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Tax-Sheltered Retirement Accounts: Can Financial Education Improve Decisions?

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Tax-Sheltered Retirement Accounts: Can Financial Education Improve Decisions?*

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Abstract

We conduct a stated-choice experiment to analyze the decision to contribute to front- or back-loaded tax-sheltered savings accounts. Our experimental design includes a randomized financial education treatment that provides information on the two types of accounts. We assess whether respondents learn about the tax implications of these accounts, and whether they make better contribution choices when exposed to the financial education intervention. We find that, relative to a control group, our intervention improves both the understanding of the tax implications of the savings accounts (an increase of 6 to 15 points on a score of 100) and the quality of contribution decisions, improving the well-being of respondents by about 140\$ in each scenario presented to them.

Keywords: Tax sheltered saving, retirement saving, financial education.

JEL Codes: G11, H31, D14

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1 Introduction

Whether people save enough for retirement ([Skinner, 2007](#)), and the mechanisms that affect saving rates in retirement accounts ([Chetty et al., 2014](#)) have been extensively studied in recent years. An equally important question is whether people save in the right type of tax-sheltered account given their personal situation and, if not, whether financial education can improve their behavior. This question is important because different types of individual retirement accounts (IRAs) generate substantially different after-tax returns in many realistic situations. Assessing the optimality of the decision to contribute to a specific type of IRA requires positing an optimal benchmark, which in turn requires a well-defined model and environment.

In this paper, we answer this question by designing a stated-choice experiment in which respondents are asked to contribute to one of two types of tax-sheltered accounts, where the main distinction is the timing in which taxes are paid on the contribution amount. Our experimental design includes a randomized financial education intervention providing the fiscal implications of the two types of accounts. We first measure the effect of this intervention by testing respondents on questions about both types of accounts. We then conduct a stated-choice experiment in which we analyze the choice between contributing to either account in a well-specified environment. We present different scenarios to respondents in which we vary contribution amounts and the rate of return on their investments. We elicit incentivized measures of the respondents’ preferences (impatience and risk aversion) following [Andersen et al. \(2008\)](#), which we use to assess whether respondents make better contribution choices after receiving the financial education, relative to an optimal benchmark. Our setting also allows us to quantify the welfare effects of the financial education intervention.

We focus on the two most important types of tax-sheltered accounts, for which the main distinction is whether taxes are back- or front-loaded ([Yoo and de Serres, 2004](#)). In “back-loaded” EET accounts, individuals contribute pre-tax income (exempt E), their investment returns are tax-sheltered (E), and they pay income tax at the time of withdrawal (taxed T); whereas in “front-loaded” or TEE accounts, individuals contribute post-tax income (T), investment returns are tax-sheltered (E), and proceeds can be withdrawn free of tax (E).¹ In the United States, traditional 401(k) and

¹We follow the wording of [Holzmann and Hinz \(2005\)](#), [Landoni and Zeldes \(2018\)](#) and others where front- and back-loaded refer to the timing of the *taxation* of cash-flows. The terms front- and back-loaded sometimes refer to

403(b) accounts are typically back-loaded, whereas Roth IRAs are front-loaded. In Canada, 40 billion dollars are annually contributed in back-loaded Registered Retirement Savings Plans (RRSP) and 62 billion dollars in front-loaded Tax-Free Savings Account (TFSA) (Statistics Canada and Canadian Revenue Agency, 2016). Despite the importance of back- and front-loaded tax-sheltered savings accounts, knowledge of their fiscal implications may be limited among households. For example, close to half of Canadians incorrectly think that front-loaded TFSA contributions are tax deductible (MacKenzie Investment, 2015).²

Back- and front-loaded accounts deliver the same retirement income when marginal tax rates are equal at the time of contribution and of withdrawal.³ However, when tax rates are not equal, contributing to the wrong type of tax-sheltered account can produce large errors, especially for individuals whose contribution and/or retirement income takes them close to a kink in the progressiveness of the tax schedule. For example, consider an individual with a lower marginal tax rate when contributing to the account while working (e.g. 30%) than when withdrawing during retirement (e.g. 60%), a case we will show is more frequent than commonly thought. In this situation, a \$1,000 TFSA contribution at age 30 would result in \$2,898 available for consumption in retirement at age 65, while the same contribution in an RRSP (re-investing the tax deduction) would result in roughly \$1,653. Assuming a 3% annual rate of return, contributing to the wrong type of savings account would leave \$1,245 on the table. In Figure 1, we plot for this example the percent change in retirement income from choosing TFSA over RRSP as a function of the difference between the marginal tax rate when withdrawing (in retirement) and when contributing (while working). The potential for better decision making could deliver large improvements in welfare.

Our findings show that, in the control group that was not exposed to the financial education intervention, respondents achieved an average score of 43% on five knowledge questions about tax-sheltered savings accounts. These respondents also correctly identify the optimal type of account in which to contribute in 55% of the cases (out of 6 choice situations presented to each respondent), not much better than if they had flipped a coin. Relative to this control group, we then find that

the timing of the tax-break, as in Burman et al. (2001).

²See <https://www.mackenzieinvestments.com/en/about/press-releases/2015-june-17-great-canadian-tfsa-test.html>

³However, an argument made by proponents of transforming 401(k) accounts (EET) into Roth IRA accounts (TEE), the *Rothification* proposal, is often based on the claim that tax-deferral in EET 401(k) prevents the Federal government from tapping into close to 600 billion in deferred tax revenues (Joint Committee on Taxation, 2016).

our financial education intervention improves general understanding of the fiscal implications of tax-deferred and post-tax savings accounts. More precisely, we find that the treatment increases the average score on the knowledge questions covered in the education treatment between 6 and 15 percentage points (an increase of 13% and 23% respectively, relative to the control group). More importantly, we find that the treatment increases the quality of contribution decisions made by respondents, an effect that translates to an average welfare benefit of about 140\$ per choice situation.

This paper is related to two key strands of literature. First, our paper provides evidence on what determines preferences and contribution choices between back- and front-loaded tax-sheltered savings accounts. A number of studies have looked at how the availability of back-loaded retirement accounts has affected savings (Venti and Wise, 1990, Gale and Scholz, 1994, Chetty et al., 2014).⁴ In a recent study, Beshears et al. (2017) provide evidence that total tax-sheltered account contributions do not change once a front-loaded savings account option is offered, which implies that total retirement savings increases since the TEE accounts deliver tax-free retirement income. In a follow-up experiment, the authors find that a plausible channel is that respondents are simply confused regarding the tax properties of these accounts. Lavecchia (2018) finds that those who use TEE accounts (TFSA) in Canada are more financially sophisticated than those using EET accounts. To the best of our knowledge, no study has investigated how savers make the choice between these accounts and how that process relates to preferences and financial knowledge. And because of their imperfect knowledge of the fiscal incidence of tax-sheltered savings, consumers can potentially make mistakes that can be very costly. Burman et al. (2001) find that many American savers would have obtained higher returns if they had used a Roth IRA (TEE) savings account as opposed to a 401(k) (EET) savings accounts.

A substantial strand of literature studies the optimality of saving through tax-sheltered accounts. For example, Gomes et al. (2009) look at saving decisions between taxable and EET accounts and Zhou (2012) look at stock market participation within taxable and EET accounts. As for the choice between EET and TEE accounts, Burman et al. (2001), Dammon et al. (2004), and Huang (2008) look at the optimal saving as well as risk allocations.⁵ In the experimental setting we use, we

⁴In a Canadian context, Milligan (2002) and Veall (2001) investigate how marginal tax rates affect the take-up of back-loaded savings accounts.

⁵Brown et al. (2017) considers the case where marginal tax rates in retirement are uncertain.

are able to construct for each respondent what would be the optimal choice given their elicited risk aversion and preference for present consumption. This allows us to compare the respondents' stated choice between TEE and EET accounts to an optimal benchmark, and compute welfare effects. Although these choice situations are simplified representations of the environment faced by consumers, this simplification allows to diagnose the determinants of that choice process which are also likely to be present in reality.

Our paper's second contribution to the literature is related to the effectiveness of financial education on financial knowledge. Starting with [Lusardi and Mitchell \(2007\)](#), a relationship has been established between an individual's level of financial literacy and his/her retirement preparation in a number of domains (see also [Lusardi and Mitchell \(2014\)](#)). For example, [Clark et al. \(2017\)](#) find that more financially literate workers earn higher annual returns on their 401(k) accounts, whereas [Lusardi et al. \(2017\)](#) show that these differences can be generated endogeneously by the accumulation of financial knowledge. While the association between, and in some instances the causality from, financial literacy to retirement savings decisions is well established, there is much less consensus with respect to whether financial education can improve outcomes. For example, an early meta-analysis of financial education intervention found small effects on actual outcomes ([Fernandes et al., 2014](#)). In a more recent meta-analysis, [Kaiser and Menkhoff \(2017\)](#) find evidence that is more positive for proponents of financial literacy interventions. Our paper contributes to this literature by conducting a randomized experiment whereby a financial education intervention can be evaluated on the basis of outcomes that are theoretically well-founded and lend themselves to welfare calculations.

The paper is structured as follows. In [Section 2](#), we investigate what should guide the optimal choice between EET and TEE savings accounts in a simple two-period model. In [Section 3](#), we present the survey instruments and the choice experiment. We discuss the elicitation of time and risk preferences from the survey instruments in [Section 3.2](#). In [Section 4](#), we present results from the experiment and measure the effect of the intervention. Finally, we conclude in [Section 5](#).

2 Optimality

2.1 Theory

In a world where individuals can adjust their savings, the choice between EET and TEE tax-sheltered savings accounts should not depend on preferences, but only on the effective rate of return on savings between the two products. Consider a two-period setting with consumption in each period c_1 and c_2 . After-tax income in the first period is given by y_1 and by $y_2 = \psi y_1$ in the second period, with $\psi < 1$. Marginal tax rates are given by τ_1 in the first period and τ_2 in the second period. Denote by s the amount saved in period 1 to be consumed in period 2, and by ϕ , the share of savings invested in an EET account ($1 - \phi$ is invested in a TEE account). In this setting, discounted utility V is a function of how much is saved and how the proportion of total savings in the EET account. Letting $u(\cdot)$ be a strictly increasing and concave utility function and δ be the discount factor of future consumption, discounted utility is thus given by:

$$V(s, \phi) = u(y_1 - (1 - \phi\tau_1)s) + \delta u(\psi y_1 + (1 - \phi\tau_2)Rs) \quad (1)$$

Maximizing discounted utility with respect to s and ϕ , subject to the constraint that $\phi \in [0, 1]$,⁶ yields the following Kuhn-Tucker conditions :

$$-(1 - \phi)\tau_1 u'_1 + \delta(1 - \phi\tau_2)R u'_2 = 0 \quad (2)$$

$$\tau_1 s u'_1 - \delta\tau_2 R s u'_2 + \lambda_1 - \lambda_2 = 0 \quad (3)$$

$$\lambda_1 \phi = 0 \quad (4)$$

$$\lambda_2(\phi - 1) = 0 \quad (5)$$

where λ_1 is the non-negative multiplier for $\phi \geq 0$ and λ_2 for $\phi \leq 1$ and u'_1 and u'_2 denote the marginal utilities of consumption in each period. Rewriting by substituting the Euler equation into the condition for ϕ , we obtain:

⁶The non-negativity constraint on s is immaterial because $y_2 < y_1$ by assumption.

$$R\delta su'_2 \left[\frac{\tau_1 - \tau_2}{1 - \tau_1 \phi} \right] = \lambda_2 - \lambda_1 \quad (6)$$

From the boundary conditions on ϕ , we know that λ_2 and λ_1 cannot be both positive, so that $\lambda_1 > 0$ if and only if $\lambda_2 = 0$. It immediately follows that the optimal tax-sheltered choice is given by :

$$\phi^* = I \left[\frac{\tau_1}{\tau_2} > 1 \right] \quad (7)$$

where $I \left[\frac{\tau_1}{\tau_2} > 1 \right]$ is equal to one if $\frac{\tau_1}{\tau_2} > 1$ and zero otherwise. In the case where $\tau_1 = \tau_2$, the consumer is indifferent between EET and TEE. As we see, the choice of EET and TEE does not depend on preferences since the only thing that matters is how the marginal tax rate during the contributing years compares to the marginal tax rate during the retirement years. We denote this rule the **perfect adjustment rule** as it allows adjustment of savings. Conditional on the optimal saving vehicle, the optimal level of savings can be obtained from the Euler equation. Whether savings are larger under EET or TEE will depend on the form of the utility function, even though the optimal tax-favoured vehicle does not.

If the consumer is unable to choose how much to save (i.e., he or she is forced to save an amount s), preferences will matter because EET schemes will lead to greater consumption in period 1 than in period 2. Hence, an agent who is impatient, or has higher marginal utility of consumption in period 1 than in period 2, may prefer an EET tax-favoured investment vehicle to a TEE tax-favoured investment vehicle. Hence, for a fixed consumption plan, the choice between EET and TEE will involve preferences.

Let the consumption plan be \bar{c}_1 and \bar{c}_2 . Then the agent's discounted utility from using an EET account is given by

$$V(s, 1) = u(\bar{c}_1 + \tau_1 s) + \delta u(\bar{c}_2 + (1 - \tau_2)Rs), \quad (8)$$

whereas the agent's discounted utility from using a TEE account is

$$V(s, 0) = u(\bar{c}_1) + \delta u(\bar{c}_2 + Rs). \quad (9)$$

Taking a first order Taylor expansion of $V(s, 1) - V(s, 0)$, and assuming a power utility function over consumption of the type $u(c) = c^{1-\sigma}/(1-\sigma)$, yields the following approximation to the decision rule:

$$\phi^* = I \left[\frac{\tau_1}{\tau_2} > R\delta \left(\frac{\bar{c}_1}{\bar{c}_2 + Rs} \right)^\sigma \right] \quad (10)$$

Hence, EET is a good choice when δ is low (i.e., the agent is impatient), σ is low (i.e., the agent is risk tolerant), both of which imply a higher sensitivity to consumption smoothing. EET will also prove to be a good choice when second period consumption is larger than first period consumption. We denote this the **imperfect adjustment rule**. In its exact form this rule is given by:

$$\phi^* = I [V(s, 1) > V(s, 0)] \quad (11)$$

Whether consumers re-optimize s when confronted with a choice between two different tax-sheltered investment vehicles is important for determining their optimal choice. When re-optimization is allowed, the optimal decision rule only depends on marginal tax rates. Hence, an experiment aiming to test whether individuals use this decision rule and how they use it only involves the manipulation on marginal tax rates. However, when re-optimization is not allowed, the optimal choice will depend on a number of variables which include preferences. Hence, predicting an optimal choice in an experiment where re-optimization is not possible implies that preferences should be measured in the time and risk domains before determining the optimal choice. Furthermore, as can be seen from the approximation rule in equation (10), it also requires specification of R as well as the each scenario's consumption plan.

2.2 Marginal Tax Rates in Canada

Because of the various government transfers and credits available to household during their working years and during retirement, marginal tax rates vary substantially. In Figure 2, we show effective marginal tax rates as a function of earnings for a 40 year old single individual living in the province of Quebec (Canada’s second largest province), who plans to retire at age 65 with a 50% replacement rate (all retirement income is assumed counted toward his/her taxable income). We use a fiscal calculator that was built to take into account the various transfers available to households in both phases of their lives (Boisclair et al., 2018). It is clear from Figure 2 that, depending on the individual’s income during his/her working years, effective marginal tax rates (i.e. including the effect of means-tested programs) during retirement are not always inferior to those while working.

