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Evolution of Gender Patterns in Retirement Saving in Canada

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Une préoccupation persistante au sujet des personnes âgées est leur capacité à maintenir leur bien-être économique après leur retraite. Dans une large mesure, ce sont les décisions d'épargne prises pendant les années précédant la retraite qui financent la consommation pendant les années de retraite. Les disparités entre les sexes en ce qui concerne les gains sur le marché du travail et les régimes de retraite financés par l'employeur, de même que la longévité plus grande des femmes, donnent à penser que les ressources dont disposent les Canadiennes à la retraite sont probablement différentes de celles des Canadiens. En étudiant sur 38 ans les données administratives, représentatives à l'échelle nationale, d'une banque de données construite à partir des déclarations d'impôt sur le revenu des particuliers, nous examinons l'évolution des tendances de l'épargne-retraite par rapport à la répartition du revenu selon l'âge et la cohorte de naissance, pour les femmes et pour les hommes. Nous constatons que même si les femmes sont plus susceptibles d'épargner à tous les âges, sous réserve de leur participation, elles épargnent moins et ont tendance à être attirées par des placements qui, en moyenne, offrent un taux de rendement inférieur. Par conséquent, il est possible que les politiques centrées sur la marge d'épargne extensive (les décisions de participation) ne réduisent pas les différences de bien-être économique entre les femmes et les hommes à la retraite, de sorte que les politiques devraient également viser la marge intensive (le montant de la contribution). Enfin, sur l'ensemble de la répartition des revenus, nous constatons une hétérogénéité substantielle des différences significatives entre les sexes quant aux effets de l'âge, de la cohorte et de la période, et ce, dans les deux marges d'épargne-retraite.

Mots clés : différence entre les sexes, épargne-retraite, modèles âge-période-cohorte, pension, préparation à la retraite

A persistent concern regarding elderly people is their ability to sustain their economic well-being after they retire. To a large extent, consumption in retirement years is funded by savings decisions made during the pre-retirement years. Gender disparities in labour market earnings and employer-funded pensions as well as greater longevity suggest that the resources available to Canadian women in retirement will likely differ from those of men. Using 38 years of a nationally representative administrative database developed from personal income tax records, we examine the evolution of retirement savings patterns over the income distribution by age and birth cohort for women and for men. We find that although women are more likely to save at all ages, conditional on participation, they save a smaller amount and tend to be attracted to investments that on average offer a

lower rate of return. Thus, policies that focus on the extensive margin of savings (participation decisions) may not reduce differences in economic well-being between women and men in retirement, and policies must also focus on the intensive margin (amount contributed). Last, across the income distribution we find substantial heterogeneity in significant gender differences in age, cohort, and period effects on both margins of retirement savings.

Keywords: retirement savings, gender differences, age-period-cohort models, pensions, retirement preparedness

Introduction

Financial advisors continually paint a picture that Canadians are ill prepared for retirement and often argue that women face greater obstacles than men in building a nest egg. Although the gender gaps in education and salary level continue to narrow (e.g., [Statistics Canada 2017](#)), women are more likely than men to interrupt their careers to care for children or parents and retire at an earlier age. These discrepancies translate into smaller balances in both workplace and non-workplace retirement savings. In addition, women on average live longer than men and must therefore finance a longer retirement period.

National surveys including the Financial Comfort Zone Study indicate that women indeed have higher odds of reporting that they are at risk of outliving their money. Currently, substantial differences exist in poverty rates among retired persons on the basis of both gender and marital status. For example, using a variety of nationally representative Statistics Canada databases, [Fox and Moyser \(2018\)](#) report that in 2015, elderly women had a low-income rate of 33.0 percent compared with 8.7 percent among elderly economic families. Moreover, the gender gap among low-income seniors increased from 1995 to 2015 because the proportion of older women living in a low-income household increased at a faster pace (11.6 percentage points) than the proportion of older men living in a low-income household (9.1 percentage points). Although widowhood currently accounts for more single elderly women than divorce ([Wister et al., 2006](#)), divorce rates steadily and dramatically increased over the past three decades, suggesting that this will further shift the relative poverty rates of elderly men and women.

Although there is much speculation in the popular press on how the determinants of saving and wealth accumulation have changed in Canada over time, less attention has been paid to gender differences. In this article, we aim to consider the role of several potential explanations that include age effects, which arise if changes in savings simply reflect the aging of the population. We also consider period effects that may arise as a result of factors such as time-varying changes in the size of capital gains in the stock or housing markets. Last, cohort effects could arise because of changes in economic conditions or the evolution of preferences because, for example, individual generations born after the Great Depression tend

to be characterized as being less thrifty or less alert to risk than previous generations.

Understanding why many Canadians continue to approach retirement with limited assets while other households reach retirement having accumulated substantial wealth is important. Trends in the Canadian labour market suggest that both the gender gap and dispersion in wealth at retirement may continue to increase,¹ in part because the number of workers who participate in employer-sponsored retirement plans is declining. This dispersion in wealth is not a recent phenomenon and can be viewed from evidence in [Ascah \(1996\)](#), which indicates that public pension schemes account for roughly 70 percent of total income for retired individuals in Canada.²

Moreover, the idea that the gender gap may grow is gaining attention since the coronavirus disease 2019 pandemic laid bare the precarious situation facing Canadian women headed toward retirement. Although many women halted their retirement savings during the pandemic,³ gaps in retirement preparedness are more generally related to whether an individual is covered by a workplace pension and types of savings (or investment) instruments chosen earlier in the life cycle as well as amounts saved (or invested). After all, the degree to which an individual can support themselves in retirement depends on the amount of assets accumulated over the life cycle, which is a function of an individual's propensity to save, earnings, and the actual performance of one's investments and pension plans. To illustrate, if a person saves an additional \$2,500 per year at only a 3.5 percent interest rate over a 40-year working life, this individual would enter retirement with approximately \$228,500 in additional wealth. Thus, seemingly small differences in annual savings can lead to very large differences in the level of wealth at retirement.

In a bid to improve retirement security, policy-makers have promoted programs based on evidence from behavioural economics, such as nudges or changing defaults in pension plans (e.g., [Employment and Social Development Canada and Sun Life Financial, 2018](#)), as well as changes to a large number of policies and tax incentives,⁴ to alter individual savings behaviour. Rather than study a single program or nudge in isolation, our goal in this article is to decompose gender patterns in retirement savings behaviour in Canada into age, period, and cohort effects.

To accomplish this goal, we use the Longitudinal Administrative Database (LAD), a longitudinal file developed from personal income tax information, which follows a representative sample of 20 percent of all Canadian tax filers and non-filing spouses over a 35-year period. The data overcome many limitations that plague survey data because they contain accurate information on labour market earnings, investment income, and contributions to multiple retirement savings programs.

We first provide an update on trends in Canadians' accumulation of wealth by examining participation in various forms of retirement savings programs and levels of annual savings within these programs across the income distribution by gender and age. If individuals behave according to the standard rational economic model, and if there are no systematic differences in risk aversion between men and women, then this model would predict that because of their (on average) longer life expectancies (a) women should save larger amounts at each point in the working life cycle and (b) women ought to tolerate more risk in investment portfolios.

We test these predictions and extend the evidence presented in several descriptive studies (i.e., [Morissette and Drolet 2001](#) and [Morissette and Ostrovsky 2006](#), among others) that document important trends, such as declining participation in workplace pension plans that is particularly severe for men and increasing heterogeneity in retirement preparedness over the income distribution, by additionally considering other savings vehicles (i.e., those investments not contained in formal retirement plans), and we examine savings behaviour over finer ranges of the income distribution.⁵ These extensions improve our understanding of the extent to which the dispersion in individuals' wealth at retirement arises because of variation in the categories of savings over their lifetime.⁶ That said, we do not focus on assessing the adequacy of retirement saving using a benchmark such as the replacement rate because [MacDonald and Moore \(2011\)](#) discuss how it can be a misleading indicator of retirees' well-being.

Second, we estimate age-period-cohort (APC) models, which remain a key approach used by epidemiologists and social scientists in the quantitative analysis of social change. These models allow economic behaviour to have three distinct time effects: (a) age effects that capture behaviour across the life cycle, (b) period effects that capture calendar-year changes in the macroeconomic environment and other related effects, and (c) cohort effects that capture changes over time as captured by year of birth, reflecting changing education, labour market opportunities, retirement savings program availability, and other idiosyncratic historical experiences and behaviour. Fundamental to the analysis, we allow the effects of age, period, and cohort to differ by gender.⁷ Last, we present descriptive evidence on the dynamics of retirement savings in Canada by examining patterns over the life cycle.

We conduct this analysis separately for decisions on both the intensive margin and the extensive margin for alternative categories of savings reported to tax authorities annually. This overall approach allows us to address how much of the dispersion in investments and savings arises because some households saved from available resources, whereas others did not. From a policy perspective, whether differences in accumulated wealth reflect the availability of financial resources or thrift has important implications. Moreover, how these patterns vary by gender is of central importance because a great deal of attention has been paid to constructing retirement income policies to ensure the financial security of older women.⁸

Our empirical results include three main findings that may contribute to the policy discussion in Canada concerning retirement savings.

First, although public attention suggests that women, particularly single women, are not properly preparing for retirement, we show that this depends on the metric used for retirement savings. Summary statistics indicate that conditional on income, women are substantially more likely to participate in Registered Pension Plan (RPP) and Registered Retirement Savings Plan (RRSP) programs than are comparable men. However, in the non-RPP-non-RRSP portion of their portfolio, women appear to have less tolerance for risk and invest in assets with lower expected returns. Thus, despite increased participation, women may not receive the same benefits from compound returns on their investments. This suggests that shifting the focus of financial education policies from the intensive margin to either the extensive margin or asset allocation may be more successful in reducing gender gaps in retirement wealth.

Second, we find heterogeneous relationships across deciles of the income distribution in gender differences in age, period, and cohort effects on retirement savings. Between 1995 and 2018, women in the bottom decile were more likely to contribute to an RRSP, whereas in the middle decile we observe declines in female participation. These declines are offset by gains in RPP participation for women in the middle decile. In aggregate, we find the amount of both the RPP and the RRSP contributions does not exhibit a gender difference at the lowest decile; women in the middle of the income distribution have received larger RPP contributions since 2000 than men in this decile. In contrast, at the top of the income distribution, period effects are muted, and gains in RPP contributions for women between 2000 and 2010 were offset by declines in the RRSP. Turning to cohort effects, we find that at each decile, more recent cohorts are characterized by declines in gender gaps in participation in both RPPs and RRSPs. That said, we observe a much steeper positive gender cohort effect for RRSP participation among women in the middle of the income distribution in recent

cohorts. At the top decile, gender cohort effects point to declines in savings in non-retirement accounts over the period studied. Last, we observe statistically significant gender differences in age effects across savings that tend to steepen at higher deciles.

Third, we also find growing differences across periods in the gender gap in the number of years over a five-year period that an individual contributes to both an RPP and an RRSP. At the top and middle of the income distribution, we observe a smaller share of women who never contributed in the past five years. Women are also much more likely to always contribute to a RRSP in a five-year period relative to men. In addition, we find that women are roughly 33 percent more likely to have contributed to an RPP than men at these deciles. Continuous RPP participation over a five-year period rose for women but has declined for men. Taken together, these results point to the importance of heterogeneity within income decile in retirement savings that may play a role in increasing inequality in the retirement years both within and across genders.

The article is organized as follows: In the next section, we outline the standard economic model that motivates our empirical hypotheses. We also provide an overview of both savings institutions in Canada and the literatures on the determinants of retirement savings in Canada and gender differences in savings. In the “Data and Empirical Framework” section, we describe the income tax data used in our analysis. We also discuss the APC model that we estimate. Our empirical results are then presented and discussed. These findings point out that a challenge in formulating public policy in this area relates to a general absence of a distinction between the intensive margin and the extensive margin. The extensive margin focuses on participation, whereas the intensive margin considers the amount conditional on having contributed. A concluding section summarizes our main findings and outlines directions for both policy reforms and future research.

