DEPARTMENT OF ECONOMICS
WORKING PAPER SERIES

2019-04

McMASTER UNIVERSITY

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‘Back-Loaded’ Tax Subsidies for Saving, Asset Location and Crowd-Out: Evidence from Tax-Free Savings Accounts*

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June 14, 2019

Abstract

This paper presents estimates of the causal effect of Canadian Tax-Free Savings Accounts (TFSAs) balances on household saving and portfolio asset location choices. Contributions to TFSAs are not tax-deductible but capital income earned in the account accrues tax-free and withdrawals are not taxed. Using a difference-in-differences research design that exploits the sharp change in a family’s cumulative TFSA contribution room that arises when a family member turns 18 years old, I find that a 10 percent increase in TFSA balances reduces taxable financial asset holdings by 2.5 percent with no statistically significant effect on holdings in traditional tax-deferred accounts. I also find that the crowd-out in taxable asset holdings is driven by families reducing the share of their taxable financial assets held in fixed income securities.

Keywords: Tax-preferred savings accounts; back-loaded versus front-loaded subsidies; Tax-Free Savings Accounts; crowd-out

JEL: D14; H31

*Acknowledgements: An earlier version of this paper circulated under the title “Tax-Free Savings Accounts: Who Uses Them and How?” I thank Katherine Cuff, Kory Kroft, Derek Messacar, Kevin Milligan, Michael Smart, Aurthur Sweetman, Frances Woolley and seminar participants at the University of Toronto, CEA 2015 and NTA 2015, Carleton University, York University, McMaster University and Wilfred Laurier University for helpful comments. I also thank the staff at the Toronto Research Data Centre, the Carleton, Ottawa Outaouais Research Data Centre and the McMaster University Research Data Centre for help with accessing the administrative data. Financial support from the H. Stanley Hunnisett Fund, the Social Sciences and Humanities Research Council (SSHRC) Doctoral Fellowship and the Ontario Graduate Scholarship (OGS) is gratefully acknowledged. This research was supported by funds to the Canadian Research Data Centre Network (CRDCN) from the SSHRC, the Canadian Institute for Health Research (CIHR), the Canadian Foundation for Innovation (CFI), and Statistics Canada. Although the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada.

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1 Introduction

Governments in many developing countries subsidize saving for retirement, home ownership and for other life-cycle events. Tax subsidies for employer-based and voluntary retirement savings accounts traditionally take the form of tax-deductible contributions (up to a pre-defined annual limit) together with tax-free accumulation of capital income. A large literature in public finance studies whether contributions to these plans represent new saving or crowd-out saving that would otherwise be done in other forms (Bernheim (2002), Friedman (2016)).

A common criticism of these traditional tax-deferred accounts is that the largest subsidies go to affluent savers who face high marginal tax rates in the year the contribution is made, and low tax rates when assets are withdrawn, typically in retirement. To contrast, low and moderate income savers receive smaller tax benefits because they face low marginal tax rates during their prime savings years and face high effective marginal tax rates in retirement due to claw-backs on income-tested government benefits (Kesselman and Poschmann (2001)). As a response, over the last two decades, several countries have introduced new accounts that reverse the timing of the tax incentives for saving. Contributions to these so-called 'back-loaded' or 'pre-paid' or TEE[1] accounts are not tax deductible, but capital income earned on assets held in the account and withdrawals are exempt from taxation.

Some examples of TEE accounts include Roth Individual Retirement Accounts (Roth IRAs) and employer-based Roth 401(k) plans in the United States, Individual Savings Accounts (ISAs) in the United Kingdom and Tax-Free Savings Accounts (TFSAs) in Canada. Despite being a relatively new savings option, TEE accounts appear to be very popular among tax payers in all three aforementioned countries. For example, 13.5 million (or nearly 50 percent) Canadian adults owned a TFSA in 2016, only eight years after the ac-

[1]The TEE acronym refers to the tax treatment of (i) contributions, (ii) accumulated interest and (iii) withdrawals. In the case of tax 'back-loaded' or 'pre-paid' accounts, contributions are made with after-tax dollars but accumulated capital income and withdrawals are *exempt* from taxation.

count's introduction in 2009 (Canada Revenue Agency (2018)).[2] Furthermore, young and low-income individuals are more likely to own a TFSA than a Registered Retirement Savings Plan (RRSP), the traditional tax-deferred account in Canada (Messacar (2017), Marchand (2018), Berger et al. (2019)).[3] In spite of their popularity, an outstanding question is whether contributions to TFSAs displace other saving.

This paper presents evidence on the causal effect of TFSA balances on (i) saving in taxable accounts and traditional tax-deferred saving accounts (RRSPs), and (ii) portfolio asset location choices (i.e. the decision about whether (and how much) to hold fixed income and equity assets in taxable or subsidized accounts). My analysis uses the master files of the Canadian Survey of Financial Security (SFS), a large nationally representative asset survey, for the years 1999 to 2016. The SFS contains detailed information on holdings in taxable financial assets, TFSAs, traditional tax-deferred accounts, employer based pensions and several other asset and liability categories at the *family level*.[4]

All Canadian citizens and permanent residents over the age of 18 may own a TFSA and contributions to the account are voluntary. To address the possibility that families with large TFSA balances are positively selected, I adopt a difference-in-differences research design that exploits the sharp variation in the total contribution room available to a family that arsies when a child reaches the age of 18. In particular, my identification strategy mimics the following thought experiment. Consider two families, each with two adults and a child. Moreover, suppose that the two families are identical except for the age of the child. In one family the child is 17 and in the other the child is 18. The family with the adult child is eligible to contribute more to a TFSA than the family with the minor child. In 2019, for example, the family with the adult child is eligible to contribute $18,000 CAD to a TFSA ($6,000 for each adult), while the family with the 17 year old child

[2]Similarly, 9.2 million ISAs were opened by U.K. residents in 1999-2000, the first year in which the account was available. By 2015-2016, more than 22.1 million U.K. residents held £337.3 billion ($439 billion USD) assets in ISAs (Her Magesty's Revenues and Customs (2018)).

[3]Hrung (2007) and Beshears et al. (2014) find that ownership of employer-based Roth IRAs 401(k)s is negatively correlated with age and income.

[4]I use the terms "family" and "household" interchangeably throughout the paper.

is only eligible to contribute $12,000. My difference-in-differences research design compares the TFSA, taxable and traditional tax-deferred saving of families with and without adult children that are similar in size and other observable characteristics, before and after the introduction of TFSAs.

My empirical results can be summarized as follows. First, having an adult child in the home and therefore more TFSA contribution room significantly increases TFSA balances even after controlling flexibly for family size, marital status, education and age. I find that the TFSA balances of families with an adult child are 93 to 130 percent higher than the balances of similar families without an adult child. Second, my difference-in-differences estimates suggest that TFSA balances displace saving in taxable financial assets and have no statistically significant effect on traditional tax-deferred account (Registered Retirement Savings Plan or RRSP) balances. In my preferred specification, a 10 percent increase in TFSA balances reduces holdings in taxable financial assets by 2.5 percent. Third, I find that TFSAs affect the asset location choices of families (i.e. the decision about the fraction of taxable assets held in fixed income versus equity securities). My estimates suggest that TFSAs lower the share of taxable assets held in fixed income securities. Specifically, a 10 percent increase in TFSA balances reduces the share of taxable assets held in fixed income securities by 2 to 5.5 percentage points or 5 to 13 percent.

An interesting feature of the SFS is that all assets and liabilities are reported at the family level even though tax-subsidized accounts such as TFSAs and tax-deferred RRSPs are owned individually.[5] As a result, I have no information on the distribution of TFSA balances within a family. An implication of this is that I cannot tell whether the response to TFSAs I estimate is being driven by changes in the independent financial choices of young adults (i.e. those just over the age of 18), by the asset shifting decisions of families seeking to minimize their current and future tax liabilities in response to the new a newly available subsidized savings account or both. Below, I present evidence that supports

[5] The SFS defines an economic family as all individuals living in the same household that are related by blood or marriage.

both of the aforementioned possibilities. Therefore, I conclude that it is likely that my estimates reflect a weighted combination of the choices of financially independent young adults and the more general tax minimization strategies of families.

My paper contributes to a large literature in public finance that estimates crowd-out in tax-preferred savings accounts. Beginning with Venti and Wise (1990a,b) and Gale and Scholz (1994), several papers estimate whether traditional tax-deferred accounts displace taxable assets. A few recent studies have exploited newly available administrative data and sharp incentives to contribute to tax-deferred accounts to estimate causal effects. These studies have led to the development an emerging consensus that tax subsidies generate very little new saving (Chetty et al. (2014), Messacar (2018)).[6] However, nearly all of the research to date focuses on traditional tax-deferred accounts. Unlike traditional tax-deferred accounts, the tax subsidies associated with saving in 'back-loaded' or TEE accounts are greater for savers that expect to face rising future marginal tax rates, such as young individuals and those with moderate incomes. Since the responsiveness of savings to tax incentives likely varies significantly across individuals with different levels of income, wealth and liquidity, the results from the previous literature may not be informative about the savings effect of 'back-loaded' or TEE accounts. Relative to previous research, this is the first paper to estimate the causal effect of 'back-loaded' or TEE accounts on saving a broad set of assets owned by households.

Two recent papers also provide evidence on the effect of TEE accounts on other saving. Using data from 11 U.S. employers that introduced a TEE account option, Beshears et al. (2017) find that individuals do not change the fraction of their salary that is contributed to their pension when a TEE option became available. Since a dollar contributed to a TEE account purchases more future consumption than a dollar contributed to a traditional tax-deferred account, they argue that the introduction of a TEE option may have increased

[6] Friedman (2016) provides a detailed review of the recent literature. Bernheim (2002) reviews the earlier literature and discusses importance of data limitations and exogenous variation in tax-preferred account eligibility for estimating crowd-out.

the retirement wealth of workers in their sample. Berger et al. (2019) use administrative data from Canadian tax records to study the correlation between TFSA and tax-deferred contributions. They find that a 10 percent increase in TFSA contributions reduces tax-deferred contributions by 1 percent, on average.[7]

While the administrative data used by Beshears et al. (2017) and Berger et al. (2019) contains accurate information on annual TEE and tax-deferred contributions, it does not contain information on other asset categories, such as taxable saving or real estate. To contrast, the SFS contains information on the full set of household assets and liabilities. This allows me to investigate whether TEE accounts displace saving in taxable, tax-deferred and other assets, thereby providing a more comprehensive understanding of how this relatively new account affects household savings decisions.[8]

My results also contribute to the literature on portfolio asset location in public finance and financial economics. The shift towards defined contribution pensions in recent decades has meant that households are increasingly required to decide on both an asset allocation (i.e. the fraction of their assets to hold in equities and fixed income, respectively) and asset location (i.e. in which type of account to hold their various asset types). Stylized (static) models of portfolio asset location support the notion that households should hold heavily taxed fixed income assets in tax-deferred accounts and hold relatively lightly taxed equities in taxable accounts to minimize their tax liability. However, several papers document that the observed asset location choices of many households differ considerably from this benchmark (Bergstresser and Poterba (2004), Barber and Odean (2004)). Recent theoretical work shows that the deviation of observed asset location choices from the benchmark can be rationalized if the stylized model is extended to introduce frictions in borrowing and lending markets, specific institutional features and risk aversion (Mintz and Smart (2002), Poterba (2002), Amromin (2003), Shoven and

[7]Using administrative data from the U.K., Middleton (2018) also finds that eligibility for higher ISA limits has a mixed effects on TEE plus tax-deferred contributions.

[8]Also, Berger et al. (2019) state that their estimates should not be interpreted as causal effects (see footnote 28 in their paper).

Sialm (2004), Dammon et al. (2004)). To the best of my knowledge, this is the first paper to investigate how the introduction of a TEE savings option affects family asset location choices.

The remainder of the paper is structured as follows. In Section 2, I describe the institutional setting and review the empirical evidence on the take-up of TFSAs to date. Section 3 presents a stylized model to organize the empirical analysis. In Section 4, I describe the data and outline the difference-in-differences empirical strategy. The main results are presented in Sections 5 and 6. Section 7 offers concluding remarks.

2 Institutional Background

2.1 The Rules and Economics of TFSAs

The Canadian retirement income and savings system is similar in structure to that in other developed countries, including the United States and the United Kingdom. The system is defined by three pillars: a public pension plan that features additional supports for low-income seniors, employer-based Registered Pension Plans (both defined benefit and defined contribution) and voluntary tax-preferred savings accounts. Historically, the only voluntary tax-preferred savings option available to Canadians was the Registered Retirement Savings Plan (RRSP), a tax-deferred account introduced in the late 1950s.