There are three features of the tax and transfer system that are responsible for the possibility that the effective marginal tax rate upon retirement can be greater than the marginal tax rate when working. First, all individuals 65 years old and over are entitled to the Guaranteed Income Supplement (GIS). The GIS provides roughly \$7,000 annually to all senior residents in Canada. This amount is means-tested, however, in the sense that any retirement income (labour, investment returns, rent received) in excess of an exempted amount of \$3,500 is taxed at a rate of 50% for unattached individuals and at a rate of 25% for couples. This *clawback* has a large impact on effective marginal tax rates in the first (lower) tier of the income distribution. Second, both federal and some provincial governments (such as Quebec) have an "old age tax credit", for which a clawback of 15% applies to all retirement income in excess of roughly \$30,000. Finally, the Old-Age Security (OAS) benefit, which is paid to every senior Canadian, is also means-tested using a clawback rate of 15% starting at a taxable retirement income of approximately \$70,000. These three fiscal features of the Canadian retirement system are such that the effective marginal tax rate in retirement can be much higher than the simple marginal income tax rate that applies to non-senior Canadians in their working years. In some instances, they make TFSA's (TEE) more attractive than RRSP's (EET). In particular, Marchand (2018) finds that, because of means-testing, contributing to a TFSA will dominate contributing to a RRSP in a large number of cases.

3 The Survey

Partnering with Asking Canadians, a Canadian online panel survey organization, we conducted a survey on retirement savings in the Spring of 2018. The choice to conduct the survey in the Spring was not innocent; Spring corresponds to the period that follows the most important period in which Canadians contribute to their personal savings plan, so that recent contribution choices would still be fresh in the participants' minds. 3,005 Asking Canadians panel members were selected to participate in this study based on their age (between 35 and 55 years old) and province of residence (Ontario and Quebec, the two largest and most populous provinces of Canada). This age range was chosen because most of the active savings for retirement occur during this period of the life-cycle of Canadians. Respondents are rewarded for their participation with loyalty rewards from their choice of major retailers within a list.⁷ We construct survey weights based on the province of residence, age, gender, and education using the 2016 census of Canadians. These weights are used when producing descriptive statistics, but are not used in regression analysis since regression models will often control explicitly for province of residence, age, gender, and education.

The questionnaire, which was available in both French and English, has 4 major parts: 1- A traditional information gathering section; 2- A preference elicitation instrument in which the participants' choices were incentivized; 3- A financial education intervention applied randomly to the participants; and 4- A choice experiment. We describe below each part of the survey questionnaire in turn. The English version of the questionnaire is reproduced in Appendix B, whereas the French version is available from the authors.

3.1 Information Gathering

In addition to gathering demographic information from the respondents, such as age, gender, province of residence, and education level attained or completed, we also collect information on the respondents' balance sheet as well as their spending habits and retirement plans. In particular, we ask how much respondents save and have saved in their RRSP (EET) and TFSA (TEE) tax-sheltered accounts. For questions where we expected a significant fraction of missing information, such as savings and income, unfolding brackets were used. We then use multiple imputation to

⁷Major retailers, such as Walmart, Petro-Canada, and Aeroplan (Air Canada) are part of the reward program.

assign missing values with information from the bracketing, conditional on basic socio-demographic covariates (age, gender).

Following [Lusardi and Mitchell \(2007\)](#), we ask three financial literacy questions on compound interest, purchasing power, and risk diversification. Table 1 reports descriptive statistics of our survey respondents. For instance, the average household annual income is \$62,000, with an average annual spending of \$75,000, with substantial heterogeneity.⁸ Overall 60% of respondents have an RRSP (EET) while 50% have a TFSA (TEE). Among survey respondents, 40% have both a RRSP and a TFSA, which makes the question of how they allocate resources between the two accounts even more relevant. Overall, respondents have on average \$100,000 in their RRSP (EET) and \$24,000 in their TFSA (TEE). The amount accumulated in TFSAs is lower in part due to the fact that it was only introduced in 2009 while RRSPs have been around for more than 30 years. In addition, the maximum that any individual could have contributed over his/her entire life to his/her TFSA by Spring 2018 is \$53,000. In comparison, RRSP contributions for any given year are capped at 18% of earned income, with a maximum of \$26,230 for fiscal year 2017. Some of the information collected in this portion of the survey, such as income, expenditure, and age, is fed into the experiment described in section [3.4](#).

3.2 Preference Elicitation

In order to examine whether individuals choose optimally their tax-sheltered savings vehicle, at least with respect to the imperfect adjustment rule of equation [11](#), we need estimates of risk aversion (σ) and time preference (δ) at the respondent level. We elicit each respondent's measures of risk aversion and time preference using the approach of [Andersen et al. \(2008\)](#), which consists of jointly estimating σ and δ using incentivized multiple price lists (MPL) over [Holt and Laury \(2002\)](#) lotteries.

We first show respondents an MPL for risk aversion with 10 lotteries (see Question Q35 in [Appendix B](#)). We randomly reward respondents for their choices using a two-step process. First, each participant has a 5% (1 in 20) chance of receiving compensation from his/her lottery choice. Second, each of the respondent's ten lottery choices made has a 10% (1 in 10) chance of actually

⁸We verify that the annual spending is higher on average than the annual income due to a longer right-tail in the distribution of spending. The medians of both variables are much closer.

being played, with potential payoffs ranging from \$1 to \$39. We use the responses to the lottery choices to estimate risk aversion bounds for each respondent assuming a power utility function, which displays constant relative risk aversion. Assuming normality, we then impute the conditional mean given the bounds and characteristics of respondents as our best estimate of risk aversion σ for this respondent. We then propose another MPL for time preference offering delayed rewards in one month and thirteen months (see Question Q46 in Appendix B).

With respect to the time preference choices, we again incentivize the responses by first drawing a one in twenty chance of any respondent being rewarded, and then picking any one of the lottery choices with equal probability. Payoffs range from \$12 for a payout in one month to \$18 for a payout in 13 months. To estimate time-preference when computing discounted utility, we use estimate of each respondent’s risk aversion based on their answers to Q35, as in Andersen et al. (2008). Because RRSP and TFSA choices have consequences far into the future, simply using the short-term discount factors that can be elicited using this particular experiment would be misleading. In particular, Andersen et al. (2008) and Frederick et al. (2002), *inter alia*, show that discount rates decline (i.e., discount factors increase) with the investment or consumption horizon. We shall therefore consider a (β, δ) specification for time preference where the discount factor for a t horizon decision is $\beta\delta^{t-1}$. Because of constraints with how the survey agency could make payments, we were not able to vary the consumption horizon over more than one year. Consequently, we elicit each survey participant’s preference for short-term discount factors, β , and fix in our analysis δ to be the same across respondents (we use $\delta = 0.98$). Appendix B provides a discussion of the methodology used to estimate risk aversion preference parameters.

We obtain an average estimate of the coefficient of risk aversion, σ , of 0.39 but with a large standard deviation (0.88). Our average estimate of risk aversion (0.39) is lower than the 0.741 obtained by Andersen et al. (2008). Less than 13.6% of respondents are risk loving. We find some evidence that risk aversion is negatively correlated with education and with being male. We find no relationship between risk aversion and the respondent’s ability to answer correctly all three financial literacy questions. In terms of time preference, we find an average estimate of the short-term discount factor β of 0.968, which suggests that our respondents are quite relatively patient, at least with respect to the results presented in Andersen et al. (2008); whereas we find an average estimate of the discount rate of $(1/0.968 - 1 =) 0.033$, they find a much higher average discount

rate estimates among Danish respondents of 0.10. We find that patience increases with age and is higher for females. We also find that those respondents who correctly answered correctly the three financial literacy questions have, on average, a 5 percentage point higher discount factor than the other 52.3% of the surveyed population. This is consistent with Lusardi et al. (2017) who find that higher time preference leads to more accumulation of financial literacy. In Figure 3, we plot the joint distribution of estimates we obtained. We find a positive correlation (coefficient correlation of 0.51) between patience and risk aversion. From a life-cycle saving perspective, if a precautionary motive is present, this positive correlation implies more dispersion in wealth accumulation than what would be obtained if these were uncorrelated.

3.3 Education Intervention

Our financial education intervention is introduced after preferences measurement. We use a randomized financial education treatment for which, aside from a control group, two potential treatment arms are considered. Hence, we have three arms to the intervention. Respondents in the first treatment arm are shown a video that explains the tax implications of front- and back-loaded retirement savings accounts in the context of Canada’s TFSA and RRSP. This treatment uses an adaptation of a video produced in English and in French by a major financial institution in Canada. Respondents that find themselves in the second treatment arm view the same video as in the first treatment, but also view a second video explaining that because government transfers depend on income at the time of retirement (including investment income) the *effective* marginal tax rate, once means-tested is taken into account, could be much higher than the marginal income tax rate for non-senior individuals in certain income segments. We do not provide information in either videos on the actual rates that apply. Hence, the videos raise awareness about two dimensions of the optimal choice decisions.

Individuals were randomly selected to be part of one of three groups: 1- No financial education (**control**); 2- Viewing only the baseline video (**tax arm**); and 3- Viewing both the baseline video and the video related to the fiscal impact of means-testing (**means-testing arm**). The two videos are available for viewing; see <https://www.youtube.com/watch?v=0nnCMrOu6Wg> for the baseline (i.e., tax arm) video, and <https://www.youtube.com/watch?v=UkS6ukBfjnA> for the means-testing video.

Some respondents never completed the survey and dropped-out in the middle of the education intervention, or, for the control group, before the choice experiment. We verified that, conditional on having a completed survey, randomization worked; we find that there are no differences in the respondents' personal socioeconomic characteristics among all three arms of the experiment (that is, the control group, and the two education treatment groups) without needing to take into account the drop-outs.⁹ Means of various variables are reported in Table 1, along with t-test of the equality of means of each treatments with the control group. We can see that differences are rather small and no differences are statistically significant, except with respect to whether respondents have a RRSP and/or a TFSA savings account. And even in these two cases, differences are only marginally significant at the 5% level.

As a first outcome to measure, we designed a set of 5 questions targeted at measuring knowledge of tax-sheltered accounts (Question Q37 to Q41 in Appendix B). The first three questions seek to assess the respondents' understanding of the tax treatment contributions, of returns, and of withdrawals. In other words, the goal of these first three questions is to examine whether respondents can correctly classify RRSP as EET and TFSA as TEE. Because both treatment arms seek to raise the respondents' awareness and knowledge of the fiscal incidence of RRSP and TFSA, we anticipate that the intervention should raise the fraction of correct answers for these three questions. We added two questions that measure knowledge of withdrawal penalties (there are none in Canada) and contribution room after withdrawal (contribution room increases with the amount withdrawn only in a TFSA). These two questions are used as placebos; we should see no effect of the intervention on those questions since these topics were not covered in the educational material.

3.4 Choice Experiment

After measuring the respondents' knowledge of the fiscal treatment of both RRSP and TFSA following the educational intervention, we administer a choice experiment using 6 scenarios that relate to RRSP and TFSA savings. The baseline scenario is presented below. We create a choice situation that stems from a non-recurring windfall gain event whereby the windfall gain must be invested in a tax-sheltered account (either RRSP or TFSA). The introductory text is reproduced

⁹It is possible that the socioeconomic characteristics of the drop-outs are different based on the intervention they had. Unfortunately this information was not kept by the organization running the survey.

below:

Suppose that in October 2018, the government of Canada informs you that you will be eligible to a one-shot, unexpected refundable tax credit worth $\$X$, which you will receive that same month. However, the government forces you to invest the entire amount either in an RRSP or in a TFSA, and to incur in 2018 any tax implication of this new contribution. In both cases, suppose that you will have to withdraw the entire amount accumulated thanks to this new contribution in $[2018+70-QB]$, at approximately 70 years old, and that the withdrawn amount will not be eligible to pension income splitting.

Finally, suppose that your contribution room is high enough to allow you to contribute the entire amount to either an RRSP or a TFSA; that there is no inflation; and that your marital status stays the way you told us it currently is.

The following questions present hypothetical changes to your personal situation as well as to the rate of return you will obtain with certainty on your new investment in an RRSP or a TFSA.

The amount of the windfall gain s that is available to invest in a tax-sheltered account varies according to the individual's reported income ($\$1,000$ if income is between $\$0$ and $\$40,000$; $\$2,000$ if between $\$40,000$ and $\$60,000$; and $\$5,000$ is above $\$60,000$). This amount is fixed across the 6 scenarios presented to individuals. Second, the age at which the amount is available for withdrawal is set at 70 years old for each respondent, which implies that the number of years during which the investment grows in the tax-sheltered account varies across respondents.

The objective is to present a choice situation that comes close to the situation faced by respondents. Since we tightly control the respondents' environment, there is no need to know what is the exact retirement plan that respondents expect. The amount saved s is worth Rs in retirement where R is either 1.02^t or 1.05^t and $t = 70 - a$ where a is current age. We do the calculation for respondents and tell them how much this contribution is worth (pre-tax) in retirement. We pre-load information on current consumption expenditures of the household, \bar{c}_1 , and current individual and spousal income, $y_{r,1}$ and $y_{p,1}$, with r for the *respondent* and p for the *partner* in

life. We round these amounts to the nearest thousand. We also pre-load, from first part of the survey, information related to the respondents' expectation of his household's income replacement rate in retirement, η . We use this to anchor each respondent's expected second period personal and household incomes, and consumption. In order to introduce some uncertainty regarding the respondents' future personal and household incomes, we posit that second period expected personal income to the respondent and his/her partner is given by $y_{j,2} = \eta_r \gamma \bar{y}_{j,1}$ for $j = r, p$, with γ taking either values (0.5, 1, 2) representing the uncertainty in future incomes. We apply the similar rule for second period expected consumption, \bar{c}_2 . Hence, there are 6 combinations of R and γ per respondent, which will represent the six scenarios in which respondents will have to make an investment choice across the two tax-favored savings accounts. We finally compute how much respondents could obtain in Old-Age Security (OAS) and Guaranteed Income Supplement (GIS) based on their reported (or imputed) individual income (for singles) and household income (for couples). Denote these amounts respectively $oas = o(y_{r,2})$ and $gis = g(y_{r,2}, y_{p,2})$.¹⁰ We use SimTax¹¹ to compute both amounts.

Figure 4 provides a screen shot of a choice situation for a couple living in Ontario. Let $\tau_1(y)$ be the tax schedule, as a function of taxable income, that results from the piece-wise marginal tax rates shown to the left in the screen shot (when the respondent is responding). When investing in an RRSP, first period consumption is given by

$$c_1 = \bar{c}_1 + \Delta_{\tau,1}(y_{r,1}, s)$$

where $\Delta_{\tau,1}(y_{r,1}, s) = \tau_1(y_{r,1}) - \tau_1(y_{r,1} - s)$ is the tax return from the contribution. When investing the windfall gain in a TFSA, there are no tax returns from the contribution so that $c_1 = \bar{c}_1$.

Turning to retirement, let $\tau_2(y)$ be the tax schedule when the respondent is retired (shown to the right on the screen shot). Because of the TEE structure of a TFSA, second period consumption due to the windfall amount earning a return R free of tax is simply $c_2 = \bar{c}_2 + Rs$. With an RRSP, let us denote by $\Delta_{\tau,2}(y_{r,2}, Rs) = -\tau_2(y_{r,2}) + \tau_2(y_{r,2} + Rs)$ the increase in taxes from withdrawing the RRSP contribution, and by $\Delta_o(y_{r,2}, y_{p,2}, Rs)$ and $\Delta_g(y_{r,2}, y_{p,2}, Rs)$ the loss (i.e., the clawback) in OAS and GIS benefits respectively from withdrawing Rs from the RRSP. consumption is given

¹⁰Recall that GIS sums are based on household income whereas OAS sums are based on individual income.

