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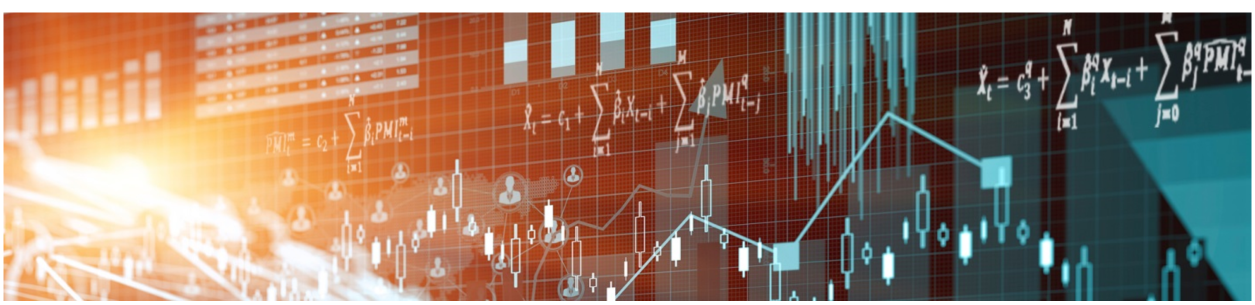

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# Flight from Safety: How a Change to the Deposit Insurance Limit Affects Households' Portfolio Allocation

by

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# Abstract

We study how an increase to the deposit insurance limit affects households' portfolio allocation by exogenously increasing the share of safe financial assets. Using unique data that identify insured versus uninsured deposits, along with detailed information on Canadian households' portfolio holdings, we show that households respond by drawing down deposits and shifting towards mutual funds and stocks. These outflows amount to 2.8% of outstanding deposits in the banking system. The empirical evidence, consistent with a standard portfolio choice model that is modified to accommodate uninsured deposits, indicates that more generous deposit insurance coverage results in non-trivial adjustments to household portfolios.



*Bank topics: Financial institutions, Financial system regulation and policies*

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# 1 Introduction

Deposit insurance is a measure implemented in many countries to protect bank depositors from failing banks, thus making insured deposits risk-free. When a deposit insurance limit is increased, some deposits that previously were uninsured are converted to insured deposits. Hence, to the extent that uninsured deposits are not risk-free, the share of risk-free assets in the portfolios of households exogenously increases. The increase in risk-free insured deposits cannot simply be undone by households, because in order to invest in uninsured deposits, a household has to invest in insured deposits up to the limit. This basic insight is the starting point of the analysis in this paper. We show that in a standard portfolio allocation model, faced with a deposit insurance limit increase, households move some of their assets out of deposits into *risky* alternatives, such as mutual funds. Our empirical analysis, taking advantage of a deposit insurance increase in Canada in 2005 and detailed household portfolio data, confirms the insights from the model. Hence, we show that an *increase* in the deposit insurance limit results in a sizable deposit *outflow*. This surprising and, at first glance, perhaps counter-intuitive result is at the center of this paper.

Retail bank deposits constitute a large component of household portfolios. Recent cross-country surveys suggest that for the average household, deposits account for as much as 40% of their wealth, and within a typical portfolio, they are about 2.5 times larger than other financial assets (Badarinza et al. 2016, HFCN 2016). Uninsured (and hence risky) deposits constitute a large share of retail deposits; for instance, in Canada they represent about 35% of all retail and small business deposits (Rose 2015 reports a similar share for US banks). And while bank bonds could be a substitute for retail deposits (as in Carletti et al. 2019), evidence from Badarinza et al. (2016) indicates that the actual share of bonds in household portfolios is negligible in many jurisdictions. Furthermore, in Canada banks do not rely on bonds for funding, leaving no close substitutes for retail deposits.[1]

[1]Based on authors' calculations using data from Chen et al. (2012), bonds represent 2% of banks'

Despite the importance of deposits as a saving vehicle, the literature has paid relatively little attention to the creation of insured vs. uninsured deposits through limited deposit insurance, and its subsequent implication on portfolio choice. Uninsured deposits exhibit one particular feature that distinguishes them from other assets: one cannot hold uninsured deposits without first investing in fully insured deposits up to the insurance limit. Thus, for a given deposit balance, an adjustment to the deposit insurance limit, as we saw across several countries during the Global Financial Crisis, corresponds to a quantity constraint change on the amount of insured vs. uninsured deposits held.

Our primary objective, then, is to understand how households respond to a deposit insurance limit change.[2] To motivate our empirical analysis, we first utilize a simple model where the household maximizes its utility under a three asset portfolio allocation problem, subject to the insured vs. uninsured deposit constraint set by the limit. We show theoretically that following a tightening of this quantity constraint (i.e., an increase in the limit), for many households it is optimal to re-balance their portfolios by reducing deposits and increasing non-deposit risky asset holdings.

Empirically, we face a number of challenges. One, we need highly granular data to classify deposits as insured or uninsured, given the complexity of insurance frameworks (Demirguc-Kunt and Huizinga, 2004). It is insufficient to simply check whether the total amount of deposits of a household exceeds the limit, as households may distribute their deposits across banks. In addition, not all institutions may benefit from the same deposit insurance. Both points require an exact match between the deposit account, its balance, and the bank where the deposit account is located. Further, coverage often depends on account characteristics (such as for single vs. jointly-held accounts). Using detailed Canadian survey data, we are

outstanding liabilities.

