector with low separation rates, collective agreements that stipulate remuneration and working conditions, and relatively high job security. In this framework, salaries typically exceed contemporaneous marginal productivity among the older workforce. Workers may, therefore, sort into firms based partly on employers' retirement-related policies (Gunderson and Luchak 2001; Ippolito 2002; Messacar 2018)—including the presence of a mandatory retirement rule—in a way that correlates with their preferences to work at older ages, which biases direct estimates of these effects. To address this concern, we exploit policy-induced variation across Canadian provinces in the timing of the elimination of mandatory retirement in an instrumental variables (IV) design. There is significant variation across provinces in the cohorts of workers potentially exposed to mandatory retirement rules in their (former) jobs. For example, Manitoba and Quebec generally abolished such rules during the 1980s but reforms were not enacted until 2000 in Alberta,

2007 in Newfoundland and Labrador, and 2009 in Nova Scotia. The reforms provide a unique opportunity to assess the effects of mandatory retirement using quasi-experimental methods.

The results of this study are fourfold. First, descriptive statistics of the extent to which individuals are retired mandatorily suggest that this outcome was not very prevalent in Canada even before the practice was largely abolished. Among retirees 65 years old and over before the reforms were enacted, only approximately 7.0 percent indicated that their reason for first retirement was a mandatory retirement rule by the employer. While there are potentially strong legal and ethical arguments for the elimination of mandatory retirement related to discrimination in the workplace (Neumark 2009; Lahey 2010), economic implications are attenuated by the fact that such rules only affect a small share of workers based on the self-reports from this survey sample.

Second, despite this finding, provincial reforms to eliminate mandatory retirement is estimated to reduce the likelihood of this outcome by approximately 3.5 percentage points, or roughly 87.5 percent out of an unconditional average mandatory retirement rate of 4.0 percent. This finding indicates that the reforms successfully and drastically reduced mandatory retirements, as intended.

Third, we find suggestive evidence that the elimination of mandatory retirement rules reduced full retirement status by approximately 7–16 percent, but raised the likelihood of subjective partial retirement by 5–6 percent. In addition, the reforms significantly reduced bridge employment as workers became able to stay in their incumbent jobs longer. These effects are observed using several statistical estimators and in some cases exploiting the policy-induced variation in exposure to mandatory retirement rules in an IV design. Thus, the reforms appear to have contributed greatly to the increased utilization of alternative pathways to retirement among Canadian workers.

Fourth, in contrast with these other findings, we estimate that the reforms had little effect on subjective measures of individuals' health and life satisfaction, or their future financial security based on an analysis of permanent total income from a panel of tax records. Taken together, mandatory retirement rules in Canada appear to have affected a small percentage of all workers prior to being generally eliminated in most provinces in terms of their preferred life-cycle work-leisure trajectories, but did not significantly

affect wider measures of well-being such as health, happiness, or future financial security. These findings suggest that the costs of mandatory retirement are limited to adjustment frictions among individuals searching for new work or entering retirement earlier than desired under the prevailing wage.

This paper proceeds as follows. The next section provides an overview of the related literature to provide context for the present study. Then, Section 3 briefly describes institutional reforms to mandatory retirement rules in Canada with a particular focus on the details most relevant to the empirical analysis. Section 4 compares retirement outcomes across Canada. Section 5 describes the datasets and methodology used. Section 6 presents the main results and robustness checks. Lastly, Section 7 concludes.

2 Previous Literature

This paper contributes to several inter-connected literatures. There is a growing body of research on rising incidences of un-retirement, bridge employment, and partial retirement among older workers. For example, in Canada, a survey of recent retirees found that 22 percent had done some paid work after retirement (Schellenberg et al. 2005). Another study found that, among workers 50 years old and over who left long-term jobs, nearly two-thirds were re-employed within ten years of job separation as observed in tax records (Bonikowska and Schellenberg 2014). Finnie and Gray (2018) show that re-employment, early retirement, and social insurance benefits are common pathways among older laid-off Canadian workers, and that re-employment becomes progressively less likely with age. Similarly, Wang et al. (2008) and Giandria et al. (2009) document the increasing use of alternative pathways to retirement in the United States based on analyses of the Health and Retirement Study (HRS).

In addition, this paper relates to a new and emerging international literature on the wide-spanning implications of mandatory retirement rules. While labor market institutions tend to be very different between Canada and France, a recent study by Rabaté (2017) shows that the use of mandatory retirement is also moderate in France—accounting for only approximately 6 percent of job separations, consistent with the results of this study—and that it has contributed little to the increase in employment for senior workers. Mulders et al. (2014) conducts an experiment among Dutch managers on employers' willingness to re-hire employees after being mandatorily retired and finds that, while there is significant heterogeneity in

preferences, employers are generally disinclined to re-hire on average. Ursel and Armstrong-Stassen (2006) find meaningful effects of age discrimination lawsuits on firms' stock prices. Larson and Diaz (2012) document effects of age discrimination in employment amendments in the United States on new faculty hires and the introduction of a retirement incentive program at the Massachusetts Institute of Technology. However, whereas those existing studies all focus on immediate effects of mandatory retirement for retirees or younger workers, this paper is the first to assess long-term effects on future financial security and subjective health and well-being outcomes.

The paper most closely related to the present study is by Shannon and Grierson (2004), who assess the effect of the elimination of mandatory retirement in Canada on the size of the older workforce. However, because of when their study was conducted, their analysis centers on early-mover provinces (Manitoba and Quebec) relative to the rest of Canada and estimates labor participation responses from Census and Labour Force Survey (LFS) datasets. The authors find that eliminating mandatory retirement had little effect on the size of the older workforce. Similarly, as our study shows, take-up of work after retirement likely mitigate direct effects of the reforms. Our finding that the incidence of full retirement increases by (at most) 7–16 percent suggests that the total size of the older workforce is inflexible to mandatory retirement rules and that most workers desire maintaining some form of labor market attachment.

Lastly, the relationship between health and retirement is currently an important topic of research in economic science. For example, in 2017, the National Bureau of Economic Research published a series of articles that investigate the health capacity of older individuals to work across countries in Asia, Europe and North America (Wise 2017). A central objectives of those studies was to investigate whether people are healthy enough to continue working later in life, amid rising pressure on governments to boost labor market attachment among older workers due to population aging. However, disentangling causality between health and retirement is difficult; a related issue that has received considerably less attention in empirical research is how retirement affects health and well-being. There are many channels through which retirement may improve health, such as reduced exposure to on-the-job injuries and lower stress. However, health may also worsen given that individuals who retire have decreased social interactions and support

networks that foster healthy and happy living. Dave et al. (2006) find that complete retirement increases difficulties associated with mobility and daily activities and illness, and decreases mental health, based on an analysis of the Health and Retirement Study from the United States. In contrast, Neuman (2007), estimates the effect of quits by older workers into retirement on objective and subjective health using the same data and exploiting variation in public and private pensions in the identification. The author finds that, at a minimum, retirement does not harm health and may improve it in some cases. Eibich (2015) finds that retirement improves mental health and reduces outpatient care utilization based on quasi-experimental analysis of the German pension system.

3 Institutional Details

The Canadian legal environment relating to the use of mandatory retirement rules by employers has experienced many changes over the past several decades. At the federal level, the Government of Canada eliminated such rules for its employees in 1986. Further repeals occurred in 2011 for employees of federally-regulated employers. Prior to this, mandatory retirement was permissible in these industries with the age threshold typically set at 65 years old.