¹¹See Boisclair et al. (2018).

by

$$c_2 = \bar{c}_2 + Rs - \Delta_{\tau,2}(y_{r,2}, Rs) - \Delta_o(y_{r,2}, y_{p,2}, Rs) - \Delta_g(y_{r,2}, y_{p,2}, Rs)$$

Tax functions $\tau_1(y)$ and $\tau_2(y)$ are computed using the aforementioned SimTax calculator. Clawback rates for OAS are 15% independent of marital status while the GIS clawback rate is 50% for singles and 25% for couples.

The value of investing in a EET ($d = 1$) or TEE account ($d = 0$) for a given respondent i in scenario j is given by

$$V_{i,j}^d = u_i(c_{1,i,j}^d) + \beta_i \delta^{t_i} u_i(c_{2,i,j}^d) \quad (12)$$

where $c_{1,i,j}^d$ is consumption as defined above for individual i in scenario j investing in account d and similarly for second period. The parameter t_i is the time horizon (age 70 minus current age). The CRRA utility function using the estimate of σ for each respondent, σ_i , is denoted $u_i(c)$, while the discount factor of the respondent is δ_i . Given that there are no unknowns in this equation RRSP is optimal when $\Delta V_{i,j} = V_{i,j}^1 - V_{i,j}^d > 0$. Hence, the correct choice, given preferences and information from the scenario, is given by $d_{i,j}^* = I(\Delta V_{i,j} > 0)$. The reported choice of respondents is $d_{i,j}$. Denote by

$$z_{i,j} = d_{i,t} d_{i,j}^* + (1 - d_{i,t})(1 - d_{i,j}^*)$$

to be the indicator of whether they answered correctly. We can thus compute the fraction of correct answers as the average of $z_{i,j}$ over the 6 scenarios that each respondent was presented in the course of the retirement planning exercise. We can, of course, regress the answers to the scenarios over each respondent's personal characteristics.

4 Results

4.1 Descriptive Statistics

Examining Table 1 presented earlier, we first check whether respondents across the three arms have similar characteristics. Although respondents were assigned randomly to the three experiment arms, it is possible that some respondents quit the survey after being assigned to treatment. This

behavior may depend on characteristics of the respondents. First, we see that the composition of the group assigned to the means-testing arm (and who completed the survey) is not different than that from the control. A similar pattern emerges for the tax arm except for 2 outcomes related to take-up of RRSP and TFSAs. For these cases, we get mild differences which are statistically significant at the 10% level, but these differences are economically small.

4.2 Effect of Interventions

Prior to administering the knowledge questions about RRSPs and TFSAs, participants were randomly selected to be part of one of 3 intervention groups: the first group saw no financial education at all (control), the second group saw a baseline video that explains the difference between RRSP and TFSA accounts (tax arm), and the third group saw the baseline video and an additional intervention slide focusing on the effects of retirement income on government clawbacks (means-testing arm).

4.2.1 Knowledge of RRPS and TFSA Accounts

Table 2 shows the 5 knowledge questions that we asked respondents regarding basic characteristics of RRSP and TFSA accounts. These were multiple choice questions for which only one of six answers is considered correct. For all the questions, the same subset of possible answers were available to respondents, and in the same order: RRSP only, TFSA only, Both, Neither, Don't know, No answer. The first question asks whether the contributions to RRSP and TSFA are deductible from taxable income. 72.85% of the sample correctly identified that only contributions made to RRSP accounts are deductible. Question 2 asks whether withdrawals from RRSP and TFSA accounts are subject to income tax in the year of the withdrawal. 76.47% of the sample correctly identified that only withdrawals to RRSP are subject to income tax. Question 3 asks whether the returns in these accounts are subject to income tax in the year during which they are generated. 46.59% of the sample correctly identified that neither the RRSP not the TFSA returns are taxed in the year investment returns and generated. Question 4 asks whether there is a penalty with withdrawing funds from either types of accounts. Only 16.94% of the respondents correctly identified that none of these accounts have such penalty. Finally, Question 5 asks whether an amount withdrawn from the account is added back to future contribution room. Almost one quarter of respondents (24.83%

to be exact) identified that it is only the case with TFSA accounts. The proportion of respondents who answered correctly all five questions is close to 10%, which tells us that, overall, Canadians have limited knowledge of how these tax-favoured accounts work.

Table 3 presents the determinants of the average score on the knowledge questions for the control group, that is, for the respondents that did not receive any education intervention. This explains the relatively small number of observations. By design, possible scores range from 0 to 5. The baseline specification controls for having and RRSP and a TFSA as well as age in quadratic form. Although age is not correlated with the average score, having an RRSP (resp. a TFSA) account increases the score by 20 (resp. 12) percentage points. The second specification adds marital status and annual income. Annual income has a small positive effect on the knowledge score so that a one standard deviation increase in income (about \$50,000) increase the knowledge score by about 2 percentage points. The third specification add education; compared to respondents with at most a high school diploma, having a bachelor degree or more increases the knowledge score by 8 percentage points. Finally, the last specification adds the answers to the typical financial literacy questions. Having 1, 2, or 3 correct answers to the questions increases the knowledge score by 11, 20 and 34 percentage points, respectively. Hence, there is a strong correlation between knowledge of financial topics and knowledge of tax-deferred saving vehicles, even conditional on having such products. The difference in terms of financial literacy is much larger than for education, while at the same time trumping any effect educations levels had in the previous specification.

4.2.2 The Nature of the Intervention

As we see, there are two levels of educational intervention that were developed for this survey. In the first intervention, the so-called baseline video identifies that RRSP contributions can be deducted for the contributor's total income, which is not the case for TFSA contribution that must come from after-tax income. The baseline video also highlights the fact that returns reinvested in either savings account are not taxed in the year they are generated, and that withdrawals are taxed as regular income when originating from an RRSP account, but not when originating from a TFSA account. The baseline video does not mention that withdrawals from TFSA accounts are added back to future contribution limits, which is not the case for RRSP withdrawals, nor does it say anything related to penalties for early withdrawals either (there are none in Canada, but that

was not mentioned). In this sense, the video teaches about Questions 1, 2, and 3, but not about Questions 4 and 5. This provides a natural placebo test as the intervention should not affect these dimension of knowledge regarding tax-deferred savings vehicles.

The second educational treatment consists in an additional intervention regarding means-testing, which adds information about benefits that are available to Canadians when they turn 65 years old: The Old Age Security (OAS) and the Guaranteed Income Supplement (GIS). The single educational slide explicitly mentions that, depending on total retirement income, an increase in RRSP withdrawals could decrease or even eliminate OAS and GIS benefits. In contrast, the slide mentions that withdrawals from TFSA accounts will leave the OAS and GIS benefits unchanged. This information can be highly relevant in the case of some of the scenarios presented to respondents.

Table 4 reports the effect of our intervention on the answers provided by respondents to questions related to the fiscal treatment of RRSP and TFSA tax-favored accounts. Because the basic intervention video provided information that was useful in answering only the 3 first questions, it is comforting to see that the effect of the educational treatment is limited to these questions. Respondents having seen the baseline video either by itself or in combination with the additional slide on potential government clawbacks are between 15 and 14 percentage points more likely to correctly identify that only contributions made to RRSP accounts are deductible from income tax. This represents a 22% increase on a baseline of 64%. We also find that either intervention induces a similar increase of between 14 and 15 percentage points in the proportion of respondents that accurately identify that withdrawals are only taxed out of RRSP accounts. This represents again about 22% increase on a baseline of 67%. Concerning the question on returns in the accounts being taxed, the video intervention increases the probability of correctly answering that none of the returns in these accounts are subject to income tax by 6 percentage points on a baseline of 45%. The additional slide on potential government clawbacks treatment renders this effect null, however. This could be because the additional slide stresses that withdrawals from RRSP would have fiscal implications on OAS and GIS benefits, which, we imagine, could have been misunderstood by some respondents as meaning that returns in RRSP accounts are implicitly taxed. Finally, Questions 4 and 5 were neither covered in the baseline video nor in the additional slide. Accordingly, these interventions have no impact on the probability that the respondents answered Questions 4 or 5

correctly. In aggregate, as a percentage score to the 5 questions, respondents in the control group were able to answer correctly 43% of the questions, which represents merely two right answers out of the five questions. Compared to this control-group baseline of 43%, the basic video intervention and the additional slide on potential government clawbacks increase the respondents' score by an average of 8.4% and 6.8%, respectively.¹² These effects are large given that the intervention lasts only a few minutes. In terms of the differences found for the control group, the intervention effects are of the magnitude of the differences in terms of whether respondents already have tax-favored savings account (TFSA or RRSP) or their score on the basic financial literacy questions.

4.3 Choice between RRSP and TFSA

Table 5 reports the tax-favored account to which respondents stated they would contribute their windfall gain in each of the 6 scenarios to which they were confronted. On average, respondents stated that they would contribute to TFSA accounts approximately 60% of the time. This matches roughly the actual mix of contributions made in Canada over the last few years (see introduction). There is no particular trend across the 6 scenarios in terms of preference for TFSA over RRSP.

We calculate the effect of our intervention on the participants' probability of choosing the optimal tax-favored savings account given their personal situation. We use two measures of optimality: The first is solely based on effective marginal tax rates (amount of taxes paid, including means-testing, as a ratio of the withdrawal or deposit), and the second is based on the individuals' ability to choose the contribution vehicle that gives his/her the greatest discounted utility given his level of risk aversion and preference for current consumption (that is, optimality is governed by equation (11)).

With respect to the first optimality measure, there are two interpretations as to why simply comparing effective marginal tax rates could be considered optimal individual behavior. The first interpretation is that comparing marginal tax rates is simple rule-of-thumb so that if the effective marginal tax rate is lower (resp. higher) in retirement than at the time contributions are made, then the optimal choice should be to invest in an RRSP (resp. TFSA). A second interpretation is

¹²We test for heterogeneous effects of the treatment across different groups of respondents but find no strong evidence of differences based on education level (F-stat=0.65, p-value=0.52 for the means-testing arm and F-stat=1.94, p-value=0.14 for the tax arm), number of correct answers to the financial literacy questions (F-stat=0.36, p-value=0.78 for the means-testing arm and F-stat=2.43, p-value=0.06 for the tax arm), and for high risk aversion and high time discounting (F-stat=2.79, p-value=0.07 for the means-testing arm and F-stat=0.73, p-value=0.48 for the tax arm).

that comparing effective marginal tax rates requires a high level of sophistication if one takes into account the possibility for individuals to re-optimize with respect to other savings. As we saw in section 2, the decision of investing in a TFSA or RRSP is independent of preference in a world with perfect capital markets and where agents are sophisticated and can re-optimize their other savings. Using this decision rule, we present in Panel A of Table 6 our findings. The control group that was not exposed to any educational material choose correctly in which tax-favored account to contributed between 50% and 60% of the time (with an average of 56%, as shown in the last column). Hence, respondents in the control group make contributions decisions that are close to random (i.e., they are right half of the time). In comparison to this baseline coin-flip average for the control group, the means-testing arm of our treatment increases the average score by 8.7 percentage points. The effects of the means-testing arm vary from 4.9 to 13 percentage points depending on the scenario. With respect to the tax arm treatment, we find, generally, no effect of the intervention on the participants' ability to make an optimal effective-marginal-tax-rate contribution choice. One possible interpretation of our results is that means-testing is the key dimension affecting the optimal choice in these scenarios.

According to the second measure of optimality, which uses equation (11) to derive the account that yields the highest utility, we find that the means-testing arm increases the propensity to make the right choice by an average of 7.8 percentage point. Compared with an average base score of 54% for the control group, this is a 14% improvement . The tax arm treatment has a moderately lower effect, increasing on average the score by merely 2.6 percentage point. Depending on the scenarios, this effect varies from zero to increasing by 7 percentage points. Hence, we find substantial (and similar) effects whether we use the effective marginal tax rate rule or a rule that account for preference differences.

We find very little evidence of heterogeneous effects. In Table 7, we report heterogeneous effects of these results based on education. We find no evidence that the level of education interacts with the treatment we administer to improve the score on both knowledge and optimal account choices. Similar findings are found for other characteristics of respondents.¹³ This may be interpreted as

¹³We also find no strong evidence of differences based on number of correct answers to the financial literacy questions (F-stat=0.26, p-value=0.85 for the means-testing arm and F-stat=1.17, p-value=0.32 for the tax arm), and for high risk aversion and high time discounting (F-stat=0.12, p-value=0.88 for the means-testing arm and F-stat=0.01, p-value=0.99 for the tax arm).

evidence that the intervention had a relatively uniform impact of the quality of decision making. A similar result emerges if we look at the treatment effect distribution. We look whether the fraction of respondents with a different number of correct answers changes significantly as a result of the intervention. These results are presented in Figure 5. We find that the effect of the intervention on the knowledge scores is larger at the bottom of the distribution, which suggest that the intervention helped in particular respondents who had limited knowledge of the intervention. These impacts are large. On the other hand, the effect of much more constant for the score of actual choices, in particular for the means-testing arm. For the tax-arm, effects are positive at the bottom and the top but not statistically significant towards the center of the distribution.

Next, to measure the effect of our intervention on individual welfare, we compute the dollar amount equivalent welfare loss from making the wrong choice between contributing to an RRSP instead of a TFSA, and vice-versa. We use equation (12) to compute the utility equivalent value of making the optimal choice, and the choice observed by the respondent. We then invert this differential to obtain the cost of making the wrong decision in present-value dollar amounts. Table 8 presents different specifications based on different demographic control variables used in studying this welfare loss. Column (1) regresses the average welfare loss on the interventions indicators. This shows that the control group on average has a \$400 welfare loss. If an individual was administered the means-testing arm of the intervention, his/her welfare loss is only \$255 (\$145 lower loss). This improvement is stable and consistent across all specifications presented in Table 8. The tax arm of the intervention does not significantly improve the welfare of participants, although we find a stable effect of about \$70 across specifications.

In column Column (2) of the table, we include in the regression the individuals' risk aversion (σ) and their preference for the present (β), both of which were elicited from the respondents answers to an early part of the survey. The effect of these parameters in explaining the welfare loss is economically important. Increasing β by 0.1 is associated with a higher welfare loss of about \$45 and \$6 for σ . These numbers are stable across the different specifications presented in Table 8. They imply that, for both, higher values of β and σ (that is more risk averse and more patient individuals) are associated with lower welfare losses when the choice is incorrect, as well as a higher propensity to make incorrect choices. At the extreme, someone with $\beta = 0$ should always pick the RRSP since he only has utility from the tax return under RRSP and no loss from the RRSP

withdrawal being taxed. Column (3) add the a quadratic form in age and indicators of whether the respondent has an RRSP and a TFSA. Having a TFSA reduces the welfare loss by about \$110, and this number is stable across specifications. Column (4) includes marital status and income. Increasing income by one standard deviation (approximately \$50,000) increases the welfare loss by \$163. A non-monotonic relationship is found for financial literacy.

5 Conclusion

Much of the literature on individual saving decisions in general, and on the determinants of retirement saving decisions in particular, has generally focused on how much individuals and households save or should save. An equally important determinant of individual and household wealth accumulation for retirement is how productive those savings have been in terms of return or in terms of their risk and return relationship. In this paper, we focus on one particular dimension of that choice which is the use of tax-sheltered (or tax-favored) savings vehicles. When they are appropriately used, tax-favored vehicles should typically increase the effective rate of return on savings *vis-a-vis* traditional taxable savings. We first document in this paper that Canadians have a modest understanding of how these products work. We also document that when Canadians are confronted with choice situations between back-loaded (EET) and front-loaded (TEE) savings savings account – known in our Canadian context as Registered Retirement Savings Plans (RRSP) and Tax-Free Savings Accounts (TFSA), respectively – they do not choose any better than if they had flipped a coin.