[2]Unlike recent studies that have analyzed the flows of insured vs. uninsured deposits and/or individual depositor runs at distressed banks (such as Martin et al. 2018, Iyer and Puri 2012, Iyer et al. 2018, Brown et al. 2017), our focus is on depositor behavior during normal times, when banks are not facing stress.

able to precisely ascertain whether deposits of a given household are insured or uninsured.

Second, one needs to identify a suitable exogenous change to the deposit insurance policy. For example, changes to deposit insurance schemes occurring during periods of financial stress would not be suitable because the response of households may be contaminated by the impact of the financial stress itself. In this paper, we exploit an increase to the Canadian deposit insurance limit in 2005 from $60,000 to $100,000. In 2005 there were no major financial events in Canada or the US. Using a clean identification of insured and uninsured deposits for each individual household at each bank, we employ a difference-in-differences (DID) specification to examine changes in household portfolio composition around the increase in the deposit insurance limit.

Our analysis reveals that following the limit increase, households with uninsured deposits before the limit increase re-balanced their portfolios away from bank deposits. Specifically, these households reduced their holdings of deposits by about 10.3% and reallocated them towards risky assets, mainly mutual funds, increasing holdings in that asset category by 26%. Overall, our results suggest that 2.8% of personal deposits ($16.5 billion) left the banking system following the limit increase. Since the theoretical model predicts that households would shift funds into *risky* assets, rather than other non-deposit *safe* assets, we also estimate the change in portfolio shares for a number of different safe asset classes separately. The evidence supports the theory: households do not increase their holdings of money market mutual funds or government bonds. They do, however, also shift funds into stocks, although less so than into risky mutual funds. Finally, and consistent with our model predictions, we show that households draw down their investment deposits (rather than their transaction accounts) and that the effect is stronger for households unable to maintain the pre-limit composition of their deposit holdings.

We also rule out alternative explanations that are primarily driven by differences in asset returns (both cross-sectional and across time), starting with deposit rates. Conceptually, deposit rates may have changed after the deposit insurance limit increase. If banks had reduced rates on deposits, households may have shifted funds from deposits into other assets to compensate. Using detailed data, we show that deposit rates dropped by about five basis points around the time of the limit increase. A decrease of such magnitude is unlikely to prompt large withdrawals of about 10.3% out of deposit accounts, suggesting that households respond to the limit change, rather than to pricing, by re-balancing their portfolios.

Subsequently, we consider returns on different mutual funds held by households in our sample. If households with uninsured deposits also hold mutual funds yielding higher returns, the faster growth in these investments can explain their higher portfolio share over time. In other words, the higher portfolio share of mutual funds among households with uninsured deposits could be the mechanical outcome of higher fund returns, without any portfolio reallocation. However, by combining information on mutual fund holdings from our data set with mutual fund return data from Morningstar, we show that the average return earned on mutual funds is the same for households with and without uninsured deposits.

We conduct multiple robustness tests to further verify our findings. We estimate placebo regressions for the 2000-2004 period and show no significant shifts in household portfolios, ruling out the presence of pre-existing trends. A potential concern with our DID approach is that rather than the policy change, pre-change differences in household characteristics drive the results. We utilize two alternative empirical specifications to address this issue. First, we run regressions with fixed pre-period household characteristics interacted with the post-change indicator. As suggested by Barrot (2016), this specification alleviates the concern that pre-change differences in observables impact the results. Second, we follow Abadie and Gardeazabal (2003) and construct a synthetic control group of unaffected households that are observationally similar to affected households. The results from both approaches reinforce our assertion that pre-change differences between the two groups do not affect the results. Further, we confirm that housing dynamics are not behind any portfolio differences, as in Chetty et al. (2017), and we rule out the possibility that households were not paying attention to their portfolio allocations (i.e., that the limit increase served as a wake-up call) by using information on their financial advice utilization.

In addition, as the Mutual Fund Dealers Association of Canada (MFDA) introduced a custodial insurance protection for investors in 2005, we examine whether this contemporaneous policy change resulted in households moving funds away from deposits and into mutual funds. We show that this policy change does not drive our results.

Our work contributes to different strands in the literature. First, although there is a large literature on the financial stability implications of deposit insurance (see Allen et al. 2015 for a review), we document a novel implication of deposit limit changes. Our framework implies that a higher limit, while enhancing protection against runs in a crisis, may also trigger deposit outflows during non-crisis times. This previously unexplored mechanism suggests that higher coverage can lead to both a utility-reducing change in some household portfolios and an aggregate deposit outflow from banks. While Pennacchi (2010) and Calomiris and Jaremski (2019) identify deposit flows from uninsured banks towards insured ones upon selective introduction of deposit insurance, they do not explicitly consider the implications of this policy on aggregate deposit flows. Flows between retail bank deposits and mutual funds have been previously documented, notably with regard to the imposition and removal of constraints on returns households can earn on US deposits, i.e., Regulation Q (Edwards and Mishkin, 1995). However, in our case, flows between these two assets are driven by a novel channel in the form of quantity constraint on uninsured deposit holdings imposed by limited deposit insurance. As a matter of fact, our framework implicitly assumes that banks do not change rates on insured or uninsured deposits in response to the higher limit, which we broadly confirm using detailed data on Canadian term deposit rates.