At the provincial level, mandatory retirement used to be permissible in employment contracts set by employers provided that workers were not forced to separate from their jobs before reaching 65 years old. Manitoba was the first to deal with such age discrimination rules through a set of policy amendments in 1974 that resulted in the abandonment of mandatory retirement rules via a 1981 court ruling (Flanagan 1985; Reid 1988). Quebec developed a similar reform in 1982 that took effect the following year. It was not until much later that most other provinces followed suit: amendments to human rights legislation were enacted in 2000 in Alberta, 2006 in Ontario, 2007 in Newfoundland and Labrador and Saskatchewan, 2008 in British Columbia, and 2009 in Nova Scotia.[1] The provinces of Prince Edward Island and New Brunswick

[1] Refer to Flanagan (1985), Reid (1988), and Shannon and Grierson (2004) for discussions of the Manitoba and Quebec reforms. The following legislation eliminated mandatory retirement in the later-adopting provinces. Alberta: *Human Rights Citizenship and Multiculturalism Act* (now the *Alberta Human Rights Act*). Ontario: *Human Rights Code*. Newfoundland and Labrador: *Human*

are peculiar cases. New Brunswick passed legislation to eliminate mandatory retirement in 1973 but exempted employees covered by pension plans that provided for mandatory retirement as well as a large number of bona fide cases. Thus, many employees remained subject to mandatory retirement and the ban had little practical impact (Reid, 1988). A Supreme Court of Canada ruling assessed the language of New Brunswick's human rights legislation and ruled to uphold an employer's right to require an employee to retire at 65 years old provided that the pension plan enforcing it is a legitimate plan that was adopted in good faith and was not set up for the purpose of defeating protected rights. In Prince Edward Island, mandatory retirement is a discriminatory practice according to human rights legislation enacted in 1988 but large exceptions were permissible until a 2010 court ruling that limited the use thereof. Based on this discussion, Table 1 shows the mapping between provinces and reform years for the elimination of mandatory retirement used in this study.[2]

[Table 1]

4 Retirement-Related Outcomes: Regional Comparisons

In Table 2, we see the differences in retirement patterns between Newfoundland and Labrador and the provinces of Atlantic Canada for participants aged 65 years and older. Overall, Newfoundland and Labrador shows higher levels both in objective and subjective retirement, 93.0 and 91.0 percent respectively, compared to 90.5 and 86.6 in Atlantic Canada, respectively. These estimates suggest that a smaller

Rights Code. Saskatchewan: *Saskatchewan Human Rights Code Amendment Act, 2006 (Eliminating Mandatory Retirement)*. British Columbia: Bill 31 – 2007 – *Human Rights Code (Mandatory Retirement Elimination) Amendment Act, 2007*. Nova Scotia: Bill 163 – *An Act Respecting the Elimination of Mandatory Retirement*.

[2] The reform year is set to 1981 for Manitoba on the basis that a court ruling to unequivocally establish that mandatory retirement was not permissible, thereby banning the practice, did not occur until that time. Reid (1988) contends that the initial legislation passed that led to this court ruling was not intended to be used to abolish mandatory retirement. For the same reason, the 1973 reform in New Brunswick and the 1988 reform in Prince Edward Island are not applicable to this analysis because the former did not effectively ban such rules and the latter did not achieve this goal until after the survey year of the dataset used in this analysis. Our results are robust to using initial reform dates rather than court ruling dates in the analysis because these provinces are small and the number of individuals in the sample affected by this choice does not drive the identification.

difference between these two concepts from the point of view of Newfoundland and Labrador. The main pattern behind this difference stems from the trends of male participants having higher levels of objective and subjective retirement. Another pattern contributing to the difference is generated by the differences in the age groups of 65–69 and 70–74. On the other hand, individuals 75 years old or more do not differ widely between Newfoundland and Labrador and Atlantic Canada.

[Table 2]

Newfoundland and Labrador has lower levels both of partial retirement as well as returning to work after the first retirement in comparison to Atlantic Canada. When considering the subjective partial retirement levels, the difference stems both from male and female participants. However, the male levels differ to a larger degree between Newfoundland and Labrador and Atlantic Canada, by 5 percentage points. Similar to the previous case, the differences are almost entirely in the age groups of 65–69 and 70–74. The largest differences are observed in the trend of returning back to work after retirement, 14.0 in Newfoudland and Labrador compared to 22.0 percent in Atlantic Canada. Again, the majority of the different levels come from the male workers.

Overall, we can state that Newfoundland and Labrador has a larger trend in the traditional process of one terminal step into retirement, mainly driven by the patterns of male workers.

This table also shows the difference between Atlantic Canada and the Rest of Canada excluding the provinces of Atlantic Canada. The overall levels of objective and subjective retirement are 3 percentage points higher in Atlantic Canada. As a consequence, the overall difference between objective and subjective retirement levels are similar. Similarly as in the case of Newfoundland and Labrador, the main differences are in male participants, and from the age groups of 65–69 and 70–74.

Partial retirement is less common in Atlantic Canada (7.3 percent) than in the rest of Canada (8.6 percent). It is a similar case for the difference in returning to work after retirement. Atlantic Canada has 22 percent of participants returning to work after the first retirement aged 65 years and older, and the rest of Canada has 24 percent of participants returning to work aged 65 years and older, thus showing a 2 percentage point difference versus an 8 percentage point difference between Newfoundland and Labrador

and Atlantic Canada, and a 10 percentage point difference to the Rest of Canada. This stresses the more traditional trends in retirement process in Newfoundland and Labrador, in comparison to other parts of Canada.

Table 3 breaks the trends of partial retirement and returning to work after the first retirement into groups by occupation. Overall, management occupations and sales and services show the highest levels of both partial retirement as well as returning to work. On the other hand, trades and transportation and primary industries present the lowest levels. We do not observe any significant differences between Newfoundland and Labrador and Atlantic Canada.

[Table 3]

Considering the occupational structure of partial retirement and returning back to work, we do not observe large differences. The main differences are between Atlantic Canada and Newfoundland and Labrador on one side, and the Rest of Canada on the other, in the case of the primary industries both for the levels of returning to work and especially for the levels of partial retirement, which are 3 and 7 percentage points higher in Atlantic Canada and Newfoundland and Labrador respectively.

5 Data and Empirical Methodology

This section begins by describing the datasets used and the sample selection criteria employed in this analysis, and by presenting descriptive statistics of the relevant sample. Then, the empirical methodology used for credibly identifying the effects of the elimination of mandatory retirement rules on workers' labor market outcomes and well-being are discussed.

5.1 Data and Sample Selection

This study uses the Master File of the 2009 Health Aging (HA) module from the Canadian Community Health Survey (CCHS), by Statistics Canada. The CCHS was designed to gather health-related data for the population of Canada. In turn, the CCHS-HA is a part of the CCHS program but is its own unique survey in terms of target population, objectives, and questionnaire. This module collected information about the factors, influences, and processes that contribute to healthy aging. Restricted to middle-aged and older

Canadians 45 years old and over, the questionnaire covers topics relating to health, disability, lifestyle and social conditions, population aging, population and demography, and seniors.

The CCHS-HA is uniquely suited to analyze the effects of the elimination of mandatory retirement in Canada for several reasons. First, the survey was carried out in 2009, which corresponds to the year in which the last province implemented its mandatory retirement reform. This timing allows for sufficient time to have elapsed between the reforms in most provinces and the survey implementation so that any observed responses can be interpreted as medium- to long-term effects. Second, the questionnaire directly asks retired respondents about the reasons for first retirement—including whether a mandatory retirement occurred—to estimate both the prevalence of this type of retirement before the reforms as well as the first-stage effects of the reforms across provinces. Third, the questionnaire asks respondents about their pathways to retirement used—including whether they worked after retirement and their current subjective full-time and part-time retirement statuses. Throughout the empirical analysis, sampling weights are used to ensure that the results generalize to the Canadian population.

The analysis conditions on survey respondents 65 years old and over to focus on individuals who are at least the normal age of retirement.[3] This ensures that all workers had the potential to be forced into retirement due to their employers' mandatory retirement rules notwithstanding the elimination of such rules from the provincial policy changes. In addition, we test for differences across observed characteristics including age, past retirement, and potential exposure to mandatory retirement to consider heterogeneity in the population.