Literature and Research Hypotheses

Literature Review

The two major programs for retirement income planning in Canada are RRSPs and employer-sponsored RPPs. Both programs were initially designed to encourage individuals to save for retirement by allowing savers to defer taxes from the present to the future. Furthermore, investment income earned in an RRSP is tax exempt until the plan is collapsed. Whereas RPPs are only available to workers employed in firms that have registered their trust with the Canada Revenue Agency,⁹ RRSPs are available for all employed taxpayers and those who are self-employed. Contributions to RRSPs are tax deductible within prescribed limits, where an individual’s annual

RRSP limit is reduced by the assessed value of benefits accrued in the previous year under an RPP or pension adjustment (PA).¹⁰ Since 1991, unused contribution room in the RRSP may be carried forward. Both programs play a large role in retirement income, and recent statistics indicate that RPP payments accounted for 29 percent of the total income elderly Canadians claimed in 1999 (Statistics Canada 2003). More recently, Uppal (2016) reports that nearly 80 percent of Canadians planned to contribute to an RRSP during their lifetime, and 31 percent expected that their RRSP would be their main source of income in retirement.

Much research examining retirement savings in Canada is descriptive and documents aggregate trends (e.g., Milligan 2005; Morissette and Ostrovsky 2006). Empirical evidence on retirement savings decisions and asset allocation over the life cycle in Canada remains limited relative to the US literature.¹¹ Although Sabelhaus (1997) points out that aggregate saving behaviour in the United States and Canada is very similar,¹² the study of differences in savings patterns and asset allocation by gender in Canada has been very limited.

Analyzing savings in different categories along subgroups defined by gender is important because researchers in the United States have suggested that women need to allocate more resources and invest more aggressively for later life (e.g., Kilpatrick and Glass 1998), and single women are particularly vulnerable (Yuh, Montalto, and Hanna 1998).¹³ For example, using simulation models, Poterba et al. (2005) examine how different portfolio allocation strategies over the life cycle affect retirement wealth. Because stocks have offered substantially higher average returns than bonds in recent times, the simulations suggest that a risk-neutral retirement saver should allocate their entire portfolio to stocks. Moreover, because on average women have a longer life expectancy than men (and retire at an earlier age, on average), they should hold riskier portfolios.

These findings also suggest that asset allocation decisions are of equal (if not larger) importance relative to discussion focused on simply increasing contributions, which is often the focus of policy discussion concerning retirement savings. Reinforcing this point are Morissette, Zhang, and Drolet (2002), who hypothesize that increases in retirement wealth inequality result from the amount of stock holdings in individual portfolios in Canada. Among studies using Canadian data that focus on gender differences in retirement savings, Morissette and Drolet (2001) decompose the decline in RPP coverage by gender and find that coverage rates fell substantially among both young men and prime-aged men, but rose among prime-aged women, between the mid-1980s and the late 1990s.

Research has found that there is a well-established positive relationship between savings and both income

and age and time trends in savings participation (e.g., Milligan 2005), but Statistics Canada (1999) shows few changes in contribution levels. To the best of our knowledge, no research has considered these factors jointly, particularly in periods after the TFSA was introduced, which could influence RRSP contributions heterogeneously depending on one's current marginal tax rate and one's belief regarding their marginal tax rate in retirement.

Although not the focus of this article, it is worth noting two important strands of the broader research literature on retirement saving. First, just as policy discussion concerning retirement savings often focuses on how to increase contributions rather than asset allocation, much research, including Milligan (2002), Veall (2001), and Engelhardt (1996), among others, has explored whether changes to either marginal tax rates or contribution limits influence RRSP savings behaviour. The consensus finding in this literature is that changes in either tax rates or contribution limits have small impacts on RRSP contributions, but they do exhibit a larger magnitude for participation decisions. It is speculated that individuals with low marginal tax rates while working could have a lower capacity to save, and these small impacts on the amount contributed reflect a (rational) response to implicit taxes in public pension programs. Second, a growing literature has developed following Lusardi and Mitchell (2008), who report that sharp gender differences in financial knowledge, in which women on average display a lower level of knowledge, may account for the observed gaps in retirement savings.¹⁴ Recently, Laurin, Messacar, and Michaud (2021) link data from a financial capability survey to Canadian tax records and present evidence suggesting that financial literacy is an important determinant of the extent to which tax-deductible savings plans are used efficiently.¹⁵ These differences in knowledge may reflect differences across birth cohorts, and it is important to understand how cohort differences, controlling for age and period effects, influence gender gaps in savings decisions.

Research Hypotheses

Retirement preparedness in Canada remains an understudied area, and much of the existing literature is (implicitly) based on the life cycle or permanent income model of inter-temporal behaviour. In this model, individuals are forward-looking and select consumption and savings paths over their lifetime to maximize their inter-temporal well-being.¹⁶ This model is also used to infer optimal asset allocation decisions based on assumptions regarding the expected returns on different investment vehicles.

Our empirical hypotheses are formally developed in Appendix A and are motivated by (a) a simple continuous-time life cycle model and (b) medical data indicat-

ing that on average women are expected to outlive men. Assuming no differences in retirement timing, then as a result of their increased longevity, one could hypothesize that women are more likely both to invest and to invest larger amounts in retirement savings than men. Marital status could influence asset allocation, and we hypothesize that single women are more likely to invest in riskier assets than single men, whereas there are no differences in asset allocation between married men and married women.¹⁷

Beyond these hypotheses that condition on a few demographic characteristics, we also examine using a regression framework if there are differential gender responses to age, period, and cohort factors. In addition, we examine savings dynamics over five-year periods of time to supplement our static investigation. These investigations are detailed further in the next section and exploit features of the administrative data that we additionally discuss in the next section.

Data and Empirical Framework

Data

The LAD is a Statistics Canada database developed from personal income tax information. It is a 20 percent random sample of all Canadian tax filers (and non-filing spouses identified by tax filers) constructed from Canada Revenue Agency tax files. The LAD follows individuals longitudinally on the basis of their social insurance number (SIN)-based individual identifiers (SINs themselves are not used, to protect individual confidentiality) and matches them into family units on an annual basis, thus providing individual- and family-level information on incomes, taxes, and basic demographic characteristics in a dynamic framework. The first year of the LAD is 1982, and data are currently available through 2018, with almost 4.7 million records per year.

Individuals are included in the LAD for all years they file tax forms and are excluded (only) for those years in which this is not the case. Individuals attrit from the sample permanently if they stop filing tax forms, pass away, or permanently leave the country. Individuals who temporarily leave the country re-enter the sample upon their return. New individuals enter the LAD on an annual basis and consist of first-time tax filers, such as young individuals beginning to file taxes or immigrants.

The LAD is uniquely well suited to the descriptive analysis undertaken here because it is closely representative of the underlying adult population. The large sample size allows us to conduct analysis on subpopulations broken down on several dimensions, including income, gender, age, and marital status, with confidence. A significant advantage of using the LAD relative to relying on survey data is that concerns regarding measurement error are substantially reduced because misrepresentation to tax

authorities could lead to legal penalties, thus reducing an individual's incentive to incorrectly report their actual income.¹⁸ Similarly, recall error is likely much less common in the LAD because of the information system that assists accurate responses (T4 slips) and the linkages of the LAD to administrative records for payments such as the Canadian Child Benefit.

Although it possesses these clear advantages, the LAD lacks information on socio-economic characteristics such as education. Furthermore, asset allocation decisions likely have important consequences for retirement wealth accumulation. Whereas the LAD also does not provide direct evidence on asset allocation, it does have information on capital gains, dividend income, and interest income. We suggest that these categories can inform asset holdings because stocks have offered substantially higher average returns than bonds over the past 90 years, meaning that greater exposure to stocks would be expected to lead to a higher average retirement account balance.

Our working sample for each year includes individuals aged 25–54 years who filed tax forms and reported at least \$101 in market income, which is the income measure used in the analysis. This cut-off minimizes the effects of reporting and coding errors, and otherwise counts very small amounts as (effectively) zero. We do not include older individuals to avoid labour force participation decisions related to retirement timing. Within each year, we define the decile in which a person lands within the overall income distribution.

Regarding categories pertaining to retirement income, the LAD contains information on the amount claimed within the calendar year in three categories: PA, RRSP, and RPP. The LAD additionally reports investment income (reflecting underlying investments and savings) in several different categories, and we examine three specific sources. The first is interest income, which can be generated from investments such as savings accounts, Guaranteed Investment Certificates, and term deposits, as well as government and corporate bonds. Interest income is taxed in full at an investor's marginal tax rate. The two remaining sources are taxed at lower rates. Taxpayers report both whether they experienced a capital gain (or capital loss) and dividend income. Capital gains (or losses) occur when an investment (such as a stock, bond, or mutual fund) is sold at a higher (or lower) price than originally purchased, and only 50 percent of the realized capital gain is reported for income tax purposes. Similarly, because dividends are paid out of a company's after-tax profits, investors are entitled to a tax credit provided the dividends received were from Canadian-source corporations. Finally, the LAD provides information on TFSA's, a program introduced in 2009 whose contributions are not deductible for income tax purposes, but amounts withdrawn, including any income earned in the account, are (generally) tax-free.¹⁹

Empirical Strategy

Our examination of the LAD first involves constructing deciles of the income distribution for the full sample of working-age adults in Canada in each year from 1987 to 2018. These deciles divide the overall population ordered by annual income into 10 equal-size groups (or cells).²⁰ Within each of these cells, conditional on gender as well as potentially specific age and marital status categories, we calculate summary measures on both participation and contribution levels.²⁰ Examining changes in these conditional summary statistics presents an opportunity to see whether the hypotheses outlined in the preceding section are supported by the data.

Second, our approach also includes a set of regression models that allows for differential responses to age, period, and cohort effects by gender. Thus, we build off the classical APC model that is used throughout the social sciences, which can be viewed as having a specific analysis of variance-type structure to explain the savings behaviour of person i at time t as follows:

$$\text{Save}_{it} = \beta_0 + \beta_1 \text{age}_{it} + \beta_2 \text{Period}_t + \beta_3 \text{YOB}_i + \beta_4 \text{Female}_i + \mu_{it}, \quad (1)$$

where age is treated as a quadratic, period is a series of indicators for the tax year of the observation, and cohort (year of birth [YOB]) is another set of indicators capturing the decade of birth. We also include a gender effect, and μ_{it} is a random error term with a mean of zero. By using the indicator variables in this way, we are reducing the associated functional form assumptions, although we restrict age to have a quadratic effect. The constant captures the combined effect of the reference categories, which are male and the initial period and cohort. This model can be viewed as postulating a linear model for the associations among cohort, period, and age, as well as implicitly imposing a stationarity assumption that the parameters β are constant across age, period, and cohort.

To address our research question of interest, we first augment this equation by interacting each of the key variables with gender, thus allowing for differential coefficients on all variables for women and men. This generates the following equation:

$$\text{Save}_{it} = \beta_0 + \beta_1 \text{age}_{it} + \beta_2 \text{Period}_t + \beta_3 \text{YOB}_i + \beta_4 \text{Female}_i + \beta_5 (\text{Female}_i \times \text{age}_{it}) + \beta_6 (\text{Female}_i \times \text{Period}_t) + \beta_7 (\text{Female}_i \times \text{YOB}_i) + v_{it}. \quad (2)$$

A nonzero interaction of age, period, or cohort with gender would indicate differential gender effects for individuals of a given age, in a different period, or in a different cohort group. Our approach requires restrictions to be placed on two parameters of the model because it is well known that no statistical model can simultaneously

estimate all of the linear APC effect parameters in either Eq. (1) or (2), given their collinearity (i.e., cohort = period \ominus age). For identification, we restrict the last cohort and period groups to be the omitted reference categories. We selected these because more recent cohorts are not captured throughout their life cycle and are generally younger in age, so their effect is closer to zero than earlier cohorts. In other words, the constant captures the combined effect of the reference categories, which are male and the last period and cohort.

Our use of a modified APC model is similar in spirit to Rosenquist et al. (2015), who examine genetic differences in age, period, and cohort effects. The choice of which restrictions constrain any two specific age, period, or cohort variables to serve as reference categories affects the estimated coefficient values and standard errors. That said, there is no empirical method of differentiating between alternative variables whose effects are constrained because, irrespective of the restrictions, all estimated models yield identical fits of the data. Although one could investigate the sensitivity of our estimated gender interactions by placing different constraints on specific age or period variables or treating birth year as a linear variable rather than a series of cohort indicators, we determined that these alternative models placed restrictions that were more difficult to justify in our setting on the basis of a graphical examination of our data. Thus, we begin the Results section by presenting graphical evidence that explores how the rates of savings across different instruments changed over time by gender.