The paper also contributes to our understanding of the link between deposit insurance and the composition of household portfolios. The household finance literature generally does not distinguish between insured and uninsured deposit accounts (Guiso and Sodini, 2013). Our results highlight the role that uninsured deposits play in the household investment decision, and the importance of studying them separately when analyzing portfolio allocation choice. Previous studies consider how changes in stock prices interact with re-balancing decisions (Brunnermeier and Nagel 2008, Calvet et al. 2009), or more recently, how housing interacts with household financial portfolios (Chetty et al., 2017). We provide direct evidence on how households react to a government policy by re-balancing portfolios.

The remainder of this paper is organized as follows: the next section motivates our main hypothesis via a standard three asset portfolio allocation framework. Section three reviews the data, sample construction, and identification strategy, while section four presents our main results. Section five discusses our robustness checks, and section six concludes.

## 2 Hypothesis Development

Households could hold uninsured deposits for two reasons. First, the transaction costs of distributing deposits across several different banks are higher than the benefit of insurance. Second, they intentionally hold uninsured deposits as an alternative to risky non-money market mutual funds (non-MMMFs), stocks and bonds. In the model below, we focus on the second case.[3] While uninsured deposits are exposed to bank failure risk, they are safe and liquid outside of the relatively infrequent case of bank failures, so they can be characterized as "semi-risky," compared to "risky" financial assets such as mutual funds. This characterization is in line with Golec and Perotti (2017), Egan et al. (2017) and Matutes and Vives (2000). Hence, we assume that the household allocates its portfolio among three assets: a safe asset (insured deposits), a semi-risky asset (uninsured deposits) and a risky asset we call "funds."

[3]Note that if households held uninsured deposits only to reduce transaction costs, they should not react to an increase in the deposit insurance limit at all. This is not what we find in the empirical analysis.

Suppose that returns of uninsured deposits and funds are both distributed i.i.d., with mean $\mu_j$ and variance $\sigma_j^2$ for $j = u, f$, respectively.[4] Since uninsured deposits are semi-risky, $\mu_f > \mu_u$ and $\sigma_f^2 > \sigma_u^2$. $\sigma_{u,f}$ is the covariance between these two assets, and $\rho_{u,f}$ is the correlation coefficient. Meanwhile, as insured deposits are assumed to be risk-free, $\mu_i < \mu_u$ and $\sigma_i^2 = 0$. The respective portfolio weights of these three assets are given by $w_f$, $w_u$ and $w_i$. Therefore, the expected return of this portfolio is $E[R_p] = w_f\mu_f + w_u\mu_u + w_i\mu_i$ (where $w_f + w_u + w_i = 1$), and its variance is given by $\sigma_p^2 = [w_f^2\sigma_f^2 + w_u^2\sigma_u^2 + 2w_f w_u \sigma_{u,f}]$.

A unique feature of a portfolio containing both insured and uninsured deposits is the inherent link between $w_i$ and $w_u$. A household that wants to include uninsured deposits in its portfolio must first invest in insured deposits up to the limit. Therefore, the household faces a constraint on the portfolio weight of insured deposits: $w_i \geq l$, where $l = limit/wealth$.[5]

Starting with the non-binding constraint case (such as $l = l^*$ and $l^* \approx 0$), and given standard mean-variance preferences derived from exponential utility, the household's utility maximization problem determining the optimal portfolio is

$$U = \underset{w_i, w_f}{max} \;\; (w_f\mu_f + w_u\mu_u + \mu_i - 0.5\lambda(w_f^2\sigma_f^2 + w_u^2\sigma_u^2 + 2w_f w_u\sigma_{u,f})),$$

where $w_f + w_u + w_i = 1$ and $\lambda$ is the degree of absolute risk aversion.[6] This standard portfolio problem including two risky and one safe asset has been extensively discussed in the

[4]As discussed below, we model the household's portfolio problem using a standard mean-variance framework, which is based on such normally distributed asset returns and an exponential utility function.

[5]As an example, consider a household with \$200,000 in total wealth and a deposit insurance limit of \$60,000. This household cannot have a portfolio with $w_i = 20\%$, $w_f = 50\%$ and $w_u = 30\%$, since this would involve holding only \$40,000 in insured deposits, making it impossible to have any uninsured deposits. If this household wants to set $w_u > 0$, then $w_i$ must be greater than $\$60,000/\$200,000 = 30\%$.

[6]The one-period, or "myopic," nature of our problem (i.e., looking at portfolios only before and after the limit increase) alleviates some of the criticisms of assuming exponential utility and a constant coefficient of absolute risk aversion ($\lambda$), as discussed in Campbell and Viceira (2002). Following their discussion, our model's main empirical predictions should remain the same if we assume a power utility function and lognormal returns. Furthermore, the capital asset pricing model, which is interlinked with the mean-variance framework, has also been frequently used in the literature on household portfolio decisions (please see Calvet et al. 2007 and Von Gaudecker 2015).

literature. The efficient, unconstrained three asset portfolio will lie somewhere along a capital allocation line (CAL) with intercept $\mu_i$. The slope of the CAL is given by $(E[R_r] - \mu_i)/\sigma_r$, where $E[R_r]$ and $\sigma_r$ are the expected return and standard deviation of the risky portion of the portfolio (consisting of funds and uninsured deposits).