Table 4 presents summary statistics for the sample used. On balance, individuals are 74.5 years old and the distribution of respondents is skewed toward younger cohorts. There are approximately 45.1 percent of respondents who are male, 63.4 percent who are either married or in common-law relationships, and 43.3 percent who have at least some post-secondary educational attainment. In addition, 23.0 percent of

[3] In Canada, the "normal" age of retirement—i.e., the age at which individuals can begin to collect income from public pensions at the full rate of benefit entitlement—is 65 years old. Many employers that impose mandatory retirement rules set the timing of job separation to align with this age threshold.

individuals are not yet objectively retired and 17.3 percent are not yet subjectively retired. The former definition is based on whether the individual receives at least 50 percent of total income from retirement sources, including public and private pensions. This is a standard variable in the dataset; we did not create this measure ourselves. The term "objective" is used because the status of retirement is derived from individuals' reliance on retirement income, which means that a consistent definition is applied to all survey respondents. In contrast, subjective retirement is based on survey respondents' self-reports, such that there is variation from person to person in what it means to be retired. Assessing the impacts of mandatory retirement on objective versus subjective retirement provides two tests that are notionally similar but may still yield different results. Thus, obtaining similar results using the two definitions boosts credibility of these findings. While the likelihood of being in high health is low, at around 15 to 35 percent, individuals are generally satisfied with their lives overall. The likelihood of having high life satisfaction is 22.6 percent for this sample.

[Table 4]

5.2 Model and Identification

The goal is to estimate the effect of retiring mandatorily, MandRetire_{ip}, for individual i in the province p on various labor market, well-being, and future financial security outcomes, denoted by Outcome_{pt}. Specifically, MandRetire_{ip} is an indicator variable that takes the value of "1" if a worker reports that he or she retired due to a mandatory retirement rule of the employer, and takes the value of "0" otherwise. The statistical model is:

$$\text{Outcome}_{ip} = f\left(\alpha_i + \sigma_p + \beta \text{MandRetire}_{ip} + X'_{ip}\theta + \epsilon_{ip}\right) \quad (1)$$

where α_i and σ_p are vectors of age- and province-specific effects, respectively, X_{ip} is a vector of observed covariates, and ϵ_{ip} is the residual. The function $f(\cdot)$ is either linear to denote ordinary least squares (OLS) or the linear probability model (LPM) or it is a non-linear Probit for cases where the dependent variable is binary; we discuss the statistical estimators used in the empirical analysis in more detail towards the end of this section. The following control variables are used: sex; dummy variables for household type and

household size; dummies for the number of persons less than 16 years old, 45 years old or more, and 65 years old or more; dwelling type dummies; educational attainment dummies; savings; investments; and total personal income (the currency measures are continuous variables). The coefficient of interest, β, gives the effect of retiring mandatorily on the outcome relative to a control group of individuals who were not directly affected by this employer rule in their jobs.

Notice that equation (1) compares outcomes across individuals who retire mandatorily with those who do not, which includes all other individuals irrespective of their current or past labor market status. Put differently, those who are not forced to retire include all individuals who are still working and those who have never worked. However, this is not a concern for the analysis because, absent a mandatory retirement policy, it is equally plausible that individuals would either choose to retire on their own or remain employed in their jobs, so it is appropriate not to exclude those who are not yet retired from the control group. While individuals who have never worked may slightly dilute our estimates of the reforms by including in the analysis a fraction of the population who are strictly unaffected, these individuals tend to comprise a small fraction of the population and we nevertheless observe strong first-stage effects.

Several concerns of this analysis are as follows. The CCHS-HA questionnaire does not separately ask respondents about their province of residence and province of employment at the time of first retirement. It is, therefore, necessary to assume that the former is a reasonable proxy for the latter, on average. This assumption is likely violated in at least two cases: (1) the worker is an inter-provincial employee whose province of residence is different from place of work; and (2) the worker relocates from one province to another upon retiring. Inter-provincial employment is common in Canada, especially in such industries as oil extraction around the time the CCHS-HA was conducted because many workers relocated to Alberta in search of gainful employment amid high oil prices and an oil extraction industry that continued to boom until a couple of years after the Great Recession of 2008/09 (Lu et al. 2013; Morissette and Qiu 2015). However, since inter-provincial employees tend to be younger workers, this issue is not a significant concern for an analysis of retirement-related outcomes. The possibility that many workers relocate after they retire may be a concern especially for such provinces as Ontario and British Columbia—

as workers flock to major cities such as Toronto and Vancouver to find jobs—for Alberta—which has the highest concentration of inter-provincial employees—and for Newfoundland and Labrador—which has the highest share of elderly in the population. Although evidence of post-retirement migration is very limited, we address this issue empirically by showing that changes in mandatory retirement rules across provinces correlate highly with the likelihood of a survey respondent reporting being retired due to a mandatory retirement rule.

Another potential concern for this analysis is that workers may sort into firms based on employers' retirement-related policies in a way that correlates with preferences to work at older ages. This means that naïve OLS or Probit estimates of β may be biased by such unobservables. We address this issue by exploiting the policy-induced variation in mandatory retirement rules across provinces in an IV design. The first-stage statistical model is:

$$\text{MandRetire}_{ip} = \omega + \alpha_i + \sigma_p + \rho\text{Treated}_{ip} + X'_{ip}\psi + \eta_{ip} \quad (2)$$

where Treated_{ip} is an indicator of whether the individual was treated by the policy change. More precisely, this variable takes the value of "1" if individual i in province p was less than 65 years old at the time when the province abolished mandatory retirement, and takes the value of "0" otherwise (i.e., the individual was 65 years of age or over in the reform year). Additionally, an individual is untreated if mandatory retirement is never abolished in the relevant study timeframe, which is the case for New Brunswick and Prince Edward Island for reasons discussed previously. This method of defining treatment assumes that all employers align their mandatory retirement rules with the normal age of retirement established by the public retirement income system. Although there may be measurement error in equation (2) resulting from this approach for assigning treatment, inability to identify federal employees or those who worked for federally-regulated employers at 65 years of age, or variation between provinces of work at retirement and residence in the survey year, we show that the treatment variable is an adequate predictor of mandatory retirement in most

cases. The expectation is that $\rho < 0$ because the reforms generally eliminated employers' ability to force their employees into retirement.[4]

Taken together, equations (1) and (2) are used throughout the empirical analysis to estimate the effect of mandatory retirement on the various outcomes of interest. Identification in the IV design comes from variation across provinces in cohorts who either "missed" having mandatory retirement rules eliminated before they turned 65 years old in the reform year, or who were treated by the reforms by being less than 65 years old in the reform year and generally could not be forced to retire by their employers. This model is not well-identified if, within firms, the employers imposed mandatory retirement selectively to employees, such as by imposing it more on workers with poor health. However, mandatory retirement is different from a retirement incentive package in which take-up is voluntary and selectivity issues are pervasive; imposing mandatory retirement selectively at the worker level would be difficult to implement, especially in sectors with high union rates, and we are not aware of any evidence in Canada to suggest that mandatory retirement rules were used by employers in this way. Throughout the analysis, standard errors clustered by province and age are reported.[5]

[4] Provinces continue to allow exceptions to the elimination of mandatory retirement. For example, all provinces except Manitoba allow mandatory retirement for provincial court judges (65 years old in Saskatchewan, 70 in Alberta, Quebec, New Brunswick and Nova Scotia, and 75 in British Columbia, Ontario and Newfoundland and Labrador). In Ontario and Quebec, mandatory retirement remains permissible for firefighters (60 years old) and police officers (65 years old), respectively. At the federal level, exceptions include Royal Canadian Mounted Police officers and members of the Canadian Armed Forces (60 years old), diplomats (65 years old), and federal and tax court judges (75 years old). Thus, reforms to eliminate mandatory retirement are expected to significantly reduce this practice but not to eliminate it altogether.

[5] A common problem in the analysis of Canadian provincial policy reform is that there are only 10 provinces, which means that clustering on this dimension is affected by the small number of cells. Clustering on the intersection of two variables is sometimes discouraged (Cameron and Miller 2015), but it is conventional to cluster on both variables relevant for identification in Canadian policy research due to a lack of better alternatives; a few notable examples are Milligan and Stabile (2007), Baker et al. (2008), and Oreopoulos (2006b).