The case for introducing a TEE savings option in Canada began with a paper by Kesselman and Poschmann (2001). The authors argued for the creation of a TEE option in Canada on two grounds. First, they argued, a TEE account would incentivize and improve the tax-efficiency of retirement saving for moderate-income workers that face rising future tax rates, as well as those that are uncertain about their future marginal tax rates. The second motivation for introducing a TEE account in Canada is that it would allow taxpayers constrained by contribution limits traditional tax-deferred accounts (voluntary RRSPs and employer-based RPPs) to save more in tax-preferred plans (Kesselman and

Poschmann (2001)).

Introduced as part of the Budget 2008, the TFSA retained many of the features advocated for by Kesselman and Poschmann (2001) along with some significant differences. Perhaps most notably, TFSAs were marketed as a vehicle through which individuals could save for a variety of life-cycle needs, not just retirement (Department of Finance Canada (2008)). Contributions to TFSAs are made out of after-tax income and all capital income generated by assets held in the account is exempt from taxation. Withdrawals of principal and interest are not taxable and assets held in TFSAs do not affect an individual's eligibility for government income-tested benefits (e.g. the Old Age Security (OAS) and Guaranteed Income Supplement (GIS) benefits for seniors). Furthermore, there are no restrictions on withdrawals from TFSAs and assets withdrawn in one calendar year can be re-contributed in future years without affecting regular contribution limits.

All Canadian residents over the age of 18 are eligible to open a TFSA and make contributions up to an annual limit. An individual's annual TFSA contribution limit is not linked to their income and does not count against their annual tax-deferred account contribution limit. The contribution limit was initially set at $5,000 CAD per year and is indexed to inflation and rounded to the nearest $500. In 2019, the statutory contribution limit is $6,000. Unused contribution room from one year can be carried forward to future years indefinitely. Individuals are permitted to own a wide variety of assets in their TFSA, ranging from cash and money market securities, certificates of deposit (GICs), marketable bonds, mutual funds and equities.

TFSAs share many similarities with TEE accounts introduced in the United States and the United Kingdom over the last 20 years. Like Roth IRAs in the United States, TFSAs are offered by financial institutions and feature no upfront tax subsidy for contributions. Unlike TFSAs, contributions for Roth IRAs are earmarked for retirement consumption and withdrawals before age 59.5 are subject to a 10 percent penalty. Moreover, each dollar contributed to a Roth account reduces an individual's traditional tax-deferred account contribution limit.[9]

Employers in the United States have been able to offer a TEE account option as part of their defined contribution pension plan since 2006. Annual contributions for eligible employees are typically made through regular payroll deductions are are often supplemented by an employer match. Similar to traditional tax-deferred plans, employee contributions are capped at exogenous level ($19,000 in 2019). Roth 401(k)s are extremely popular; in 2011, only five years after their introduction, more than 49 percent of firms offering a defined contribution pension plan featured a Roth option (Plan Sponsor Council of America (2014), Beshears et al. (2014)).

TFSAs are the most similar to U.K. Individual Savings Accounts (ISAs). Like TFSAs and Roth accounts, savers can open an ISA with a bank, credit union or stock broker. Contributions to ISAs are not tax-deductible and are capped at £20,000 in 2019. Both TFSAs and ISAs are designed to encourage saving for a variety of life-cycle needs, not just retirement. Furthermore, both accounts do not restrict withdrawals and allow withdrawals in one tax year to be re-contributed in future tax years.[10]

2.2 Descriptive Facts on TFSA Savings Behavior

By all accounts, TFSAs appear to be very popular among Canadian tax filers. According to aggregate statistics complied by the Canada Revenue Agency, 13.5 million Canadian residents held nearly $232.9 billion in TFSA assets at the end of 2016 or $17,286 per account owner (Canada Revenue Agency (2018)). By 2012 annual aggregate TFSA contributions surpassed RRSP contributions, despite the fact that the traditional tax-deferred account has been available since 1957 (Kesselman (2015b)).

Previous research has found that TFSA ownership and balances are positively correlated with age, education attainment, income and RRSP account ownership and nega-

[9] In 2019, the joint Roth IRA and tax-deferred IRA limit is $6,000 for individuals under the age of 50 and $7,000 for those over the age of 50.

[10] Flexible ISAs allow savers to re-contribute withdrawals within the same tax year.

tively correlated with the number of children in a family (Department of Finance Canada (2014), Kesselman (2015a,b), Shaw (2015), Al Zaman (2017)). Interestingly, many low-income TFSA owners (i.e. those with taxable incomes lower than $20,000 CAD in 2013) make large contributions, sometimes in excess of their annual income, and have relatively high balances. Kesselman (2015b) finds that many TFSA owners with low incomes and large balances live in households with high total incomes. Noting that the income attribution on inter-family transfers is waived for the purpose of TFSA contributions, Kesselman (2015b) argues that this finding is consistent income splitting and asset shifting among families with members facing different marginal tax rates, notably those with children over age 18 living at home.

The above correlations mask differences between individuals and families that only own a TFSA, those that only own a tax-deferred RRSP and those that both a TFSA and a RRSP. In particular, young individuals and those with lower incomes are more likely to own a TFSA than a RRSP (Messacar (2017), Marchand (2018), Lavecchia (2018b)). This is not surprising because TEE accounts are more attractive than tax-deferred accounts for savers that expect to face rising marginal tax rates. Thus, while the evidence to date suggests that while young and moderate income individuals are taking advantage of the tax incentives associated with saving in a TFSA, important institutional features such as the absence of an age limit for contributors has led to a large share of aggregate contributions being made by older and high income savers.

Perhaps not surprisingly, the TFSA ownership and contribution patterns to date are most similar to the observed patterns for ISAs in the U.K. (Attanasio et al. (2004), Her Magesty's Revenues and Customs (2007), Donnelly and Young (2012), Middleton (2018)). To contrast, Roth IRA and Roth 401(k) ownership and balances are negatively correlated with age and income (Hrung (2007), Holden and Schrass (2014), Beshears et al. (2014)). This suggests that the main differences between Roth accounts and their TEE counterparts in Canada and the U.K., namely the restrictions on contributions for older savers and those that make contributions to traditional tax-deferred plans, may be important for explaining the differences in the distribution of account balances between the three countries.

3 Conceptual Framework

How might the introduction of a TEE option affect the savings decisions? In a standard life-cycle model with utility maximizing individuals, TEE accounts are imperfect substitutes for taxable accounts. On one hand, a one dollar contribution to a TEE account purchases more future consumption than a dollar contributed to a taxable account. On the other hand, however, TEE balances may be less liquid (or are perceived to be less liquid) than taxable saving.[11] Similarly, TEE accounts are also imperfect substitutes for EET accounts for individuals that expect to face rising future marginal tax rates or who are uncertain about their future marginal tax rate.

Let $e_{N,T}$ and $e_{R,T}$ denote the percentage change in taxable and EET balances following a one percent increase to TEE saving. In a model in which TEE accounts are imperfect substitutes for other saving, the introduction of a TEE option leads to less taxable and EET saving, on average (i.e. $e_{N,T} \leq 0$ and $e_{R,T} \leq 0$). A related question is whether the introduction of a TEE account option increases total (taxable plus EET plus TEE) saving. The introduction of a TEE option expands the consumption and savings possibilities available to individuals. In other words, it pushes out the budget constraint by (weakly) increasing the after-tax return to saving. Whether total savings increases or decreases depends on the magnitudes of offsetting substitution and income/wealth effects. The magnitude of the substitution effects is governed by the elasticities $e_{N,T}$ and $e_{R,T}$.

A unique feature of the SFS data I use in this study is that all assets are reported

[11] Individuals may also receive non-pecuniary benefits from the availability of a TEE option. For example, if individuals engage in mental accounting and earmark assets held in different accounts for different purposes (Thaler (1990)).

at the household (economic family) level in spite of the fact that Canadian TEE (TFSA) and EET (RRSP, RPP) accounts are individually owned. An important question, then is whether the response to the introduction of a TEE account option is qualitatively (and quantitatively) different in a model with multi-person households compared with the single-person household case. Appendix A presents a stylized two-period model with single-person and two-person households in which TEE and taxable saving are imperfect substitutes. In the two-person model, household consumption and savings decisions and are efficient in the sense that the members make decisions that maximize total family after-tax income. In the model, each member of the two-person household is permitted to own a TEE account and the contributions of each member are constrained by an exogenous contribution limit. I model the expansion of a TEE savings opportunity by studying how the household responds when the TEE contribution limit of one person is increased.

Families can be divided into two distinct groups based on their optimal TEE account savings decisions. The TEE contributions of both members of the first group, whom I refer to as *fully constrained households*, are constrained by either the exogenous contribution limit or a non-negativity constraint or both. The second group, whom I refer to as *partially constrained households*, feature only one member whose TEE contributions are constrained. I define $\epsilon_{N,T}$ to be the elasticity of the household's taxable saving with respect to total household TEE saving.

In Appendix A, I show that fully constrained two-person households respond to an increased TEE contribution limit in the same way as one-person households. In particular, TEE savings crowd-out taxable saving for both types of households (i.e. $\epsilon_{N,T} \leq 0$ and $e_{N,T} \leq 0$). On the other hand, the introduction of a TEE option *crowds-in* taxable saving for partially constrained two-person households (i.e. $\epsilon_{N,T} \geq 0$). Intuitively, although taxable and TEE savings are imperfect substitutes, the TEE contribution of one member of a two-person household is a perfect substitute for the TEE contribution of another member. Consequently, partially constrained households respond to a higher TEE limit on the constrained member by reducing the TEE savings of the other member. Overall, the household's total TEE contribution falls and taxable savings increase. As I show in Section 5, the increased TEE contribution room available to families with young adults living at home leads to higher total TEE balances. Interpreting this empirical result through the lens of the stylized model in Appendix A suggests that families affected by the introduction of a TEE option are, on average, fully constrained.

4 Data and Empirical Strategy

4.1 Data

I pool cross-sectional data from the master files of the 1999, 2005, 2012 and 2016 waves of the Survey of Financial Security (SFS). The SFS is a representative asset survey of Canadians in the ten provinces administered by Statistics Canada. Respondents are asked detailed questions about their ownership and balances for a variety of assets and liabilities, including chequing and savings accounts, a variety of taxable (non-registered) assets, tax-deferred Registered Pension Plans (RPPs) and Registered Retirement Savings Plans (RRSPs), real estate, mortgages, installment loans and credit cards. The 2012 wave of the SFS is the first to ask respondents about their holdings in TFSAs.

The unit of observation for the asset variables in the SFS is an economic family. Statistics Canada defines an economic family as two or more persons who "live in the same dwelling and are related to each other by blood, marriage, common-law and adoption or a foster relationship." This definition encompasses adult children living in the same home as their parents, adult siblings living together and families living with elderly grandparents. Therefore, despite the fact that TFSAs, tax-deferred RRSPs, RPPs and taxable accounts are owned individually, I only observe balances at the family level. I discuss the implications of this feature of the data for the interpretation of my empirical results below.

My baseline analysis sample is all SFS families whose respondent reports that their child is living in the home. In some sensitivity checks I restrict the sample further to SFS families whose oldest child is between the ages of 15 and 17 or whose youngest adult child is age 18 to 21. Although assets are measured at the family-level, I observe demographic information, such as relationship to the SFS respondent, age, gender, race, labor market status, earnings and workplace pension information for all family members over the age of 15. The SFS also reports the number of children in a family under the age of 14. I deflate all dollar amounts from the 1999, 2005 and 2012 waves of the SFS to 2016 dollars using the Consumer Price Index. Throughout the paper, I use population weights provided by the SFS.

[Insert Table 1]

Table 1 reports summary statistics on TFSA ownership and balances for the pooled post-2009 period (column 1), 2012 only (column 2) and 2016 only (column 3). In the top panel, I report summary statistics for all SFS families, while the middle and bottom panels restrict the sample to families with positive TFSA balances and families with children living in the home, respectively. I report summary statistics for all three samples to facilitate a comparison of my analysis sample of families with children living in the home to other groups.

In general, the sub-sample of families with children is representative of the average Canadian family in the SFS. For example, columns 2 and 3 show that the proportion of families that owned at least one TFSA increased dramatically over the 2009-2016 period. By 2012, one third (33.7 percent) of all families owned at least one TFSA, a number that grew to 42.7 percent by 2016.[12] The TFSA ownership rate among families with children living at home is nearly identical to the full sample in both 2012 and 2016. Perhaps not surprisingly, the distribution of TFSA balances is right-skewed in all sub-samples. Among families with children in 2016, the (unconditional) median TFSA balance in 2016 is $0,

[12]Note that the proportion of SFS families that own a TFSA will generally be lower than the proportion of individuals that own a TFSA if multiple individuals in the same family own a TFSA.

while the mean balance is $8,558 and the balance of families at the ninety-fifth percentile is $50,000.