The weight of funds *within* the risky portion of the portfolio is:

$$x_f^* = \frac{(\mu_f - \mu_i)\sigma_u^2 - (\mu_u - \mu_i)\sigma_{u,f}}{(\mu_f - \mu_i)\sigma_u^2 + (\mu_u - \mu_i)\sigma_f^2 - (\mu_f - \mu_i + \mu_u - \mu_i)\sigma_{u,f}},$$

and the weight of uninsured deposits *within* the risky portion is $x_u^* = 1 - x_f^*$. Accordingly, the optimal portfolio weights will be given by $w_i^* = 1 - \frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$, $w_f^* = x_f^* \frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$ and $w_u^* = (1 - x_f^*)\frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$. The derivation of these standard results can be found in the Appendix.

If a change in the deposit insurance limit raises $l$ from $l^*$ to $l'$, such that $l^* \leq w_i^* \leq l'$, then the constraint on $w_i$ becomes binding and the optimal unconstrained three asset portfolio is no longer attainable. In this case, the household can choose to hold the lowest possible amount of insured deposits ($w_i = l'$) and maintain a "constrained" three asset portfolio. Alternatively, it can choose to construct a new two asset portfolio consisting solely of insured deposits and funds (i.e., $w_u = 0$). This two asset portfolio allows the household to set the weight of insured deposits to any desired level, but it is also "constrained" because it entirely drops uninsured deposits from the portfolio. Therefore, the household's utility maximization problem that determines the optimal portfolio with a binding constraint is:

$$
\begin{aligned}
& U = \max(U_3, U_2) \\
\text{where} \quad & U_3 = \max_{w_i, w_f} \; (w_f\mu_f + w_u\mu_u + l'\mu_i - 0.5\lambda(w_f^2\sigma_f^2 + w_u^2\sigma_u^2 + 2w_f w_u \sigma_{u,f})) \qquad (1) \\
& \qquad \text{if} \quad w_i = l'; \;\; w_f > 0; \;\; w_u > 0; \;\; w_u + w_f = 1 - l', \\
& U_2 = \max_{w_f} \; (w_f\mu_f + w_i\mu_i - 0.5\lambda w_f^2\sigma_f^2) \qquad (2) \\
& \qquad \text{if} \quad w_u = 0; \;\; w_f > 0; \;\; w_i > 0; \;\; w_i + w_f = 1.
\end{aligned}
$$

In the case of the constrained three asset portfolio that yields utility $U_3$, the optimal portfolio weight of funds ($w'_f$) can be found by noting that $w_u = (1 - l' - w_f)$ and solving for the first order condition of (1):

$$
w'_f = \frac{\mu_f - \mu_u}{\lambda(\sigma_f^2 + \sigma_u^2 - 2\sigma_{u,f})} + \frac{(1 - l')(\sigma_u^2 - \sigma_{u,f})}{(\sigma_f^2 + \sigma_u^2 - 2\sigma_{u,f})},
$$

as long as $w'_f < (1 - l')$. Given a sufficiently large $l'$, this portfolio will lie on a flatter CAL and it will yield a lower level of utility.

Meanwhile, the weights on the (also constrained) two asset portfolio are determined by the first order condition for $U_2$ (given in (2)), which yields $w_f^+ = \frac{\mu_f - \mu_i}{\lambda\sigma_f^2}$ (and $w_i^+ = 1 - w_f^+$). Since this portfolio only contains one risky and one safe asset, the only possible CAL is the one that connects $\mu_i$ to $\mu_f$.

The household's choice of the "constrained three asset" vs. the "two asset" portfolio will primarily depend on the combination of $\lambda$ and $l$. The main factor determining whether the household continues to maintain a three asset portfolio is the amount of risky assets that will remain following the limit increase. Consider a household with a high $\lambda$: this household has a high portfolio share of safe assets ($w_i$) even before the limit increase. If the $w_i$ required to maintain a three asset portfolio increases further due to a large $l$, the household will be left with very few risky assets (i.e., a small $w_f + w_u$). In such a portfolio, there are few benefits to diversifying the risky portion between uninsured deposits and funds. Instead, a two asset portfolio will likely yield higher utility by allowing the household to keep slightly fewer safe assets compared to the constrained three asset portfolio. Meanwhile, a household with a low $\lambda$ will start off with lower $w_i$ and higher $(w_f + w_u)$. Even after the limit increase, this household's constrained three asset portfolio will have a relatively high amount of risky assets and the benefits of diversification will make it a better choice over the two asset portfolio. Finally, if $l$ is relatively small and the required increase in the weight of safe assets is not substantial, both types of households will be more likely to maintain a three asset portfolio, albeit in a constrained manner.

Next, we illustrate the conditions under which the household may prefer one portfolio over the other via a simple numerical exercise. We set the return and variance parameters at: $\mu_f = 6$ and $\sigma_f = 3$; $\mu_u = 3$ and $\sigma_u = 2$; $\mu_i = 2$; $\rho_{u,f} = 0.3$ and $\sigma_{u,f} = 2.4$. These parameters are meant to approximate the mean return and standard deviation of balanced mutual funds and of deposit accounts differentiated by their minimum and maximum balance requirements (discussed in more detail below). With these parameters, we first find the level of utility associated with the optimal portfolio and the weight of funds in this portfolio ($w_f^*$) for a range of absolute risk aversion $\lambda \in [1.5, 8]$, under the assumption that the constraint imposed by the deposit insurance limit is not binding (i.e., $w_i^* > l^*$).

We then assume a higher deposit insurance limit $l'$, such that $w_i^* < l'$, and consider both a constrained three asset portfolio (where $w_i' = l'$) and a two asset portfolio. We examine both a relatively modest increase in the deposit insurance limit, such that $w_i' = w_r^* + 3\%$ (panel (a) of Figure 1), and a larger increase, with $w_i' = w_i^* + 10\%$ (panel (b) of Figure 1). The left hand side graphs in both panels show the option yielding the higher utility and its comparison to the optimal pre-increase case.