We then implement a financial education intervention within the choice experiment to see whether we can improve upon the survey respondents' lack of knowledge about tax-favored retirement vehicles. In other words, we seek to investigate whether financial literacy with respect to savings vehicles for retirement can be modified an improved, and whether such educational interventions can improve the quality of decision making. We find that a rapid, relatively modest, and straightforward intervention can raise both the knowledge of how tax-favored instruments work, as well as the quality of the decisions made, at least in terms of optimality benchmarks based either on marginal tax rates or on discounted utility functions. This has important implications for educators and regulators as modest and cost-effective interventions could be designed to increase

not only contributions to retirement savings plans, but, perhaps more importantly, the welfare of savers.

Our paper makes another important contribution in constructing a choice experiment in which there is a clear benchmark in terms of what respondents should do. We do this both in a sophisticated framework where only effective marginal tax rates, in retirement and during the contribution years, matter, and a less-sophisticated framework in which preferences intervene because respondents do not adjust how much they save following a once-in-a-lifetime unexpected windfall gain. Because this optimal choice rule is heterogeneous across the population, it implies that identifying an unambiguous outcome for evaluating such interventions cannot be done without postulating a clear benchmark. The framework we propose can therefore be extended to other experimental choice dimensions in which an education intervention occurs, as well as to other types of real life interventions.

References

- ANDERSEN, S., G. W. HARRISON, M. I. LAU, AND E. E. RUTSTRÖM (2008): “Eliciting Risk and Time Preferences,” *Econometrica*, 76, 583–618.
- BESHEARS, J., J. J. CHOI, D. LAIBSON, AND B. C. MADRIAN (2017): “Does front-loading taxation increase savings? Evidence from Roth 401(k) introductions,” *Journal of Public Economics*, 151, 84–95.
- BOISCLAIR, D., G. LACROIX, S. MARCHAND, AND P.-C. MICHAUD (2018): “Individual financial returns from Quebec pension plan reform options: Analyzing proposals to renew a second-pillar retirement income program,” *Canadian Public Policy*, 44.
- BROWN, D. C., S. CEDERBURG, AND M. S. ODOHERTY (2017): “Tax uncertainty and retirement savings diversification,” *Journal of Financial Economics*, 126, 689–712.
- BURMAN, L. E., W. G. GALE, AND D. WEINER (2001): “The Taxation of Retirement Saving: Choosing Between Front-Loaded and Back-Loaded Options,” *National Tax Journal*, 54, 689–702.
- CHETTY, R., J. N. FRIEDMAN, S. LETH-PETERSEN, T. H. NIELSEN, AND T. OLSEN (2014): “Active vs. Passive Decisions and Crowd-Out in Retirement Savings Accounts: Evidence from Denmark,” *The Quarterly Journal of Economics*, 129, 1141–1219.
- CLARK, R., A. LUSARDI, AND O. S. MITCHELL (2017): “Financial knowledge and 401(k) investment performance: a case study,” *Journal of Pension Economics & Finance*, 16, 324–347.
- DAMMON, R. M., C. S. SPATT, AND H. H. ZHANG (2004): “Optimal Asset Location and Allocation with Taxable and Tax-Deferred Investing,” *The Journal of Finance*, 59, 999–1037.
- FERNANDES, D., J. G. LYNCH, AND R. G. NETEMEYER (2014): “Financial Literacy, Financial Education, and Downstream Financial Behaviors,” *Management Science*, 60, 1861–1883.
- FREDERICK, S., G. LOEWENSTEIN, AND T. ODOGHOUE (2002): “Time Discounting and Time Preference: A Critical Review,” *Journal of Economic Literature*, 40, 351–401.
- GALE, W. G. AND J. K. SCHOLZ (1994): “IRAs and Household Saving,” *The American Economic Review*, 84, pp. 1233–1260.
- GOMES, F., A. MICHAELIDES, AND V. POLKOVNICHENKO (2009): “Optimal savings with taxable and tax-deferred accounts,” *Review of Economic Dynamics*, 12, 718–735.
- HOLT, C. A. AND S. K. LAURY (2002): “Risk Aversion and Incentive Effects,” *American Economic Review*, 92, 1644–1655.
- HOLZMANN, R. AND R. HINZ (2005): *Old-Age Income Support in the 21st Century*, The World Bank.
- HUANG, J. (2008): “Taxable and Tax-Deferred Investing: A Tax-Arbitrage Approach,” *Review of Financial Studies*, 21, 2173–2207.
- KAISER, T. AND L. MENKHOFF (2017): “Does Financial Education Impact Financial Literacy and Financial Behavior, and If So, When?” *The World Bank Economic Review*, 31, 611–630.

- LANDONI, M. AND S. P. ZELDES (2018): “Should the Government Be Paying Investment Fees on \$3 Trillion of Tax-Deferred Retirement Assets?” .
- LAVECCHIA, A. (2018): “Tax-Free Savings Accounts: Who Uses Them and How?” .
- LUSARDI, A., P.-C. MICHAUD, AND O. MITCHELL (2017): “Optimal financial knowledge and wealth inequality,” *Journal of Political Economy*, 125.
- LUSARDI, A. AND O. MITCHELL (2007): “Financial Literacy and Retirement Preparedness: Evidence and Implications for Financial Education,” *Business Economics*, 42, 35–44.
- LUSARDI, A. AND O. S. MITCHELL (2014): “The Economic Importance of Financial Literacy: Theory and Evidence,” *Journal of Economic Literature*, 52, 5–44.
- MARCHAND, S. (2018): “Who Benefits from Tax-Preferred Savings Accounts?” *CEDIA Working Papers #18-12*, 37p.
- MILLIGAN, K. (2002): “Tax-preferred savings accounts and marginal tax rates: evidence on RRSP participation,” *Canadian Journal of Economics/Revue Canadienne d’Economie*, 35, 436–456.
- SKINNER, J. (2007): “Are You Sure You’re Saving Enough for Retirement?” *The Journal of Economic Perspectives*, 21, pp. 59–80.
- VEALL, M. R. (2001): “Did tax flattening affect RRSP contributions?” *Canadian Journal of Economics/Revue Canadienne d’Economie*, 34, 120–131.
- VENTI, S. F. AND D. A. WISE (1990): “Have Iras Increased U. S. Saving?: Evidence From Consumer Expenditure Surveys,” *The Quarterly Journal of Economics*, 105, 661–698.
- YOO, K.-Y. AND A. DE SERRES (2004): “Tax Treatment of Private Pension Savings in OECD Countries and the Net Tax Cost Per Unit of Contribution to Tax-favoured Schemes,” .
- ZHOU, J. (2012): “Life-cycle stock market participation in taxable and tax-deferred accounts,” *Journal of Economic Dynamics and Control*, 36, 1814–1829.

Figures

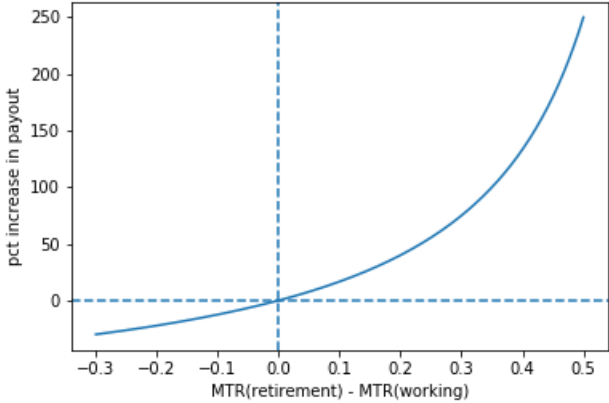


Figure 1: **Tax Advantage:** Gain in retirement income from contributing 1000\$ to a TFSA compared to an RRSP (in percentage) as a function of the difference in marginal tax rates (MTR) at retirement and when contributing (work). We assume a 3% real return and that the contribution is made at age 30 and withdrawn at age 65. We fix the marginal tax rate when contributing to 30%.

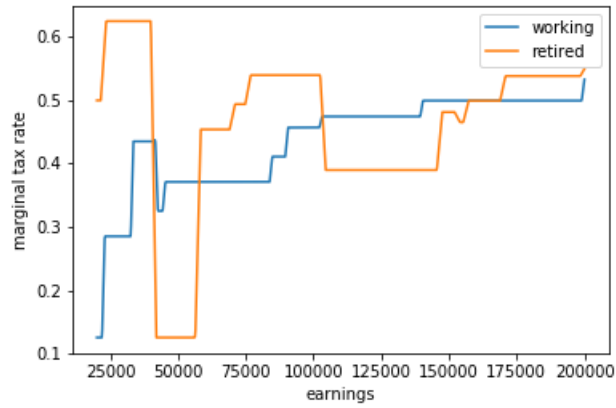


Figure 2: **Effective Marginal Tax Rates:** Effective Marginal Tax Rates for a single individual age 30 working in Quebec who plans to retire at 65 as a function of earnings a replacement rate (in terms of taxable retirement income) of 50%. These estimates are based on a calculator described and used in (Boisclair et al., 2018).

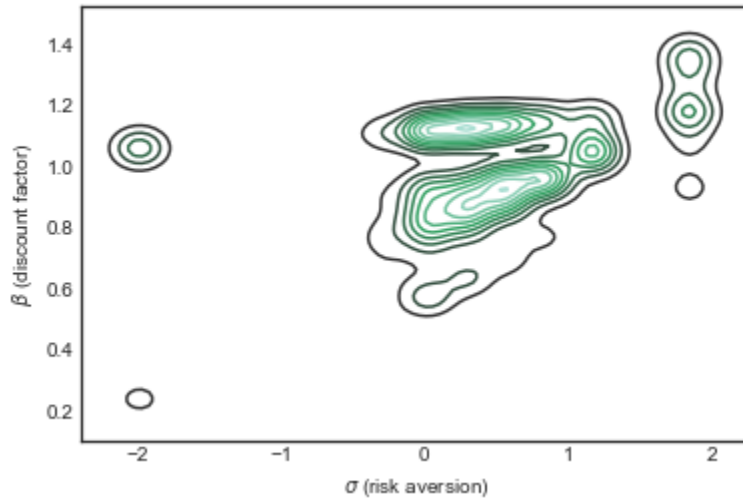


Figure 3: **Joint Distribution of Time and Risk Preference:** This figure shows the two-dimensional density estimate of the distribution of the short-term discount factors β and relative risk aversion coefficients σ . The procedure to impute these preference parameters from the two Multiple Price lists we used is presented in Appendix A.

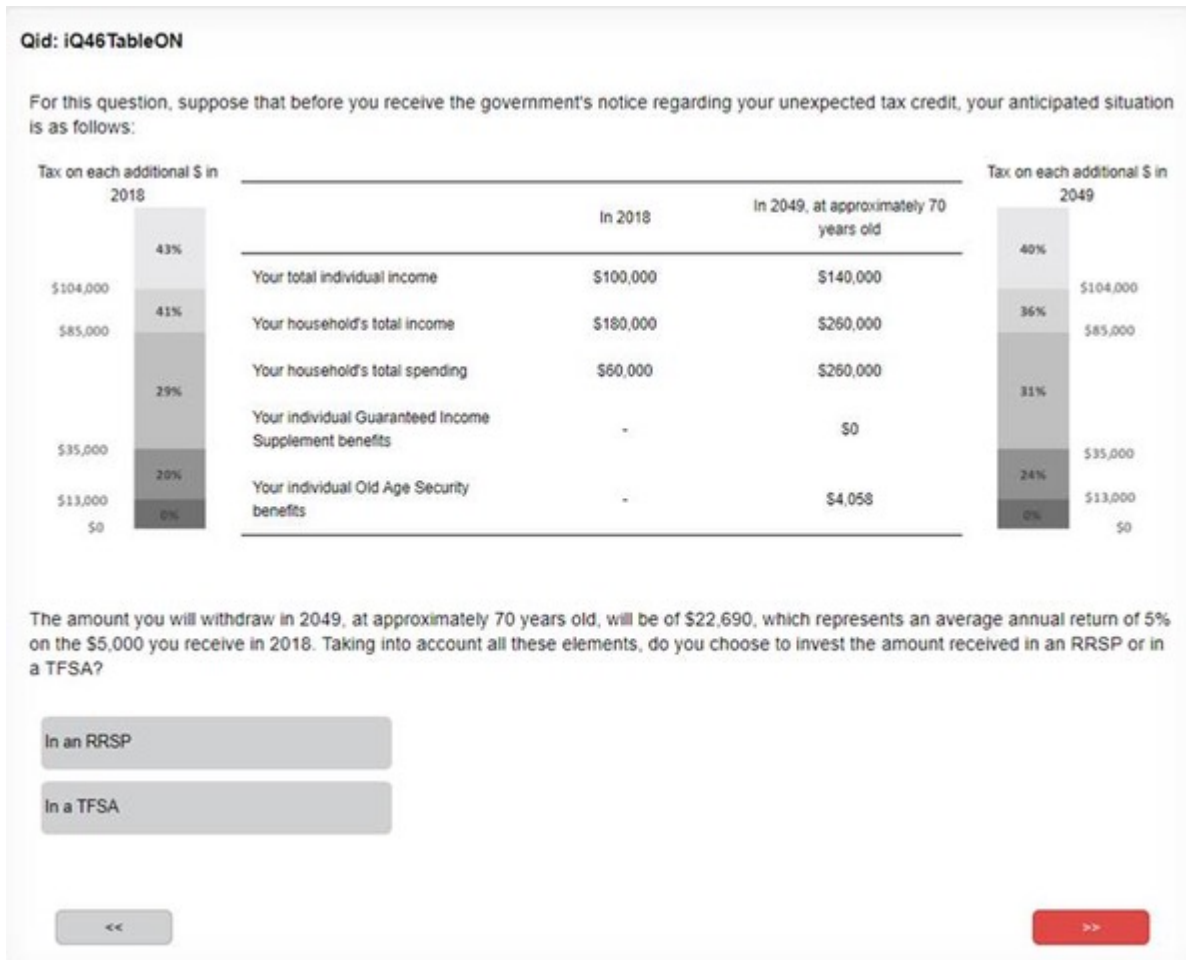
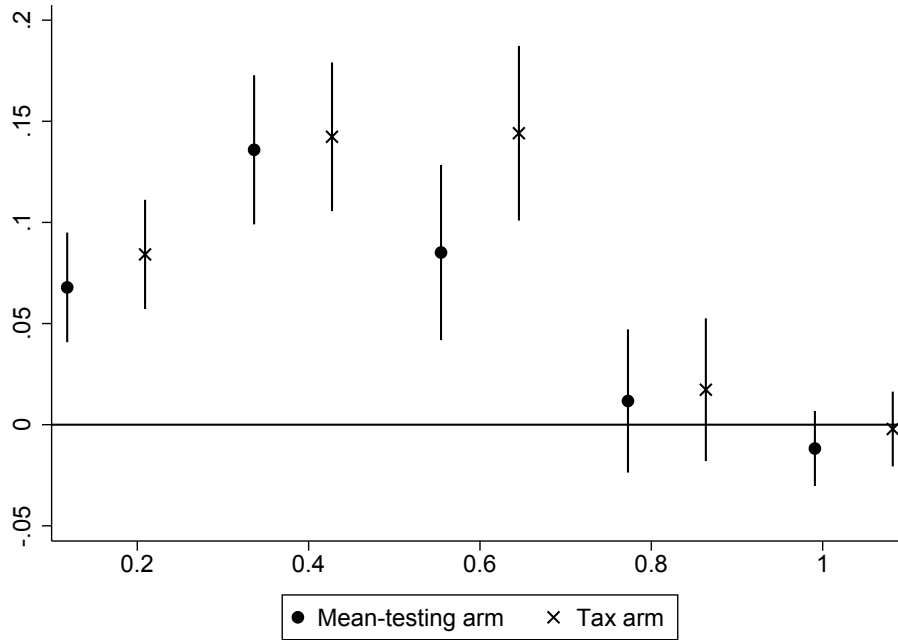
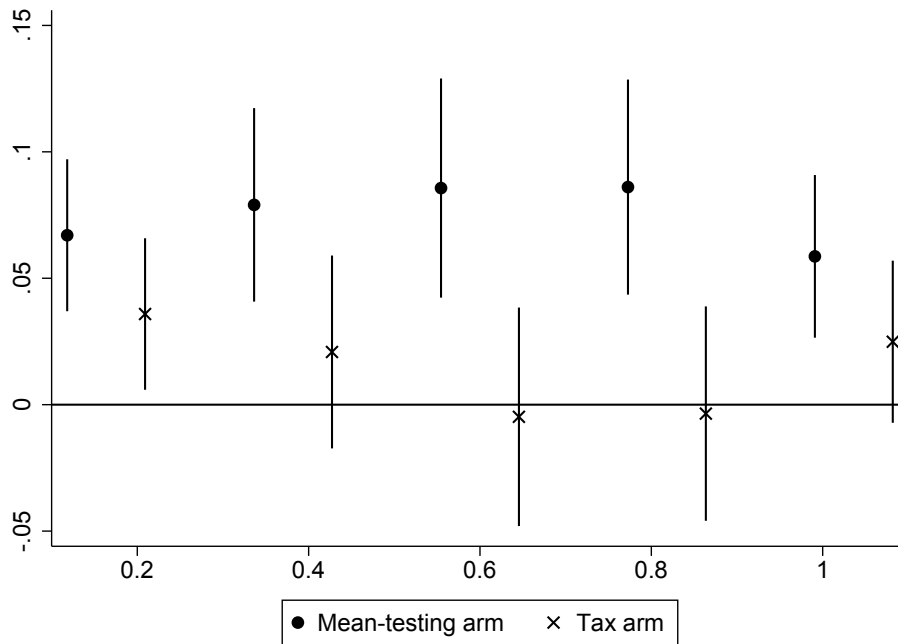