The function $f(\cdot)$ is linear (OLS) if the outcome is continuous and either the LPM or Probit model if the outcome is binary. There is unfortunately no perfect estimator for this research study given that the dependent variable and excluded instrument are both binary in most cases. Instead, we assign greater emphasis on results that are robust across a variety of estimators and to those that are supported by tests of validity of the models. Three notes on the approaches used are warranted. First, the preferred model specification controls for province and age effects so that mandatory retirement, which is known to vary exogenously due to the reforms, is well-identified. However, we also present results that control parametrically (linearly) for age given that the preferred non-parametric specification includes a wide array of controls and this can sometimes absorb much of the variation relevant to the identification. Because the empirical analysis compares individuals who reached the normal age of retirement just before mandatory retirement was eliminated to those who had not yet reached this age when the reforms occurred, the cohort effect—i.e., the age variable—is the running variable and is best-suited to be included parametrically in this robustness check. For results that show no statistically significant effect of mandatory retirement, such as health and well-being, this robustness check is informative for showing that insignificance does not simply arise from the model being over-saturated along relevant margins of variation.

Second, while naïve OLS and Probit estimates from equation (1) are plausibly identified because mandatory retirement is imposed by employers rather than workers, augmenting the analysis to exploit the treatment variable in an IV design is conventional (Angrist and Krueger 1991; Acemoglu and Angrist 2000; Oreopoulos 2005, 2006a). However, IV can reduce efficiency of the estimator and produce wide confidence intervals; this leads us to present results from both the naïve and IV approaches and to consider what is learned from how their results vary. In the latter approach, we implement reduced-form estimation and the standard "two-step" method. The reduced form is a fuzzy differences-in-differences (de Chaisemartin and D'Haultfœuille 2017) given that mandatory retirement is not completely determined by the reforms, but they do increase the probability of retiring mandatorily only among treated workers.

Third, when the dependent variable is binary, the preferred choice of LPM or Probit is unclear in this case. Probit would be preferred except for the concern that IV Probit requires the endogenous variable

to be continuous for estimation to be valid (Wooldridge 2010), and Angrist (2009) typically recommends using two-stage least squares (2SLS) in this case. A check on the effectiveness of the LPM is to report the percent of observations for which the predicted outcome falls on the [0,1] interval, as desired, such that linearlization is not a significant concern if this occurs frequently. In practice, we find that the LPM yields predicted values on this interval for approximately 79.6 to 99.9 percent of observations depending on the outcome variable and that min and max predicted values are never egregiously low or high, meaning that average effects are not widely skewed and this estimator is likely valid.

6 Results

In this section, we first consider reduced-form graphical and regression-based evidence of the effects of mandatory retirement rules on retirement-related outcomes. Then, analysis of the effects of retirement on the outcomes of interest is presented.

6.1 Effects of the Reforms on Retirements

Figure 1 begins by illustrating the likelihoods of being objectively retired, being subjectively fully and partially retired, and working after first retirement conditional on whether the respondent belongs to the treated or untreated group. As expected, the analysis shows that the treated group is the least likely to be objectively and subjectively (both fully and partially) retired. This group is also slightly less likely to work after first retirement by approximately 2.3 percentage points.

[Figure 1]

To provide further insights into the mechanisms behind these findings, Figure 2 shows that the treated group is significantly less likely to retire mandatorily than the untreated group. While untreated retirees report they were forced to retire about 7.0 percent of the time (the same measure unconditional on current labor market status is 5.4 percent), only approximately 2.8 percent of retirees (or 2.1 percent of all individuals) who were less than 65 years old when a reform was implemented report being forced to retire. The latter estimate is not expected to reach zero for several reasons including the exceptions available in some provinces, employer-specific age thresholds that may differ from the normal age of retirement, lack of regulation for employees of federally-regulated employers, measurement error (e.g., misreporting), and

non-compliance by employers. The possibility of non-compliance is likely to be exacerbated by the fact that many workers do not always understand specific details of their employers' retirement-related policies, such as pension benefits (Mitchell 1988; Luchak and Gunderson 2000), and may fail to challenge the legality of such policies as they continue to be used by employers pursuant to their abolishment. Note that, among individuals who are untreated by the reforms, mandatory retirement occurs for only approximately 5 percent of individuals. Such rules are not a driving force for retirement in most cases. This finding is consistent with Rabaté (2017), who shows that mandatory retirement is not commonly used in France despite its legality.

[Figure 2]

A caveat of this analysis is that the reduced-form graphical analysis only considers simple means across groups and does not control directly for cohort effects. Thus, while it is possible that the elimination of mandatory retirement reduced the likelihood of being retired, the observe differences are driven in part by the treatment group being younger, on average, than the untreated group. This issue is addressed by extending the analysis to control for compositional effects in a regression framework. To that end, the first-stage effects of treatment on the probability of retiring mandatorily, based on the model specification in equation (2), is provided in Table 5. Specifically, this analysis shows the results from the linear probability model (column 1) and the Probit estimator (columns 2 to 5), where the marginal effects from the Probit estimator are reported. To test the robustness of the results at different points in the marginal probability distribution, effects are computed at the observed values and at the sample means ("partial effects"). In the former case, the marginal effects are also computed at observed values except for the assignment of treatment, which is set to either "1" (column 2) or "0" (column 3). This yields predicted effects for a change in the permissibility of mandatory retirement focusing on treated and untreated individuals, respectively. Regardless of the estimator used, the key finding from this analysis is that treatment reduces the probability of retiring mandatorily by approximately 3.5 percent out of a baseline probability of 4.0 percent, which

represents an 87.5 percent reduction. In each case, the estimated effect is both statistically significant and economically relevant.[6]

[Table 5]

6.2 Effects of Mandatory Retirement on Labor, Health and Well-Being

The effects of mandatory retirement on the probabilities of being objectively retired and taking up work after first retirement, based on the specification from equations (1) and (2), are presented in Panels A and B of Table 6, respectively. We carry out each analysis using the LPM, IV, Probit, and IV Probit estimators, as previously discussed.

[Table 6]

The results for objective retirement (Panel A) are mixed, but in some cases indicate that mandatory retirement increases the probability of objective retirement by approximately 7.4 to 9.0 percentage points, or approximately 9.6 to 11.7 percent of the baseline average rate of objective retirement of 77.0 percent. The LPM and Probit estimators return very similar results and the LPM correctly returns a predicted value for the outcome in 99.9 percent of cases. However, the significance of mandatory retirement disappears when the policy-induced variation is used in the IV design, even though there is strong first-stage identification of the reforms. The Kleinberen-Paap Wald rk F-statistic of the excluded instrument from the

[6] Table A1 shows that the results are robust to several model permutations. First, Manitoba and Quebec are dropped because their reforms occurred very early compared with the majority of provinces. Second, cases were dropped where the survey year equals the reform year, for which there may be insufficient time between the two events to observe any effect in the data. Third, the analysis is conditioned on progressively younger individuals given that the older group is far-removed from their retirement decisions. Table A2 assesses whether there is heterogeneity across subgroups of workers by: sex; marital status; level of educational attainment; and level of income. The results suggest that women were slightly more affected by the reforms than men, as were unmarried workers, those with high education, and those with low earnings. Comparisons across groups are confounded by the large standard errors associated with each of the estimates. The only sub-group for whom the predicted effect of the reforms is close to zero is individuals with high income but the sample size is very small in this case. Given this difficulty in interpreting the heterogeneity in first-stage effects of the reform, we refrain from testing for differential second-stage effects across groups and instead focus on overall impacts.

first-stage regression, which we obtain by repeating the analysis using a two-step estimator, is 9.738 (i.e., $p < 0.002$), indicating that there is a strong first-stage instrument (the "golden rule" for this F-statistic is 10.0 or higher). The Cragg-Donald Wald F-statistic is 15.020. One possibility for the stark difference in significances across Probit and IV Probit models is that, in each case, the test of exogeneity—i.e., a Wald test of whether the correlation parameter between the error terms in the structural equation and reduced-form equation for the endogenous variable are zero—does not reject the null hypothesis that the correlation parameter is zero. This finding suggests that there is no endogeneity, that there is no need to use instrumental variables in each of these three cases, and that the Probit estimator is the preferred specification. Intuitively, the results suggest that any sorting of workers into firms based on mandatory retirement rules is uncorrelated with their eventual decisions to eventually become objectively retired, perhaps because public or private pension incentives are a much stronger determinant of such behavior in practice. This leads us to conclude that being exposed to a mandatory retirement rule is associated with an increase in the probability of being objectively retired by approximately 8 percent. It is important to note that basing this conclusion on the naïve LPM and Probit estimators, while supported by the Wald test of endogeneity, still implies that a significant share of workers who were exposed to mandatory retirement rules did not become objectively retired. This finding highlights the importance of non-retirement-related sources of funding used by these retirees as they bridged into retirement.