As seen in Figure 1, our numerical exercise confirms our model's main intuition. Households choose the two asset portfolio as long as $\lambda$ is sufficiently high. Even for a relatively low $l$, such as the case in panel (a), risk averse households still derive higher utility from the two asset portfolio following the limit increase. Furthermore, given that the limit increased by \$40,000 in Canada and that the average wealth of the households in our sample was around \$400,000, we consider the $l = 10\%$ case of panel (b) to be the more applicable scenario. In panel (b), $l$ is so high that the two asset portfolio is preferred for almost any $\lambda$.

The aspect of this switch from a three asset to a two asset portfolio that is more relevant for our study is the change in the weight of funds in the household's portfolio. Specifically, we would like to see the conditions under which $w_f^+ > w_f^*$, or:

$$\underbrace{\frac{\mu_f - \mu_i}{\lambda\sigma_f^2}}_{w_f^+} > \underbrace{\frac{E[R_r] - \mu_i}{\lambda\sigma_p^2}}_{w_r^*} \underbrace{\frac{(\mu_f - \mu_i)\sigma_u^2 - (\mu_u - \mu_i)\sigma_{u,f}}{(\mu_f - \mu_i)\sigma_u^2 + (\mu_u - \mu_i)\sigma_f^2 - (\mu_f - \mu_i + \mu_u - \mu_i)\sigma_{u,f}}}_{x_f^*}. \tag{3}$$

Note that although $w_f^+ < w_r^*$ due to the CAL becoming flatter, this inequality will still be satisfied as long as $x_f^* \ll 1$. Therefore, the return on uninsured deposits cannot be too close to that of insured deposits (i.e., $\mu_u - \mu_i$ is sufficiently large).[7] Given the nature of the three assets considered in this study (and findings of other studies such as Egan et al. 2017), this is a reasonable assumption. Therefore, while the portfolio weight of *risky assets* will drop following the limit increase, the post-increase risky component of the portfolio will now consist solely of mutual funds, and their weight in the entire portfolio will be higher. Our numerical exercise also confirms this, since both right hand side graphs in Figure 1 show that the portfolio weight of funds in the post-increase two asset portfolio is higher than the pre-increase optimal three asset portfolio.

This observation leads to the main testable hypothesis of our empirical analysis. We expect that following an increase in the deposit insurance limit, households will hold fewer

[7] If $\mu_u \approx \mu_i$, the household may have zero uninsured deposits even before the limit increase (i.e., $x_f^* \approx 1$).

deposits (insured + uninsured) and more non-deposit risky assets. In the following section we discuss our empirical setup and the data that we use to test this hypothesis.

# 3 Empirical Implementation

## 3.1 Sample Construction

The Canadian deposit insurance limit was increased from $60,000 to $100,000 in 2005. Hence, we focus on the 2004-2006 period for the portfolios of Canadian households. We drop 2005 given that the limit changed that year. The federal deposit insurance system in Canada protects Canadian dollar deposits recorded at a branch of a member-institution up to the insurance limit. As in the US, coverage applies separately per depositor, bank, and ownership category. Deposit accounts with subsidiaries who are stand-alone members of the insurance scheme are covered separately from the parent. Eligible retail deposits include checking and savings accounts held in one name (either demand or time deposits), joint deposit accounts held in more than one name, savings held in trust for another person, or savings held in registered accounts (such as for retirement).

We use the Canadian Financial Monitor (CFM) survey, to ascertain whether a deposit is insured or uninsured and for detailed portfolio and demographic information about the household. The CFM includes an annual cross-sectional sample of approximately 12,000 households with a rotating short panel of 5,200 completing the survey in at least two consecutive years. Hence the starting sample consists of households that completed the survey in both 2004 and 2006. The survey offers a detailed description of households' checking, savings and term deposit holdings. The data include the type of account, amount held, and the institution's identity, which facilitates the clean identification of insured vs. uninsured deposits, for each individual account of each household. The survey also contains sections on households' holdings of stocks, bonds and mutual funds, and demographic information on household composition, age, income, education, occupation and employment status.[8]

In order to classify deposits as insured or uninsured, we proceed in several steps, taking the exact institutional detail of the Canadian deposit insurance scheme into account. One, the rules allow two savings accounts of the same household in the same institution to be separately insured up to the limit if one account is solely owned by one spouse, while the other is jointly owned. Therefore, we consider whether the account is held by the "male head of household," "female head of household," "other member of household" or "held jointly," while counting the number of accounts each household holds in any given institution. If the household has more than one account with the same owner in a given bank, then we combine these accounts into one "bundle," since the deposit insurance limit will apply to the combined balance of these accounts. Meanwhile, two savings accounts owned by different members of the household are treated as two separate bundles even if at the same bank.[9]

In calculating the bundles, we also account for subsidiaries that benefit separately from deposit insurance. Similarly, "registered" accounts linked to retirement or educational savings plans are insured on their own, so we consider such accounts owned by the same household member in the same institution as separate bundles. Once each bundle is identified, we determine if the balance exceeds the insurance limit. We label households with at least one bundle exceeding the limit as *affected* households.[10]

[8]These data have been used by Foerster et al. (2017) to study the influence of financial advisors on their Canadian clients' portfolios, and by Damar et al. (2019) to study the effects of bank financial distress on consumer credit and consumption expenditures.