Figure 4: **Screenshot of a Choice Situation:** This figure is a screenshot of the choice situation for a respondent from Ontario (with illustrative numbers). On the left side is information provided on marginal tax rates when making a contribution and. On the right side, we show the marginal tax rate in retirement. The scenario specifies total individual and household income and expenditures by pre-loading information from the survey. When the respondent is 70 years old, we show projected income, total income and spending as well as how much the respondent receives in GIS and OAS benefits. This provides an indication to the respondent that he could lose some of those benefits if he invests in an RRSP. In the paragraph below we explain that the contributed amount will be worth \$20,690 at age 70. We also mention the rate of return.



(a) Knowledge score distribution



(b) Scenario score distribution

Figure 5: **Treatment effect distribution:** This figure presents the effect of the means-testing and tax arm treatments on the distributions of knowledge score and optimal scenario choice score (based on the imperfect adjustment rule), relative to the control group. Each point represents the effect of the treatment in increasing the score of individuals who have a score below the level in the x-axis to a level equal or above that. The omitted group is individuals with a score of zero.

Tables

	Sample	Diff. w/ control (std. err.)	
	Mean (std. dev.)	Means-testing arm	Tax arm
<i>A. Demographics</i>			
Age	44.43 (6.26)	0.18 (0.28)	0.19 (0.27)
Male (%)	45.70	-0.49 (2.23)	-1.89 (2.22)
Married or common-law (%)	61.39	-0.70 (2.15)	-1.24 (2.14)
Widowed, separated or divorced (%)	11.10	1.53 (1.40)	0.64 (1.42)
Never married (%)	27.51	-0.83 (1.94)	0.60 (1.92)
High school or less (%)	62.42	-1.28 (1.80)	0.80 (1.76)
College or some university (%)	14.46	3.31 (2.08)	0.84 (2.09)
Bachelor degree or more (%)	23.11	-2.03 (2.23)	-1.64 (2.22)
<i>B. Income and Savings</i>			
Annual income ('000 \$)	61.59 (55.43)	1.98 (2.41)	-0.27 (2.44)
Annual spending ('000 \$)	75.29 (185.42)	-5.15 (8.05)	-15.32* (8.65)
Has RRSP (%)	59.70	-3.67* (2.03)	-4.31** (2.02)
RRSP amount ('000 \$)	100.83 (246.95)	20.76 (12.89)	19.11* (11.34)
Has TFSA (%)	49.44	1.20 (2.21)	-4.31** (2.19)
TFSA amount ('000 \$)	23.50 (31.48)	1.57 (2.26)	2.38 (2.14)
Has TFSA and RRSP (%)	39.55	0.68 (2.22)	-4.42** (2.22)
<i>C. Financial Literacy</i>			
1 correct answer (%)	15.97	-1.50 (1.36)	0.46 (1.30)
2 correct answers (%)	29.55	-3.10 (1.94)	0.67 (1.89)
3 correct answers (%)	46.80	4.26* (2.19)	-1.84 (2.16)
<i>D. Preferences</i>			
σ	0.43 (0.94)	0.01 (0.04)	-0.01 (0.04)
β	0.97 (0.21)	0.01 (0.01)	0.01 (0.01)

Table 1: **Differences in Characteristics by Treatment Arms and Control:** This table reports the differences between the means-testing and tax arms of the treatment. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

	Frequency	Percent	Cum. Percent
Q1. According to you, are the contributions made to an RRSP or to a TFSA deductible from taxable income?			
Correct : RRSP only	2,189	72.85	72.85
Wrong: TFSA only	145	4.83	77.67
Wrong : both	382	12.71	90.38
Wrong: none	112	3.73	94.11
Don't Know	150	4.99	99.10
Refuse	27	0.90	100.00
Q2. According to you, when money is withdrawn from an RRSP or from a TFSA, is it subject to income tax in the year of the withdrawal? Assume the withdrawn amount is not used for the Home Buyers Plan (HBP) or the Lifelong Learning Plan			
Correct : RRSP only	2,298	76.47	76.47
Wrong: TFSA only	112	3.73	80.20
Wrong : both	310	10.32	90.52
Wrong: none	73	2.43	92.95
Don't Know	188	6.26	99.20
Refuse	24	0.80	100.00
Q3. Money invested in an RRSP or in a TFSA can generate returns in the form of interest, dividends or capital gains. According to you, are these returns subject to income tax in the year during which they were generated?			
Wrong : RRSP only	719	23.93	23.93
Wrong: TFSA only	182	6.06	29.98
Wrong : both	351	11.68	41.66
Correct: none	1,400	46.59	88.25
Don't Know	328	10.92	99.17
Refuse	25	0.83	100.00
Q4. According to you, is there a penalty associated with withdrawing money from an RRSP or from a TFSA before retirement? Assume the withdrawn amount is not used for the Home Buyers Plan (HBP) or the Lifelong Learning Plan (LLP).			
Wrong : RRSP only	1,901	63.26	63.26
Wrong: TFSA only	75	2.50	65.76
Wrong : both	254	8.45	74.21
Correct: none	509	16.94	91.15
Don't Know	239	7.95	99.10
Refuse	27	0.90	100.00
Q5. Lets assume you withdraw \$1,000 from an RRSP or from a TFSA. According to you, will this withdrawn amount be added to your future contribution room?			
Wrong : RRSP only	468	15.57	15.57
Correct: TFSA only	746	24.83	40.40
Wrong : both	546	18.17	58.57
Wrong: none	558	18.57	77.14
Don't Know	656	21.83	98.97
Refuse	31	1.03	100.00

Table 2: **Answers to Survey Questions:** This table reports the answers to general knowledge questions about RRSP and TFSA accounts. RRSPs are tax-deferred (EET) accounts and TFSAs are post-tax (TEE) accounts.

	(1)	(2)	(3)	(4)
Has RRSP	0.20*** (0.019)	0.19*** (0.019)	0.17*** (0.019)	0.13*** (0.018)
Has TFSA	0.12*** (0.017)	0.11*** (0.017)	0.11*** (0.018)	0.11*** (0.016)
Age	0.015 (0.022)	0.013 (0.022)	0.010 (0.022)	-0.0045 (0.021)
Age ²	-0.00015 (0.00025)	-0.00013 (0.00025)	-0.000090 (0.00025)	0.000058 (0.00023)
Marital Status				
(Married omitted)				
Widow, separated or divorce		0.0091 (0.025)	0.012 (0.025)	0.016 (0.023)
Never married		0.024 (0.019)	0.027 (0.019)	0.030* (0.017)
Annual income (100,000's)		0.039*** (0.015)	0.029* (0.015)	0.018 (0.014)
Education				
(High School or less omitted)				
Some university			0.041* (0.023)	0.0072 (0.022)
Bachelor degree or more			0.083*** (0.023)	0.033 (0.022)
Financial Literacy				
(0 Right answer omitted)				
1 correct answer				0.11*** (0.039)
2 correct answers				0.20*** (0.035)
3 correct answers				0.34*** (0.034)
R^2	0.196	0.202	0.212	0.325
Observations	1,043	1,043	1,043	1,043

Table 3: **Determinants of Score on Knowledge Questions for the Control Group:** This table reports the correlation between observable characteristics and the score on knowledge questions (in percentage) using OLS regressions. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

	Contributions Deductible?	Withdrawals Taxed?	Returns Taxed?	Withdrawal Penalty?	Contribution Room?	Score/100
Means-testing arm	0.14*** (0.020)	0.14*** (0.019)	0.0014 (0.022)	-0.016 (0.017)	0.021 (0.019)	0.068*** (0.015)
Tax arm	0.15*** (0.020)	0.15*** (0.019)	0.060*** (0.022)	0.0057 (0.017)	0.028 (0.019)	0.084*** (0.014)
Control avg.	0.64	0.67	0.45	0.17	0.23	0.43
R^2	0.019	0.023	0.002	0.001	0.001	0.019
Observations	3,005	3,005	3,005	3,005	3,005	3,005

Table 4: **Is the answer to the question correct?** This table reports marginal effects calculated after probit estimations of $Y=1$ if correct answer, and 0 otherwise for each of the questions asked to respondents. We report the effect of the treatments on the answer given to the questions, as listed in Table 2. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

	<u>Scn 1</u>	<u>Scn 2</u>	<u>Scn 3</u>	<u>Scn 4</u>	<u>Scn 5</u>	<u>Scn 6</u>
RRSP	37.66	36.71	41.71	37.19	36.17	40.84
TFSA	62.34	63.29	58.29	62.81	63.83	59.16

Table 5: **Respondents' choice in each scenarios:** This table reports the percentage of respondents in the sample who chose RRSP and TFSA in each of the 6 scenarios presented to them. A total of 26 respondents refused to answer or chose "do not know" when these options were available in the soft launch of the online survey.

	Scn1	Scn2	Scn3	Scn4	Scn5	Scn6	Score
<i>A. Based on Marginal Tax Rates</i>							
Means-testing arm	0.13*** (0.021)	0.082*** (0.021)	0.049** (0.025)	0.096*** (0.022)	0.10*** (0.021)	0.064*** (0.024)	0.087*** (0.015)
Tax arm	0.015 (0.022)	0.0072 (0.022)	0.043* (0.025)	0.035 (0.022)	0.0060 (0.022)	0.046* (0.025)	0.024 (0.015)
Control avg.	0.56	0.59	0.52	0.57	0.59	0.52	0.56
R^2	0.010	0.004	0.001	0.005	0.007	0.002	0.012
Observations	3,005	3,005	2,450	3,005	3,005	2,450	3,005
<i>B. Based on Utility Values</i>							
Means-testing arm	0.079*** (0.024)	0.039 (0.024)	0.049* (0.027)	0.12*** (0.023)	0.083*** (0.023)	0.081*** (0.026)	0.078*** (0.015)
Tax arm	0.0091 (0.024)	-0.011 (0.024)	0.070*** (0.026)	0.048** (0.024)	0.0043 (0.023)	0.039 (0.026)	0.026* (0.015)
Control avg.	0.54	0.52	0.51	0.55	0.58	0.52	0.54
R^2	0.004	0.001	0.003	0.008	0.005	0.003	0.011
Observations	2,597	2,597	2,130	2,597	2,597	2,130	2,597

Table 6: **Did respondents make the right choice?** This table presents marginal effects calculated after probit estimations of $Y=1$ if correct answer, and 0 otherwise for each of the scenarios presented to respondents. We report the probability of making the right choice between an RRSP and a TFSA account, given the scenario provided and an optimality rule based on either comparing effective marginal tax rates during the working life and at retirement (perfect adjustment rule), or based on utility values derived from a theoretical model using a multi-period CRRA utility function where each participant’s risk aversion and inter-temporal discount factor were elicited using incentivized lottery choices (imperfect adjustment rule). ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

	Knowledge	RRSP/TFSA (rates)	RRSP/TFSA (utility)
Means-testing arm×Some university	-0.036 (0.032)	-0.022 (0.042)	-0.0054 (0.043)
Means-testing arm×Bachelor degree+	-0.026 (0.030)	-0.020 (0.039)	-0.024 (0.040)
Tax arm×Some university	-0.062* (0.032)	0.0066 (0.042)	-0.00091 (0.043)
Tax arm×Bachelor degree+	-0.050 (0.031)	-0.0027 (0.040)	0.0023 (0.040)
Intervention			
(Control omitted)			
Means-testing arm	0.081*** (0.025)	0.10*** (0.033)	0.092*** (0.035)
Tax arm	0.12*** (0.026)	0.023 (0.034)	0.026 (0.034)
Education			
(High School or less omitted)			
Some university	0.11*** (0.022)	-0.0057 (0.029)	-0.0038 (0.030)
Bachelor degree+	0.19*** (0.021)	-0.025 (0.028)	-0.014 (0.028)
R^2	0.074	0.014	0.012
Observations	3,005	3,005	2,597

Table 7: **Heterogeneous Effects in Terms of Education:** This table reports the treatment effects for different education levels. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Intervention						
(Control omitted)						
Means-testing arm	-145.9*** (55.1)	137.1** (55.0)	-140.3** (55.0)	-134.2** (54.9)	-133.3** (54.9)	-140.6** (54.8)
Tax arm	-76.2 (54.4)	-68.4 (54.3)	-66.2 (54.3)	-66.9 (54.1)	-66.5 (54.1)	-64.5 (54.0)
σ		58.8** (29.9)	55.6* (29.9)	66.3** (30.0)	66.8** (30.0)	64.8** (29.9)
β		447.3*** (129.2)	465.5*** (129.4)	449.0*** (129.2)	449.0*** (129.3)	449.2*** (129.2)
Has RRSP			53.7 (53.4)	20.9 (54.0)	12.3 (54.5)	37.5 (55.2)
Has TFSA			-107.9** (48.5)	-118.6** (48.6)	-122.1** (49.2)	-125.6** (49.2)
Age			101.2 (62.1)	97.7 (61.9)	94.8 (61.9)	93.3 (61.8)
Age ²			-1.16* (0.69)	-1.14* (0.68)	-1.11 (0.68)	-1.08 (0.68)
Marital Status						
(Married omitted)						
Widow, separated or divorce				165.4** (74.5)	162.5** (74.6)	161.3** (74.4)
Never married				-74.7 (52.8)	-71.5 (52.9)	-70.3 (52.8)
Annual income (100,000's)				163.1*** (45.5)	159.7*** (46.5)	169.3*** (46.6)
Education						
(High School or less omitted)						
Some university					108.2 (66.3)	126.2* (66.5)
Bachelor degree or more					72.3 (64.7)	105.4 (65.6)
Financial Literacy						
(0 Right answer omitted)						
1 correct answer						273.4** (129.5)
2 correct answers						58.7 (117.5)
3 correct answers						-8.55 (113.0)
Constant	408.4*** (38.2)	-48.8 (126.0)	-2208.4 (1393.6)	-2152.4 (1388.8)	-2156.6 (1389.0)	-2216.8 (1390.2)
R^2	0.003	0.014	0.018	0.026	0.027	0.032
Observations	2,572	2,591	2,591	2,591	2,591	2,591

Table 8: **Determinants of Welfare Loss (in \$)**: This table reports OLS regressions of the welfare loss, computed from the utility specification in the text on various controls. ***, **, and * represent significance at the 1, 5 and 10 percent level, respectively.