The primary dependent variables I consider are taxable financial assets and RRSP balances. A family's taxable financial assets is the sum of its holdings in chequing and savings accounts, certificates of deposit (GICs), marketable bonds, Canada Savings bonds, stocks, mutual funds and income trust securities. Detailed descriptions of all of the dependent and explanatory variables used below can be found in Appendix B.

4.2 Empirical Strategy

The objectives of the paper are to provide evidence on whether (i) TFSAs displace saving in taxable accounts, tax-deferred accounts and other saving and (ii) TFSAs affect household asset location choices. To these ends, the economic relationships I wish to estimate are ones between reported taxable or tax-preferred balances (or the fraction of taxable assets held in fixed income securities) and TFSA holdings. My empirical specification takes the following form.

$$A_{i(t)} = \beta_0 + \beta_1 TFSA_{i(t)} + X'_{i(t)}\beta_2 + \delta_t + u_{i(t)} \quad (1)$$

where $A_{i(t)}$ is family i's holdings of asset A in year t, $TFSA_{i(t)}$ is family i's TFSA balance, $X'_{i(t)}$ is a vector of family characteristics (including whether there are any adult children), δ_t are year fixed effects and $u_{i(t)}$ is the residual. Unless otherwise noted, I transform all asset values using the inverse hyperbolic sine (IHS) transformation. This transformation allows zero and negative asset values to be defined while retaining the properties of the log transformation.[13] The coefficient of interest, β_1, can be interpreted as the semi-elasticity of balances in asset A with respect to TFSA balances. If TFSA balances crowd-out other

[13]This IHS is defined as $sinh^{-1}(A) = ln(A + \sqrt{1 + A^2})$. See Pence (2006) and Gelber (2011) for examples of recent papers that use the IHS transformation. Another attractive property of this transformation is that the trends in assets between two groups will evolve similarly as long as assets have the same percentage growth over time.

saving, then β_1 will be negative.

Estimating the causal effect of TFSA balances on other saving is challenging because TFSAs are universally available and contributions are voluntary. Since families with large TFSA balances are more likely to own other assets, a naive OLS regression of equation (1) will generate estimates of β_1 that are biased upwards. My identification strategy attempts to overcome this challenge by exploiting plausibly exogenous variation in the maximum amount that members of a family can collectively contribute to TFSAs each year. Recall that all Canadian citizens and permanent residents over the age of 18 can open and contribute to a TFSA. Since I observe assets at the family-level, this means that all else equal, families with more adults living in the home are eligible to contribute more to TFSAs each year than similar families with fewer adults.

My identification strategy approximates the following thought experiment. Consider two families (family A and family B), each with a married couple and one child. In family A, the child is 18 years old and the child in family B is 17 years old. Other than the difference in the age of the child, suppose the two families are identical. In 2019, individuals in family A are collectively eligible to contribute \$18,000 to TFSAs (\$6,000 for each member). However, members in family B were only eligible to contribute \$12,000. Thus, we expect family A to hold larger TFSA balances than family B (all else equal).

Families with adult children living at home are different in observable ways from families with only minor age children (i.e. without an adult child). Table 2 reports means for various demographic variables for all families with at least one child living at home (column 1), families whose oldest child is younger than 18 (column 2) and families with at least one adult child living at home (column 3). On average, families with adult children living at home are older, less educated, less likely to be married and have higher earnings than families with children under the age of 18. These differences, as well as unobservable differences, may be correlated both with TFSA balances and other saving leading to a similar omitted variables bias problem as mentioned previously. Consequently, I adopt a difference-in-differences instrumental variables (DD-IV) research design that compares the savings of families with "adult children/additional TFSA room" to the savings of families with only minor age children (i.e. without "additional TFSA room") before and after the introduction of TFSAs in 2009.

[Insert Table 2]

I define an indicator variable called "$\text{adultchild}_{i(t)}$" equal to one if family i has an adult child living at home in year t and zero otherwise.[14] My instrument $Z_{i(t)}$ is the interaction of the "$\text{adultchild}_{i(t)}$" variable with a dummy variable (post_t) equal to 1 for years after 2009 and 0 otherwise.

$$Z_{i(t)} = \text{adultchild}_{i(t)} \times \text{post}_t \quad (2)$$

All specifications reported below control flexibly for family size and household composition using family size and and marital status fixed effects, and in some specifications, their interaction.[15] Therefore, my empirical strategy involves comparing the TFSA, taxable and tax-deferred account balances of families of similar size that differ only in whether they have adult children living at home, both before and after 2009.

The DD-IV design is valid if (i) families with adult children living at home have larger TFSA balances than families without an adult child after 2009 because they have more TFSA contribution room (the first stage) and (ii) the counterfactual path of non-TFSA balances for families with an adult child would have followed the same pattern as families without adult children. Assumption (ii) is the well-known parallel trends assumption. For brevity, I sometimes refer to families with adult children as "treated families". If assumptions (i) and (ii) hold, the estimate for β_1 can be interpreted as a Local Average Treatment Effect (LATE). That is, it is the average causal effect of a one percent increase in

[14]Note that families with an adult child may also have children under the age of 18.
[15]To avoid small cell sizes, I group all families with seven or more members.

TFSA balances on non-TFSA balances for families that were induced to accumulate larger TFSA balances because of additional contribution room.[16]

There may be remaining concerns with my empirical strategy if the non-TFSA assets of treated families would have evolved differently than those of control families in the absence of the introduction of TFSAs. For example, treated families may have faced different financial or economic shocks than control families after 2009 that affected their willingness or ability to save. The financial crisis of 2008 and the ensuing recession are particularly noteworthy and may have affected the asset balances of these families differently. I address this concern in three ways. First, as is common in difference-in-differences designs, I visually inspect the pre-2009 trends in non-TFSA balances for both treated and control families. As shown below, it is reassuring that the pre-2009 paths for gross taxable assets, RRSPs and other assets are similar for these two groups. Second, I preform a number of robustness tests, including showing that a rich set of baseline family characteristics does not affect the magnitude of the estimate of β_1. Also, I show that the baseline characteristics of treated families follow a similar path as the baseline characteristics of the control families over the sample period.

As mentioned earlier, the semi-elasticity β_1 that I estimate likely reflects a combination of the savings behavior of young adults whose finances are made jointly with their families and the young adults whose financial decisions are completely separate from those of their families. Like most data sets, one limitation of the SFS is that it does not contain information on the reasons underlying the financial decisions undertaken by families. Anecdotal evidence from media sources and the financial industry suggest that some families may be using TFSAs as part of an asset-splitting strategy to enhance the tax-efficiency of their portfolios.[17] For example, in a December 2012 article in the popular

[16]Lavecchia (2018a) estimates the causal effect of higher IRA and 401(k) limits on tax-deferred savings.

[17]Regulations set out by the Canada Revenue Agency allows parents to gift assets to their children to finance their TFSA contribution. While such a gift means that parents lose control over the funds, capital income earned on savings in the child's TFSA is not attributed to the individual who gifted the assets, unlike with taxable accounts.

Canadian personal finance magazine, *MoneySense*, discusses the tax-advantages of gifting assets to children and grandchildren for the purpose of contributing to a TFSA.[18] At one extreme, if the crowd-out estimates reported below solely reflect the savings decisions of families maximizing a single utility function then the estimate $\hat{\beta}_1 = -\epsilon_{N,T}$. At the other extreme, if the crowd-out estimates solely reflect the decision making of young adults whose portfolios are separate from those of their families then $\hat{\beta}_1 = -e_{N,T}$. My estimates below are likely a combination of $e_{N,T}$ and $\epsilon_{N,T}$ whose weights are unknown. Recall, however, that $e_{N,T}$ and $\epsilon_{N,T}$ likely have the same sign unless the introduction of TFSAs causes total household tax-sheltered contributions to fall.

5 Results

5.1 Main Results

For my DD-IV research design to be valid, families with an adult child living at home must have higher TFSA balances than similar families without adult children in the post-2009 period. Figure 1 and Table 3 present evidence that this is indeed the case. Figure 1 is constructed by plotting average (inverse hyperbolic sine transformed) TFSA balances by year separately for families with and without adult children. Of course neither group has TFSA balances in 1999 or 2005. However, in 2012 and 2016, the TFSA balances of families with adult children (and therefore more contribution room) are approximately one log point higher than families without adult children living at home. It is noteworthy that the gap in the TFSA balances between the two types of families is about the same in both 2012 and 2016.

[Insert Figure 1]

[18]See https://www.moneysense.ca/magazine-archive/how-tfsas-can-make-your-child-a-millionaire/. Advice from the financial planning community also echoes this advice. For example, see https://www.blueshorefinancial.com/ToolsAdvice/Articles/Investing/ReachFurtherTFSA and https://www.assante.com/assante-life/wealth-planning/seven-ways-split-income-and-pay-less-tax.

Table 3 reports coefficient estimates on the adultchild$_{i(t)}$ $\times$ post$_t$ interaction term for several different specifications. In the top panel of Table 3 the dependent variable is (inverse hyperbolic sine transformed) TFSA balances; in the bottom panel the dependent variable is a binary variable equal to one for SFS families that own at least one TFSA and equal to zero otherwise. The specification in column 1 only includes the adultchild$_{i(t)}$ dummy variable, family size fixed effects and year fixed effects as control variables. The coefficient estimate on the interaction term of 0.93 suggests that the TFSA balances of families with adult children are approximately twice as large as the TFSA balances of families of the same size without an adult child in the post-2009 period. The specification in column 2 controls for family size-by-marital status-by-education fixed effects as well as year fixed effects. Reassuringly, the coefficient estimate on the interaction term of 1.038 is very similar to the estimate in column 1. The specifications in the remaining columns of Table 3 add more control variables and interaction terms without dramatically affecting the magnitude or the statistical significance of the coefficient on the adultchild$_{i(t)}$ $\times$ post$_t$ interaction term.

In the bottom panel of Table 3, the dependent variable is a dummy variable equal to one if the family owns at least one TFSA and zero otherwise. The coefficient estimates in columns 1 to 5 suggest that the extensive margin is important for explaining the differences between the TFSA balances of families with and without adult children. For example, the coefficient estimate in column 3 suggests that having more adults in the household eligible for TFSAs increases the likelihood that a family owns at least one TFSA by 11 percentage points or 27 percent of the mean of families with children. This large extensive margin response suggests is consistent with young adults responding to the availability of a TFSA option by opening an account.

[Insert Table 3]

Figure 2 plots the unconditional average (inverse hyperbolic sine transformed) taxable financial assets (Figure 2a) and RRSP balances (Figure 2b) by year separately for families with adult children and families without adult children. These figures illustrate the reduced form regression underlying the DD-IV estimates reported below. Three things stand out in these figures. The first is that families with adult children hold more taxable and RRSP assets than families with only minor children. These differences reinforce the importance of having data from the pre-TFSA period for the estimation of causal effects.

The second thing that stands out in these figures is that the initial differences in the non-TFSA assets of the two groups of families appears to remain fixed between 1999 and 2005. In other words, the trend in taxable and RRSP assets of families with adult children appears to be the same as the trend in the non-TFSA assets of families with minor children in the years leading up to 2009.[19] This supports the plausibility of the parallel trends assumption required for my "extra adult" research design to be valid.

The third thing that stands out in these figures is that they suggest that the introduction of TFSAs in 2009 displaced saving in taxable assets and had little effect on RRSP assets. In particular, Figure 2a shows that the average taxable financial asset holdings of families without adult children has grown over time, nearly doubling since 1999. The growth in the taxable financial asset holdings of families with adult children follows the same path as families without adult children from 1999 to 2005 before slowing considerably. Compared with the pre-TFSA period, the gap in the taxable financial asset holdings between the two groups falls nearly 0.5 log points after 2009. To contrast, the pre-TFSA gap between the RRSP balances of families with adult children and families with minor children in Figure 2b appears to remain constant after 2009.