[9]As a concrete example, if household $i$ has one joint checking account and one joint savings account, along with one savings account owned by the male head of household and one time deposit owned by the female head of household in bank $b$, we consider this household to hold three "bundles" for insurance purposes.

[10]There is one subtlety to consider when ascertaining whether households are affected or not. Deposits in provincially chartered credit unions and cooperative credit institutions are insured by separate provincial schemes, whose limits can differ from each other and from the Canada-wide limit for bank deposits. While determining whether a bundle is insured or not, we use the appropriate limit (bank vs. credit union). Even in cases where a provincial limit exceeds the national limit and/or a provincial limit remains unchanged, we label households with uninsured credit union deposits in these provinces as affected, given that most of them have both bank and credit union accounts. Excluding these few uninsured credit union depositors (there are 30 such households in our sample) from our analysis does not change our results.

The control group consists of households with pre-change financial assets and deposit balances that are greater than \$60,000, who own only fully insured deposits. After eliminating households with missing values, we obtain a sample of 491 affected households and 392 households in the control group: a total of 883 households per period. These 883 households represent 18.2% of all CFM households completing the survey in 2004 and 2006 (or 14.2% of the population if survey weights are used). However, they also account for 76% of all deposits and 45.5% of all financial wealth (71.4% and 41.2% with survey weights). Given that we observe households during the pre- and post-limit increase periods, the final sample size is 1,766 observations.[11]

Despite being a narrower subset of all CFM households, the portfolio allocation decisions of affected households can have large aggregate implications. Although accounting for only 10% of all respondents completing the survey in 2004 and 2006, households with uninsured deposits hold approximately 56% of all CFM deposits reported in 2004 (with survey weights, these ratios are 7.5% and 51.8%, respectively). The uninsured portion of their deposit holdings account for 26.7% of all deposits (24.7% with survey weights). Therefore, any changes to the deposit holdings of affected households due to the higher limit can lead to non-trivial deposit flows for the banking system.

Table 1 compares the groups as of the pre-period (2004) and establishes some stylized facts. To the best of our knowledge, this is the first paper to offer a detailed breakdown of different deposit holdings within household portfolios and relate them to various characteristics. The affected group holds on average more deposits than the unaffected group (\$272,100 vs. \$119,800), of which \$117,400 are uninsured, despite having fewer bundles (3.74 vs. 4.2). To gauge the liquidity level of the deposits, we report the share held in demand accounts relative to demand plus term deposits, and observe that the two groups hold a

[11] We note that CFM tends to oversample older and higher income households. However, such selection issues are less likely to be of concern, given our focus on a policy change that is more relevant for wealthier households (with large deposit balances) in the first place.

similar low share (less than half of a bundle). This suggests that households are aware of term deposits and use them as investment vehicles, as opposed to leaving "money on the table" in low-yielding demand accounts. Both groups also hold term bundles with similar maturities of about 24 months.

Panel B reports the households' portfolio shares relative to total financial assets, which are the sum of deposits, other non-deposit safe assets, and risky assets.[12] We define non-deposit safe financial assets as government bonds and money market mutual funds, and risky assets as stocks, non-government bonds and mutual funds. In the pre-period, the groups' portfolios differ slightly: the affected group has a lower share of risky assets (22.3% vs. 26.6%) and a higher share of deposits (73% vs. 69%) compared to the unaffected households.

The differences in pre-change portfolios could be attributed to heterogenous household characteristics that are presented in Panel C. While both groups report similar levels of income, affected households are slightly older and financially wealthier, but with lower levels of housing wealth. We examine these differences (including those related to housing wealth) in the robustness section and conclude that they are not driving the results.

## 3.2 Econometric Setup

We compare the portfolio allocations of affected vs. unaffected households using a DID specification by estimating the following depositor-level regression:

$$Y_{i,t} = \alpha_1 + \alpha_2 Affected_i \cdot Post_t + \alpha_3 Post_t + \alpha_4 Affected_i + \alpha_5 X_{i,t} + \epsilon_{i,t}, \tag{4}$$

where $Y_{i,t}$ is the outcome variable measured in year $t$ for depositor $i$, $Affected$ is a dummy variable that equals 1 for households with partially insured deposits, $Post_t$ equals 1 for the

[12] During our sample period, the insurance scheme did not cover time deposits with maturities greater than 5 years and foreign currency deposits. While very few households hold such deposits, we include them as non-risky assets (like uninsured deposits), but results are similar if they are excluded.

year following the limit increase (i.e., 2006) and $X_{i,t}$ is a vector of time-varying depositor characteristics. It includes gross income, total wealth, age (and age squared), a marital status dummy, a home ownership dummy, household size, education level dummies (high school, some college and college), a dummy variable for whether the household lives in a large metropolitan area and dummy variables for each of the ten Canadian provinces (a similar set of controls is used by Shy et al. 2014 and Iyer et al. 2018, who identify the features of uninsured depositors in the presence of limited deposit insurance). We cluster the standard errors at the level of the household's local area, captured by the first two digits of the postal code. The coefficient of interest is $\alpha_2$, which captures the change in $Y_{i,t}$ following the increase in the deposit insurance limit.