Results

Result 1

There are substantial differences in savings across the income distribution for both men and women, and women participate more than men in retirement savings programs. The top panel of Figure 1, which reports participation in different kinds of saving categories, shows that the rate of participation in RRSP and RPP programs increases greatly across deciles in both 1987 and 2018 and that women have higher participation (contribution) rates at each decile, a pattern also observed for TFSA participation, which is measured only in 2018 because the program did not exist in 1987.²² The participation rates increased for both men and women in the top three deciles, whereas the rates in the bottom deciles have been constant.²³ The bottom panel explores other non-retirement program savings, and large declines are seen in interest income over time and very small gender differences in reporting both dividend income and capital gains across deciles. There do not appear to be any significant changes in the differences in participation across deciles over time in any of the non-retirement saving categories.

Online Appendix Figure B.1 shows that the gender gap in combined RPP and RRSP participation is almost always larger among the sub-sample of single individuals than among those who are married. Both in the full sample and in the sub-sample of single individuals, the size of this gender gap has remained constant over time in the middle third of the income distribution, but there have been slight increases in the size of the gap in both the bottom third and top third of the income distribution.

Result 2

Over time, there is rising inequality across income deciles in the amounts saved in all saving categories, and gender gaps in RPP contribution also emerge across deciles over time.

Examining Figure 2, which reports amounts saved,²⁴ we observe large spikes in the amounts saved (conditional on saving) in RPPs and RRSPs in the top decile. The gap between the top decile and the lower deciles increases markedly between 1987 and 2018. A gender gap emerges over time, as well as larger amounts saved in a RPP at each decile. Among non-retirement (program) assets, we find that whereas women had higher amounts saved in interest income conditional on income decile in 1987, this gap vanished by 2018 when men claimed more interest income at deciles below the 50th percentile. Men are also increasingly likely to report higher dividend income savings, with a large gender gap between the 30th and 80th percentile, as well as a small gender gap at each decile in the TFSA program.

In Online Appendix Figure B.2, which examines the breakdown by age of contribution amounts, we observe that although women in the top deciles made larger contributions to RRSPs from 1980 to the 1990s, this gap has declined substantially over time.²⁵ In the lower and middle deciles, men tend to make on average slightly larger contributions, and this difference is driven by the sub-sample of single individuals. Ignoring the extreme deciles, within cells the gender gap in RRSP contributions (as well as the average amount contributed) has remained fairly stable over time. Women aged 25–34 and 35–44 years are more likely to both participate in an RPP and have larger contributions than corresponding men in almost every decile. The gender gap in RPP contributions among those aged 45–54 years is similar only in the top 50 percent of the income distribution. In the bottom half of the distribution, men make slightly larger RPP contributions on average than women aged 45–54 years. Examining contributions to both RRSPs and RPPs, we witness a similar pattern, with men making slightly larger contributions in the bottom half of the income distribution and women making larger contributions in the top half. In general, the gap between men and women in the upper deciles has declined over time. Regarding amounts of asset allocation, the only striking difference

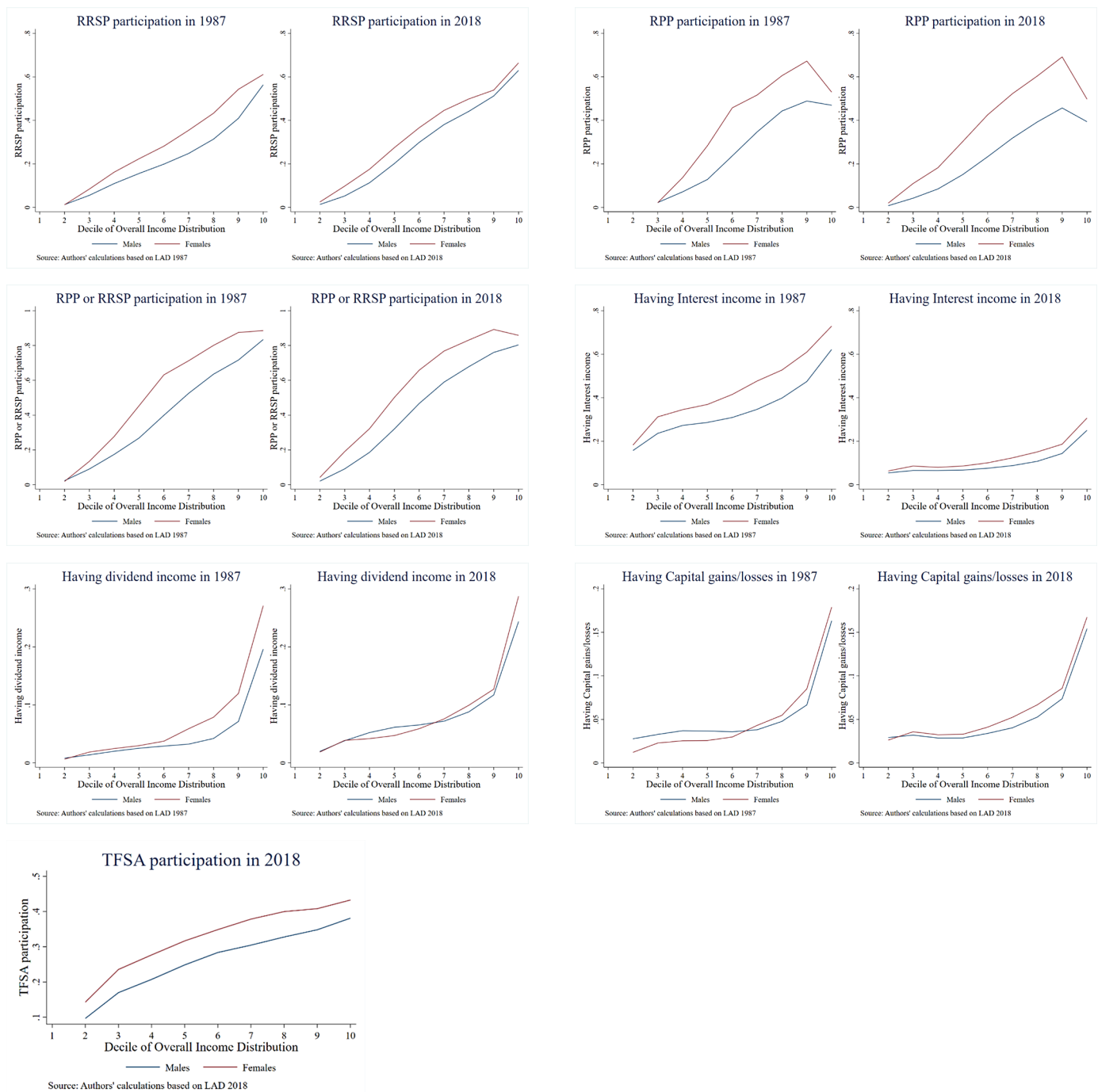


Figure 1: Gender Differences in Participation (Intensive Margin) in Different Savings Vehicles by Income Decile in 1987 and 2018. Source: Authors' calculations based on the Longitudinal Administrative Database, 1987 and 2018.

is the amount of capital gains, where on average men consistently report more than \$1,000 more in gains than corresponding women. Among the sample aged 45–54 years, the gap in more than half of the deciles is approximately \$5,000. This is striking because if one were to assume that the structure of the retirement portfolio mimics the structure of investment income outside of RRSPs and RPPs, then this would suggest that gender differences

in retirement wealth in Canada may arise strictly from asset allocation decisions rather than from participation in RRSPs and RPPs.

Result 3

The magnitude of the gender gap in retirement savings activity depends on the margin examined. Comparing the top panels of Figures 1 and 2, we observe that in each

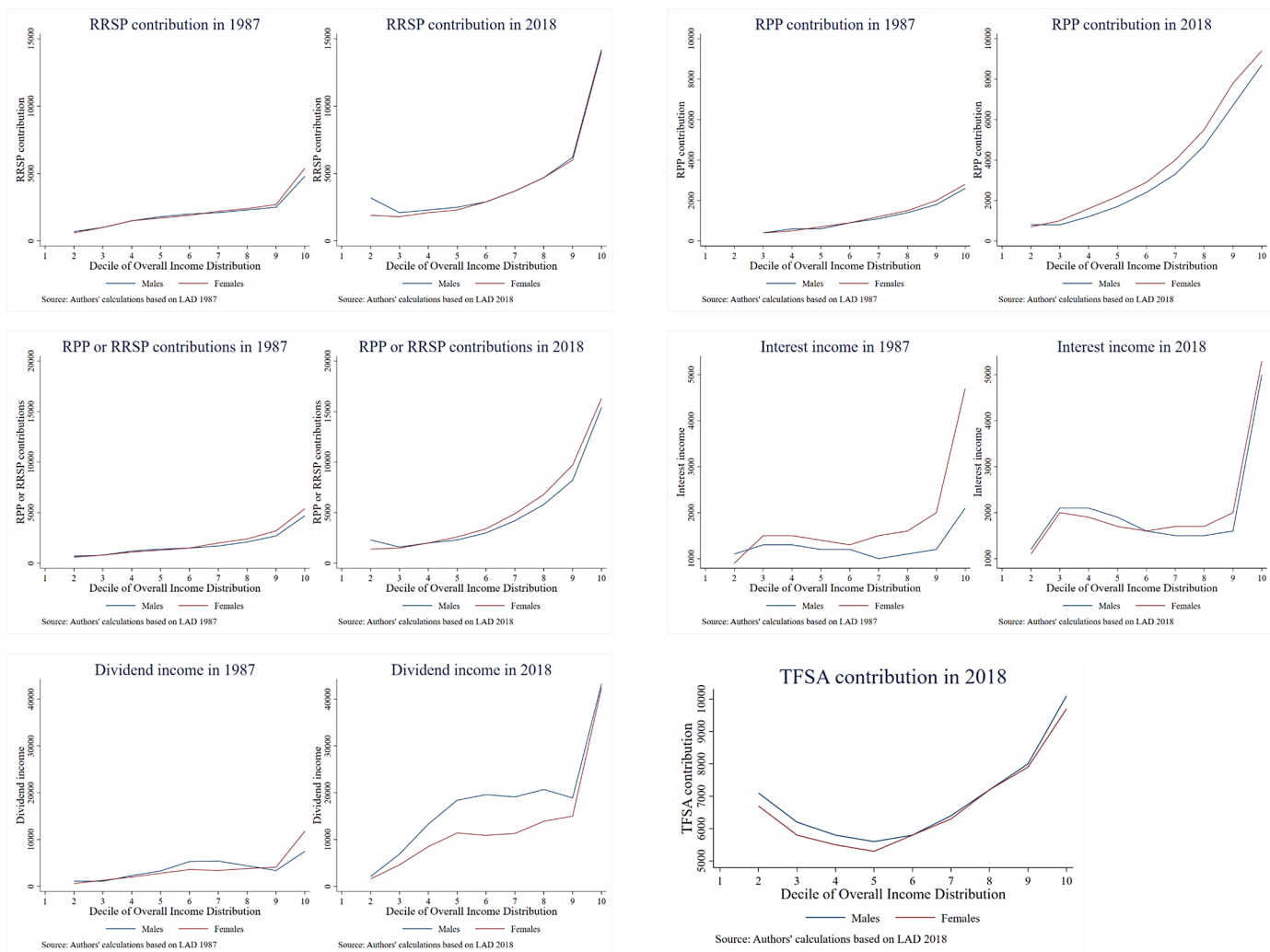


Figure 2: Gender Differences in Amount Contributed (Extensive Margin) in Different Savings Vehicles by Income Decile in 1987 and 2018. Source: Authors' calculations based on the Longitudinal Administrative Database, 1987 and 2018.

conditional decile of the income distribution, the simple difference between the percentage of women in the conditional decile who make a non-zero contribution and the percentage of men contributing has declined over time. By examining graphs in the intervening years (available in Appendix A), one observes that this reduction in activity on the intensive margin is particularly striking in the middle third of the income distribution. However, we do not observe a gender gap in the amount contributed between 1987 and 2018 in any conditional income decile. At some income deciles, unconditionally men either contribute a larger amount or there is no statistically significant gender difference on the extensive margin in RRSP. However, we observe a gender gap on both the intensive and the extensive margins with the RPP, with the latter widening over time.²⁶ Last, in the non-retirement savings categories presented in the bottom panel, women generally have higher participation but lower contributions on average at most income deciles. This decrease on the

extensive margin for women appears particularly salient for dividend income, reflecting likely differences in the risk appetites between the genders. These differences in activity on the intensive and extensive margins were only conditional on the income decile. We next examine how these gaps evolve across age, time period, and birth cohorts.