[Insert Figure 2]

Table 4 reports the estimated crowd-out semi-elasticities for taxable financial assets (top panel) and RRSP balances (bottom panel) based on my DD-IV research design. The

[19] I formally test whether the gap in the non-TFSA assets between families with and without adult children diverges or converges between 1999 and 2005 by regressing assets on demographic characteristics, a year 2005 fixed effect, an indicator variable for whether a family has adult children and the interaction between the 2005 dummy and the presence of adult children dummy. The coefficient on the interaction term is small in magnitude and statistically insignificant in the case of both taxable and RRSP assets.

specification in column 1 includes the adult child indicator, year fixed effects and family size fixed effects. The estimate for β_1 in the top panel implies that a 10 percent increase in TFSA balances reduces taxable financial asset holdings by a statistically significant 4.24 percent. Adding the triple interaction of the family size fixed effects, the marital status dummy and the education attainment fixed effects reduces the estimate for β_1 somewhat from -0.424 to -0.273. The specification in column 3 replaces the triple interaction term with a quadruple interaction term. Specifically, I interact the family size indicator variables with the marital status dummies, the education attainment categories and year fixed effects. The estimate for β_1 is nearly unchanged at -0.248 and is statistically significant at the 5 percent level.[20]

The estimates in the top panel of Table 4 suggest that a 10 percent increase in TFSA balances reduces taxable financial assets by 2.48 to 4.24 percent. It is possible to convert this semi-elasticity to a dollar crowd-out estimate (Chetty et al. (2014), Messacar (2018)). However, converting any semi-elasticity to a dollar amount is sensitive to where in the taxable asset and TFSA distribution the elasticity is evaluated at. A natural choice is to evaluate β_1 at average level of TFSA and taxable financial asset holdings of families with children in 2016, the last year of my data. Evaluating at this level, the elasticity -0.248 in column 3 of Table 4 implies that every dollar of TFSA balances reduces taxable financial asset holdings by \$1.71 ($-0.248 \times (\$59,157/\$12,174)$). Note that because TFSA balances purchase more future consumption that gross taxable balances (the latter are subject to taxation) it is possible for TFSA balances to crowd-out taxable savings by more than dollar for dollar. For example, for individuals with an expected future marginal tax rate of 40 percent, every dollar held in a TFSA purchases as much consumption as \$1.40 held in a taxable account.[21]

[20] The first stage F-statistic for all specifications is reported in the bottom row of Table 4. For all specifications, the F-statistic is above 10, and in many cases is above 50. In column 3, the preferred specification, the first stage F-statistic is 106.30.

[21] Consequently, if an individual's expected future marginal tax rate is 40 percent, the dollar crowd-out estimate is \$-1.22 (\$-1.71/1.4) after adjusting for taxes.

The dependent variable in the bottom panel of Table 4 is RRSP balances. For the most part, the crowd-out semi-elasticities are small in magnitude and are not statistically significant in any of the five specifications. For example, the estimate for β_1 in column 1 of 0.091 (standard error 0.260) implies that a 10 percent increase in TFSA balances leads to a statistically insignificant 0.91 percent increase in RRSP balances. The standard errors on the crowd-out estimates in the bottom panel of Table 4 are large and do not allow me to rule out substantial positive or negative pass-through effects of TFSAs on RRSP balances. In Section 5.3, I investigate whether the imprecise estimates for my baseline sample of families with children masks heterogeneous effects for different subgroups.

[Insert Table 4]

5.2 Sensitivity Checks

Table 5 presents the results of several robustness checks. Column 1 presents the estimates from column 3 of Table 4 as a benchmark. One way in which I investigate the sensitivity of the crowd-out results is by restricting the sample to "control" families whose oldest child is between the ages of 15 and 17 and "treated" families whose youngest adult child is between the ages of 18 and 21. This sample restriction brings my estimation closer to the thought experiment described in Section 4.2. The cost of comparing families with children closer in age is that the number of observations in my pooled SFS sample falls by 67 percent from 17,809 to 5,856. Column 2 of Table 5 reports the results from the estimation of equation (1) on this smaller sub-sample when (inverse hyperbolic sine transformed) taxable financial assets is the dependent variable. Although the estimate for β_1 falls somewhat from -0.248 to -0.124 (top panel), the standard increase from 0.120 to 0.270. As a result, I am unable to reject the null hypothesis that the two estimates are statistically different from each other. In the bottom panel, the dependent variable is RRSP balances. Restricting the analysis to families with children between the ages of 15 and 21, increases the coefficient estimate slightly from 0.174 to 0.201, though the estimate remains statistically insignificant (standard error 0.420).

A major life-cycle event for many young adults and is the enrollment in college or university. The decision to enroll in a postsecondary institution often has significant financial consequences for young adults and their families. If the number of young adults attending a postsecondary institution or the way in which families save for higher education changed systematically around 2009, then the estimate for β_1 may be biased. In column 3, I check whether the controlling for postsecondary attendance by young adults in the family affects the estimated crowd-out semi-elasticity. Reassuringly, the coefficient estimate for β_1 of -0.256 is nearly identical to the baseline estimate in column 1 and is statistically significant at the 5 percent level.[22] The estimate for β_1 for the case where RRSP balances is the dependent variable is 0.153 and is statistically significant (standard error 0.170).

In column 4 of Table 5, I restrict the sample to families with 3 or 4 members to check whether the crowd-out estimates are being driven by economic families with many members. Restricting the sample in this way reduces the number of family-year observations by nearly a third, from 17,809 to 12,409. Perhaps not surprisingly, the standard errors for both taxable financial assets and RRSP balances increase but the estimates for β_1 remain similar in sign and magnitude. The results in Table 5 suggest that the baseline crowd-out estimates in Table 4 are robust to various sensitivity checks.[23]

[Insert Table 5]

[22] In an unreported robustness check, I also include the interaction between the indicator variable for adult child's postsecondary attendance and the post-2009 dummy variable. The estimate for β_1 is -0.244 (standard error 0.126) for taxable financial assets, very similar to the baseline estimate in column 1.

[23] Furthermore, Appendix Table C5 reports estimates from regressions 2SLS regressions where the dependent variable is family background variables (e.g. immigrant status, francophone status, family income). The evolution of these characteristics is similar for families with and without children before and after the introduction of TFSAs in 2009.

5.3 Heterogeneity

I estimate equation (1) on various subgroups to investigate whether the crowd-out estimates reported above are being driving by young adults making independent financial decisions or by wealthy families engaging in tax planning. Table 6 reports the estimates for β_1 for both taxable financial assets (column 1) and RRSP balances (column 2). In panel A (resp. panel B), the sample is restricted to families with total household income in the bottom four quintiles (resp. top quintile) in their group and year.[24] The coefficient estimates in panel A, column 1 suggests that a 10 percent increase in TFSA balances reduces taxable financial asset holdings by 3.6 percent for families in the bottom four income quintiles. This estimate is statistically significant at the 5 percent level and is approximately 50 percent larger in absolute value than the coefficient estimate based on the full sample of families with children (-0.360 versus -0.248). When the sample is restricted to families in the top income quintile (panel B, column 1), the estimate for β_1 is -0.104. and the standard error is 0.206. Taken at face value, these estimates imply that TFSA balances crowd-out taxable financial asset holdings *more* for lower income families. However, with a standard error of 0.206, I am unable to rule out larger crowd-out (or even crowd-in) of taxable financial assets for high income families.

To contrast, the estimates for β_1 in panels A and B suggest that TFSA balances have a small, statistically significant effect on RRSP balances for families in the bottom four income quintiles and modestly increase RRSP balances for families in the top income quintile. In particular, the estimate for β_1 is -0.016 (standard error 0.204) in panel A and 0.382 (standard error 0.228) in panel B. The latter estimate is only statistically significant at the 10 percent level, however.

In panels C and D, I re-estimate equation (1) on the sub-samples of families in the bottom four and top quintiles of the wealth (net-worth) distribution, respectively. The results

[24]A family's group status is based on whether they have an adult child or not. I chose to rank family incomes by group and year because families with adult children are older and have more income than families without adult children, on average (see Table 2).

are broadly similar to panels A and B in that they suggest that TFSA balances crowd-out saving in taxable accounts for families lower in the wealth distribution and have little effect on the taxable saving of high net worth families. Moreover, TFSA balances are estimated to have no statistically significant effect on RRSP balances for families in the bottom four wealth quintiles or families in the top wealth quintile.

Taken together, the estimates in panels A-D of Table 6 provide evidence that the crowding out of taxable financial assets is being driven by families in the middle and bottom of the income and wealth distributions. This evidence complements the findings in other studies of the causal effects of tax subsidies for retirement saving on wealth accumulation in other settings (Gelber (2011), Chetty et al. (2014), Messacar (2018)). In particular, the finding that the finding that 'back-loaded' (TFSA) account balances displace the taxable saving of moderate income savers at a similar rate as tax-deferred accounts displace the other saving of high income individuals is noteworthy.

How then to reconcile the estimates in Table 6 with the anecdotal evidence that the contributions that high-income, high-wealth households finance their TFSA contributions by displacing other assets? Recall that my "extra adult/adult child" instrumental variable isolates the causal effect of TFSA balances on other saving for families that are induced to accumulate higher TFSA balances because they have more members that are eligible to open an account. In other words, it is the causal effect of TFSA balances on other saving for "complier" families. It is possible that the high-income families seeking to use the TFSA as an asset-splitting strategy are "always takers" in that they would have taken advantage of the new tax-preferred account and therefore are unaffected by my instrument. Consequently, the estimates presented in Table 6 do not allow me to rule out the possibility that high-income families finance their TFSA contributions by reducing other saving.

[Insert Table 6]

6 Fixed Income Share

This section investigates the effect of TFSA balances on household asset location decisions. One of the advantages of the SFS is that it contains detailed disaggregated information on household assets. In particular, the SFS includes self-reported balances in chequing and savings accounts, certificates of deposit or GICs, Canada Savings Bonds and marketable bonds at the family level. I define a family's taxable fixed income assets as the sum of the holdings in these accounts and the share of taxable assets held in fixed income securities as the ratio of taxable fixed income assets to total taxable financial assets. Figure 3 plots the average (inverse hyperbolic sine transformed) taxable fixed income share by year, separately for families with and without adult children. Among families with minor children, the average share of taxable financial assets held in fixed income securities is approximately 75 percent between 1999 and 2005. The taxable fixed income share increases by 10 percentage points to 85 percent from 2005 to 2016 for this group. Families with adult children initially hold a higher share of fixed income securities in their taxable accounts (about 78 percent). However, the taxable fixed income share grows more slowly for this group so that by 2016 their portfolios are more heavily weighted towards equities than families with minor age children. Together with Figures 1 and 2a, Figure 3 suggests that families with adult children financed their TFSA balances by reshuffling taxable fixed income assets.

[Insert Figure 3]

Table 7 reports the estimates of β_1 from two-stage least squares regressions of equation (1) when the dependent variable is the taxable fixed income share. The five specifications in columns 1 to 5 are identical to those in Table 4. Across all columns, the coefficient estimate for β_1 is negative and, with the exception of column 5, statistically significant at the 1 percent or 5 percent levels. For example, the estimate in column 3 (the preferred specification) suggests that a 10 percent (resp. 100 percent) increase in TFSA balances reduces the taxable fixed income share by 0.52 percentage points (resp. 3.74 percentage points). Relative to the average 82.9 percent taxable fixed income share for all families with children, these estimates represent 0.6 and 4.5 percent decreases, respectively.

The coefficient estimates reported in Table 7 suggest that families responded to the introduction of TFSAs by restructuring their portfolios towards holding more fixed income securities in their tax sheltered accounts and equities in their taxable accounts. This reallocation is consistent with the rule of thumb advice financial planners often give to their clients and may not be surprising given that TFSA balances are very liquid. To the best of my knowledge, this is the first paper to provide evidence on *how* tax-advantaged savings crowd-out taxable savings, as well as the causal link between tax-preferred savings and household asset location decisions (Shoven and Sialm (2004), Bergstresser and Poterba (2004)).

[Insert Table 7]

7 Conclusion

This paper presents estimates of the causal effect of 'back-loaded' or TEE account balances on taxable and tax-deferred savings. I use data on family-level assets from the Survey of Financial Security and exploit the age eligibility rule for Tax-Free Savings Accounts (TFSA), a new 'back-loaded' account introduced in Canada in 2009. My difference-in-differences instrumental variables (DD-IV) strategy compares the TFSA and non-TFSA balances of similar families with adult children and families with minor age children, before and after 2009. The results suggest that a 10 percent increase in TFSA balances crowds-out taxable financial assets by 2.5 percent, with no statistically significant effect on saving in traditional tax-deferred (RRSP) accounts. Moreover, I find that families responded to the introduction of TFSAs by restructuring their portfolios to hold more equities in their taxable accounts and more fixed income securities in their sheltered accounts.

My paper contributes to several active literatures in public finance, as well as to the policy debate about the merits of expanding access to tax-preferred savings accounts. One concern that some policy makers have with expending access to vehicles that exempt capital income to taxation is that such expansions have negative effects on government finances. For example, Milligan (2012), Poschmann (2012) and Kesselman (2015a,b) discuss the effect of increasing the annual limit on TFSAs on Canadian government revenues. Milligan (2012) estimates that in an environment where individuals tax full advantage of TFSAs, very few tax filers will pay capital income taxes. Relatedly, Donnelly and Young (2012) offer a critique of the expansion of Individual Savings Accounts (ISAs) in the U.K., arguing that the account has done little to stimulate new saving among low and middle-income individuals. Taken at face value, the estimates presented in this paper suggest that the introduction of TFSAs generated little to no new saving. Under the assumption that the local average treatment effect (LATE) estimates presented here apply to other groups, then the results in this paper support the support the conclusions of Milligan (2012) and Donnelly and Young (2012).