Against that background, the results for work after retirement (Panel B) show strong and robust effects of mandatory retirement on the use of bridge employment. The only exception is for the IV Probit by MLE, but this is very imprecisely estimated and the point estimate is identical to that obtained from the standard Probit model. The LPM and Probit estimators suggest that being exposed to mandatory retirement increases the probability of work after retirement by 6.6–9.7 percentage points depending on the model specification, out of a baseline average of 17.7 percent. The IV LPM produces a very large mean estimate of 162.3 percent, suggesting that the incidence of bridge employment is nearly double as a result of such rules, although we note that the lower-bound of the 95 percent confidence interval is only approximately 0.32 due to the imprecision of the estimator in this case. Taken together, we refrain from inferring the exact

magnitude of the effect in this case, especially given that the Wald test of endogeneity indicates that sorting may be a potential concern for the analysis and so we prefer not to favor one estimator over any other. The relevance of sorting in this case seems to pass the "plausibility" test because it reveals that workers sort into firms with different rules for work separation at older ages based on their preferences for work at older ages. The results confirm that the elimination of mandatory retirement reduced the incidence of work after first retirement, as workers are no longer being forced out of jobs and instead choose to stay with their current employers longer.

The results for subjective full and partial retirement are presented in Table 7, which are similar to those of objective retirement. The naïve estimators suggest that exposure to mandatory retirement rules leads to approximately a 12.6–23.6 percentage point increase in the likelihood of being subjectively retired—out of a baseline average of 75.2 percent—but to a 5.3 to 6.1 percentage point decrease in the incidence of subjective partial retirement—out of a much lower baseline rate of only 7.5 percent. This suggests that up to about four-fifths of partial retirement may have been induced by the elimination of mandatory retirement; the lower-bound of the 95 percent confidence interval for these estimates puts this effect at closer to one-third, which is still sizeable. Exploiting the policy-induced variation in mandatory retirement due to the reforms, the point estimates are virtually unchanged but levels of statistical significance fall drastically. Because the point estimates from the Probit and IV Probit are virtually identical in both panels, and the Wald test of endogeneity suggests that sorting is not a problem in either case, we interpret these results as "suggestive" evidence that mandatory retirement impacts both objective and subjective full retirement status and subjective partial retirement status, but we emphasize that the most discernible effect observed is on the likelihood of working after retirement.

[Table 7]

In contrast with these findings, analyses of the impacts of mandatory retirement for health and subjective well-being fail to detect any meaningful effects, shown in Table 8.[7] More precisely, Panels A and B indicate that being retired mandatorily does not lead to changes in the likelihoods of reporting high health or high life satisfaction, respectively. In every case, the point estimates are both statistically and economically insignificant. An interesting extension of this study would be to consider how the elimination of mandatory retirement affects such outcomes as worker performance and marginal productivity, as well as poverty and inequality, although these issues are outside our scope of analysis. More broadly, the findings relate to a large literature on the inter-connections between objective and subjective well-being (several examples include Layard [2010], Oswald and Wu [2010], and Diener et al. [2015]). The standard life-cycle model posits that an agent's utility (weakly) improves when a constraint on labor supply—such as mandatory retirement—is eliminated because the agent is free to choose the first-best work-leisure path (and strictly improves among individuals for whom the constraint binds). Our analysis suggests that costs of mandatory retirement are limited to adjustment frictions among individuals searching for new work or entering retirement earlier than desired under the prevailing wage but that subjective well-being is mostly unaffected. It is important to note that, because mandatory retirement rules serve a function in settings with implicit contracts and deferred wages, it is possible that workers affected by the reforms would have faced very different life-cycle wage profiles such that decisions to work or retire could have been very different due to permanent income effects had such rules never existed.

[Table 8]

6.3 Effects of Mandatory Retirement on Future Financial Security

The goal of this analysis is to estimate the effect of the elimination of mandatory retirement on total income. However, a problem of implementing this analysis, as in the previous section, is that the reforms have already been shown to affect retirement decisions and work transitions, which have direct effects on

[7] We also implemented this analysis using an indicator of high mental health as the dependent variable (not shown, but available upon request) but these results also do not detect any significant effects.

transitory income received. This renders it difficult to separately identify the effect of the reform on transitory income versus permanent income, the latter of which is the more relevant measure of overall well-being.

To address this issue, we focus the analysis on a subset of CCHS-HA respondents for whom it was possible to link survey data to a panel of administrative personal income tax records, from 2010 to 2013, obtained from Canada's central tax authority.[8] We focus on four years of tax data for several reasons: (1) 2010 is the year after the last provincial reform analyzed and coincides with the CCHS-HA implementation date, which ensures that at least one year of adjustment period has elapsed; (2) the last year of tax data availability when the linkage began was 2013; (3) using several years of tax data permits us to assess permanent income effects of the reforms to a greater extent than using income data from a single cross-section given that income in the first year or two following a transition may be especially volatile, so that averaging over 4 years to a large extent mitigates this concern; and (4) using a wider time interval has an undesired effect of reducing the overall match rate because it becomes necessary that individuals are observed in the tax data for more than four consecutive years.

To test for permanent-income effects of the reforms, we begin by constructing an income measure, $\overline{\text{Income}}_{ip}$, from the four years of total income observed:

$$\overline{\text{Income}}_{ip} = \frac{\sum_{t=2010}^{2013} P_t \text{Income}_{ipt}}{4} \tag{3}$$

[8] More precisely, approximately 81.9 percent of 2009 CCHS-HA responses for individuals 65 years old and over were successfully linked to tax data spanning the years 2010 to 2013 inclusive based on a deterministic linkage approach that utilizes individuals' names, addresses, and other factors such as year of birth and sex. The linkage was carried out with help from a methodology team at Statistics Canada to ensure that the resulting analytical dataset did not contain respondents' identifying information and their anonymity was fully maintained from the researchers.

where Income_{ipt} is the value of total (before-tax) income observed for individual i in province p in year t, and P_t is a price deflator to express income in 2009 constant dollars. We then estimate equation (1) using the log of this variable as the outcome of interest, Outcome_{ip}.[9]

The results of this analysis are presented in Table 9, using the OLS and IV estimators given that the dependent variable is continuous, where both the reduced-form and 2SLS approaches are used in the latter case. The findings indicate that retiring mandatorily does not significantly affect permanent post-transition income; the estimates from the OLS and reduced-form approaches (columns 1 to 3) are statistically and economically insignificant. In contrast, the point estimate from the 2SLS approach (column 4) is large and negative, which might suggest that being forced to retire reduces permanent income by up to 16.2 percent, although this effect is imprecisely estimated. However, we do not assign much weight to this estimate on the basis that the F-statistic of the excluded instrument from the first-stage regression is only 7.462, hence there is a potential weak instrument problem such that the 2SLS bias could be even larger than the bias from OLS. The reduced-form IV estimate is our preferred result that corrects for potential endogeneity between future permanent income and sorting into firms based on the employers' mandatory retirement rules.

[Table 9]

These findings suggest that, on balance, mandatory retirement does not affect workers' future financial security. This may help explain the lack of effect of the reforms on subjective well-being. Since the reforms had little effect on financial security notwithstanding small adjustments in the pathways to retirement used, then overall well-being should also remain unaffected by the reforms to the extent that utility is consumption-dependent.