Result 4

Controlling for period and cohort effects, we observe that the gender difference in age effects in RRSP and RPP participation steepens more sharply as one ages. The panels of Table 1 present coefficient estimates of the age effects and their interactions with gender for three specific deciles of the income distribution.²⁷ In addition, we observe that conditional on the other covariates, the main effect of being female is negative and significantly related to RPP participation in each decile, whereas there is a positive relationship at both the top and fifth

Table 1: Estimates of Selected Coefficients from the Augmented Age, Period, and Cohort Model: Participation and Intensive Margin Decision by Savings Instrument

Explanatory Variables	RRSP		RPP		Interest Income		Dividend Income		TFSA	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
First Decile										
Age	0.00030 ^{***}	0.00007	0.00026 ^{***}	0.00003	0.00334 ^{***}	0.00011	-0.00015 ^{***}	0.00004	-0.00210 ^{***}	0.00041
Age ² /100	-0.00007	0.00008	-0.00030 ^{***}	0.00004	-0.00292 ^{***}	0.00013	0.00048 ^{***}	0.00004	0.00228 ^{***}	0.00050
Female	-0.00282	0.00197	-0.00209 ^{**}	0.00090	-0.01448 ^{***}	0.00317	-0.00395 ^{***}	0.00109	-0.08929 ^{***}	0.01087
Female × Age	0.00036 ^{***}	0.00008	-0.00008 ^{***}	0.00004	0.00208 ^{***}	0.00013	0.00015 ^{***}	0.00005	0.00462 ^{***}	0.00052
Female × Age ² /100	-0.00068 ^{***}	0.00010	0.00011 ^{**}	0.00005	-0.00305 ^{***}	0.00016	-0.00032 ^{***}	0.00006	-0.00448 ^{***}	0.00063
Fifth Decile										
Age	0.00397 ^{***}	0.00032	0.00171 ^{***}	0.00027	0.00061 ^{***}	0.00025	-0.00352 ^{***}	0.00015	-0.01367 ^{***}	0.00063
Age ² /100	-0.00076 [*]	0.00039	-0.00220 ^{***}	0.00034	0.00619 ^{***}	0.00030	0.00811 ^{***}	0.00018	0.01347 ^{***}	0.00079
Female	0.14861 ^{***}	0.00996	-0.04439 ^{***}	0.00866	0.06747 ^{***}	0.00778	0.02822 ^{***}	0.00465	0.12441 ^{***}	0.01760
Female × age	-0.00280 ^{***}	0.00043	0.00906 ^{***}	0.00037	-0.00107 ^{***}	0.00033	-0.00060 ^{***}	0.00020	-0.00555 ^{***}	0.00086
Female × Age ² /100	0.00447 ^{***}	0.00053	-0.01042 ^{***}	0.00046	0.00299 ^{***}	0.00041	0.00071 ^{***}	0.00025	0.00865 ^{***}	0.00107
10th Decile										
Age	-0.00311 ^{***}	0.00032	0.02770 ^{***}	0.00034	-0.01483 ^{***}	0.00032	-0.00115 ^{***}	0.00029	-0.03302 ^{***}	0.00070
Age ² /100	0.00401 ^{***}	0.00037	-0.02382 ^{***}	0.00040	0.02619 ^{***}	0.00038	0.00913 ^{***}	0.00034	0.03814 ^{***}	0.00083
Female	0.45983 ^{***}	0.01568	-0.34857 ^{***}	0.01686	0.40231 ^{***}	0.01581	0.09305 ^{***}	0.01423	0.34425 ^{***}	0.03057
Female × Age	-0.01873 ^{***}	0.00068	0.01532 ^{***}	0.00073	-0.01370 ^{***}	0.00069	0.00025 ^{***}	0.00062	-0.01582 ^{***}	0.00141
Female × Age ² /100	0.02047 ^{***}	0.00079	-0.01517 ^{***}	0.00085	0.01555 ^{***}	0.00080	0.00001	0.00072	0.02068 ^{***}	0.00164

Notes: Specifications also include period and cohort indicators that are additionally interacted with gender and a constant term. Robust standard errors are reported.

Coef. = coefficient; RPP = Registered Pension Plan; RRSP = Registered Retirement Savings Plan; TFSA = tax-free savings account.

* $p = 0.1$; ** $p = 0.05$; *** $p = 0.01$.

Source: Authors' econometric analysis of the Longitudinal Administrative Database.

deciles for RRSP participation. In general, the main effect of being female increases in magnitude in absolute value at higher deciles across all outcomes, reinforcing that gender gaps in the intensive margin also increase across deciles of the income distribution when we condition on period and cohort effects.

A surprising finding is that for each savings outcome examined at each decile, we observe that the gender difference in age effects enters in a statistically significant manner. The first column examines RRSP participation, and the non-linear relationship in age steepens more sharply for women. This pattern is also observed in the second column that focuses on RPP participation. These results suggest that gender gaps within deciles steepen at older ages.

Specification tests of the modified APC model were considered for each outcome investigated at each of the deciles discussed in the text. These specification tests considered the joint significance of the gender interactions. For nearly every outcome, we observe highly significant period, age, and cohort effects on activity in a savings category for Canadian women in the middle decile of the income distribution.

Table 2 examines decisions on the intensive margin. We find that conditional on other factors, being female is associated with significantly smaller RPP and significantly larger RRSP contributions in the fifth and 10th deciles. Moreover, we observe a significant non-linear age effect that differs between genders, leading the gap in RRSP to widen, whereas the gap in RPP contributions shrinks at older ages at both the fifth and 10th deciles. We speculate that a portion of this difference may arise because RPP contributions may reflect salary differences that could exist early in the career. Last, we observe in the first decile that interest income is the sole outcome for which there is a statistically significant different gender difference in age effects.

Result 5

Recent cohorts of women are more likely to participate in a RPP when controlling for age and period effects. Recent cohorts of men are more likely to save in non-retirement categories. Figure 3 reports the model coefficient estimates for the gender interactions with birth cohort indicators from Eq. (2) for three deciles of the income distribution for four selected savings vehicles. Results for the bottom decile are presented in the first column, and across all cohorts the gender interaction is not statistically different from zero for both RRSP and RPP participation. This pattern differs at higher quantiles, where we observe in each cohort that women are more likely to participate in an RRSP, conditional on age and period effects and their interactions with gender. However, the trend in the estimated interaction effect for RRSP participation as well as that for the RPP participation de-

clines for the most recent cohorts in the middle decile. In other words, the wide prevalence of RRSP participation among women demonstrated a sharp decrease across birth cohorts before 1950 and then an increasing trend for generations born in the 1970s and 1980s. Although the rates of RPP participation did not vary widely across birth cohorts for men, there was a substantial increase in participation for women from the 1930 through the 1950 cohorts, a fall for the 1960 cohort, and then essentially no change since the 1960 birth cohort.

In the final column, we observe that whereas RPP participation is lower for women in cohorts in the middle decile, it is significantly higher in the top decile. The results shown in Figure 3 present the first visualization of evidence that the evolution of cohort effects differs for most savings vehicles across the income distribution. This can also be observed in the different trends for reporting interest income across deciles, whereas an exception is that reporting a capital gain or loss is statistically not different from zero for most cohorts in the middle and top decile of the income distribution. Taken together with evidence on significant main cohort effects, these results indicate that these cohort factors appear to play a large role that differs across gender and decile of the income distribution in employment and savings decisions in Canada.

Result 6

In the fifth decile of the income distribution, controlling for age and cohort, the gender gap in both RRSP and RPP participation continues to grow but at a slower rate since 2000. Figure 4 reports the coefficients estimated for the regression model for participating in the various savings programs for the series of interactions between gender and period (calendar-year) dummy variables for three deciles of the income distribution. There is substantial heterogeneity in how these gender interactions with period effects have evolved over time across these deciles. Most interesting is the middle decile, where we observe that after 2000, the negative gender gap in period effects for RPP participation has become smaller in absolute value. Similarly, we observe that the positive gender \times period interactions for RRSP participation remain positive but have grown smaller in magnitude in the middle decile since 2000. This indicates that the gender gap is growing at a smaller rate. In contrast, the gender \times period interactions are generally statistically insignificant for the bottom and top deciles. The gender \times period interactions for RPP participation have tended to grow over time. Participation rates for both genders follow an inverse U shape (i.e., rising and then falling over time), peaking from 1997 to 2002 and then declining sharply in both 2002 and 2008, corresponding to economic and financial downturns. The gender gap in RRSP participation (women contributed more, especially in the middle

Table 2: Estimates of Selected Coefficients from the Augmented Age, Period, and Cohort Model: Amount and Extensive Margin Decision by Savings Instrument

Explanatory Variables	RRSP			RPP			Interest Income			Dividend Income			TFSA	
	Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE		Coef.	SE
First Decile														
Age	46.92	46.43		352.19	304.64		143.38 ^{***}	32.95		358.20	389.18		-161.88 ^{**}	66.83
Age ² /100	-13.98	54.82		-446.17	362.06		-97.10 ^{**}	38.69		-617.36	447.22		258.91 ^{***}	81.43
Female	512.90	1,593.05		8,179.84	8,908.25		4,607.37 ^{***}	925.57		607.74	12,622.65		-3,946.50 ^{**}	1,645.11
Female × Age	-19.62	58.61		-535.36	393.40		-214.95 ^{***}	41.77		-346.67	544.88		97.44	77.93
Female × Age ² /100	39.20	69.91		714.33	471.96		207.62 ^{***}	49.83		568.51	628.86		-36.45	95.26
Fifth Decile														
Age	17.00 ^{***}	3.66		10.65 ^{***}	1.61		-24.35 ^{***}	6.59		1,087.36 ^{***}	35.36		-205.56 ^{***}	36.44
Age ² /100	25.16 ^{***}	4.48		-1.78	1.99		104.64 ^{***}	7.90		-1,401.48 ^{***}	41.94		342.58 ^{***}	46.89
Female	504.38 ^{***}	110.54		-284.95 ^{***}	44.04		-313.35	193.50		10,159.77 ^{***}	1148.15		-714.08	945.26
Female × Age	-28.54 ^{***}	4.68		24.13 ^{***}	1.90		25.64 ^{***}	8.41		-577.05 ^{***}	48.31		28.38	46.59
Female × Age squared/100	32.80 ^{***}	5.71		-37.23 ^{***}	2.34		-17.70 [*]	10.06		730.09 ^{***}	56.99		-36.20	59.42
10th Decile														
Age	-265.40 ^{***}	9.43		186.32 ^{***}	9.14		-296.30 ^{***}	30.52		942.07 ^{***}	241.75		-185.71 ^{***}	25.45
Age ² /100	453.31 ^{***}	11.03		-139.42 ^{***}	10.57		517.15 ^{***}	35.37		-926.78 ^{***}	277.64		247.08 ^{***}	30.14
Female	5,498.79 ^{***}	451.06		-1,542.07 ^{***}	420.19		3,017.96 ^{**}	1,369.02		8,877.59	10,734.39		3,532.28 ^{***}	1,030.06
Female × Age	-170.19 ^{***}	19.40		74.05 ^{***}	18.35		16.42	60.01		124.73	466.64		-138.59 ^{***}	47.46
Female × Age ² /100	142.99 ^{***}	22.67		-78.70 ^{***}	21.14		23.30	69.58		-486.85	535.85		132.29 ^{**}	55.50

Notes: Specifications also include period and cohort indicators that are additionally interacted with gender and a constant term. Robust standard errors are reported. Coeff. = coefficient; RPP = Registered Pension Plan; RRSP = Registered Retirement Savings Plan; TFSA = tax-free savings account.

* $p = 0.1$; ** $p = 0.05$; *** $p = 0.01$.

Source: Authors' econometric analysis of the Longitudinal Administrative Database.