While the paper offers new and arguably compelling evidence on how individuals and families respond to (relatively new) 'back-loaded' accounts, there are some caveats worth mentioning. As alluded to in the previous paragraph, the causal effects I estimate are are valid only for "complier" families that were induced to accumulate larger TFSA balances because they have a larger share of adults in the home. While these families are broadly representative of Canadian families, there is no guarantee that the causal effects reported here apply to other groups. Additionally, the data do not allow me to infer the extent to which my estimates are being driven by the independent financial decisions of young adults or by families that are using TFSAs to reduce the tax liability of members with high incomes and high marginal tax rates. A promising avenue for future research, therefore, may be to investigate whether the TFSA contribution behavior of families aligns with commonly used models of household consumption, labor supply and savings decisions.

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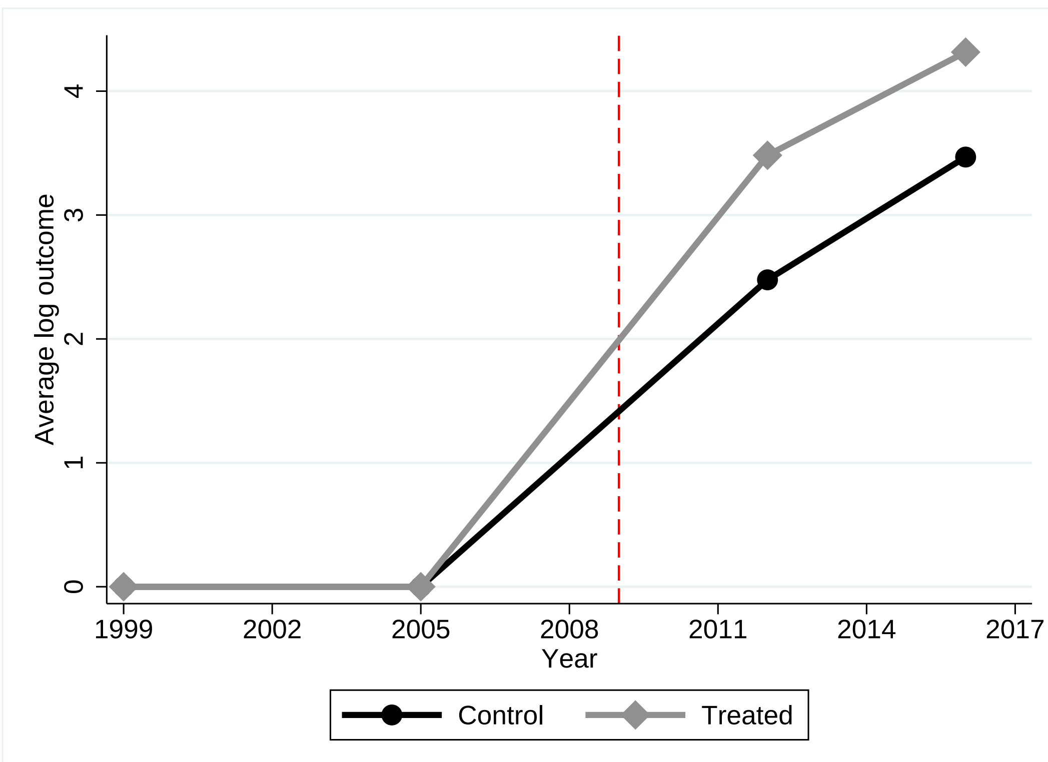
Figures

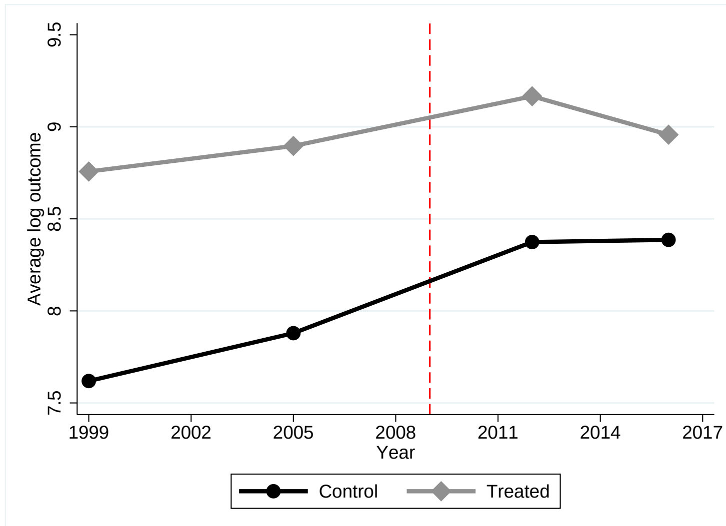
Figure 1: TFSA Balances Over Time For Families With and Without Adult Children (First stage)



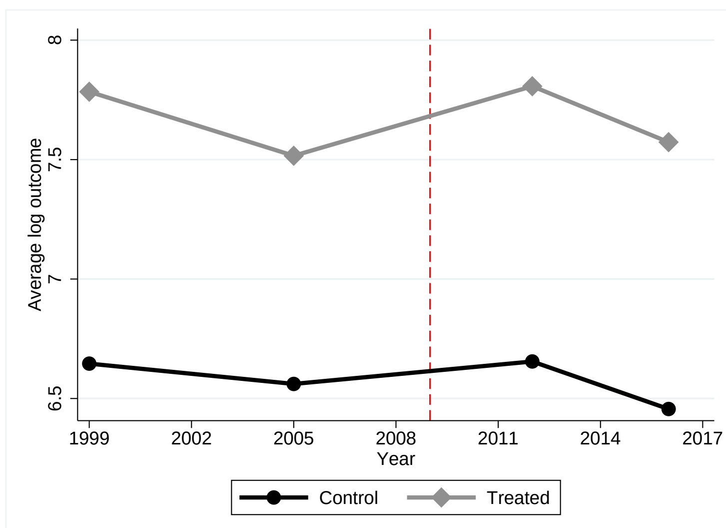
Notes: The figure plots the average (log) TFSA balances by year separately for families with at least one adult child (the "treated" group) and families with only minor children (the "control" group). All dollar values are inflated to 2016 levels using the Consumer Price Index. The dashed line represents the introduction of the TFSA in 2009.

Figure 2: Taxable and RRSP Assets Over Time For Families With and Without Adult Children (Reduced form)

(a) Taxable Financial Assets

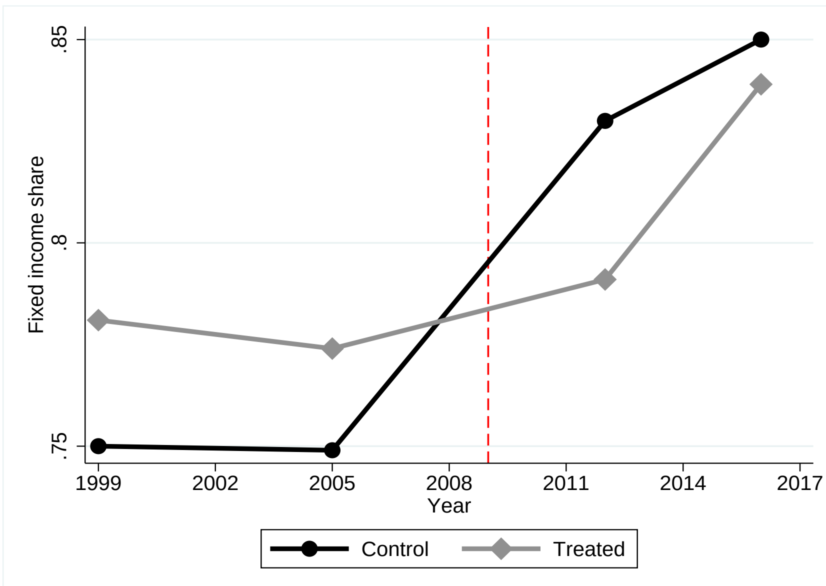


(b) RRSP Assets



Notes: All dollar values are inflated to 2016 levels using the Consumer Price Index. Figure 2a plots average (log) gross taxable financial assets by year separately for families with at least one adult child (the "treated" group) and families with only minor children (the "control" group). Taxable financial assets are comprised of holdings in stocks, mutual funds, checking and savings accounts, guaranteed investment certificates (GICs), Canada Savings Bonds, as well as holdings in marketable bonds. Figure 2b plots the same relationship for average (log) RRSP assets. The dashed line represents the introduction of the TFSA in 2009.

Figure 3: Share of Taxable Balances Held in Fixed Income Assets



Notes: The figure plots the average share of taxable financial balances held in fixed income assets by year separately for families with at least one adult child (the "treated" group) and families with only minor children (the "control" group). All dollar values are inflated to 2016 levels using the Consumer Price Index. The dashed line represents the introduction of the TFSA in 2009.

Tables

Table 1: Basic facts about TFSA ownership and balances

	(1) Pooled	(2) 2012 only	(3) 2016 only
A. Full sample			
TFSA owner	0.382	0.337	0.427
(standard deviation)	(0.486)	(0.473)	(0.495)
Average TFSA balance ($)	7,898	4,803	10,905
(standard deviation)	(20,218)	(10,800)	(25,965)
p25	0	0	0
p50	0	0	0
p75	5,305	3,183	10,000
p95	44,558	26,621	60,000
B. Families with positive TFSA balances			
TFSA owner	1.000	1.000	1.000
(standard deviation)	(0.000)	(0.000)	(0.000)
Average TFSA balance ($)	20,631	14,255	25,514
(standard deviation)	(28,374)	(14,543)	(34,709)
p25	3,000	3,023	3,000
p50	10,609	10,609	13,000
p75	30,000	21,218	40,000
p95	75,000	42,436	90,802
C. Families with children			
TFSA owner	0.363	0.317	0.407
(standard deviation)	(0.481)	(0.466)	(0.491)
Average TFSA balance ($)	6,475	4,376	8,558
(standard deviation)	(17,564)	(10,650)	(22,212)
p25	0	0	0
p50	0	0	0
p75	3,183	1,167	5,000
p95	40,000	27,583	50,000

Notes: This table reports summary statistics for TFSA ownership and balances for various sub-samples using data from the 2012 and 2016 SFS. In column 1, the sample is families in 2012 and 2016 SFS. In column 2 (column 3), the sample is restricted to families in the 2012 (2016) SFS. All tabulations use sample weights provided by the SFS. All dollar amounts are deflated to 2016 dollars using the Bank of Canada's CPI. The values for TFSA ownership rates are rounded to 3 decimal places. The values for TFSA balances are rounded to the nearest dollar.

Table 2: Characteristics of SFS Families with Children Living at Home (2012 and 2016 years)

Variable	(1) All	(2) Under 18 (control)	(3) Over 18 (treated)
Age	46.173	39.089	55.244
Educ. attainment	2.933	3.081	2.742
Immigrant	0.357	0.325	0.398
Francophone	0.193	0.202	0.182
Married	0.814	0.855	0.761
Family size	3.847	3.899	3.781
Self employed	0.143	0.137	0.151
Pre-tax family income	$112,661	$101,690	$126,712
N	8,749	5,137	3,612

Notes: This table reports means for various sub-samples using data from the 2012 and 2016 SFS. In column 1, the sample is all is SFS families that report having an adult child living at home. In column 2 (column 3), the sample is restricted to families whose oldest child is under 18 (with at least one child over 18 living at home). All tabulations use sample weights provided by the SFS. All dollar amounts are deflated to 2016 dollars using the Bank of Canada's CPI.

Table 3: The Effect of More Contribution Room on TFSA Balances (First-Stage)

	(1)	(2)	(3)	(4)	(5)
A. Log TFSA Balance (2016 Mean: \$8,558)					
$\text{adultchild}_{i(t)} \times \text{post}_t$	0.930***	1.038***	1.325***	1.317***	0.604***
	(0.130)	(0.130)	(0.130)	(0.130)	(0.170)
B. TFSA ownership dummy (2016 Mean: 0.407)					
$\text{adultchild}_{i(t)} \times \text{post}_t$	0.072***	0.082***	0.110***	0.110***	0.068***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.018)
Year FE	Y	Y	N	N	N
HH size FE	Y	N	N	N	N
HH size×married×Educ. FE	N	Y	N	N	N
HH size×married×Educ. × Year FE	N	N	Y	Y	Y
Age group FE	N	N	N	Y	N
Age group × Year FE	N	N	N	N	Y

Notes: The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All dollar amounts are deflated to 2016 dollars using the Bank of Canada's CPI. All specifications include the "adult child" binary variable and use sample weights provided by the SFS. All specifications include dummies for family size (1 to 7 members (1 member being the omitted category)). Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Do TFSA Balances Displace Other Saving?