[9] Specifically, we set $\text{Outcome}_{ip} = \log\left(\overline{\text{Income}}_{ip} + 1\right)$ so that the variable is defined for any non-negative value of income. Very few individuals have strictly negative total before-tax income averaged over this four-year timeframe and the results are robust to taking the log without adding one to its argument.

7 Conclusion

This study provides a comprehensive analysis of the effects of employer mandatory retirement rules on labor market, health and well-being outcomes of Canadian workers, and the effects of provincial policies to eliminate such rules. Using data from a national household healthy aging survey, the analysis reveals four key findings. First, mandatory retirement was relatively uncommon—according to statements given by workers for why they retired from their first jobs—even before provincial governments and court systems moved to abolish the practice. Second, we observe empirically robust effects of the reforms on the likelihood that individuals retired (mandatorily) from their jobs. Third, we credibly observe that mandatory retirement rules push some workers into full retirement and others into taking up post-retirement employment. Interestingly, the elimination of such rules has made workers more likely to be partially retired, perhaps due to such factors as post-retirement contract work, flexible work arrangements, or part-time and seasonal employment. Our point estimates suggest that up to four-fifths of partial retirement may have been induced by the elimination of mandatory retirement, although the effect may be smaller due to the precision of the estimator. Fourth, despite these other findings, mandatory retirement appears to have little effect on health, life satisfaction, and financial security. The negligible effect on these outcomes is likely driven, at least in part, by the high incidence of bridge employment; individuals who take up new work are not exposed to the health effects of retiring.

Taken together, our study contributes to a small but growing international literature on the effects of mandatory retirement rules on labor market and related outcomes. We offer new insights into this important issue by analyzing medium- to long-term effects based on the timing of the reforms across Canadian provinces, and by jointly focusing the analysis on a variety of objective and subjective measures of individual well-being. Mandatory retirement does not affect a large percentage of Canadians 65 years old and over but there are still discernible effects of such rules on individuals' labor market outcomes including the use of alternative pathways to retirement.

Two limitations of this study are important to note. First, the analysis is based on a unique dataset that provides rich information on the retirement decisions of older Canadians but, unfortunately, the data

were only collected in 2009. The CCHS also has an annual component that is carried out each year but it does not include key variables used in the present study. Extending this analysis to recent years is, thus, left for future research. Second, because mandatory retirement only affects a small segment of the Canadian population, IV estimates are often much less precise than the direct OLS and Probit estimates. Endogeneity tests generally suggest this is not a problem and that OLS and Probit are the preferred models; however, this also suggests that results from the present study may not generalize to settings in which mandatory retirement rules are more pervasive.

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Table 1
Summary of Mandatory Retirement Reforms across Provinces

	Reform year (1)
Manitoba	1981
Quebec	1982
Alberta	2000
Ontario	2006
Saskatchewan	2007
Newfoundland and Labrador	2007
British Columbia	2008
Nova Scotia	2009
New Brunswick	Not applicable
Prince Edward Island	Not applicable

Notes: Reforms in New Brunswick and Prince Edward Island are not applicable to the empirical analysis for the reasons described in tex (in particular, see footnote 4).
Source: Various; see text for additional information.

Table 2
Retirement-Related Outcomes, 65 Years Old or More, by Region, Sex and Age Group

	Percent Objectively Retired (1)	Percent Subjectively Retired (2)	Percent Subjectively Partially Retired (3)	Percent who Worked after First Retirement (4)
	Panel A – Newfoundland and Labrador			
Full Sample	93	91	4	14
By Sex				
Male	91	89	6	17
Female	94	93	3	12
By Age Group				
65 to 69 Years Old	82	82	9	21
70 to 74 Years Old	97	97	1	13
75 to 79 Years Old	100	97	2	13
80 Years Old or More	100	97	1	5
	Panel B – Atlantic Canada			
Full Sample	91	87	7	22
By Sex				
Male	87	82	11	30
Female	93	92	4	14
By Age Group				
65 to 69 Years Old	78	77	12	27
70 to 74 Years Old	93	90	7	23
75 to 79 Years Old	98	94	4	18
80 Years Old or More	100	96	2	13
	Panel C – Rest of Canada			
Full Sample	87	83	9	24
By Sex				
Male	83	77	12	31
Female	91	87	6	17
By Age Group				
65 to 69 Years Old	72	71	13	27
70 to 74 Years Old	85	84	9	24
75 to 79 Years Old	98	89	6	22
80 Years Old or More	100	94	3	18

Notes: Estimates are rounded to the nearest percent. Atlantic Canada herein excludes Newfoundland and Labrador for comparative purposes. Rest of Canada refers to the full CCHS-HA sample excluding those residing in Newfoudland and Labrador, Prince Edward Island, Nova Scotia and New Brunswick. Population weights are used in the analysis.

Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 3
Retirement-Related Outcomes, 65 Years Old or More, by Industry

	Newfoundland and Labrador	Atlantic Canada	Rest of Canada
	(1)	(2)	(3)
	Panel A – Percent who are Partially Retired		
Management	41	38	39
Business and Finance	18	19	22
Sales and Services	25	25	21
Trades and Transportation	7	10	13
Primary Industries	9	8	5
	Panel B – Percent who Worked after First Retirement		
Management	36	37	35
Business and Finance	16	14	22
Sales and Services	24	23	24
Trades and Transportation	13	12	13
Primary Industries	11	14	6

Notes: Estimates are rounded to the nearest percent. See notes in Table 2 for more information. Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 4
Descriptive Statistics

	Mean (1)
Age	
65 to 69	30.2
70 to 79	44.8
80 and Older	25.0
Sex	
Male	45.1
Female	54.9
Marital Status	
Married or Common-Law	63.4
Divorced, Separated, or Widowed	32.8
Single	3.8
Educational Attainment	
Less than a High School Diploma	41.3
High School Diploma	15.4
Some Post-Secondary Education Below a Bachelor's Degree	4.7
Bachelor's Degree or Higher	38.6
Employment Status	
Has Employment Income	12.6
No Employment Income	87.4
Income	
Personal Income is Below $50,000	85.2
Personal Income is $50,000 or More	14.8
Retirement	
Objective Retirement Status	
Not Retired	23.0
Retired	77.0
Subjective Retirement Status	
Not Retired	17.3
Partly Retired	7.5
Fully Retired	75.2
Retirement History	
Has Retired in the Past	76.1
Has Not Retired in the Past	23.9
Mandatory Retirement	
Has Retired Mandatorily	4.0
Has Not Retired Mandatorily	96.0
Worked After Retirement	
Has Worked After a First Retirement	17.7
Has Not Worked After a First Retirement	82.3
Health and Well-Being	
High Health	14.5
High Life Satisfaction	22.6

Note: Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 5
First-Stage Effect of the Elimination of Mandatory Retirement on the Probability of Retiring due to an Employer Mandatory Retirement Rule

		Probit			
		As Observed			
	LPM	All	Treated = 1	Treated = 0	At Means
	(1)	(2)	(3)	(4)	(5)
	Dependent Variable: Mandatory Retirement (Baseline Average = 0.040) (Observations = 10,306)				
Treated	-0.034	-0.035	-0.024	-0.044	-0.028
	(0.011) ***	(0.013) ***	(0.006) ***	(0.020) **	(0.010) ***
R-Squared	0.044	0.111	0.111	0.111	0.111

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. A worker is treated if mandatory retirement rules are eliminated in his or her province before 65 years old. The "baseline average" refers to the simple mean across pre- and post-treatment periods of a worker retiring due to an employer mandatory retirement rule for the relevant sample. The linear probability model (LPM) (column 1) gives a predicted value for the dependent variable on the [0,1] interval for approximately 75.0% of observations; the minimum and maximum predicted values are approximately -0.114 and 0.252, respectively. The marginal effects from the Probit estimator are reported at various points of the distribution: at the observed values of the covariates (column 2); at the observed values of the covariates except for the indicator of being treated evaluated at one (column 3) or zero (column 4); and at the mean values of the covariates (column 5). The following control variables are included: province fixed effects (FEs) and age FEs; sex; household type and household size FEs; number of persons less than 16 years old, 45 years old or more, and 65 years old or more FEs; dwelling type FEs; educational attainment; savings and investments; and total personal income. Standard errors (in brackets) are clustered by province and age. Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 6
Effects of Mandatory Retirement on Objective Labor Market Outcomes