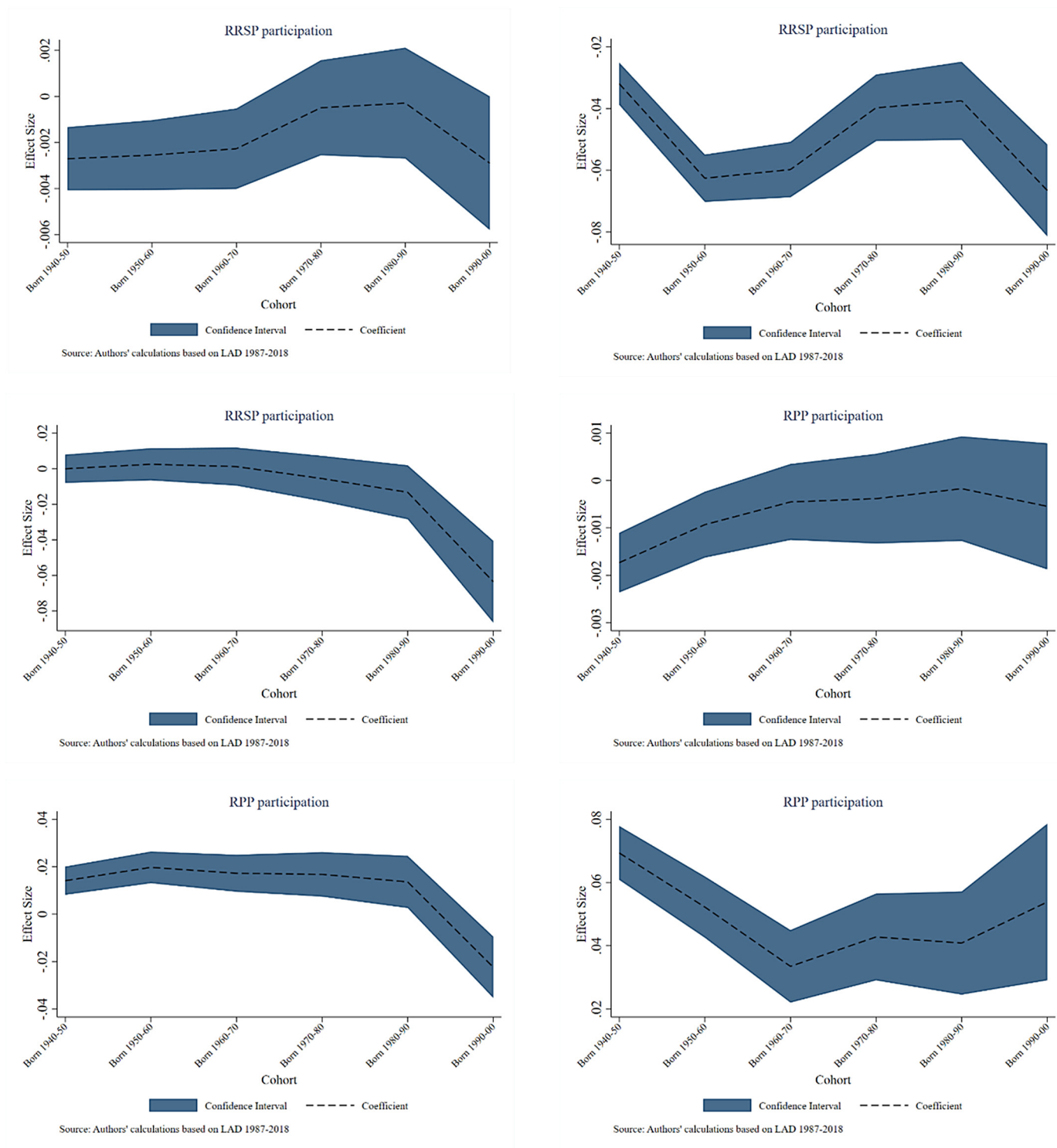


Figure 3: Estimated Gender Differences in Cohort Effects for Participation in Different Savings by Income Deciles. Source: Authors' calculations based on the Longitudinal Administrative Database, 1987–2018.

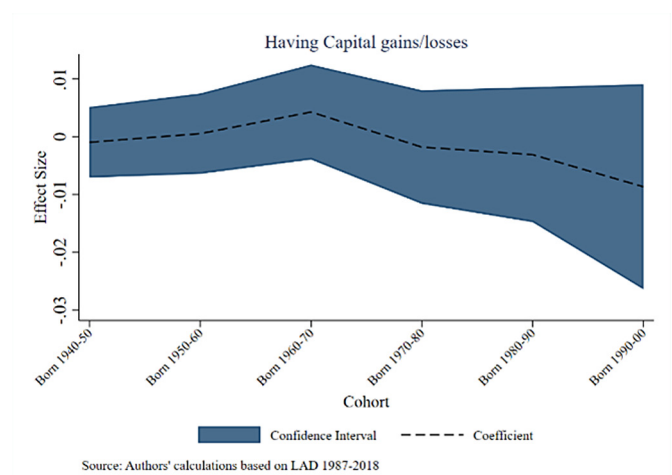
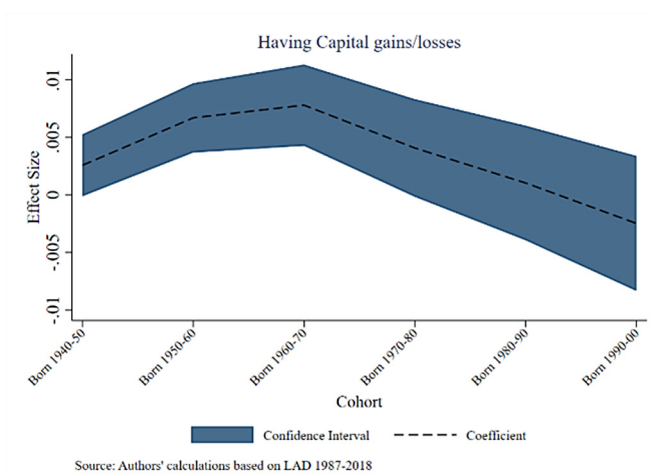
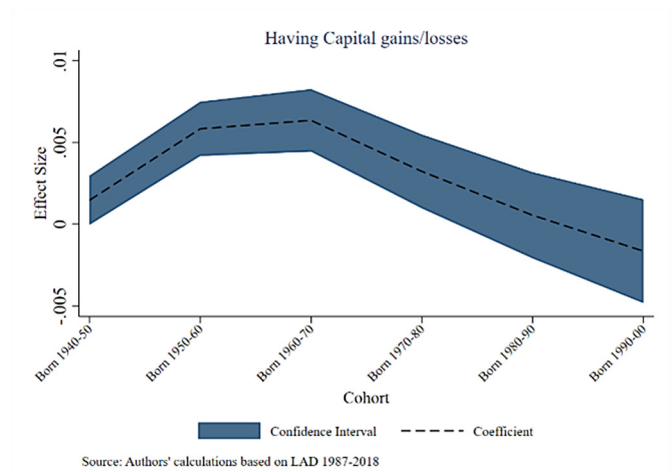
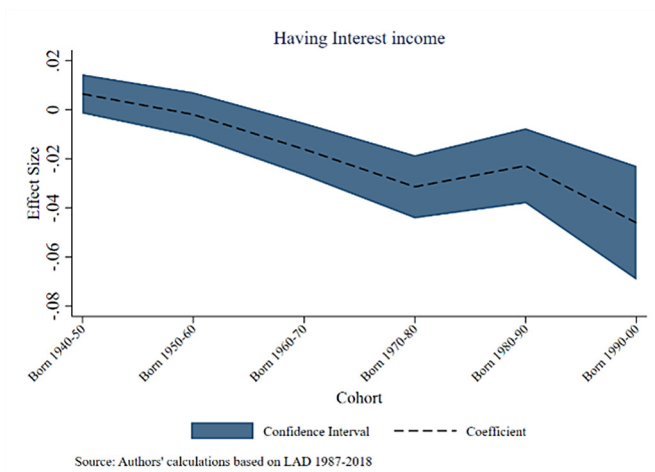
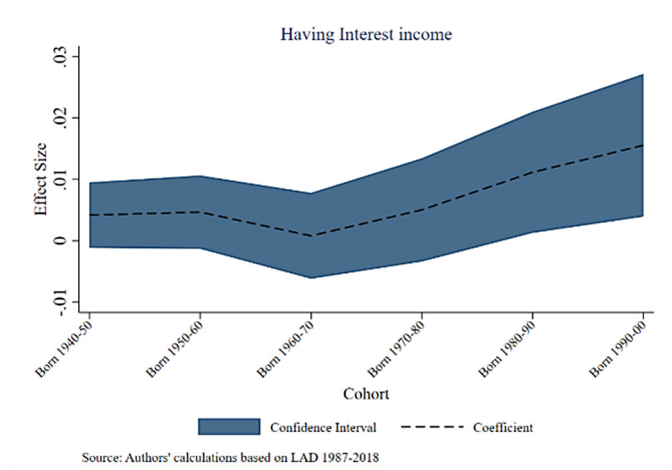
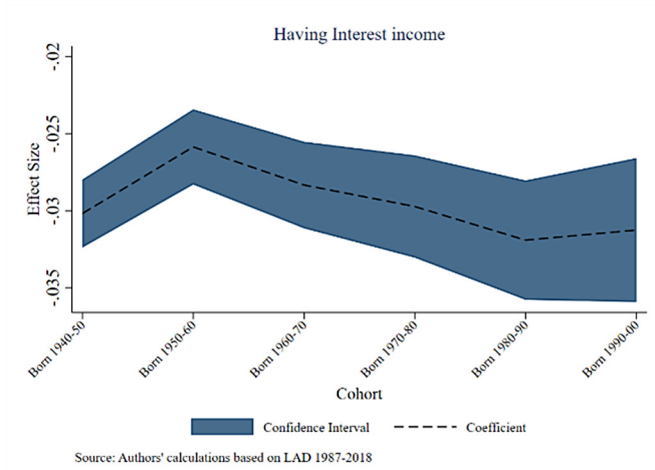


Figure 3: (Continued)

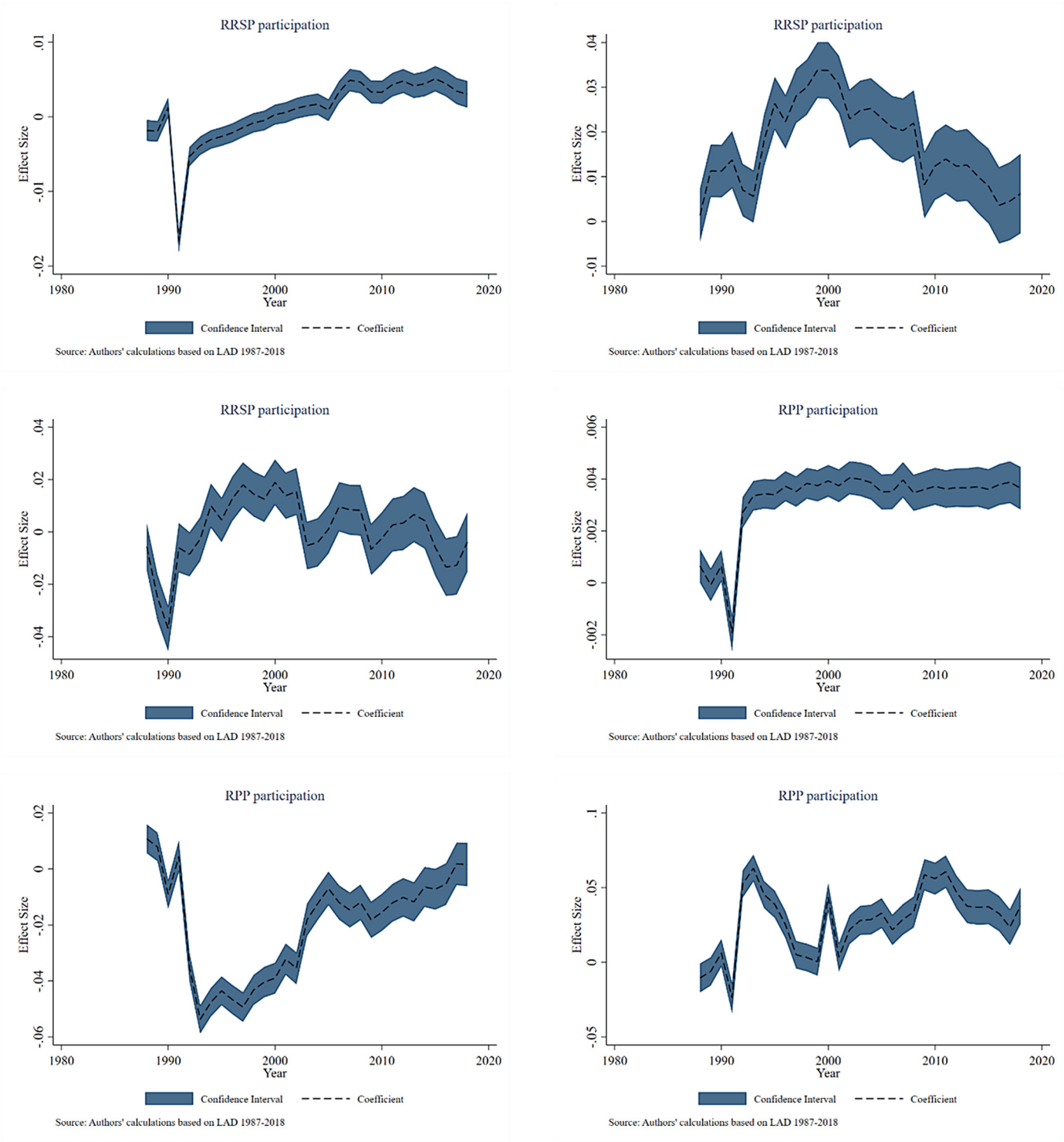


Figure 4: Gender Differences in Period Effects in Participation in Different Savings Vehicles by Income Decile. Source: Authors' calculations based on the Longitudinal Administrative Database, 1987–2018.