While estimating Equation 4 via OLS, we also recognize that our dependent variables are bounded between zero and one (given that they are portfolio weights). This suggests that the effect of any independent variable cannot be the constant throughout the bounded range of $Y_{i,t}$. Hence, we also estimate a fractional logit model, as developed by Papke and Wooldridge (1996), using the following general linear model (GLM):

$$E(Y_{i,t}|\mathbf{x}) = G(\alpha_1 + \alpha_2 Treated_i \cdot Post_t + \alpha_3 Post_t + \alpha_4 Treated_i + \alpha_5 X_{i,t}), \tag{5}$$

where $\mathbf{x}$ represents the vector of all our covariates and $G(.)$ is a logistic link function.[13]

As seen in Table 1, the two groups differ along some dimensions that could be correlated with their portfolio allocation decision, thus potentially biasing the estimation. We address these concerns in the robustness section via two additional approaches (the empirical specification by Barrot (2016) and using "synthetic control" as in Abadie and Gardeazabal (2003)). We conclude that pre-period differences are not contaminating our results.

[13]However, the use of a fractional logit model in a DID setting also raises its own issues related to the complexity of using and interpreting interaction terms in non-linear models (Ai and Norton, 2003). Accordingly, we opt to use Equations 4 and 5 as complements. The two models yield very similar results.

# 4 Empirical Results

## 4.1 Baseline Results

We begin by reporting the overall effect of the limit change on portfolio allocations in a manner consistent with our theoretical framework, which involves three assets: safe, semi-risky and risky. Given that households in our data set hold multiple types of assets, we start with two broad categories: "risky" and "safe." Within our modelling framework, "safe" aggregates all deposits (insured and uninsured) plus semi-risky assets (i.e., government bonds and money market mutual funds). All remaining assets, including non-MMMF, stocks and non-government bonds, form the "risky" asset category. We then calculate the weights of safe vs. risky assets in each household's portfolio and use them as dependent variables in our baseline estimation of Equations 4 and 5.[14] Each specification also includes the household controls discussed above and listed in Table 1.

The results in Table 2 clearly indicate that affected households reduced their holdings of safe assets (including uninsured deposits) and increased the portfolio weight of risky assets. The results are consistent across the two specifications, and the magnitude of the switch between the two categories is around 6%. This finding aligns with the main testable hypothesis from our theoretical framework.

Next, we examine individual components of the safe asset portfolio in order to establish that the funds being moved to risky assets are coming out of deposit accounts and not other safe assets. If non-deposit safe assets are being sold in order to purchase more risky assets, this is unlikely to be related to the deposit limit increase. We rule out this possibility by re-estimating Equations 4 and 5 while using the portfolio weights of deposits vs. non-deposit

[14]We combine insured and uninsured deposits within the safe assets category, since our unaffected households do not hold any uninsured deposits, by definition. Therefore, it is not practical to define and use a portfolio weight of uninsured (or semi-risky) assets in our empirical specification, since this weight would be zero for all unaffected households.

safe assets as the dependent variable. The results in Panel A of Table 3 confirm that affected households were increasing the weight of risky assets in their portfolios at the expense of deposits and not non-deposit safe assets such as money market mutual funds.[15]

Since our evidence strongly suggests re-balancing towards risky assets, we then further extend the analysis by decomposing the risky portfolio share into its subcomponents, i.e., stocks, non-government bonds, and non-MMMF. Using the portfolio weights of these individual components as independent variables, we re-estimate Equations 4 and 5 and report the results in Panel B of Table 3. These results indicate that the shift is entirely towards risky assets: the portfolio share invested in stocks goes up by about 2.4%, whereas the share invested in non-MMMF rises by 3.4%.

Finally, we consider whether households were more likely to invest in two specific types of funds that are distinguished by their risk and cost structures. We first look at the portfolio weight of segregated funds, a potential substitute for partially insured deposits as they typically protect the holder against some decline in the value of the fund (Khorana et al., 2009). As such, it is possible that affected households chose to move wealth out of partially insured deposit accounts and into the next closest substitute. In addition, we also consider the portfolio weight of index funds in our analysis. Due to their lower fee structure, index funds can potentially be a closer substitute to bank deposits, compared to higher cost, actively-managed funds. However, as shown in Panel C of Table 3, affected households do not move deposits into either type of funds. Therefore, we conclude that deposits were moved into riskier, actively-managed funds.

Our results strongly suggest that changes in deposit insurance limits impact the allocation of financial assets in households' portfolios. In our case, with a higher limit, some households substituted away from high-balance deposit accounts towards riskier assets. A back-of-the-envelope calculation suggests that a 7.1% decrease in the portfolio weight of bank

[15] All specifications in Table 3 also include household characteristics (coefficients not reported for brevity).

deposits (the smaller coefficient for the portfolio weights of deposits from Table 3) implies a 10.3% reduction in total bank deposits held by affected households. Given that the average affected household had approximately $272,000 in deposits during the pre-change period, this translates into $28,000 converted into stocks and mutual funds.

The economic magnitude of the effect is not negligible. Using the entire CFM sample for 2004 (as opposed to our panel sample) and utilizing survey weights, we estimate that there were 590,033 affected Canadian households, and when multiplied by the average amount of deposits converted to risky assets, this implies a total of $16.5 billion leaving the bank deposit space. This corresponds to 2.8% of all personal deposits outstanding in the Canadian financial system at the end of 2004. Meanwhile, based on the coefficients in Table 3, 55% of the deposit balance withdrawal was invested in mutual funds (3.2% vs. 2.6% in stocks). Relative to the $16.5 billion from above, this means that roughly 1.95% of the increase in the net assets of non-MMMFs between 2004 and 2006 was attributed to the outflow of deposits due to the limit increase.