A Preference Estimation

The general approach to preference estimation is inspired by the methodology developed by Andersen et al. (2008). We first estimate σ for each individual using an MPL involving two lotteries. We then use this estimate of σ as an input to estimate, with a second MPL, the discount factor β . Each MPL provides a bounded estimate of these parameters and we use parametric assumptions to recover a respondent level unbiased estimate of each parameter.

A.1 Risk Aversion

We use the MPL found in Q35 of Appendix B which is adapted from Holt and Laury (2002). In Table A.1, we report the MPL along with the expected value of each lotteries and the bounds on σ for each switching point. For example, a switch at lottery 5 implies that σ is between 0.164 and 0.426.

	p_A	$w_{A,1}$	$1-p_A$	$w_{A,2}$	Ew_A	p_B	$w_{B,1}$	$1-p_B$	$w_{B,2}$	Ew_B	σ_{\min}	σ_{\max}
1	0.1	20.0	0.9	16.0	16.4	0.1	39.0	0.9	1.0	4.8	$-\infty$	-1.672
2	0.2	20.0	0.8	16.0	16.8	0.2	39.0	0.8	1.0	8.6	-1.672	-0.916
3	0.3	20.0	0.7	16.0	17.2	0.3	39.0	0.7	1.0	12.4	-0.916	-0.462
4	0.4	20.0	0.6	16.0	17.6	0.4	39.0	0.6	1.0	16.2	-0.462	-0.122
5	0.5	20.0	0.5	16.0	18.0	0.5	39.0	0.5	1.0	20.0	-0.122	0.164
6	0.6	20.0	0.4	16.0	18.4	0.6	39.0	0.4	1.0	23.8	0.164	0.426
7	0.7	20.0	0.3	16.0	18.8	0.7	39.0	0.3	1.0	27.6	0.426	0.689
8	0.8	20.0	0.2	16.0	19.2	0.8	39.0	0.2	1.0	31.4	0.689	0.981
9	0.9	20.0	0.1	16.0	19.6	0.9	39.0	0.1	1.0	35.2	0.981	1.376
10	1.0	20.0	0.0	16.0	20.0	1.0	39.0	0.0	1.0	39.0	1.376	∞

Table A.1: **Multiple Price List of Lotteries:** Each respondent is presented with two lotteries A and B, with probabilities p_J of obtaining $w_{J,1}$ and $1 - p_J$ of obtaining $w_{J,2}$ for $J = A, B$. We also report the expected value of each lotteries Ew_J for $J = A, B$ and the bounds on σ compatible with a switch from A to B for a particular lottery.

We have 3005 respondents with reported switch points. Some respondents switch multiple times which is inconsistent with Expected Utility Theory (EUT). We keep the last switch respondents make. 784 respondents have these inconsistent patterns. If respondents have not switched by the 10th lottery, their choice is not coherent with EUT given that they have under A a sure gain that is higher than the sure gain under B. We discard these observations (392 lost). Hence, we have a total of 2613 respondents with valid answers. The distribution of switch points is provided in Table A.2.

	1	2	3	4	5	6	7	8	9	10	total
frequency	174.0	28.0	37.0	118.0	497.0	488.0	437.0	295.0	244.0	295.0	2613.0
percent	6.7	1.1	1.4	4.5	19.0	18.7	16.7	11.3	9.3	11.3	100.0

Table A.2: **Distribution of Switch Points for Risk MPL:** We report both frequencies as well as percentage of total.

We apply the bounds to the switch points and Figure A.1 shows the distribution of lower and upper bounds for the distribution of σ . The median lower bound is 0.16 while the median upper bound is 0.426. 25% of respondents have a lower bound of 0.688 or higher and an upper bound of 0.98.

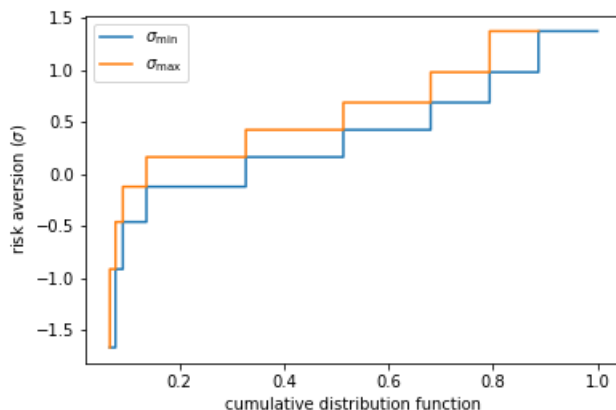


Figure A.1: **Cumulative Distribution of Lower and Upper Bounds on σ**

We construct a parametric econometric model to impute within bounds. Assume σ follows a $N(\mu, \eta^2)$. The mean μ is a function of x_i , a vector of observed characteristics, $\mu = x_i\beta$. Then the probability of observing choice $y_i = j$ is given by:

$$\Pr(y_i = j) = \Phi\left(\frac{\sigma_{j,\max} - x_i\beta}{\eta}\right) - \Phi\left(\frac{\sigma_{j,\min} - x_i\beta}{\eta}\right) \quad (13)$$

If we choose Φ to be the normal CDF, this yields an ordered probit with known thresholds. We estimate this model by maximum likelihood including as regressors gender, age, marital status, education (in categories), a dummy for residing in Quebec and a constant. Table A.3 reports parameter estimates. We find some evidence that males and those with more education are less risk averse. However, these differences are not large and are barely statistically significant at the 10% level. Hence, there is a lot of heterogeneity in these reports.

	point estimate	standard error
age (z)	-0.023	0.018
male	-0.071	0.037
married	0.013	0.038
some college	-0.059	0.053
college	-0.092	0.051
quebec	0.039	0.036
FL 3 correct	-0.022	0.039
constant	0.483	0.056
η	0.899	0.015

Table A.3: **Parameter Estimates of the Ordered Probit for σ** : We report parameter estimates β and η obtained by maximum likelihood using the BFGS algorithm. Standard errors obtained using the inverse Hessian of the log-likelihood.

We can now compute the posterior mean of risk aversion given the characteristics we observe and importantly the switching point in the MPL. We have:

$$E(\sigma|y_i = j, x_i) = \mu(x_i) + \eta \frac{\phi(\frac{\sigma_{j,\min} - \mu(x_i)}{\eta}) - \phi(\frac{\sigma_{j,\max} - \mu(x_i)}{\eta})}{\Phi(\frac{\sigma_{j,\max} - \mu(x_i)}{\eta}) - \Phi(\frac{\sigma_{j,\min} - \mu(x_i)}{\eta})} \quad (14)$$

where $\mu(x_i) = x_i\beta$ and $\phi(\cdot)$ denotes the Normal pdf. We replace parameters with their estimates and computes these posterior mean for the entire sample. In Figure A.2, we plot the density of the estimated σ . On average $\sigma = 0.39$ but the standard deviation is large (0.88). Less than 13.6% of respondents are risk loving. More than 25% of respondents have relative risk aversion in excess of 0.83.

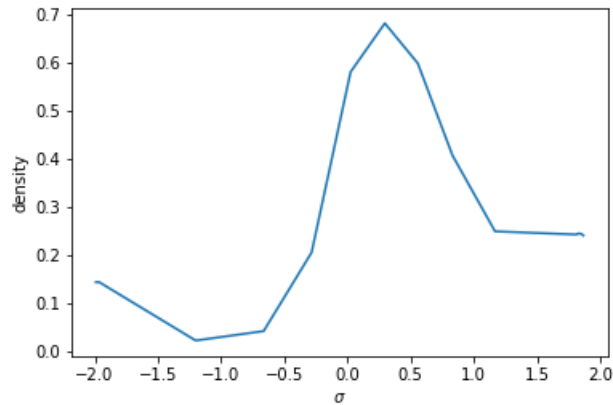


Figure A.2: **Density Estimate of the Distribution of σ**

A.2 Time Preference

We use a similar strategy for time preference. We use the MPL found in Q36 in Appendix B. The only difference between option A and B is the time delay (1 month vs 13 month). We use the time delay of 1 month to avoid hyperbolic discounting or liquidity constraints playing a role. Hence, the question directory provides bounds on the annual rate of discount β . If a consumer will be indifferent between switching and keeping option A at list element j he has to have $\beta_j = \frac{c_A}{c_B} 1^{-\sigma}$. As emphasized by Andersen et al. (2008), these cutoffs depends on σ . Hence, we use the σ imputed in the previous step as an input into the computation of the thresholds for time discount.

We again start with 3005 potentially valid response. We drop those with a missing value of σ . This leaves us with 2613 valid responses. A total of 459 responses have reversals (switch back to A). We use the last switch to B. We report in Table A.4 the distribution of switch points. A significant fraction of respondents (close to a third) switch at the first element which indicates a high degree of patience.

	1	2	3	4	5	6	7	8	9	10	11	total
frequency	872.0	265.0	135.0	161.0	252.0	176.0	125.0	101.0	122.0	132.0	272.0	2613.0
percent	33.4	10.1	5.2	6.2	9.6	6.7	4.8	3.9	4.7	5.1	10.4	100.0

Table A.4: **Distribution of Switch Points for Time MPL:** We report both frequencies as well as percentage of total.

When we impute bounds based on switch points and estimates of σ , we obtain that the average discount factor is between 0.931 and 0.945. Of course, this does not account for the distribution within bounds and the heterogeneity in bound estimates. We estimate the same ordered probit as for risk aversion with the same regressors. Table A.5 reports the estimates. We find that discount factors increase with age, are lower for males and interestingly larger for those with a high level of financial literacy. Hence, those who are more financially literate are also more patient.

	point estimate	se
age (z)	0.010	0.005
male	-0.034	0.010
married	-0.001	0.010
some college	-0.004	0.015
college	-0.004	0.014
quebec	0.005	0.010
FL 3 correct	0.050	0.011
constant	0.925	0.016
η	0.211	0.005

Table A.5: **Parameter Estimates of Ordered Probit for Time MPL:** We report both frequencies as well as percentage of total. We report parameter estimates β and η obtained by maximum likelihood using the BFGS algorithm. Standard errors obtained using the inverse Hessian of the log-likelihood. age (z) refers to the standardized z score of age.

We then take the ordered probit and construct posterior means as we did for risk aversion. We obtain an mean of 0.968 which shows a relatively high degree of patience among our respondents. There is however substantial heterogeneity in these estimates as more than 25% of the sample have discount factors less than 0.85 and 25% have discount factors in excess of 1.12.

B Survey Instrument

INSTRUCTIONS INCLUDED WITH THIS ANONYMOUS QUESTIONNAIRE

RETIREMENT SAVING VEHICLES

The following pages contain an anonymous questionnaire, which we invite you to complete. This questionnaire was developed as part of a research project at HEC Montréal.

Since your first impressions best reflect your true opinions, we would ask that you please answer the questions included in this questionnaire without any hesitation. We ask, however, that you take the time needed to consider certain questions on knowledge, which might involve concepts with which you are less familiar. There is no time limit for completing the questionnaire, although we have estimated that it should take approximately 15 minutes.

The information collected will be anonymous and will remain strictly confidential. It will be used solely for the advancement of knowledge and the dissemination of the overall results in academic or professional forums. It is possible that the collected data will be shared with other researchers, solely for non-commercial research purposes, but for projects other than the one for which the data was originally collected.

The online data collection provider agrees to refrain from disclosing any personal information (or any other information concerning participants in this study) to any other users or to any third party, unless the respondent expressly agrees to such disclosure or unless such disclosure is required by law.

You are free to refuse to participate in this project and you may decide to stop answering the questions at any time. By completing this questionnaire, you will be considered as having given your consent to participate in our research project and to the potential use of data collected from this questionnaire in future research. Since the questionnaire is anonymous, you will no longer be able to withdraw from the research project once you have completed the questionnaire because it will be impossible to determine which of the answers are yours.

Please note that the use of the masculine is to simplify the text.

If you have any questions about this research, please contact the principal investigator, Pierre-Carl Michaud, at the telephone number or email address indicated below.

HEC Montréal's Research Ethics Board has determined that the data collection related to this study meets the ethics standards for research involving humans. If you have any questions related to ethics, please contact the REB secretariat at (514) 340-6051 or by email at cer@hec.ca.

Thank you for your valuable cooperation!

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Section 1: Background

QA. Are you...?

- 1 Male
- 2 Female

QB. How old are you? Please specify. [PN: MUST ENTER THE 2 CHARACTERS]

Numeric (35-55)

[NOTE: TERMINATE IF NOT 35-55 INCLUSIVELY]

QC. Which province or territory do you live in?

- 1. British Columbia [Screen Out]
- 2. Alberta [Screen Out]
- 3. Saskatchewan [Screen Out]
- 4. Manitoba [Screen Out]
- 5. Ontario
- 6. Quebec
- 7. New Brunswick [Screen Out]
- 8. Nova Scotia [Screen Out]
- 9. Prince Edward Island [Screen Out]
- 10. Newfoundland and Labrador [Screen Out]
- 11. Northwest Territories [Screen Out]
- 12. Nunavut [Screen Out]
- 13. Yukon [Screen Out]
- 14. None of the above [Screen Out]

Q0 What is the highest certificate, diploma or degree you have obtained?

- 1 Less than high school diploma or its equivalent
- 2 High school diploma or a high school equivalency certificate
- 3 Trade certificate or diploma
- 4 College, CEGEP or other non-university certificate or diploma (other than trades certificates or diplomas)
- 5 University certificate or diploma below the bachelor's level
- 6 Bachelor's degree (e.g. B.A., B.Sc., LL.B.)
- 7 University certificate, diploma, degree above the bachelor's level

Q1 What is your marital status?

- 1 Married
- 2 Living common-law
- 3 Widowed
- 4 Separated
- 5 Divorced
- 6 Single, never married

IF Q1 ==1,2

Q1a How old is your partner?

Numeric (18-120)

END IF

For the remainder of this survey, it could be useful to have the following documents in front of you, if they are available: your [PN: IF QC==6, ADD « federal »] income tax return for 2017 and that of your spouse, as the case may be; your notice of assessment for 2016 from the Canada Revenue Agency; and your most recent investment and pay statements, if applicable.

Section 2: Financial situation

Q2 Which of the following statements best describes your work situation for 2017?

- 1 Employed (full time, part time, seasonal work)
- 2 Self-employed
- 3 Unpaid worker in a family business
- 4 Retired [Screen Out]
- 5 Did not work, but for a reason other than retirement
- 7777777 Don't know
- 8888888 Refuse to answer

Q3 For 2017, what is your best estimate of your total individual income, from **all** sources, before taxes and deductions? This amount corresponds to line 150 of your [IF QC==6, ADD « federal»] income tax return for 2017.

- Numeric (0-\$5,000,000)
- 9999999 Don't know or refuse to answer

IF Q3== 9999999

Q3a Is it more than \$60,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q3a == 1

Q3b Is it less than \$80,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q3b ==2

Q3c Is it more than \$100,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

ELSE IF Q3a == 2

Q3d Is it more than \$40,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q3d ==2

Q3e Is it more than \$20,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

END IF

END IF

Q4 (IF Q1 ==1,2) For 2017, what is your best estimate of your spouse's total individual income, from **all** sources, before taxes and deductions? This amount corresponds to line 150 of his(her) [IF QC==6, ADD « federal»] income tax return for 2017.