			IV LPM			IV Probit	
	LPM	LPM	Reduced-Form	2SLS	Probit	Reduced-Form	MLE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A – Dependent Variable: Objective Retirement (Baseline Average = 0.770) (Observations = 10,306)						
Treated			-0.028			0.019	
			(0.027)			(0.015)	
Mandatory Retirement	0.090	0.074		0.836	0.081		0.081
	(0.017) ***	(0.017) ***		(0.803)	(0.026) ***		(0.303)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.202	0.221	0.219		0.301	0.298	
F-Statistic				9.738			9.738
Wald Test Statistic							2.120
Percent on [0,1] Interval	99.9	99.9	99.9	99.9			
Min Predicted Value	-0.014	-0.017	-0.005	-0.032			
Max Predicted Value	1.355	1.214	1.180	1.947			
	Panel B – Dependent Variable: Work After Retirement (Baseline Average = 0.177) (Observations = 10,306)						
Treated			-0.055			-0.056	
			(0.018) ***			(0.018) ***	
Mandatory Retirement	0.097	0.078		1.623	0.066		0.064
	(0.031) ***	(0.032) **		(0.664) **	(0.025) ***		(0.285)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.085	0.097	0.096		0.087	0.086	
F-Statistic				9.738			9.738
Wald Test Statistic							9.270 ***
Percent on [0,1] Interval	94.6	88.8	88.6	82.9			
Min Predicted Value	-0.375	-0.422	-0.422	-0.450			
Max Predicted Value	0.591	0.565	0.547	2.049			

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. Marginal effects from the Probit and IV Probit estimators evaluated at the observed values of all covariates are reported. Min and max values for the Probit and IV Probit estimators are not reported because they are necessarily bounded between zero and one. The statistic for the Wald test of endogeneity is reported. See notes in Table 5 for more information. Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 7
Effects of Mandatory Retirement on Subjective Labor Market Outcomes

			IV LPM			IV Probit	
	LPM	LPM	Reduced-Form	2SLS	Probit	Reduced-Form	MLE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A – Dependent Variable: Subjective Retirement (Baseline Average = 0.752) (Observations = 10,306)						
Treated			-0.035			-0.010	
			(0.023)			(0.017)	
Mandatory Retirement	0.236	0.126		1.034	0.163		0.162
	(0.025) ***	(0.016) ***		(0.719)	(0.027) ***		(0.448)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.124	0.374	0.370		0.178	0.171	
F-Statistic				9.738			9.738
Wald Test Statistic							0.180
Percent on [0,1] Interval	97.4	83.2	83.8	85.0			
Min Predicted Value	0.001	-0.493	-0.495	-0.513			
Max Predicted Value	1.198	1.228	1.186	2.092			
	Panel B – Dependent Variable: Subjective Partial Retirement (Baseline Average = 0.075) (Observations = 10,306)						
Treated			0.015			0.003	
			(0.011)			(0.009)	
Mandatory Retirement	-0.054	-0.053		-0.441	-0.061		-0.061
	(0.011) ***	(0.011) ***		(0.336)	(0.018) ***		(0.250)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.070	0.074	0.072		0.123	0.120	
F-Statistic				9.738			9.738
Wald Test Statistic							0.040
Percent on [0,1] Interval	80.2	79.6	79.9	80.0			
Min Predicted Value	-0.149	-0.151	-0.150	-0.491			
Max Predicted Value	0.347	0.367	0.361	0.388			

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. See notes in Tables 5 and 6 for more information. Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 8
Effects of Mandatory Retirement on Subjective Health and Well-Being Outcomes

			IV LPM			IV Probit	
	LPM	LPM	Reduced-Form	2SLS	Probit	Reduced-Form	MLE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Panel A – Dependent Variable: High Health (Baseline Average = 0.145) (Observations = 10,306)						
Treated			0.014			0.012	
			(0.019)			(0.018)	
Mandatory Retirement	0.050	0.050		-0.404	0.042		0.042
	(0.038)	(0.037)		(0.615)	(0.029)		(0.501)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.043	0.050	0.049		0.058	0.058	
F-Statistic				9.738			9.738
Wald Test Statistic							0.550
Percent on [0,1] Interval	98.0	96.8	96.8	93.8			
Min Predicted Value	-0.146	-0.144	-0.145	-0.413			
Max Predicted Value	0.527	0.535	0.530	0.535			
	Panel B – Dependent Variable: High Life Satisfaction (Baseline Average = 0.226) (Observations = 10,306)						
Treated			-0.027			-0.025	
			(0.020)			(0.018)	
Mandatory Retirement	0.011	0.013		0.779	0.010		0.009
	(0.044)	(0.043)		(0.670)	(0.041)		(0.502)
Cohort (Continuous)	✓						
Cohort (FEs)		✓	✓	✓	✓	✓	✓
Province (FEs)	✓	✓	✓	✓	✓	✓	✓
R-Squared	0.049	0.058	0.059		0.054	0.054	
F-Statistic				9.738			9.738
Wald Test Statistic							1.530
Percent on [0,1] Interval	99.3	98.6	98.5	96.5			
Min Predicted Value	-0.086	-0.127	-0.131	-0.194			
Max Predicted Value	0.664	0.688	0.698	1.283			

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. See notes in Tables 5 and 6 for more information. Population weights are used in the analysis.

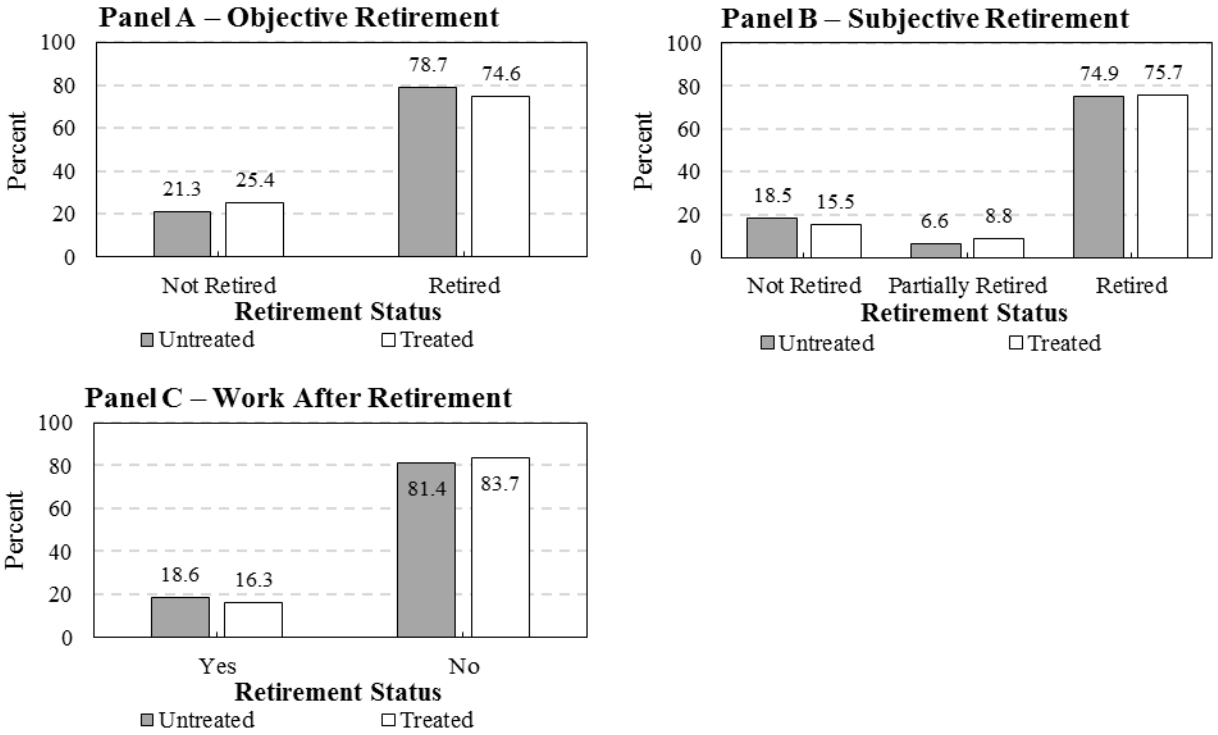
Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table 9
Effect of Mandatory Retirement on Objective Financial Well-Being