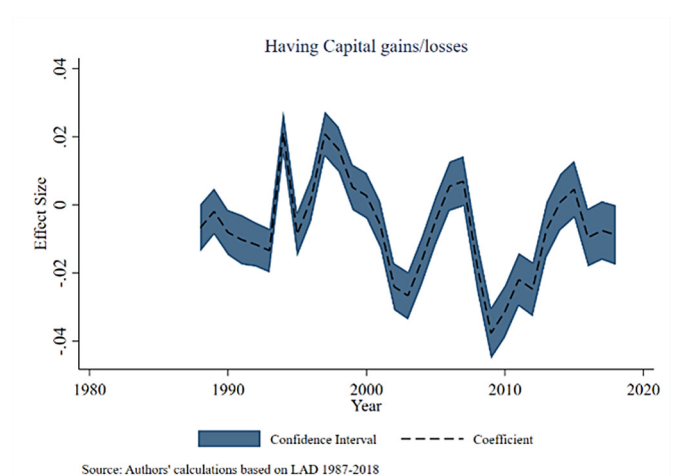
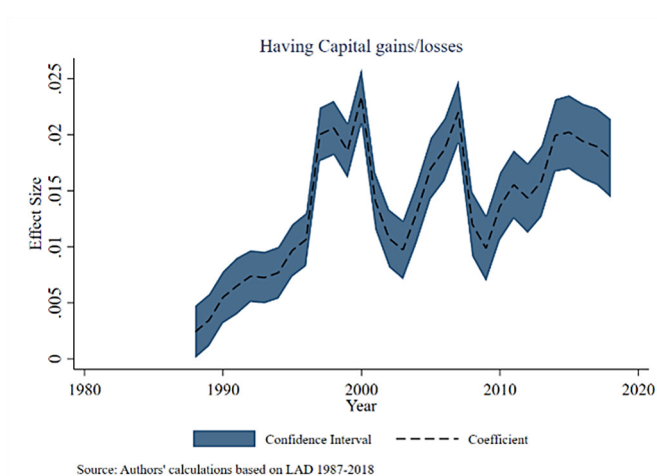
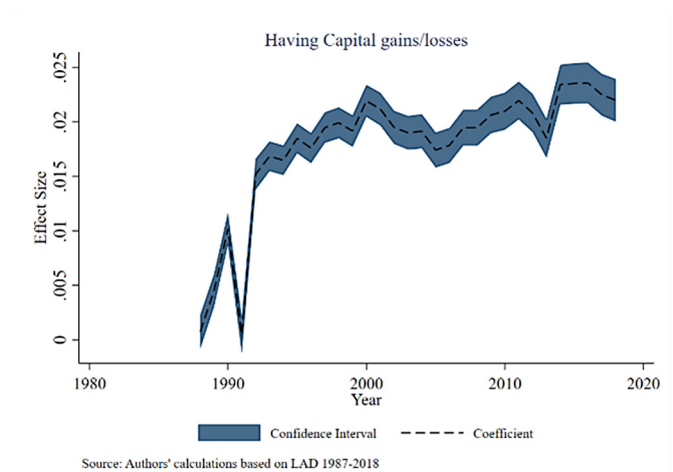
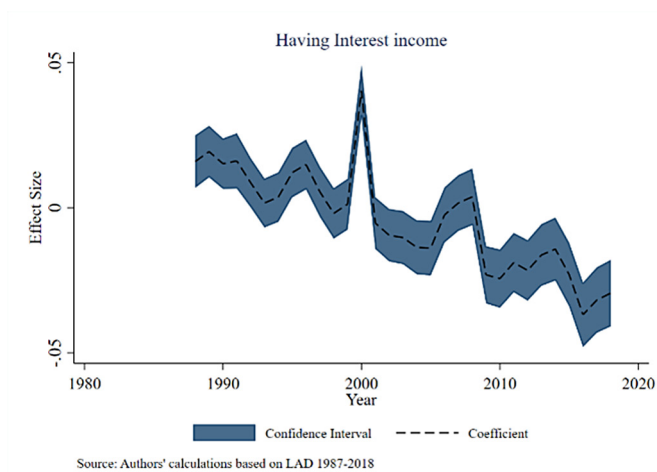
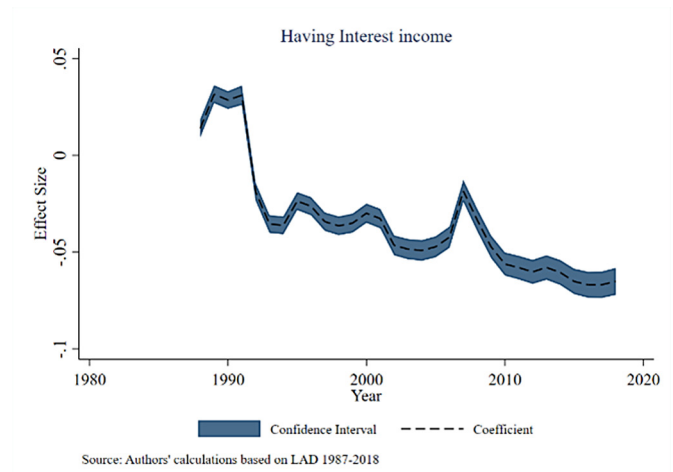
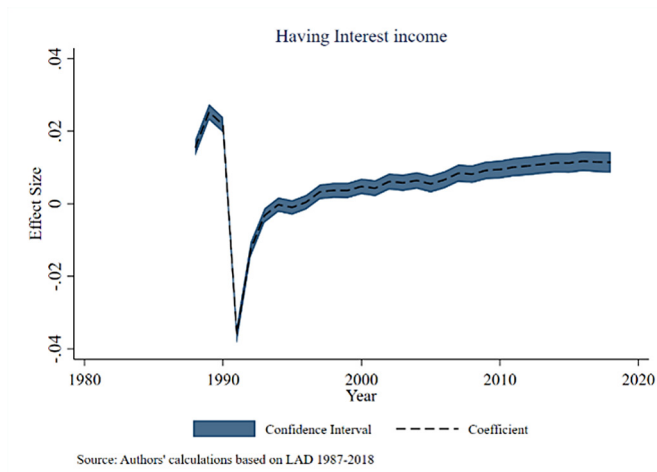


Figure 4: (Continued)

periods) appears to be offset by TFSA participation, where men contribute more. There were large declines in RPP participation in the early 1990s, followed by recovery, and the gender gap follows a trend of first increasing and then decreasing. Among earners in these deciles, women are more likely to report dividend or interest income in a context in which the levels of the former have been increasing over time and levels of the latter have declined sharply since 2010. Last, among non-retirement savings vehicles we observe that the trend for gender \times period interactions is in the opposite direction between the middle and top deciles, whereas the trend for interest income differs only in the bottom decile.

Result 7

The gender difference in amount contributed to the RPP and retirement accounts has increased in favour of women in the middle and top deciles over time. Figure 5 presents estimates of the gender \times period interactions and their 95 percent confidence intervals from Eq. (2) for contributions to four different saving vehicles. At the top and middle deciles of the income distribution, these curves have a positive slope, indicating that conditional on age and cohort effects as well as the interaction with gender, women are saving more than men in each period in their RPP as well as in their combined RPP and RRSP. We do not see a similar pattern in the TFSA, suggesting that the increased savings are targeted toward retirement. Moreover, we observe a declining time trend in these gender interactions for interest income as well as for other reported amounts saved in investments that are held outside of retirement accounts.

Result 8

Over time, a gender gap in women's continuous participation in RPPs has grown, whereas the fraction continuously participating in RRSPs has remained constant between the sexes. In Tables 3 and 4, we shift from examining the evolution of retirement savings in a static context to examining savings dynamics over time. Understanding dynamic elements is particularly important in a policy context because one must determine whether a widespread incidence of sporadic savings implies fundamentally different policy prescriptions than does a greater concentration of savings made only by a smaller number of Canadians. For public policy to design policies that can boost national savings, it is important to identify the correct target population. The former implies the need to help more individuals make generally more frequent contributions, whereas the latter suggests a need for programs that are targeted at specific portions of the population.

To report dynamic patterns, we tabulate the number of times an individual contributes to an RRSP or RPP in a five-year period for the sub-sample of LAD respondents

who filed in each of those five years. We tabulate these statistics by gender on the basis of the decile of the income distribution in which they were located in the first year. As before, for space considerations we report only results for the periods 1987–1991 and 2014–2018, but the trends are quite stable between these periods.

Table 3 provides the results of these tabulations, in which each entry presents the share of Canadians in either the middle or the top decile of the income distribution who saved that number of years starting in 1987 and 2014. The columns of the table are ordered from zero years out of five to five years out of five. In the top panel of Table 3, there is no gender gap in either decile in the percentage who saved in a RRSP in each of the last five years, but we observe a smaller share of women who never contributed in the last five years in each decile. Among RPP participants shown in the bottom panel of Table 3, we see trends that reflect broader labour market trends with an increase in those working in positions that do not offer this benefit. That is, whereas 60 percent of private-sector workers in the United States are covered by a workplace retirement plan, the percentage in Canada is presently 20 percent and has declined substantially over the past three decades.

Result 9

Over time, whether women aged 35 years or older repeatedly contribute or never contribute to a retirement savings plan depends on their income decile, whereas only single men aged younger than 35 years were more likely to annually contribute to an RRSP. Table 4 re-examines the patterns in Table 3 for single individuals only. Thus, each entry compares those who are unmarried by gender and age range for both the fifth and the 10th decile of the income distribution measured in either 1987 or 2018. Examining individuals in the middle-income decile, we observe growth in the fraction of women aged 35 years and older who never contributed in the next five years over time that mirrors Table 3, suggesting that this finding is irrespective of marital status. In contrast, in the top decile, there is an increase among women aged 35 years and older who have saved in each of the past five years. If we were to decompose patterns by savings vehicle, we would find that, for the RRSP, with the sole exception of single women in the youngest cohort, single individuals have lower rates of always saving and higher rates of never saving compared with other individuals of the same gender and in the same income decile. A surprising finding is that there has been a growth in the fraction of single men aged 25–34 years who contributed to their RRSP in each of the next five years over time. This result can be viewed as demonstrating that the diminishing gender gap on the intensive margin at the top of the income distribution is due to more recent cohorts.