	(1)	(2)	(3)	(4)	(5)
A. Log Taxable Financial Assets (2016 Mean: $59,157)					
Log TFSA Balance	-0.424***	-0.273*	-0.248**	-0.302***	-0.343
	(0.180)	(0.150)	(0.120)	(0.120)	(0.380)
B. Log RRSP Assets (2016 Mean: $73,092)					
Log TFSA Balance	0.091	0.217	0.174	-0.008	-0.484
	(0.260)	(0.210)	(0.170)	(0.170)	(0.600)
Year FE	Y	Y	N	N	N
HH size FE	Y	N	N	N	N
HH size×married× Educ. FE	N	Y	N	N	N
HH size×married×Educ. × Year FE	N	N	Y	Y	Y
Age group FE	N	N	N	Y	N
Age group × Year FE	N	N	N	N	Y
F-statistic (First-stage)	48.86	62.88	106.30	105.27	12.04

Notes: N = 17,809. The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS. All specifications include dummies for family size (1 to 7 members (1 member being the omitted category)). Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Sensitivity Checks

	(1) Baseline	(2) Child Age 15-21	(3) Child in PSE Control	(4) Family Size 3-4
A. Log Taxable Financial Assets				
Log TFSA Balance	-0.248**	-0.120	-0.256**	-0.140
	(0.120)	(0.270)	(0.115)	(0.130)
Child in PSE			0.293***	
			(0.103)	
B. Log RRSP Assets				
Log TFSA Balance	0.174	0.201	0.153	0.312
	(0.170)	(0.420)	(0.170)	(0.200)
Child in PSE			0.799***	
			(0.154)	
HH size×married×Educ. × Year FE	Y	Y	Y	Y
N	17,809	5,856	17,809	12,409

Notes: The sample in column 1 is 1999, 2005, 2012 and 2016 SFS families children In column 2, the sample is restricted to SFS families that satisfy one of the following two criteria: (i) their oldest child is between the ages of 15 and 17 or (ii) they have at least one child between the ages of 18 and 21. All specifications use sample weights provided by the SFS. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Heterogeneity

	Taxable Assets	RRSP Balance
	(1)	(2)
A. Family Income in Bottom 4 Quintiles (N=14,246)		
Log TFSA balance	-0.360**	-0.016
	(0.142)	(0.204)
B. Family Income in Top Quintile (N = 3,563)		
Log TFSA balance	-0.104	0.382*
	(0.206)	(0.228)
C. Family Net Worth in Bottom 4 Quintiles (N = 14,245)		
Log TFSA balance	-0.406**	0.104
	(0.142)	(0.200)
D. Family Net Worth in Top Quintile (N = 3,563)		
Log TFSA balance	0.203	0.329
	(0.148)	(0.230)

Notes: The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS and include full interactions of household (family) size, marital status , education of the reference person FE and year FE (corresponds to specification 3 in Table 4). The first-stage F-statistic is 106.30. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Do TFSA Balances Affect Portfolio Asset Location?

	(1)	(2)	(3)	(4)	(5)
Share of Taxable Balances Held in Fixed Income Assets					
Log TFSA Balance	-0.027**	-0.059***	-0.054***	-0.052***	-0.015
	(0.013)	(0.015)	(0.012)	(0.012)	(0.034)
Year FE	Y	Y	N	N	N
HH size FE	Y	N	N	N	N
HH size×married × *Educ FE*	N	Y	N	N	N
HH size×married × *Educ* × *Year FE*	N	N	Y	Y	Y
Age Group FE	N	N	N	Y	N
Age Group ×*YearFE*	N	N	N	N	Y
F-statistic (First-stage)	48.86	62.88	106.30	105.27	12.04

Notes: N = 17,809. The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS. All specifications include dummies for family size (1 to 7 members (1 member being the omitted category)). Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

A Two-Period Models of Consumption, Saving and Asset Location

A.1 Single-Person Model

A.1.1 Setup

Individuals live for two periods. In period 1, an individual earns exogenous income y which can be consumed or allocated between a taxable savings (N) account and a TEE account (T).[25] The after-tax real return to a one dollar contribution to the taxable and TEE account is R^N and R^T, respectively. The parameters R^N and R^T capture the net returns to saving that take into account the tax-treatment of capital income. I assume that $R^T \geq R^N$ and that individuals take both parameters as given when making their savings decision. Contributions to the TEE account are subject to a non-negativity constraint (with Lagrange multiplier μ^T) and an exogenous contribution limit L^T (multiplier λ^T). The period 1 and period 2 budget constraints for are $c_1 = y - N - T$ and $c_2 = NR^N + TR^T$. Following Chetty et al. (2014), I model the liquidity or any non-pecuniary benefits from saving in the taxable account using the concave function $g(N)$.[26] Individual preferences over consumption in periods 1 and 2 and liquidity are represented by the following lifetime utility function

$$U = u(c_1) + \delta u(c_2) + g(N) \tag{A1}$$

where $u'(c_t) \geq 0$ and $u''(c_t) \leq 0$ and $\delta \in (0,1)$ is the exponential discount factor. The in-

[25] I abstract from a third savings option, a tax-deferred EET account. Allowing for a third savings option does not change the qualitative results reported below.

[26] In a two-period setting, saving in the TEE account strictly dominates taxable saving because the after tax-return in the TEE account is higher despite the fact contributing to both accounts requires giving up a dollar of consumption in period 1. Consequently, in the absence of the liquidity benefit the optimal savings strategy is to follow a pecking order rule in which funds are only allocated to the taxable account after the contribution room in the TEE account is fully exhausted. In a model with three or more periods, income in periods $t \geq 2$, can be stochastic so that some individuals will save in the taxable account if the TEE account is not liquid (see Gale and Scholz (1994)).

dividual chooses taxable and TEE contributions optimally (N^*, T^*) to maximize equation (**??**). With two constraints on TEE contributions, this simple two-period model admits three types of savers: (i) those that do not contribute to the TEE account; (ii) those that contribute to the TEE limit and (iii) interior TEE contributors. In the analysis that follows, I only consider the case where the individual optimally contributes to the TEE limit. In other words, $T^* = L^T$.

A.1.2 Comparative Statics

I model the introduction of a TEE savings option as an increase to the exogenous increase to the TEE contribution limit. Intuitively, the qualitative effects from the introduction of a TEE option are the same as increasing L^T and evaluating at an *initial limit* of $L^T = 0$.[27] Let $e_{N,T} = -\frac{\partial N}{\partial T}\frac{T}{N}$ denote the elasticity of taxable saving with respect to TEE contributions. It captures the extent to which savings in the taxable account are displaced by TEE contributions. The following proposition describes the impact of an exogenous increase to TEE limit on taxable and total saving for limit contributors.

Proposition 1. *A small increase to the exogenous contribution limit decreases taxable saving and increases total saving only if* $e_{N,T} \leq L^T/N^*$.

Proof: The Lagrangian function for the individual's utility maximization problem is

$$\mathscr{L} = u(y - N - T) + \delta u(NR^N + TR^T) - \lambda^T(T - L^T) + \mu^T T \tag{A2}$$

The first order conditions with respect to N and T are, respectively

$$\frac{\partial \mathscr{L}}{\partial N} = -u'(c_1) + \delta R^N u'(c_2) + g'(N) = 0 \tag{A3}$$

[27] Another approach would be to first compute taxable savings in a model with no TEE option. Following this, one could compute taxable savings for an individual constrained by some exogenous TEE limit $\bar{L}^T > 0$. The degree of crowd-out between TEE and taxable savings would then be the difference between taxable savings in the environment with and without a TEE option.

$$\frac{\partial \mathcal{L}}{\partial T} = -u'(c_1) + \delta R^T u'(c_2) - \lambda^T + \mu^T = 0 \tag{A4}$$

From equations (A3) and (A4), if the TEE contribution limit is binding, then $\mu^T = 0$ and $\lambda^T = \delta R^T u'(c_2^*) - u'(c_1^*) = \delta(R^T - R^N)u'(N^* R^N + L^T R^T) - g'(N^*) \geq 0$. Differentiating equation (A3) with respect to L^T yields

$$u''(c_1^*)\left[\frac{\partial N^*}{\partial L^T} + 1\right] + \delta R^N u''(c_2^*)\left[\frac{\partial N^*}{\partial L^T} R^N + R^T\right] + g''(N^*)\frac{\partial N^*}{\partial L^T} = 0$$

Rearranging to isolate $\partial N^* / \partial L^T$ yields:

$$\frac{\partial N^*}{\partial L^T} = -e_{N,T}\frac{N^*}{L^T} = -\frac{u''(c_1^*) + \delta R^N R^T u''(c_2^*)}{u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)} \leq 0 \tag{A5}$$

where the crowd-out elasticity is evaluated at $T^* = L^T$ because the TEE limit is binding. The second part of the proposition is obtained by adding $\frac{\partial T^*}{\partial L^T} = 1$ to equation (A5).

$$\frac{\partial T^*}{\partial L^T} + \frac{\partial N^*}{\partial L^T} = 1 - \ e_{N,T}\frac{N^*}{L^T} = \frac{-\delta R^N (R^T - R^N) u''(c_2^*) + g''(N^*)}{u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)} \tag{A6}$$

□

Intuitively, TEE accounts and taxable saving are imperfect substitutes. While assets held in the TEE account generate a higher after-tax real return, savings in the taxable account may be more liquid (or have other non-pecuniary benefits). Increasing the TEE contribution limit pushes out the (kinked) budget set of individuals that are initially constrained by the limit. In response to a higher contribution limit, TEE balances increase mechanically among limit savers. With more available TEE contribution room, constrained individuals have to give up less period 1 consumption to finance period 2 consumption. Since the two accounts are imperfect substitutes, individuals adjust their portfolios by reducing taxable account balances. The magnitude of the crowd-out depends on the income/wealth effect caused by pushing out the individual's budget constraint. If the income effect is large (small) enough – that is, if $e_{N,T}$ is large (small) in absolute value

– the decline in taxable saving more (less) than offsets the mechanical increase in TEE contributions and total savings goes down (increases).

A.2 Two-Person Model

A.2.1 Setup

I now consider a setting with a representative two-person household. Both members of the household live for two periods. In period 1, the household must decide how much allocate to the individually-owned TEE accounts of each member, how much to allocate to a jointly-owned taxable account and how much to consume.[28] Let y^h and T^h denote the exogenous period 1 income and TEE contribution for household member $h \in (1, 2)$. For each dollar contributed to their TEE account, household member h earns the after-tax real return R^{Th}. Differences between R^{Th} between household members may arise because of differences between current and future tax rates. Without loss of generality, I assume that $R^{T2} \geq R^{T1}$. Contributions to individually-owned TEE accounts are constrained by an annual limit L^{Th} (multiplier λ^{Th}) and a non-negativity constraint (multiplier μ^{Th}).

From the perspective of the household, the TEE contributions to member 1's account is a *perfect substitute* for the TEE contributions to member 2's account. However, a household's total TEE contribution ($T^* = T^{1*} + T^{2*}$) is an *imperfect substitute* for taxable savings. The household chooses TEE contributions for person 1 and person 2 and taxable savings to maximize the following utility function: $U(c_1, c_2, N) = u(c_1) + \delta u(c_2) + g(N) = u(y - N - T^1 - T^2) + \delta u(R^N N + R^{T1} T^1 + R^{T2} T^2) + g(N)$.

[28] If household decisions are efficient (i.e. resources are allocated in a way that does not leave Pareto improvements available), any differences in the after-tax real rates of return on taxable saving between household members will lead to borrowing from the account with the lower return to finance contributions to the account with the higher return.