	Ordinary Least Squares (1)	Ordinary Least Squares (2)	Instrumental Variables	
			Reduced-Form (3)	Second-Stage (4)
	Dependent Variable: Permanent Income (Baseline Average = 10.286) (Observations = 6,854)			
Treated			0.006	
			(0.022)	
Mandatory Retirement	0.030	0.036		-0.162
	(0.031)	(0.032)		(0.633)
Cohort (Continuous)	✓			
Cohort (FEs)		✓	✓	✓
Province (FEs)	✓	✓	✓	✓
R-Squared	0.650	0.653	0.653	0.650
F-Statistic				7.462

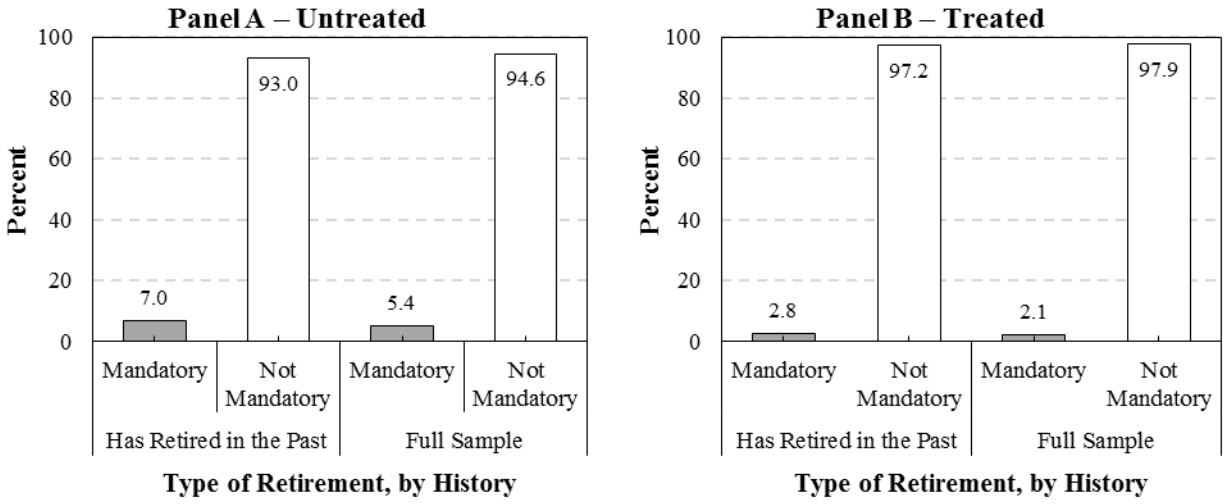
Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. Total income is a four-year average of before-tax income from personal income tax records, inflation-adjusted to 2009 constant dollars. See notes in Tables 5 and 6 for more information. Population weights are used in the analysis.
Source: 2009 Healthy Aging Component, Canadian Community Health Survey and T1 Personal Master File, Statistics Canada.

Figure 1
Labor Market Outcomes, by Treatment Group



Notes: See text for the definition of treatment and the distinction between objective and subjective retirement. Work after retirement is based on whether the respondent reports that he or she worked after a first retirement. Population weights are used in the analysis.
Source: Statistics Canada, Canadian Community Health Survey, Healthy Aging Component, 2009.

Figure 2
Mandatory Retirement by Treatment Status



Note: Mandatory retirement is defined as an indicator for whether the individual self-reports that his or her first retirement occurred due to such a rule, and treatment is defined as in text. Population weights are used in the analysis.
Source: Statistics Canada, Canadian Community Health Survey, Healthy Aging Component, 2009.

Appendix

Table A1
Robustness Checks of the First-Stage Effects

	No Early Reformers	Reform ≠ Survey Year	Age of Respondent		
			Under 85	Under 80	Under 75
	(1)	(2)	(3)	(4)	(5)
			Panel A: LPM		
Treated	-0.026	-0.035	-0.038	-0.031	-0.035
	(0.014) *	(0.011) ***	(0.012) ***	(0.011) ***	(0.013) ***
Baseline Average	0.047	0.040	0.043	0.039	0.034
Observations	7,776	9,576	8,141	6,734	4,822
R-Squared	0.049	0.044	0.038	0.041	0.036
Percent on [0,1] Interval	67.6	77.8	83.3	77.5	77.7
Min Predicted Value	-0.158	-0.117	-0.268	-0.286	-0.255
Max Predicted Value	0.275	0.250	0.250	0.237	0.243
			Panel B: Probit		
Treated	-0.036	-0.036	-0.035	-0.027	-0.030
	(0.017) **	(0.013) ***	(0.013) ***	(0.012) **	(0.012) **
Baseline Average	0.047	0.040	0.043	0.039	0.034
Observations	7,776	9,576	8,141	6,734	4,822
R-Squared	0.107	0.111	0.106	0.116	0.110

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. Panel A uses the linear probability model (LPM) and marginal effects from the Probit estimator evaluated at the observed values of all covariates are reported in Panel B. The provinces that implemented early reforms are Manitoba (in 1981) and Quebec (in 1982). The only province to eliminate mandatory retirement in the same year that the survey was conducted is Nova Scotia. See notes in Table 3 for more information. Population weights are used in the analysis.

Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.

Table A2
Heterogeneity in the First-Stage Effects

	Sex		Marital Status		Education		Income	
	Female	Male	Married	Unmarried	Low	High	Low	High
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A: LPM				
Treated	-0.033	-0.030	-0.025	-0.046	-0.031	-0.034	-0.040	0.003
	(0.010) ***	(0.018) *	(0.012) **	(0.019) **	(0.014) **	(0.020) **	(0.011) ***	(0.029)
Baseline Average	0.029	0.054	0.040	0.041	0.035	0.047	0.043	0.046
Observations	5,700	4,606	5,117	5,189	5,913	4,393	9,028	1,278
R-Squared	0.050	0.074	0.067	0.055	0.054	0.066	0.047	0.102
Percent on [0,1] Interval	74.3	79.9	67.4	74.2	73.3	80.4	74.7	72.8
Min Predicted Value	-0.140	-0.731	-0.519	-0.176	-0.157	-0.176	-0.126	-0.240
Max Predicted Value	0.209	1.037	0.601	0.236	0.189	1.191	0.250	0.375
				Panel B: Probit				
Treated	-0.037	-0.029	-0.026	-0.052	-0.024	-0.039	-0.041	-0.004
	(0.013) ***	(0.020)	(0.014) *	(0.023) **	(0.019)	(0.019) **	(0.014) ***	(0.028)
Baseline Average	0.029	0.054	0.040	0.041	0.035	0.047	0.043	0.046
Observations	5,700	4,606	5,117	5,189	5,913	4,393	9,028	1,278
R-Squared	0.163	0.132	0.164	0.121	0.157	0.134	0.122	0.229

Notes: *** p < 0.01; ** p < 0.05; * p < 0.10. Panel A uses the linear probability model (LPM) and marginal effects from the Probit estimator evaluated at the observed values of all covariates are reported in Panel B. In columns 3 and 4, married refers to being either legally married or in a common-law relationship. In columns 4 and 5, low and high education refer to a high school education or less and at least some post-secondary education, respectively. In columns 7 and 8, low and high income refers to personal income below $50,000 and personal income of $50,000 or more, respectively. See notes in Table 3 for more information. Population weights are used in the analysis.

Source: 2009 Healthy Aging Component, Canadian Community Health Survey, Statistics Canada.