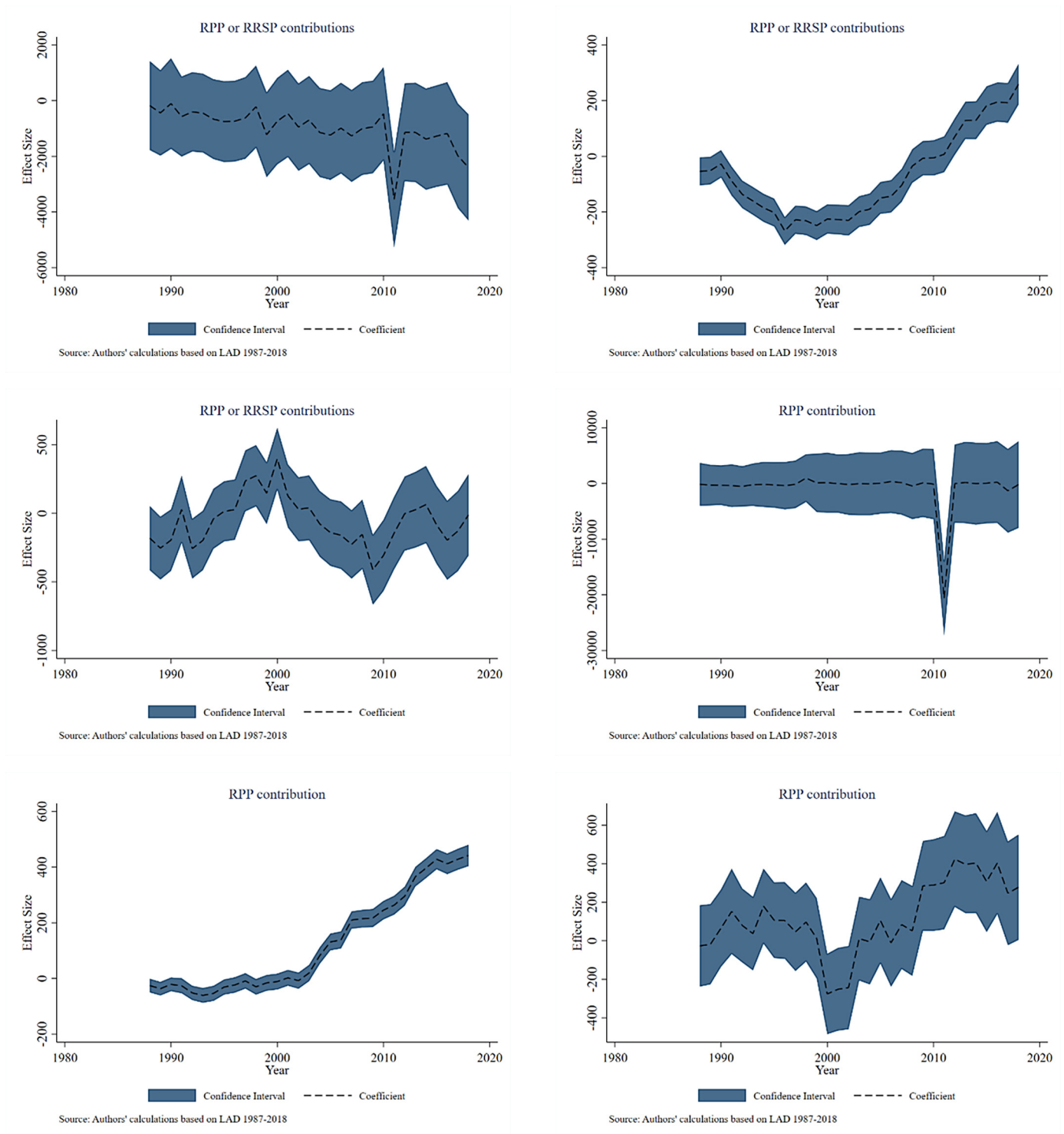


Figure 5: Gender Differences in Period Effects in Amounts Contributed to Different Savings Vehicles by Income Decile. Source: Authors' calculations based on the Longitudinal Administrative Database, 1987–2018.

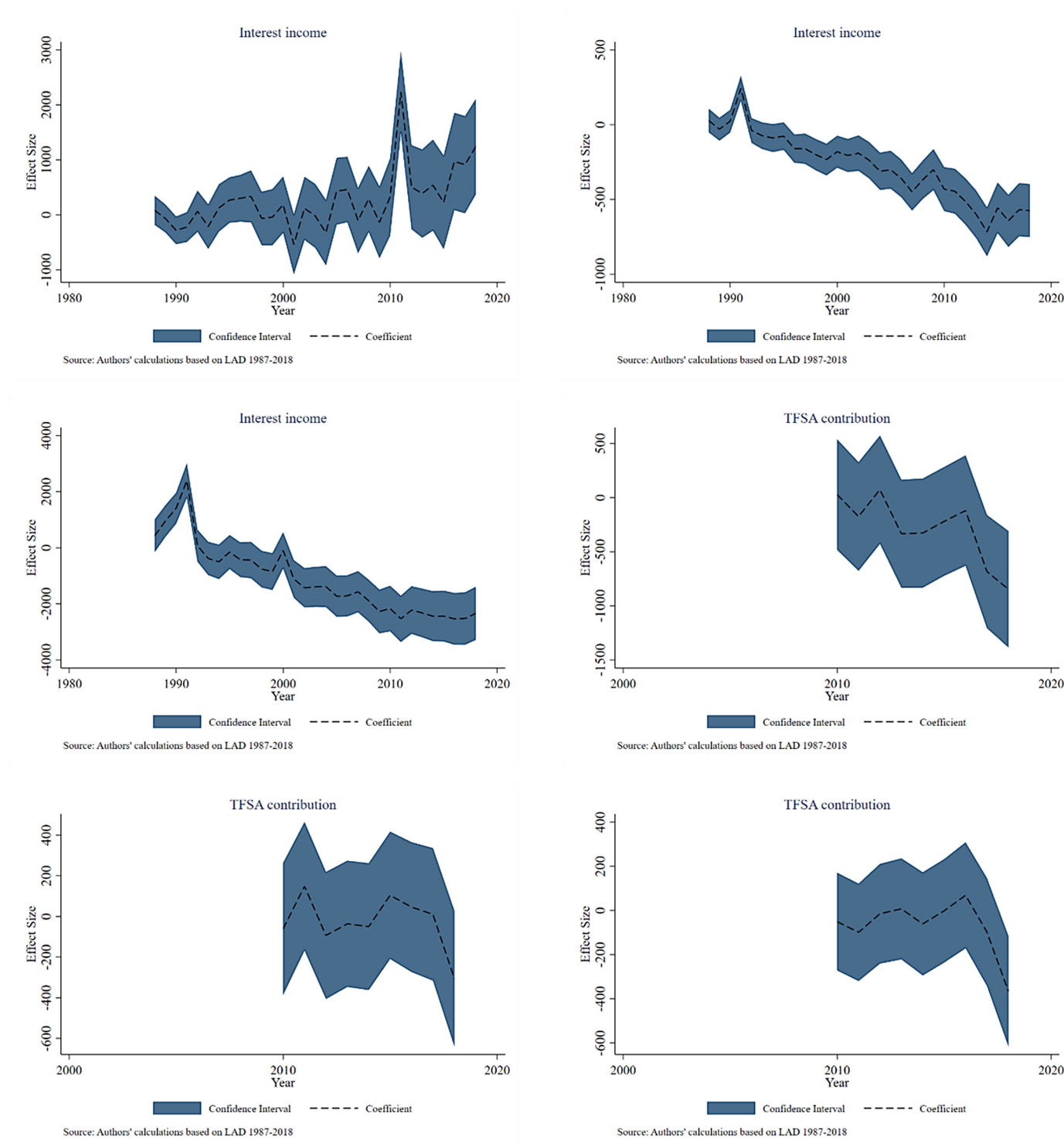


Figure 5: (Continued)

Table 3: Fraction of Years over a Five-Year Interval Participants Contributed to Retirement Savings Plans by Gender in Specific Deciles

Interval, Gender, and Decile	No. of Years in the Next 5 y					
	Never	1	2	3	4	All
Percentage of individuals by how many years participated in RRSP						
1987–1991						
Female						
5	46	14	10	9	9	12
10	16	15	10	10	13	37
Male						
5	55	13	9	8	8	8
10	18	14	9	10	13	36
2014–2018						
Female						
5	50	10	8	7	8	18
10	17	8	8	9	13	46
Male						
5	56	10	8	6	7	13
10	20	8	8	8	11	45
Percentage of individuals by how many years participated in RPP						
1987–1991						
Female						
5	55	7	5	5	7	21
10	44	4	3	3	4	43
Male						
5	74	6	4	4	4	9
10	48	4	3	3	4	38
2014–2018						
Female						
5	58	4	4	4	5	25
10	47	3	3	3	4	40
Male						
5	75	4	3	3	4	11
10	56	4	3	3	3	31

Note: RPP = Registered Pension Plan; RRSP = Registered Retirement Savings Plan.

Source: Authors' calculations.

These tables suggest that the loss in the fraction of the population that holds an RPP comes from nearly every age-marital status subgroup. The percentage of single women who never contribute to an RPP in each of the next five years has been constant over three decades, irrespective of age and marital status. This could indicate that there has not been a noticeable aggregate change in how women sort for jobs on the basis of a private pension.

Taking the RRSP and RPP jointly, we additionally observe that at deciles below the middle of the income

Table 4: Fraction of Years Contributed to Retirement Savings Plans by Gender and Age for Single Individuals in Specific Deciles

Gender, Age (y), and Decile	No. of Years in the Next 5 y					
	Never	1	2	3	4	All
1987–1991						
Female						
25–34						
5	49	10	9	9	9	14
10	13	7	9	11	14	46
35–44						
5	51	9	7	7	8	18
10	13	6	6	7	14	53
45–54						
5	51	8	6	6	7	21
10	12	7	7	8	12	55
Male						
25–34						
5	54	11	9	8	8	11
10	20	9	9	10	13	40
35–44						
5	57	9	7	6	6	14
10	20	8	8	8	11	44
45–54						
5	56	8	6	5	6	18
10	19	8	7	9	11	46
2014–2018						
Female						
25–34						
5	58	6	6	5	7	18
10	54	4	4	4	4	29
35–44						
5	59	4	4	4	5	23
10	43	4	4	3	4	42
45–54						
5	60	3	4	3	5	25
10	38	4	4	4	4	47
Male						
25–34						
5	69	6	5	4	5	11
10	61	5	5	4	4	21
35–44						
5	74	4	3	3	4	12
10	59	4	4	3	3	28
45–54						
5	76	3	2	2	3	14
10	54	4	4	3	3	32

Source: Authors' calculations.

distribution, there is a substantial population of both men and women who are not preparing for retirement at all. For policy purposes, it is important to understand whether this group would change their savings behaviour in response to alternative stimuli or if this just indicates that a large fraction are prepared to rely strictly on the public pension system.

Our full set of results from expanding these tables to other deciles suggests that at the lowest deciles, many individuals may not save because they lack resources. In sum, the results for five-year dynamic savings patterns suggest that at the lowest deciles, policies that can encourage savings and in the middle deciles policies that could encourage individuals to diversify their investments to ensure higher returns could help reduce dispersion in retirement wealth.

Conclusions

The retirement prospects of subsequent generations are increasingly becoming a source of public concern. The risks that many will struggle in retirement are increasing, and recent trends are demonstrating that many of the recently retired not only have to support themselves but may also need to support their parents in advanced age. Deciding how much to save and where to save are complicated decisions that require processing a substantial amount of information and making inter-temporal trade-offs. In this article, we have attempted to shed light on trends in these areas with a focus on gender patterns and gaps because among elderly individuals, women have substantially higher poverty rates. Estimates from our APC model with gender interactions find that these interactions have a heterogeneous relationship with decisions to save and amount saved. This casts doubt on the overall effectiveness of a one-size-fits-all policy. An improved understanding of the mechanisms underlying the evolution of gender differences in age, period, and cohort effects presents a direction for future research.

Our findings also indicate that the specific metric used to measure retirement savings activity could lead to different policy conclusions, whereas the gender gap on the extensive margin differs in sign from that on the intensive margin. Women overall, and single women specifically, are increasingly more likely than men to prepare for retirement at nearly all deciles of the income distribution. In addition, men are increasingly less likely to participate in RPP programs. We also find evidence that individuals are saving at earlier ages because differences across age groups in contributing to a voluntary retirement savings plan conditional on income have disappeared across cohorts. We also observe in the non-tax-advantaged categories of savings that women are more likely to report activity in categories that are less risky (such as interest income) than men. These results would suggest that

shifting the focus of financial education policies from the intensive margin to either the extensive margin or asset allocation may be more successful at reducing gender gaps in retirement wealth.

Our examination of individual saving decisions over the life cycle indicates substantial heterogeneity in savings rates that is suggestive of there being multiple distinct reasons for dispersion in retirement wealth across the income distribution. In particular, we observe a growing fraction of never-savers that increases with age in the lower deciles of the income distribution. Whether this results from cohort effects, inertia, or simply not having thought about preparing for retirement is important. We argue that an understanding of this source of heterogeneity is important for policy and should encourage policy-makers to move beyond simply changing marginal tax rates and contribution limits as levers to affect personal retirement savings. Although the introduction of tax-prepaid savings plans may boost aggregate savings, it appears unlikely to change the composition of savers in the population and will probably increase the inequality in the distribution of retirement wealth. Although tax planning and financial literacy are often considered as an explanation, the gender differences in risk tolerance may account for a larger percentage of the gap in retirement wealth.

Future work is also needed to better grasp the connections between retirement wealth and savings decisions over the life cycle and gender, including how they influence retirement timing. Much research has documented that the actual timing of retirement is affected by family caregiving responsibilities and own health, but little is known about how retirement wealth factors in. Understanding how pre-retirees change their savings behaviour over their lifetime could help us understand whether individuals are retiring when expected. Recent years have been characterized by an increasing number of older adults working after their retirement to maintain their standard of living, which suggests that they may not have understood what wealth is needed at the time of retirement. Moreover, a gender perspective when exploring whether individuals constrained in retirement were affected by binding limits on their RRSP contributions during their working years would be interesting. These questions present an agenda for future research.