The Lagrangian function for the household's utility maximization problem is

$$\mathscr{L} = u(y - N - T^1 - T^2) + \delta u(NR^N + T^1R^{T1} + T^2R^{T2}) + g(N) - \lambda^{T1}(T^1 - L^{T1})$$
$$-\lambda^{T2}(T^2 - L^{T2}) + \mu^{T1}T^1 + \mu^{T2}T^2 \quad \text{(A7)}$$

The first order conditions with respect to N, T^1 and T^2 are, respectively

$$\frac{\partial \mathscr{L}}{\partial N} = -u'(c_1) + \delta R^N u'(c_2) + g'(N) = 0 \quad \text{(A8)}$$

$$\frac{\partial \mathscr{L}}{\partial T^1} = -u'(c_1) + \delta R^{T1} u'(c_2) - \lambda^{T1} + \mu^{T1} = 0 \quad \text{(A9)}$$

$$\frac{\partial \mathscr{L}}{\partial T^2} = -u'(c_1) + \delta R^{T2} u'(c_2) - \lambda^{T2} + \mu^{T2} = 0 \quad \text{(A10)}$$

Let (N^*, T^{1*}, T^{2*}) denote the utility maximizing taxable and TEE contributions. With two constraints on the TEE contributions of each member, there are nine combinations of constrained and interior solutions to the household's maximization problem. Similar to the previous subsection, my analysis focuses on the cases where the TEE contribution limit for person 2 is binding (i.e. $T^{2*} = L^{T2}$). If the contribution limit for person 2 is binding, then the household's utility maximizing savings choices fall into one of three categories: (i) $T^{2*} = L^{T2}$ and $T^{1*} = 0$; (ii) $T^{2*} = L^{T2}$ and $T^{1*} = L^{T1}$; (iii) $T^{2*} = L^{T2}$ and $T^{1*} \in (0, L^{T1})$. From equations (A8)-(A10), if the TEE contribution limit is binding for person 2, then $\mu^{T2} = 0$ and

$$\lambda^{T2} = \delta R^{T2} u'(c_2^*) - u'(c_1^*) = \delta(R^{T2} - R^N)u'(c_2^*) - g'(N^*) = \delta(R^{T2} - R^{T1})u(c_2^*) + \lambda^{T1} - \mu^{T1}$$

Furthermore, since the TEE contribution limit is binding for person 2 then $\lambda^{T2} \geq 0$. This requires that $\delta(R^{T2} - R^N)u'(c_2^*) \geq g'(N^*)$, which, in turn, requires that $R^{T2} \geq R^N$.

I am interested in understanding the savings response to an increase in the TEE contribution limit for person 2. It turns out that the response of households when both members are constrained (cases (i) and (ii) above) is qualitatively different than the situation where person 1 is an interior TEE contributor. I label the former group of households *fully constrained households* and the latter group *partially constrained households* My analysis below considers each of these groups separately.

A.2.2 Comparative Statics

Let $\epsilon_{N,T} = -\frac{\partial N}{\partial (T^1+T^2)} \frac{(T^1+T^2)}{N}$ denote the elasticity of taxable saving with respect to the household's total TEE contributions and $\zeta_{T,L^{T2}} = \frac{\partial (T^1+T^2)}{\partial L^{T2}} \frac{L^{T2}}{(T^1+T^2)}$ denote the percentage change in the household's total TEE contributions in response to a one percent increase person 2's TEE contribution limit. Differentiating equation (A8)-(A10) with respect to L^{T2} yields

$$u''(c_1^*)\left[\frac{\partial N^*}{\partial L^{T2}} + \frac{\partial T^{1*}}{\partial L^{T2}} + 1\right] + \delta R^N u''(c_2^*)\left[\frac{\partial N^*}{\partial L^{T2}} R^N + \frac{\partial T^{1*}}{\partial L^{T2}} R^{T1} + R^{T2}\right] + g''(N^*)\frac{\partial N^*}{\partial L^{T2}} = 0 \quad \text{(A11)}$$

$$u''(c_1^*)\left[\frac{\partial N^*}{\partial L^{T2}} + \frac{\partial T^{1*}}{\partial L^{T2}} + 1\right] + \delta R^{T1} u''(c_2^*)\left[\frac{\partial N^*}{\partial L^{T2}} R^N + \frac{\partial T^{1*}}{\partial L^{T2}} R^{T1} + R^{T2}\right] - \frac{\partial \lambda^{T1}}{\partial L^{T2}} + \frac{\partial \mu^{T1}}{\partial L^{T2}} = 0 \quad \text{(A12)}$$

$$u''(c_1^*)\left[\frac{\partial N^*}{\partial L^{T2}} + \frac{\partial T^{1*}}{\partial L^{T2}} + 1\right] + \delta R^{T2} u''(c_2^*)\left[\frac{\partial N^*}{\partial L^{T2}} R^N + \frac{\partial T^{1*}}{\partial L^{T2}} R^{T1} + R^{T2}\right] - \frac{\partial \lambda^{T2}}{\partial L^{T2}} = 0 \quad \text{(A13)}$$

Cases (i) and (ii): fully constrained households

In fully constrained households, the TEE contributions of person 1 are be constrained by either the contribution limit (i.e. $T^{1*} = L^{T1}$) or the non-negativity constraint (i.e. $T^{1*} = 0$). In either case, increasing the TEE contribution limit faced by person 2 has no effect on the TEE contributions of person 1. In other words, $\frac{\partial T^{1*}}{\partial L^{T2}} = 0$.

Proposition 2. *For fully constrained households, a small increase to the exogenous contribution limit for person 2 increases household's total TEE contributions ($\zeta_{T,L^{T2}} > 0$), weakly decreases the taxable saving ($\epsilon_{N,T} \geq 0$) and increases total saving only if $\epsilon_{N,T} \leq \zeta_{T,L^{T2}} \frac{(T^*)^2}{N^* L^{T2}}$.*

Proof: The first part of the proposition is trivial. Since $\frac{\partial T^{1*}}{\partial L^{T2}} = 0$, $\frac{\partial(T^{1*}+T^{2*})}{\partial L^{T2}} = \zeta_{T,L^{T2}} \frac{(T^{1*}+L^{T2})}{L^{T2}} = 1$. To solve for $\partial N^*/\partial L^{T2}$, rearrange equation (A11) and substitute $\partial T^{1*}/\partial L^{T2} = 0$:

$$\frac{\partial N^*}{\partial L^{T2}} = -\frac{\left[u''(c_1^*) + \delta R^{T2} R^N u''(c_2^*)\right]}{\left[u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)\right]} = -\epsilon_{N,T} \frac{N^*}{(T^{1*} + L^{T2})} \leq 0 \qquad \text{(A14)}$$

which proves the second part of Proposition 2. To prove the third part, add $\frac{\partial(T^{1*}+L^{T2})}{\partial L^{T2}} = \zeta_{T,L^{T2}} \frac{T^*}{L^{T2}} = 1$ to (A14):

$$\frac{\partial T^*}{\partial L^{T2}} + \frac{\partial N^*}{\partial L^{T2}} = \frac{-\delta R^N (R^{T2} - R^N) u''(c_2^*) + g''(N^*)}{u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)} = \zeta_{T,L^{T2}} \frac{T^*}{L^{T2}} - \epsilon_{N,T} \frac{N^*}{T^*} \qquad \text{(A15)}$$

□

The intuition is similar to the previous subsection. Since the TEE contributions for person 1 do not respond to an increase in L^{T2} the only margin along which the household can respond is by changing taxable saving. Consequently, the qualitative prediction from an increase in L^{T2} in the two-person model for fully constrained households is that same as the one-person model.

Case (iii): partially constrained households

Proposition 3. *For partially constrained households, a small increase to the exogenous contribution limit for person 2 weakly decreases household's total TEE contributions ($\zeta_{T,L^{T2}} \leq 0$), weakly increases the taxable saving ($\epsilon_{N,T} \leq 0$) and increases total saving only if $\epsilon_{N,T} \geq \zeta_{T,L^{T2}} \frac{T^*}{N^*}$.*

Proof: In partially constrained households, $\lambda^{T1} = \mu^{T1} = \mu^{T2} = 0$ and $\delta R^{T1} u'(c_2^*) = u'(c_1^*)$. In turn, this implies that $R^{T2} \geq R^{T1} \geq R^N$. Rearranging equations (**??**) and (A12) to isolate $\partial N^*/\partial L^{T2}$ yields:

$$\frac{\partial N^*}{\partial L^{T2}} = -\frac{\Big[u''(c_1^*) + \delta R^{T2} R^N u''(c_2^*)\Big]}{\Big[u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)\Big]} - \frac{\partial T^{1*}}{\partial L^{T2}} \frac{\Big[u''(c_1^*) + \delta R^{T1} R^N u''(c_2^*)\Big]}{\Big[u''(c_1^*) + \delta (R^N)^2 u''(c_2^*) + g''(N^*)\Big]} \tag{A16}$$

$$\frac{\partial N^*}{\partial L^{T2}} = -\frac{\Big[u''(c_1^*) + \delta R^{T1} R^{T2} u''(c_2^*)\Big]}{\Big[u''(c_1^*) + \delta R^{T1} R^N u''(c_2^*)\Big]} - \frac{\partial T^{1*}}{\partial L^{T2}} \frac{\Big[u''(c_1^*) + \delta (R^{T1})^2 u''(c_2^*)\Big]}{\Big[u''(c_1^*) + \delta R^{T1} R^N u''(c_2^*)\Big]} \tag{A17}$$

Solving for $\partial T^{1*}/\partial L^{T2}$ yields:

$$\frac{\partial T^{1*}}{\partial L^{T2}} = -\frac{u''(c_1^*)\delta u''(c_2^*)(R^{T2} - R^N)(R^{T1} - R^N) + \Big(u''(c_1^*) + \delta R^{T1} R^{T2} u''(c_2^*)\Big) g''(N^*)}{u''(c_1^*)\delta u''(c_2^*)(R^{T1} - R^N)^2 + \Big(u''(c_1^*) + \delta (R^{T1})^2 u''(c_2^*)\Big) g''(N^*)} \leq 0 \tag{A18}$$

To prove the first part of Proposition 3 add $\frac{\partial T^{2*}}{\partial L^{T2}} = 1$ to $\frac{\partial T^{1*}}{\partial L^{T2}}$:

$$\frac{\partial (T^{1*} + T^{2*})}{\partial L^{T2}} = -\frac{\delta u''(c_2^*)(R^{T2} - R^{T1}) \Big[u''(c_1^*)(R^{T1} - R^N) + g''(N^*) R^{T1}\Big]}{u''(c_1^*)\delta u''(c_2^*)(R^{T1} - R^N)^2 + \Big(u''(c_1^*) + \delta (R^{T1})^2 u''(c_2^*)\Big) g''(N^*)} = \zeta_{T,L^{T2}} \frac{T^*}{L^{T2}} \leq 0 \tag{A19}$$

To solve for $\frac{\partial N^*}{\partial L^{T2}}$ substitute (A18) into (A16) (or (A17)):

$$\frac{\partial N^*}{\partial L^{T2}} = \frac{u''(c_1^*)\delta u''(c_2^*)(R^{T2} - R^{T1})(R^{T1} - R^N)}{\Big[u''(c_1^*)\delta u''(c_2^*)(R^{T1} - R^N)^2 + \Big(u''(c_1^*) + \delta (R^{T1})^2 u''(c_2^*)\Big) g''(N^*)\Big]} = -\epsilon_{N,T} \zeta_{T,L^{T2}} \frac{N^*}{L^{T2}} \geq 0 \tag{A20}$$

To complete the proof add $\frac{\partial(T^{1*}+L^{T2})}{\partial L^{T2}} = \zeta_{T,L^{T2}} \frac{(T^{1*}+L^{T2})}{L^{T2}} = \zeta_{T,L^{T2}} \frac{T^*}{L^{T2}}$ to $\frac{\partial N^*}{\partial L^{T2}}$:

$$\frac{\partial(T^{1*}+L^{T2})}{\partial L^{T2}} + \frac{\partial N^*}{\partial L^{T2}} = \frac{\zeta_{T,L^{T2}}}{L^{T2}} \left[T^* - \epsilon_{N,T} N^* \right] \tag{A21}$$

Since $\zeta_{T,L^{T2}} \leq 0$, (A21) is only positive if $\epsilon_{N,T} \geq T^*/N^*$. □

Relaxing the contribution limit constraint lower total TEE savings for partially constrained households because the TEE contributions of members 1 and 2 are perfect substitutes. Since $R^{T2} \geq R^{T1}$ for partially constrained households, allowing member 2 to contribute more to her TEE account increases the after-tax real return on the marginal dollar of tax-preferred savings. Consequently, the household is able to achieve its preferred TEE balance in period 2 with lower contributions in period 1. Moreover, because total TEE contributions and taxable savings are imperfect substitutes, the latter increases in response to a decline in the former.

There are two takeaways from the analysis in this appendix. First, the two-person model has the same qualitative predictions for fully constrained households as the one-person model. Both models predict that higher TEE limits (or introducing a TEE option) increase total TEE contributions, decrease taxable saving and have an ambiguous effect on overall (taxable plus TEE) saving. Second, the two-person model has the opposite prediction for partially-constrained households. Interpreted through the lens of the two-person model, the empirical results in Section 5 imply that most households with young adults (18-year olds) are fully constrained households.