Numeric (0-\$5,000,000)

9999999 Don't know or refuse to answer

IF Q4== 9999999

Q4a Is it more than \$60,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q4a== 1

Q4b Is it less than \$80,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q4b==2

Q4c Is it more than \$100,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

ELSE IF Q4a== 2

Q4d Is it more than \$40,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q4d ==2

Q4e Is it more than \$20,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

END IF

END IF

Q5 For 2017, what is your best estimate of your household's average total **monthly** spending? Numeric (1 – \$850,000)
9999999 Don't know or refuse to answer

IF Q5== 9999999

Q5a Is it more than \$9,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q5a== 1

Q5b Is it less than \$13,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q5b==1

Q5c Is it more than \$11,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

ELSE IF Q5b==2

Q5d Is it more than \$15,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

IF Q5d==1

Q5e Is it less than \$17,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

END IF

ELSE IF Q5a== 2

Q5f Is it more than \$5,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse
to answer

IF Q5f==1

Q5g Is it less than \$7,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

ELSE IF Q5f==2

Q5h Is it less than \$3,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q5h==1

Q5i Is it more than \$1,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

END IF

END IF

END IF

Section 2.1: Assets

Q6 Do you own your primary residence?

1 Yes

2 No

8888888 Refuse to answer

Q7 (IF Q6 ==1) What is the current market value of your primary residence?

Numeric (1-\$9,999,998)

9999999 Don't know or refuse to answer

IF Q7==9999999

Q7a Is it more than \$300,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to
answer

IF Q7a==1

Q7b Is it less than \$600,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

IF Q7b== 1

Q7c Is it more than \$450,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

ELSE IF Q7b ==2

Q7d Is it less than \$750,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

IF Q7d== 2

Q7e Is it more than \$900,000? 1 Yes 2 No 7777777
Don't know 8888888 Refuse to answer

END IF

END IF

ELSE IF Q7a==2

Q7f Is it more than \$150,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

END IF

END IF

For the following questions, we are interested in your **individual** assets, namely assets that were not acquired through an employer.

Q8 Among the following assets, please select all that you own:

- 1 Individual RRSPs (Registered Retirement Savings Plans)
- 2 Individual TFSAs (Tax-Free Savings Accounts)
- 3 RESPs (Registered Education Savings Plans)
- 4 Savings accounts or non-registered investments
- 5 Universal life insurance policy, which includes a savings portion
- 6 Other assets (car, secondary residences, RDSPs, etc.)
- 7 I don't own any of the previously mentioned assets [CANNOT BE COMBINED WITH ANY OTHER RESPONSE]
7777777 Don't know
8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE OPTION, EXCEPT IF THEY SELECT RESPONSES 7, 7777777, OR 8888888]

Q9 (FOREACH Q8==1,2,4 - ASK THE FOLLOWING QUESTION) What is your best estimate of the amount accumulated in [ACCORDING TO THE NUMBER SELECTED IN QUESTION Q8, INPUT THE APPROPRIATE ASSET: 1= your individual RRSPs 2= your individual TFSAs 4 = your savings accounts or non-registered investments]?

Numeric (1 – \$5,000,000)

9999999 Don't know or refuse to answer

IF Q9==9999999

Q9a Is it more than \$50,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q9a==1

Q9b Is it less than \$200,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

ELSE IF Q9a==2

Q9c Is it more than \$10,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

END IF

Q10 (FOREACH Q8 = 1,2,4, ASK THE FOLLOWING QUESTION) What is your best estimate of the proportion of the amount accumulated in [ACCORDING TO THE NUMBER SELECTED IN QUESTION Q8, INPUT THE APPROPRIATE ASSET: 1= your individual RRSPs 2= your individual TFSAs 4 = your savings accounts or non-registered investments] that is invested in shares of stock of publicly held corporations, including through mutual funds or investment trusts?

Numeric (0-100%)

9999999 Don't know or refuse to answer

IF Q10== 9999999

Q10a Is it more than 50%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q10a ==1

Q10b Is it less than 75%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

ELSE IF Q10a ==2

Q10c Is it less than 25%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

END IF

Q11 Do you have a financial advisor who guides you in your savings activities? For example, does he help you manage your investments and portfolios? If you deal with more than one financial advisor, think about the one you consult the most.

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q11 ==1

Q11a (IF Q8 = 1,2,4) For each type of financial asset that you own, please select your financial advisor's method of compensation.

Method of compensation	Main individual RRSP	Main individual TFSA	Main savings account or non-registered investment
1 Commission (% on trades, investments, etc.)			
2 Commission (\$ on trades, investments, etc.)			
3 Fee for service (\$ per year, depending on asset value)			
4 Fee for service (\$ per hour)			
5 Fee for service (% of portfolio value, per year)			
6 My financial institution pays my advisor			
7 My financial advisor does not manage this asset			
7777777 Don't know			
8888888 Refuse to answer			

(SHOW THE COLUMNS THAT CORRESPOND TO ANSWERS SELECTED IN Q8 ==1,2,4)
(NEED CHECKBOXES IN EACH CELL OF THE COLUMN)

Q11b Is your financial advisor tied to your financial institution?

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q11b ==2

Q11c Why? Select all that apply to your situation.

1 I already had a financial advisor before I started doing business with my current financial institution

2 My financial institution does not offer the type of advice I need

3 I prefer dealing with an independent financial advisor

4 My financial advisor is a trustworthy person who was recommended by someone close to me

5 It is less expensive

6 Other: specify [PN: MUST SPECIFY]

7777777 Don't know
8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE RESPONSE
FROM 1 TO 6]

END IF

ELSE IF Q11 ==2

Q11d Why? Select all that apply to your situation.

- 1 I have enough financial and savings knowledge to forego the services of a financial advisor
 - 2 The services of a financial advisor are too costly
 - 3 I do not have enough money to afford the services of a financial advisor
 - 4 I do not trust financial advisors
 - 5 A relative deals with my savings investments
 - 6 Other: specify (PN: MUST SPECIFY)
- 7777777 Don't know
8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE RESPONSE FROM 1 TO 6]

END IF

For the following questions, we are interested in retirement plans offered by an **employer**.

IF Q2 >=2, SKIP TO Q14

Q12 Among the following pension plans, please select all that are offered by your **current** employer and in which you chose to participate:

- 1 Defined benefit (DB) pension plan** – This type of pension plan pays fixed benefits during retirement. The benefits depend on number of years worked and income, but not on the pension plan's returns.
- 2 Defined contribution (DC) pension plan, including simplified pension plans**– This type of pension plan pays benefits that depend on the pension plan's returns. You and your employer deposit contributions.
- 3 Hybrid pension plan** – This type of pension plan combines characteristics from DB and DC pension plans.
- 4 Group RRSP (Registered Retirement Savings Plan)** – RRSP offered by the employer and for which contributions are taken on work income. The employer can contribute to the group RRSP.
- 5 Group TFSA (Tax-Free Savings Account)** - TFSA offered by the employer and for which contributions are taken on work income. The employer can contribute to the group TFSA.

6 Voluntary Retirement Savings Plan (VRSP) (in Quebec) or Pooled Registered Pension Plan (PRPP)- These types of pension plans are similar to defined contribution pension plans. The employer can contribute to the VRSP and to the PRPP.

7 I chose not to participate in at least one of the pension plans offered by my employer

8 My employer does not offer pension plans [CANNOT BE COMBINED WITH ANY OTHER RESPONSE]

7777777 Don't know

8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE RESPONSE FROM 1 TO 7]

IF Q12 == 7, ASK:

Q13 In your current employment, did you ever choose **not to** participate in a VRSP (in Quebec) or a PRPP?

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q13==1

Q13a Why? Select all that apply to your situation.

1 I do not wish to save money

2 I save enough money elsewhere

3 I have not been working long enough for my current employer

4 I do not plan on working for my current employer for much longer

5 I am not able to save money

6 I do not understand the employer provided pension plan

7 The employer provided pension plan does not fulfill my savings needs for retirement

8 Other reason: specify [PN : MUST SPECIFY]

7777777 Don't know

8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE RESPONSE FROM 1 TO 8]

END IF

END IF

Q14 IF Q12== 1 THROUGH 6 ASK: You mentioned that you chose to participate in one of the pension plans offered by your current employer. In the past, did you participate in a pension plan offered by another employer?

IF Q12== 7,8,7777777, 8888888 OR Q2 >=2: In the past, did you participate in a pension plan offered by an employer?

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q14==1

Q14a Among the following pension plans, please select all in which you chose to participate in the past. (IF Q12 == 1 THROUGH 7 ADD) It is important to **exclude** pension plans offered by your current employer.

1 Defined benefit pension plans

2 Defined contribution pension plans, including simplified pension plans

3 Hybrid pension plans

4 Group RRSPs (Registered Retirement Savings Plan)

5 Group TFSAs (Tax-Free Savings Account)

6 Voluntary Retirement Savings Plans (VRSPs) (in Quebec) and Pooled Registered Pension Plans (PRPPs)

7777777 Don't know

8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 6]

END IF

(IF Q6 ≠ 1: SKIP TO SECTION 3)

Section 2.2: Debt

Q15 Previously, you mentioned that you own your primary residence. What proportion of the current market value of your primary residence do you still owe on your mortgage?
Numeric (0-200%)

9999999 Don't know or refuse to answer

IF Q15== 9999999

Q15a It is more than 50%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q15a== 1

Q15b Is it less than 75%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

ELSE IF Q15a== 2

Q15c Is it less than 25%? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF
END IF

Section 3: Current savings

In this section, we are interested in your savings for the 2017 fiscal year.

IF RESPONDENT DID NOT SELECT Q8 == 1, SKIP TO **END OF** Q17

The following questions ask about your individual RRSPs only.

Q16 For the 2017 fiscal year, how much did you contribute to an individual RRSP? This includes contributions made during the first 60 days of 2018.

Numeric (0-\$2,000,000) for the year
9999999 Don't know or refuse to answer

IF Q16== 9999999

Q16a Is it more than \$12,000? 1 Yes 2 No 7777777 Don't know 8888888
refuse to answer

IF Q16a==1

Q16b Is it less than \$18,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q16b==1

Q16c Is it more than \$15,000? 1 Yes 2 No 7777777 Don't
know 8888888 Refuse to answer

ELSE IF Q16b==2

Q16d Is it more than \$21,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

ELSE IF Q16a==2

Q16e Is it less than \$6,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q16e==1

Q16f Is it more than \$3,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

ELSE IF Q16e==2

Q16g Is it more than \$9,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

END IF
END IF

IF(Q16 IS GREATER THAN 0 AND LESS THAN 9999999) OR (AT LEAST ONE OF THE QUESTIONS RANGING FROM Q16a TO Q16g IS EITHER 1 OR 2)

Q16h During which months did you contribute to an individual RRSP for the 2017 fiscal year? Please select all months during which you made a contribution.

- 1 January 2017
- 2 February 2017
- 3 March 2017
- 4 April 2017
- 5 May 2017
- 6 June 2017
- 7 July 2017
- 8 August 2017
- 9 September 2017
- 10 October 2017
- 11 November 2017
- 12 December 2017
- 13 January 2018
- 14 February 2018
- 7777777 Don't know
- 8888888 Refuse to answer

(RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 14)

END IF

Q17 What was your available RRSP/PRPP contribution room for 2017? This information can be found in your notice of assessment for 2016 from the Canada Revenue Agency.

Numeric(0- \$2,000,000)

7777777 Don't know

8888888 Refuse to answer

IF RESPONDENT DID NOT SELECT Q8 ==2, SKIP TO **END OF Erreur ! Source du renvoi introuvable.**

The following questions ask about your individual TFSAs only.

Q18 In 2017, how much did you contribute to an individual TFSA?

Numeric (0-\$2,000,000) for the year

9999999 Don't know or refuse to answer

IF Q18==9999999

Q18a Is it more than \$12,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q18a==1

Q18b Is it less than \$18,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q18b ==1

Q18c Is it more than \$15,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answers

ELSE IF Q18b ==2

Q18d Is it more than \$21,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

ELSE IF Q18a ==2

Q18e Is it less than \$6,000? 1 Yes 2 No 7777777 Don't know 8888888
Refuse to answer

IF Q18e ==1

Q18f Is it more than \$3,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

ELSE IF Q18e ==2

Q18g Is it more than \$9,000? 1 Yes 2 No 7777777 Don't know
8888888 Refuse to answer

END IF

END IF

END IF

IF(Q18 IS GREATER THAN 0 AND LESS THAN 9999999) OR (AT LEAST ONE OF THE
QUESTIONS RANGING FROM Q18a TO Q18g IS EITHER 1 OR 2)

Q19 For 2017, did you reach your maximum TFSA contribution limit?

1 Oui

2 Non

7777777 Don't know

8888888 Refuse to answer

END IF

IF Q8 ==1 AND Q8 ==2 AND Q16 ≠ Q18

IF Q16> Q18AND Q16< 9999999 AND Q18 <9999999

Q20 Why did you choose to contribute more to individual RRSPs than to individual TFSAs? Select all that apply to your situation.

- 1 It is more fiscally beneficial in the short-term
- 2 It will be more fiscally beneficial when I'm retired
- 3 RRSPs offer more flexibility than TFSAs
- 4 So as not to exceed my TFSA contribution room
- 5 It was suggested by my financial advisor
- 6 To reimburse money withdrawn through the Home Buyers' Plan (HBP) or the Lifelong Learning Plan (LLP)
- 7 It was suggested by someone close to me
- 8 Other: enter [PN: MUST SPECIFY]
- 7777777 Don't know
- 8888888 Refuse to answer

(RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 8)

ELSE IF Q16 < Q18 AND Q16 < 9999999 AND Q18 < 9999999

Q21 Why did you choose to contribute more to individual TFSAs than to individual RRSPs? Select all that apply to your situation.

- 1 It is more fiscally beneficial in the short-term
- 2 It will be more fiscally beneficial when I'm retired
- 3 TFSAs offer more flexibility than RRSPs
- 4 So as not to exceed my RRSP contribution room
- 5 It was suggested by my financial advisor
- 6 It was suggested by someone close to me
- 7 Other: enter [PN: MUST SPECIFY]
- 7777777 Don't know
- 8888888 Refuse to answer

(RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 7)

END IF

END IF

IF Q12 ≠ 1 THROUGH 6, SKIP TO QUESTION Q23

For the next question, we are interested in pension plans offered by your **current employer**.

Q22 For the 2017 fiscal year, how much did you contribute to employer provided pension plans, either in percentage of your work income or in dollars? We are interested in your personal contributions, not those of the employer.

Type of pension plan	Contributions	7777777 Don't know	8888888 Refuse to answer
Defined benefit pension plan			
Defined contribution pension plan			
Hybrid pension plan			
Group RRSP			
Group TFSA			
Voluntary Retirement Savings Plan (VRSP) (in Quebec) or Pooled Registered Pension Plan (PRPP)			

(SHOW THE ROWS THAT CORRESPOND TO ANSWERS SELECTED IN Q12==1 THROUGH 6)

[NEED 2 DROP DOWN MENUS FOR EACH CELL IN THE “Contributions” COLUMN, WHERE:

- RESPONDENTS CAN SELECT \$ OR %
- RESPONDENTS CAN SELECT: Per week, every two weeks, per month, per year]
- ALL ANSWER IN THE TABLE ARE: Numeric(0-200% OR 0 – \$2,000,000)

AND A CHECKBOX OF SOME SORT IN THE 7777777 AND 8888888 COLUMNS]

IF ANY FIELD UNDER THE “Contributions” COLUMN IN Q22 IS GREATER THAN 0%, THEN

Q22a For 2017, what is your best estimate of your work income, before taxes and deductions? This amount corresponds to line 101 of your [IF QC ==6, ADD “federal”] income tax return for 2017.