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Notes

- 1 Fortin et al. (2012) document that from 1997 to 2010 the wage distribution became increasingly polarized, which led to unequal improvements in the relative position of women across the wage distribution.
- 2 Canada's retirement income system consists of three tiers: basic guaranteed income funded through general tax revenues, earnings-related social insurance programs funded by contributions from workers and their employers, and private retirement savings in which participation is voluntary and reflects an individual's choices.
- 3 The third annual Canadian Retirement Survey from Healthcare of Ontario Pension Plan and Abacus Data reports that in 2021, 69 percent of women did not save for retirement versus 57 percent of men. This is a roughly 15 percent increase from 2020 for each gender.
- 4 These include changes in the contribution rate to the Canada Pension Plan/Quebec Pension Plan, introduction of a tax-free savings account (TFSA), multiple changes to the age at which one is entitled to full pension benefits, and new programs for specific workers, including the individual pension plan and retirement compensation agreement, among others. Last, Milligan and Schirle (2020) discuss how changes to the means-tested benefits available to older adults also play an important role in the incentives one must have to continue working at an older age.
- 5 Examining quintiles of the income distribution, Morissette and Ostrovsky (2006) report that families in the top quintile became better prepared than their counterparts in the mid-1980s or the early 1990s. We examine finer details because research on the income distribution (Saez and Veall 2005) reports that there have been dramatic increases in the top decile, particularly in the top percentile.
- 6 Venti and Wise (1998) consider three explanations for the large variations in wealth accumulated for retirement in the United States. Wealth is significantly affected by chance events such as illness or inheritances, the performance of investments, and savings patterns over the life cycle.
- 7 Yang and Land (2013) describe this framework in detail, and our use of a modified APC model is similar in spirit to Rosenquist et al. (2015), who examine genetic differences in age, period, and cohort effects.
- 8 Much of these policies focus on outcomes related to issues that women are more likely to engage in unpaid and non-standard work in the paid labour market.
- 9 Many of the workers covered by an RPP are employed in the public sector. In addition, approximately 84 percent of RPPs in 2000 were defined benefit types (Statistics Canada 2003). Given concerns for RPPs' future viability, there has been a shift toward defined contribution types.
- 10 PA is a calculated value of the pension credits accrued by tax filers in an employer sponsored pension plan or a deferred profit-sharing plan. The use of the PA is intended to provide similar tax breaks to workers with or without RPP coverage.
- 11 The Spring 1996 special issue of the *Journal of Economic Perspectives* contains articles that debate the effects of tax-deferred savings plans on household saving in the United States. Bernheim (2002) also provides an overview of the literature.
- 12 He notes two exceptions: since 1971, Canadians have saved a bit more (~2 percent annually) than Americans on average, and the Canadian saving rate grew a few percentage points relative to the US saving rate after the early 1970s.
- 13 A large literature using US data examines gender differences in savings and retirement preparation and presents mixed evidence. Even and Macpherson (1994) report a large gender gap in pension coverage, much of which can be explained by observed labour market characteristics. Within firms, Clark and Pitts (1999) found that enrolment in specific plans did not significantly differ by gender. Research in consumer finance and economics generally shows that women invest more conservatively than men (Bajtelsmit and Bernasek 1996) and men tend to be more risk tolerant than women (Barsky et al. 1997). For example, in a 1989 Survey of Consumer Finances, 60 percent of women and 40 percent of men said they were unwilling to take any financial risks with their retirement investments. Regarding specific investments, VanDerhei and Olsen (2000) find that women showed greater risk aversion in the allocation of funds to pension assets, although Dwyer, Gilkeson, and List (2002) examine mutual funds and find that level of risk aversion fell with increased financial education. Embrey and Fox (1997) compare single women and men using the 1995 Survey of Consumer Finances and find that although there may appear to be a gender difference in the investment decision-making process, it plays a very limited role because the majority of the gap could be explained by differences in age, net worth, and expectation of a future inheritance. The Retirement Confidence Survey conducted by the Employee Benefits Research Institute (n.d.) tracks confidence levels regarding retirement preparation, and results suggest that women are less confident than men in retirement preparation and less willing to take investment risks.
- 14 Hospido, Izquierdo, and Machelett (2021) also present evidence that in Spain men are better at an-

- swering financial literacy questions than women and provide evidence suggesting that (a) social norms may be important in explaining these disparities and (b) men being overconfident rather than more knowledgeable also accounts for a sizable portion of the gender gap in financial literacy measures.
- 15 Although Boyer, d'Astous, and Michaud (forthcoming) present evidence from a field experiment conducted in Canada that shows that randomized financial education improves the understanding of the tax implications of both savings accounts (an increase from 6 to 15 percent) and contribution decisions, they did not explore treatment effect heterogeneity by gender.
 - 16 Other savings models are not considered in this article, and many of these highlight the precautionary motive of savings (e.g., self-insurance).
 - 17 Although the model makes this specific prediction, it may be that in practice within married households, the husband invests aggressively, but the wife invests conservatively, and the combined investments result in an appropriate combined risk level. In addition, because the model ignores marginal tax rates, it is reasonable to expect the prediction to hold only among married couples with similar marginal tax rates. In other words, married individuals are more tolerant of equity market risk than unmarried taxpayers. This is not simply due to differences in longevity, but also because couples are better able to adapt to respond to an adverse economic shock than singles because they co-insure.
 - 18 Survey data are thought to contain substantial measurement error, particularly in responses related to income and wealth.
 - 19 See [Laurin, Messacar, and Michaud \(2021\)](#) for evidence related to the timing of tax-preferred savings account withdrawals in Canada, an issue we do not investigate in this article.
 - 20 Statistics Canada disclosure rules limit our ability to examine smaller slices of the income distribution. Thus, examining deciles allows us to report patterns over the full distribution in the first nine cells without concerns regarding the impacts of these factors.
 - 21 Results that examine marital status are presented in the Online Appendix because our model does not consider household decision making, and as such, we do not incorporate the spousal information available in the LAD to study retirement savings decisions at the household level. Because married households pool financial resources, transfers may occur between partners to achieve household tax benefits; thus, we examine gender differences only among single individuals.
 - 22 The patterns between 1987 and 2018 follow a trend, and as such we present data from early and late years in the main text, and a selected subset of years in the middle are contained in the Online Appendix. We use all the data in our formal regression analysis that explores the APC model.
 - 23 Note that many of the individuals in the top 2–3 percent of the income distribution both earn incomes and have RPPs that prevent them from contributing to an RRSP. As such, RRSP participation can be viewed as a lower bound if behaviour were unconstrained. In addition, many members in the top decile receive additional forms of compensation for retirement, such as options that cannot be measured with the LAD.
 - 24 We do not report the amount of capital gains because carryovers of capital losses are often used to offset taxable income, rendering an interpretation of this figure difficult. Moreover, in Canada it is also possible to carry back the losses to any of the three preceding taxation years to be deducted against capital gains in those years.
 - 25 For space considerations, this set of figures corresponding to amounts contributed in age and marital status cells is included in the Online Appendix.
 - 26 As pointed out by an anonymous reviewer, the variation in RPP coverage observed between 1990 and 1992 is due in part to changes in measurement rather than actual coverage. A more consistent measure of changes over time around that time period may be changes in RPP employee contributions, which are available in LAD even before the pension adjustment was introduced.
 - 27 Unconditionally, both women and men participate and contribute more as they age. Online Appendix Figure A.1 presents the within-gender difference in participation rates in the savings categories considered for three different age cohorts. For both genders and years, participation rates in each savings category increase at each decile across age groups. We observe that single women have, conditional on income, higher RRSP participation rates than married women. In contrast, the pattern among men differs considerably from that among women. Married men have higher RRSP participation rates than single men. The size of the gap in each decile is small relative to that witnessed for women, in which there are fewer dramatic changes over time. For example, the size of the gaps in RPP participation are small, and married women in the bottom 70 percent of the income distribution have higher participation rates than single women younger than age 45 years. A similar temporal pattern exists for the difference between married and single women aged 45–54 years, yet single women in the top 60 percent of the income distribution are more likely to have a RPP. In con-

trast, single men (particularly those aged 35–54 y) are almost always more likely to have a RPP than married men. Overall, in the top half of the income distribution, single women are more likely to make a contribution to retirement savings, whereas consistent with the theory, married men have higher participation rates than single men. Yet the gap by marital status among men is fairly small in size and has declined over time.

- 28 We are assuming that longevity is fixed exogenously, ruling out uncertainty about the timing of death (e.g., Leung 1994; Kalemli-Ozcan and Weil 2010), as well as the possibility that consumption of health inputs could increase longevity (e.g., Ehrlich and Chuma 1990; Philipson and Becker 1998).
- 29 This simple model motivates our empirical hypotheses but ignores several other factors that affect individual savings decisions, such as credit constraints and legislation on retirement age.

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Appendix A: Model

To motivate our hypotheses in the “Literature and Research Hypotheses” section, consider the following basic continuous-time life cycle model. The consumer lives from time 0, until known death at time T .²⁸ Utility is derived from consumption and each individual maximizes lifetime utility,

$$\max_{C_t, L_t} \int_0^T U(C_t, L_t) e^{-\delta t} dt \quad (1)$$

subject to the inter-temporal budget constraint

$$\begin{aligned} \int_0^R E_t e^{-rt} dt + \int_R^T B_t e^{-rt} dt \\ = \int_0^T C_t e^{-rt} dt + \int_0^T S_t r_t^s e^{-rt} dt + \int_0^T F_t r^f e^{-rt} dt \end{aligned} \quad (2)$$

where R denotes the point in time when retirement occurs, E is labour-market earnings and is a function of hours worked (total hours available – L_t), B is real public and private pension benefits, S is stock or risky asset holdings, F is riskless asset (i.e., T-bills) holdings, r is the real rate of return, and δ is the rate of time preference. We are assuming that individuals can invest in these two financial assets (S and F) each period, where the riskless asset yields a constant rate of return r^f and the risky asset yields r_t^s . Furthermore, we allow the returns on equity to vary across periods and the relationship between the returns on the two assets is given by

$$r_t^s - r^f = r^d + v_t \quad (3)$$

where $v_t \sim N(0, \sigma_v^2)$. It should be stated explicitly that we are not interested in estimating the structural parameters of such a model and ignore the possibility of a bequest motive in saving (i.e., Skinner 1985).

Assuming that the instantaneous utility function U is increasing and strictly concave in each argument (i.e., consumption and leisure are normal goods), individuals would work up to the point where their marginal utility of extra leisure equals the marginal utility of the consumption goods they could purchase if they worked. Retirement occurs when the marginal utility of leisure, even with no work, exceeds the marginal utility of consumption times the wage rate. If we also assume that individuals begin life with zero wealth holdings and are unable to borrow against future labour income, then this

model implies that individuals save initially to build up wealth and then run this wealth down.

Under this set of assumptions that are not considering any specific preference parameters, a difference in longevity between two individuals requires the individual with the longer life span to have a higher savings rate each period. In addition, it also encourages the individual with the longer life span to invest a larger fraction of their funds in the riskier asset. The longer horizon provides more time for the benefits of compound interest to accumulate. (Note that these predictions would also hold if there was an increase in the rate of interest and rate of time preference in such a model.)

Medical data indicate that on average (a) women are expected to outlive men and (b) married individuals outlive single individuals. On the basis of these stylized facts, this simple model would make the following five predictions, which are also presented in the “Literature and Research Hypotheses” section:²⁹

1. Assuming no differences in retirement timing, then due to their increased longevity, single women are both more likely to invest and to invest larger amounts in retirement savings than single men.
2. Similarly, married individuals are both more likely to both make investments and to invest larger amounts in retirement savings than unmarried individuals.
3. Married individuals are more tolerant of equity market risk than unmarried individuals. This is not simply the result of differences in longevity because single individuals may have fewer opportunities to respond to an adverse economic shock than married couples.
4. Single women are more likely to invest in riskier assets than single men.
5. There are no differences in asset allocation between married men and married women. Although the model makes this specific prediction, it may be that, in practice in married households, the husband invests aggressively, but the wife invests conservatively. Thus, the combined investments result in an appropriate combined risk level. In addition, because the model ignores marginal tax rates, in practice we should expect the prediction to only hold among married couples with similar marginal tax rates.

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