B Data Appendix

The Survey of Financial Security (SFS) is periodic asset survey administered by Statistics Canada. To date, four waves of the SFS have been administered: 1999, 2005, 2012 and 2016. The SFS sample is representative of the non-institutionalized, civilian population in the 10 provinces.[29] SFS respondents are asked detailed questions about their various assets and debts. The definitions of several key asset variables used in the paper are presented in Table B1.

In addition to questions about their assets and liabilities, SFS respondents are asked to provide a count of all members of the family. Respondents are also asked about the age, gender, education attainment, labor market status and earnings of all family members over the age of 15. In the 2012 and 2016 cycles of the SFS, information about pensions, individual earnings, tax credits, tax liabilities and taxable income comes from linked administrative tax data provided by the Department of Finance and the Canada Revenue Agency. Pension information and individual and family income is self-reported in the 1999 and 2005 SFS.

[29] Indigenous Canadians living on reserves, members of religious and other communal colonies, foreign diplomats and people living in residents for seniors are excluded from the SFS.

Table B1: Descriptions of Key Variables

Variable	Description
A. Asset Variables	
Log TFSA Assets	The inverse hyperbolic sine transformation of the TFSA balances of a SFS family.
TFSA owner	A binary variable equal to 1 if the a family's total (cumulative) TFSA balance is positive and equal to 0 otherwise.
Log RRSP Assets	The inverse hyperbolic sine transformation of the RRSP balances of a SFS family.
Log Chequing/savings Assets	The inverse hyperbolic sine transformation of the chequing and savings account balances of a SFS family.
Log Bonds/GICs Assets	The inverse hyperbolic sine transformation of the marketable bond, Canada Savings Bond and Guaranteed Investment Certificate/Certificate of Deposit (GIC) assets of a SFS family.
Log Taxable Fixed Income Assets	The inverse hyperbolic sine transformation of the chequing/savings account and bonds/GICs balances of a SFS family.
Log Taxable Equity Assets	The inverse hyperbolic sine transformation of the stocks, mutual funds and income trust balances of a SFS family.
Log Taxable Financial Assets	The inverse hyperbolic sine transformation of the sum of the taxable fixed income and taxable equity assets of a SFS family.
Log RESP Assets	The inverse hyperbolic sine transformation of the RESP balances of a SFS family.
Share of Taxable Assets in Fixed Income	The ratio of the taxable fixed income assets to taxable financial assets of a SFS family.
Net Worth	The sum of a SFS family's assets less liabilities. The family's pension plan assets are evaluated using a going concern approach.
B. Demographic Variables	
Female	A binary variable equal to 1 if a SFS respondent is female and 0 otherwise.
Family Size	The number of persons in the "economic family", as defined by Statistics Canada. Families with more than 7 or more individuals are censored at 7.
Married	A binary variable equal to 1 if a SFS respondent reports being married or living in a common-law relationship and 0 otherwise.
Education Group	The education attainment of a SFS respondent. This categorical variable takes values between one and five. 1 corresponds to less than a high school diploma, 2 corresponds to a high school graduate or trade school certificate, 3 corresponds to a two-year college diploma or some university, 4 corresponds to a bachelor's degree and 5 corresponds to a post-graduate degree.
Year	The year of the SFS cycle (1999, 2005, 2012 and 2016)
Year of Birth	The year of birth of a SFS respondent.
Age	A SFS respondent's age as of year end is equal to the calendar year minus year of birth.
Age group	The age of a SFS respondent. This categorial variable takes on one of 13 values (ages 18-29, 30-34, 35-39,...,80-84, 85+).
adultchild	A binary variable equal to 1 if a SFS respondent reports that one of their children over the age of 18 lives in the home and 0 otherwise.

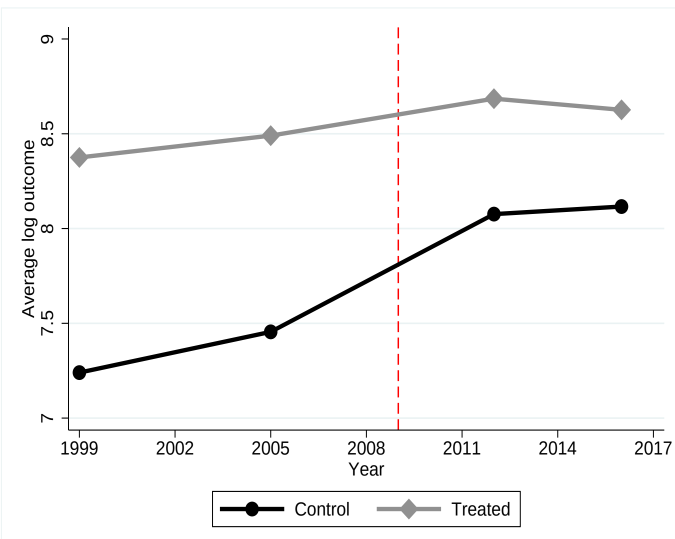
Variable	Description
Log Before-Tax Family Income	The inverse hyperbolic sine transformation of the sum of the before-tax incomes of all members of a SFS economic family.
Francophone	A binary variable equal to 1 if a SFS respondent reports that the language they speak at home is French and 0 otherwise.
Immigrant	A binary variable equal to 1 if a SFS respondent was not born in Canada and 0 otherwise.
Self Employed	A binary variable equal to 1 if a SFS respondent reports positive income from a partnership or a sole proprietorship and 0 otherwise.
Child in PSE	A binary variable equal to 1 if the child of a SFS respondent reports that their main activity is being in school full-time at a postsecondary (PSE) institution.
Family Income Top Quintile	A binary variable equal to 1 if a SFS family's before-tax income is in the top 20 percent of all families in their group in a given year, and 0 otherwise. Group status is defined by whether or not a family reports that an adult child is living at home.
Family Net Worth Top Quintile	A binary variable equal to 1 if a SFS family's net worth (going concern) is in the top 20 percent of all families in their group in a given year, and 0 otherwise. Group status is defined by whether or not a family reports that an adult child is living at home.

C Additional Tables and Figures

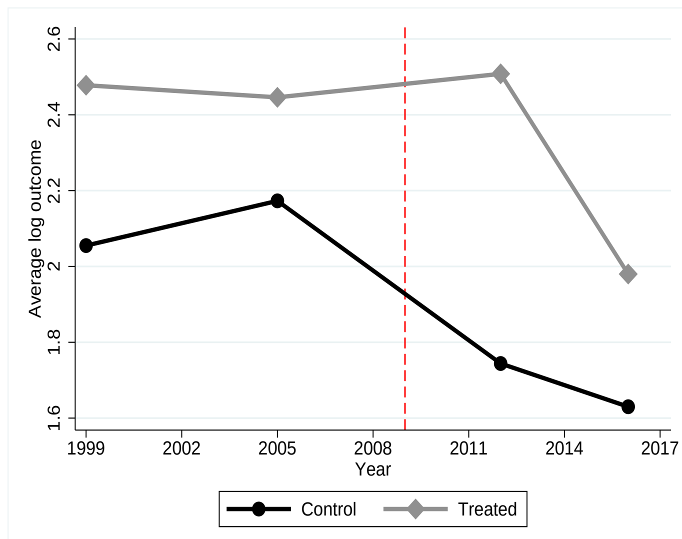
C.1 Additional Figures

Figure C1: Taxable Financial Assets

(a) Taxable Fixed Income Assets



(b) Taxable Equity Assets



Notes: All dollar values are inflated to 2016 levels using the Consumer Price Index. Figure C1a plots average (log) taxable fixed income assets by year separately for families with at least one adult child (the "treated" group) and families with only minor children (the "control" group). Taxable fixed income assets are comprised of holdings in chequing/savings accounts, guaranteed investment certificates (GICs), Canada Savings Bonds and holdings in marketable bonds. Figure C1b plots the same relationship for average (log) taxable equity assets. Taxable equity assets are comprised of holdings in stocks, mutual funds and income trusts. The dashed line represents the introduction of the TFSA in 2009.

C.2 Additional Tables

Table C1: The Evolution of TFSAs, Taxable Assets and RRSP Assets Before and After 2009 (First Stage and Reduced Form)

	(1) Log TFSA Assets	(2) Log Taxable Fin. Assets	(3) Log RRSP Assets
$\text{adultchild}_{i(t)} \times 1[\text{year} = 2016]$	1.295***	-0.445*	0.233
	(0.180)	(0.237)	(0.365)
$\text{adultchild}_{i(t)} \times 1[\text{year} = 2012]$	1.353***	-0.211	0.198
	(0.183)	(0.236)	(0.374)
$\text{adultchild}_{i(t)} \times 1[\text{year} = 1999]$	0.000	0.003	-0.030
	(0.000)	(0.221)	(0.336)
$\text{adultchild}_{i(t)}$	0.000	1.342***	1.644***
	(0.000)	(0.196)	(0.300)
2016 Mean (dollars)	8,558	59,157	73,092
	(4) Log Taxable Fixed Income	(5) Log Taxable Equity Assets	(6) Log RESP Assets
$\text{adultchild}_{i(t)} \times 1[\text{year} = 2016]$	-0.528**	0.116	
	(0.233)	(0.297)	
$\text{adultchild}_{i(t)} \times 1[\text{year} = 2012]$	-0.429*	0.640**	
	(0.233)	(0.318)	
$\text{adultchild}_{i(t)} \times 1[\text{year} = 1999]$	-0.022	0.142	
	(0.219)	(0.290)	
$\text{adultchild}_{i(t)}$	1.331***	0.487*	
	(0.195)	(0.258)	
2016 Mean (dollars)	24,827	34,330	

Notes: The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All dollar amounts are deflated to 2016 dollars using the Bank of Canada's CPI. All specifications use the sample weights provided by the SFS. All specifications include full interactions of household (family) size, marital status , education of the reference person FE and year FE (corresponds to specification 3 in Table 4). The last row of each panel reports the 2016 mean of the dependent variabel (in dollars) for families with children. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C2: Extensive Margin Crowd-Out

	Taxable Assets (1)	Equities (2)	Fixed Income (3)	Bonds/GICs (4)	Chequing/Saving (5)	RRSP (6)
TFSA ownership	-0.375***	0.162	-0.426***	-0.181	-0.399***	0.124
	(0.120)	(0.150)	(0.130)	(0.160)	(0.130)	(0.180)

Notes: N = 17,809. The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS. All specifications include full interactions of household (family) size, marital status , education of the reference person FE and year FE (corresponds to specification 3 in Table 4). The first-stage F-statistic is 106.30. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C3: Heterogeneity in Crowd-Out: Female versus Male SFS Respondents

	Taxable Assets (1)	RRSP Balance (2)
A. Male SFS Respondent (N = 9,551)		
Log TFSA balance	-0.061	0.383
	(0.200)	(0.310)
B. Female SFS Respondent (N = 8,258)		
Log TFSA balance	-0.501**	-0.028
	(0.230)	(0.300)

Notes: The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS and include full interactions of household (family) size, marital status , education of the reference person FE and year FE (corresponds to specification 3 in Table 4). The first-stage F-statistic is 106.30. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C4: Do TFSA Balances Displace Registered Education Savings Plan (RESP) Balances?

	(1)	(2)	(3)	(4)	(5)
Log RESP Assets (2016 Mean: $7,276)					
Log TFSA Balance	-1.112	-0.822	-0.538	-0.302	-1.136
	(0.267)***	(0.209)***	(0.149)***	(0.116)***	(0.619)*
Year FE	Y	Y	N	N	N
HH size FE	Y	N	N	N	N
HH size × married × Educ. FE	N	Y	N	N	N
HH size × married × Educ. × Year FE	N	N	Y	Y	Y
Age group FE	N	N	N	Y	N
Age group × Year FE	N	N	N	N	Y
F-statistic (First-stage)	48.86	62.88	106.30	105.27	12.04

Notes: N = 17,809. The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS. All specifications include dummies for family size (1 to 7 members (1 member being the omitted category)). Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C5: Evolution of Covariates

	Francophone (1)	Immigrant (2)	Self Employed (3)	Before Tax Family Income (4)	Child in PSE (5)
Log TFSA Balance	0.003	-0.003	0.001	-0.046*	0.026*
	(0.014)	(0.016)	(0.011)	(0.027)	(0.014)

Notes: N = 17,809. The sample is all 1999, 2005, 2012 and 2016 SFS families with children. All specifications use sample weights provided by the SFS. All specifications include full interactions of household (family) size, marital status , education of the reference person FE and year FE (corresponds to specification 3 in Table 4). The dependent variable in column 4 is the inverse hyperbolic sine transformation of total family income before taxes and transfers. Heteroskedasticity robust standard errors are reported in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.