Numeric (0-5 000 000 \$)
9999999 Don't know or refuse to answer

IF Q22a==9999999

Q22b Is it more than \$60,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q22b ==1

Q22c Is it less than \$80,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q22c ==2

Q22d Is it more than \$100 000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

ELSE IF Q22b ==2

Q22e Is it more than \$40,000? 1 Yes 2 No 7777777 Don't know 8888888

Refuse to answer

IF Q22e==2

Q22f Is it more than \$20,000? 1 Yes 2 No 7777777 Don't know

8888888 Refuse to answer

END IF

END IF

END IF

END IF

Q23 Did a financial advisor contact you in 2018 to talk about RRSPs?

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q23==1

Q23a Did he offer you a loan to finance your contribution to an RRSP? Such loans are sometimes called "RRSP loans".

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q23a ==1

Q23b Did you take out such an "RRSP loan"?

1 Yes

2 No

7777777 Don't know

8888888 Refuse to answer

IF Q23b ==1

Q23c Why? Select all that apply to your situation.

1 It will yield more money than the real cost of the loan

2 The interest rate offered was very interesting

3 I wanted to maximize my RRSP contributions

4 I was following the financial advisor's recommendation

5 I was following the recommendation of someone close to me

6 Other: enter [PN : MUST SPECIFY]

7777777 Don't know

8888888 Refuse to answer

(RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 6
)

ELSE IF Q23b ==2

Q23d Why? Select all that apply to your situation.

- 1 It would have yielded less money than the real cost of the loan
- 2 The interest rate offered was not interesting
- 3 I did not want to add to my debts
- 4 I was following the recommendation of someone close to me
- 5 Other: enter [PN : MUST SPECIFY]
- 7777777 Don't know
- 8888888 Refuse to answer

(RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 5)

END IF

END IF

END IF

Q24 Did a financial advisor contact you in 2018 to talk about TFSAs?

- 1 Yes
- 2 No
- 7777777 Don't know
- 8888888 Refuse to answer

Section 4: Retirement

Q25 At what age do you plan on retiring?

Numeric (> RESPONSE TO QB – RESPONDENT'S AGE)

- 7777777 Don't know
- 8888888 Refuse to answer

Q26 Do you have a financial plan for your retirement?

- 1 Yes
- 2 No
- 7777777 Don't know
- 8888888 Refuse to answer

Q27 In today's dollars, what is your best estimate of your annual gross income once you will be completely retired, around the age of 70 years old? Consider all types of income, **including** benefits from public programs.

Numeric (1 – \$5,000,000) per year

9999999 Don't know or refuse to answer

IF Q27== 9999999

Q27a It is more than \$60,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q27a==1
 Q27b Is it less than \$80,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse
 to answer
 IF Q27b==2
 Q27c Is it more than \$100,000? 1 Yes 2 No 7777777 Don't know
 8888888 Refuse to answer
 END IF

ELSE IF Q27a==2
 Q27d Is it more than \$40,000? 1 Yes 2 No 7777777 Don't know 8888888
 Refuse to answer

 IF Q27d ==2
 Q27e Is it more than \$20,000? 1 Yes 2 No 7777777 Don't know
 8888888 Refuse to answer
 END IF

END IF

END IF

Q28 (IF Q1==1,2) In today's dollars, what is your best estimate of your spouse's annual gross income once you will be completely retired, around the age of 70 years old? Consider all types of income, **including** benefits from public programs.

Numeric (1- \$5,000,000) per year
9999999 Don't know or refuse to answer

IF Q28== 9999999

Q28a Is it more than \$60,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to
 answer

 IF Q28a==1

Q28b Is it less than \$80,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse
 to answer

 IF Q28b==2

Q28c Is it more than \$100,000? 1 Yes 2 No 7777777 Don't know
 8888888 refuse to answer

 END IF

 ELSE IF Q28a==2

Q28d Is it more than \$40,000? 1 Yes 2 No 7777777 Don't know 8888888
 Refuse to answer

 IF Q28d==2

Q28e Is it more than \$20,000? 1 Yes 2 No 7777777 Don't know
 8888888 Refuse to answer

 END IF

END IF

Q29 If your retirement income turns out to be much lower than what you previously expected, what will you do? Select all that apply to your situation.

- 1 I will retire later than expected
 - 2 I will reduce my spending
 - 3 I will take a partial retirement (and thus work part-time)
 - 4 Other: enter [PN: MUST SPECIFY]
- 7777777 Don't know
8888888 Refuse to answer

[RESPONDENTS CAN SELECT MORE THAN ONE ANSWER FROM 1 TO 4]

Q30 In today's dollars, what is your best estimate of your household's average total **monthly** spending once you will be fully retired, around the age of 70 years old?

Numeric (1 – \$850,000)
9999999 Don't know or refuse to answer

IF Q30== 999999

Q30a Is it more than \$9,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q30a== 1

Q30b Is it less than \$13,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q30b==1

Q30c Is it more than \$11,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

ELSE IF Q30b==2

Q30d Is it more than \$15,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q30d ==1

Q30e Is it less than de \$17,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

END IF

END IF

ELSE IF Q30a== 2

Q30f Is it more than \$5,000? 1 Yes 2 No 7777777 Don't know 8888888 Refuse to answer

IF Q30f ==1

Q30g Is it less than \$7,000? 1 Yes 2 No 7777777 Don't know 8888888

```

                                Refuse to answer
ELSE IF Q30f ==2
    Q30h Is it less than $3,000? 1 Yes 2 No 7777777 Don't know 8888888
                                Refuse to answer

                                IF Q30h ==1
                                    Q30i Is it more than $1,000? 1 Yes 2 No 7777777 Don't know
                                        8888888 Refuse to answer
                                END IF
                            END IF
                        END IF
                    END IF
                END IF
            END IF

```

Q31 How much savings do you want to have for your retirement? Exclude benefits from public programs (Guaranteed Income Supplement, Old Age Security, Quebec Pension Plan/Canada Pension Plan), but include the value of all assets you will use to fund your retirement (such as an employer provided pension plan or your primary residence).
 Numeric (0 – \$20,000,000)
 7777777 Don't know
 8888888 Refuse to answer

Section 5: Financial literacy and preferences

We would now like to ask you 3 questions concerning your familiarity and ease with certain financial concepts. Please answer the questions as best you can.

Q32 Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow during these 5 years?
 1 More than \$102
 2 Exactly \$102
 3 Less than \$102
 7777777 Don't know
 8888888 Refuse to answer

Q33 Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, with the money in this account, would you be able to buy...
 1 More than today
 2 Exactly the same as today
 3 Less than today
 7777777 Don't know
 8888888 Refuse to answer

Q34 Do you think the following statement is true or false? “Buying a single company’s stock usually provides a safer return than a stock mutual fund.”

1 True

2 False

7777777 Don’t know

8888888 Refuse to answer

Q35 For this question, we ask you to make 10 choices, for which you will have to decide if you prefer to participate in lottery A or lottery B.

Each of the two lotteries offer you certain chances of winning different dollar amounts. Let’s take, for example, the first choice, which corresponds to the first row of the following table. In this case, lottery A gives you a 10% chance of winning \$20 and a 90% chance of winning \$16. Lottery B, on the other hand, gives you a 10% chance of winning \$39 and a 90% chance of winning \$1.

All other choices work in the same way, but the chances of winning each amount change from one choice to the next. For each choice, you need to select your preferred lottery, either lottery A or lottery B.

Warning: in addition to the rewards points you receive to participate in a survey, you have a 1 in 20 chance of receiving additional points that correspond to the value of the choices you make. If you are selected, the system will randomly pick one of the 10 choices you made and perform your preferred lottery for that choice. For example, if the system picks your number 1 choice and for that row you picked lottery B, lottery B will be performed and you will receive additional points of a value of \$39 or \$1, depending on the result of the lottery. When you make your choices, you do not know which row will be selected for payment by the system, if any. You should therefore treat each choice as if it might actually count for payment.

Choice	Lottery A				Lottery B					
	Lottery A	Lottery B	Chances of winning	Amount to win	Chances of winning	Amount to win	Chances of winning	Amount to win		
1	<input type="checkbox"/>	<input type="checkbox"/>	10%	\$20	90%	\$16	10%	\$39	90%	\$1
2	<input type="checkbox"/>	<input type="checkbox"/>	20%	\$20	80%	\$16	20%	\$39	80%	\$1
3	<input type="checkbox"/>	<input type="checkbox"/>	30%	\$20	70%	\$16	30%	\$39	70%	\$1
4	<input type="checkbox"/>	<input type="checkbox"/>	40%	\$20	60%	\$16	40%	\$39	60%	\$1
5	<input type="checkbox"/>	<input type="checkbox"/>	50%	\$20	50%	\$16	50%	\$39	50%	\$1
6	<input type="checkbox"/>	<input type="checkbox"/>	60%	\$20	40%	\$16	60%	\$39	40%	\$1
7	<input type="checkbox"/>	<input type="checkbox"/>	70%	\$20	30%	\$16	70%	\$39	30%	\$1
8	<input type="checkbox"/>	<input type="checkbox"/>	80%	\$20	20%	\$16	80%	\$39	20%	\$1
9	<input type="checkbox"/>	<input type="checkbox"/>	90%	\$20	10%	\$16	90%	\$39	10%	\$1
10	<input type="checkbox"/>	<input type="checkbox"/>	100%	\$20	0%	\$16	100%	\$39	0%	\$1

Q36 For this question, we ask you once more to make 10 choices, for which you will have to decide whether you prefer option A or option B.

With option A, you will always receive \$12 in 1 month. With option B, on the other hand, you will receive a certain amount greater than \$12, but in 13 months.

Let's take, for example, the first choice, which corresponds to the first row of the following table. In this case, if you choose option A, you will receive an amount of \$12.00 in 1 month. If you choose option B instead, you will receive \$12.60 in 13 months. Option B will thus give you \$0.60 more than option A, which corresponds to an annual interest rate of 5%.

All other choices work in the same way, but the amount received if you choose option B changes from one choice to the next. For each choice, you need to select your preferred option, either option A or option B.

Warning: in addition to the rewards points you receive to participate in a survey, you have a 1 in 20 chance of receiving additional points that correspond to the value of the choices you make. If you are selected, the system will randomly pick one of the 10 choices you made and you will receive additional points of a value that corresponds to your preferred option, either A or B. If for the choice selected by the system you picked option B, you will have to remain an active member of the Web panel until April 2019 in order to receive your additional rewards points for this question. When you make your choices, you do not know which row will be selected for payment by the system, if any. You should therefore treat each choice as if it might actually count for payment.

Option A		Option B		Choice	
Amount you would receive in 1 month	Amount you would receive in 13 months	Effective annual interest rate	Option A	Option B	
\$12.00	\$12.60	5%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$13.20	10%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$13.80	15%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$14.40	20%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$15.00	25%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$15.60	30%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$16.20	35%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$16.80	40%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$17.40	45%	<input type="checkbox"/>	<input type="checkbox"/>	
\$12.00	\$18.00	50%	<input type="checkbox"/>	<input type="checkbox"/>	

[RESPONDENTS SHOULD NOT BE ABLE TO GO BACK AND CHANGE THEIR RESPONSES TO THE ABOVE 2 QUESTIONS]

INSERT A SCREEN HERE SHOWING THE “EXCHANGE RATE” BETWEEN CA\$ AND RESPONDENT’S CHOSEN LOYALTY POINTS (I.E. AN EXAMPLE OF HOW MANY POINTS THEY WILL GET FOR A \$1 VALUE)

START OF VIDEO INTERVENTION:

FOR 1/3 OF RESPONDENTS, RANDOMLY SELECTED, SHOW:

We now show you a short video on RRSPs and TFSAs. You have to watch it in its entirety to continue the survey. This video is an adaptation of a video graciously offered by SFL Desjardins Financial Security - Actualis (September 2014). Please make sure the volume of your device is at an appropriate level.

VIDEO:

https://www.dropbox.com/s/mr775gpjqxz4szd/RRSP_or_TFSA_EN_V1.mp4?dl=0

To complete the information on RRSPs and TFSAs, we show you a very short animation pertaining to certain benefits for seniors. You have to watch it in its entirety to continue the survey.

EXTRA SLIDE:

https://www.dropbox.com/s/7ypnalpbqnlwcd4/extra_slide_EN_final_survey.mp4?dl=0

[RESPONDENTS SHOULD BE ABLE TO REPLAY VIDEO AND ANIMATED SLIDE]

[NEED A « next » BUTTON AFTER THE ANIMATED SLIDE SO THAT RESPONDENTS CAN GET TO NEXT QUESTION]

FOR 1/3 OF RESPONDENTS, RANDOMLY SELECTED, SHOW:

We now show you a short video on RRSPs and TFSAs. You have to watch it in its entirety to continue the survey. This video is an adaptation of a video graciously offered by SFL Desjardins Financial Security - Actualis (September 2014). Please make sure the volume of your device is at an appropriate level.

VIDEO:

https://www.dropbox.com/s/mr775gpjqxz4szd/RRSP_or_TFSA_EN_V1.mp4?dl=0

[RESPONDENTS SHOULD BE ABLE TO REPLAY ANIMATED SLIDE]

[NEED A « next » BUTTON AFTER VIDEO SO THAT RESPONDENTS CAN GET TO NEXT QUESTION]

FOR 1/3 OF RESPONDENTS, RANDOMLY SELECTED, SHOW NOTHING

END OF VIDEO INTERVENTION

The following questions focus on RRSPs and TFSAs, whether individual or group-based.

Q37 According to you, are the contributions made to an RRSP or to a TFSA deductible from taxable income?

- 1 Yes, for the RRSP only
- 2 Yes, for the TFSA only
- 3 Yes, for the RRSP and the TFSA
- 4 No, for the RRSP and the TFSA
- 7777777 Don't know
- 8888888 Refuse to answer

Q38 According to you, when money is withdrawn from an RRSP or from a TFSA, is it subject to income tax in the year of the withdrawal? Assume the withdrawn amount **is not** used for the Home Buyers' Plan (HBP) or the Lifelong Learning Plan (LLP).

- 1 Yes, for the RRSP only
- 2 Yes, for the TFSA only
- 3 Yes, for the RRSP and the TFSA
- 4 No, for the RRSP and the TFSA
- 7777777 Don't know
- 8888888 Refuse to answer

Q39 Money invested in an RRSP or in a TFSA can generate returns in the form of interest, dividends or capital gains. According to you, are these returns subject to income tax in the year during which they were generated?

- 1 Yes, for the RRSP only
- 2 Yes, for the TFSA only
- 3 Yes, for the RRSP and the TFSA
- 4 No, for the RRSP and the TFSA
- 7777777 Don't know
- 8888888 Refuse to answer

Q40 According to you, is there a penalty associated with withdrawing money from an RRSP or from a TFSA before retirement? Assume the withdrawn amount **is not** used for the Home Buyers' Plan (HBP) or the Lifelong Learning Plan (LLP).

- 1 Yes, for the RRSP only
- 2 Yes, for the TFSA only

- 3 Yes, for the RRSP and the TFSA
- 4 No, for the RRSP and the TFSA
- 7777777 Don't know
- 8888888 Refuse to answer

Q41 Let's assume you withdraw \$1,000 from an RRSP or from a TFSA. According to you, will this withdrawn amount be added to your future contribution room?

- 1 Yes, for the RRSP only
- 2 Yes, for the TFSA only
- 3 Yes, for the RRSP and the TFSA
- 4 No, for the RRSP and the TFSA
- 7777777 Don't know
- 8888888 Refuse to answer