## 4.2 Transaction versus Investment Deposits

So far we have treated deposits as investment instruments, assuming households reallocate wealth between deposits and other assets based solely on risk-return considerations. However, deposits held for transactional purposes differ from those held for investment purposes, most notably in terms of yields, maturity, and the ability to provide liquidity for transactions. Such "transactional" deposit holdings should not respond to a change in the deposit insurance limit; if the household is not holding these deposits as part of its investment portfolio, it may not be willing to convert some of these deposits to risky assets for investment considerations. Furthermore, any movement away from transactional deposits towards risky assets could be caused by factors other than the change in the deposit insurance limit, for example, due to a change in the transactional needs of the household. This can represent an increase in the size of the household's investment portfolio (i.e., the extensive margin), as opposed to the effect we are interested in, which is a reallocation of assets away from investment deposits into risky assets (i.e., the intensive margin). Therefore, we differentiate between changes in "transactional" vs. "investment" deposit holdings.

To do so, we return to the deposit holdings at the individual account level. We then categorize deposits in checking accounts as "transactional deposits." Since these earn little or no interest, they are unlikely to qualify as the interest-bearing safe asset discussed in our theoretical framework. We classify all deposits held in savings accounts and term accounts as "investment deposits" and calculate the share of financial wealth being held as transactional vs. investment deposits. We then re-estimate our baseline regression Equations (4) and (5) using the portfolio weight of transactional vs. investment deposits as the dependent variable. Our expectation is that the drop in the share of deposits reported in Table 2 will be exclusively driven by a reduction in the holdings of investment deposits.

Table 4 indicates that after the limit increase, primarily investment deposits were used to purchase risky assets. This confirms the presence of different motives for holding deposits and validates the inclusion of at least some deposits in the household's investment portfolio.

## 4.3 Heterogeneity in Quantity Constraints

Both in our theoretical framework and the empirical analysis so far, our main assumption has been that an increase in the insurance limit will tighten the constraint on the amount of uninsured deposits a household can hold. However, some of the affected households in our sample could have enough slack in their quantity constraints to maintain their pre-increase levels of uninsured deposits. This, in turn, can result in the quantity constraint being not binding, and we should expect the portfolio allocation of these households to remain unchanged. Consider a deposit insurance limit of $60,000 and a household with $200,000 in deposits equally divided between two accounts (resulting in an uninsured deposit balance of \$80,000). When the limit increases to \$100,000, the household will be left without any uninsured deposits, *unless* it is able to move funds between the two accounts. A new allocation where one account has a balance of \$180,000 while the other is left with \$20,000 will result in the household maintaining its pre-limit increase level of uninsured deposits. Under such a scenario, there should be no incentive for the household to move wealth away from deposits and into risky assets. Accordingly, we expect that the impact of the deposit insurance limit increase on the portfolio allocation of affected households will vary based on the degree to which the quantity constraint will bind.

We investigate this possibility by examining the make-up of affected households' deposit portfolios. We assume that households are able to move funds between two retail accounts and between two registered retirement/educational savings accounts. However, we exclude the possibility of frictionless transfers between one retail and one registered account, due to tax and/or contribution limit implications associated with net flows in and out of registered accounts. We then focus on households that have the ability to re-create their insured vs. uninsured deposit allocation after the limit increase by moving funds between different accounts of the same type. This can be achieved by either combining two or more uninsured deposit accounts, or by moving funds out of a low-balance insured account into an uninsured account in order to compensate for the higher limit. Any affected household that is able, at least in theory, to re-create their pre-limit increase deposit allocation is identified as having a "slack" quantity constraint. We find 141 (out of 491) such affected households in our sample. We then modify our baseline empirical approach to capture differences in the way affected households with slack vs. binding quantity constraints might react to the limit increase:

$$\begin{aligned}
Y_{i,t} &= \beta_1 + \beta_2 Slack_i \cdot Affected_i \cdot Post_t + \beta_3 Affected_i \cdot Post_t + \beta_4 Affected_i \\
&+ \beta_5 Slack_i + \beta_6 Post_t + \beta_7 X_{i,t} + \epsilon_{i,t} \\
E(Y_{i,t}|\mathbf{x}) &= G(\beta_1 + \beta_2 Slack_i \cdot Affected_i \cdot Post_t + \beta_3 Affected_i \cdot Post_t + \beta_4 Affected_i \\
&+ \beta_5 Slack_i + \beta_6 Post_t + \beta_7 X_{i,t} + \epsilon_{i,t}),
\end{aligned}$$

where the first specification uses OLS, while the second equation is the fractional logit model. $Slack_i \cdot Affected_i$ and $Slack_i \cdot Post_t$ are absent from these specifications since they are collinear with $Slack_i$ and $Slack_i \cdot Affected_i \cdot Post_t$, respectively ($Slack_i$ being a subset of $Affected_i$). Our main coefficients of interest are $\beta_2$ and $\beta_3$, which should capture the heterogeneity in affected households' responses due to differences in quantity constraints. The results given in Table 5 indicate that households with slack quantity constraints do not significantly alter their portfolio allocation between safe and risky assets following the limit increase (the effect captured by $\beta_3$ is offset by $\beta_2$). This provides further evidence that the higher deposit insurance limit acts as a tighter quantity constraint on uninsured deposits.

## 4.4 Deposit Rates

So far, the analysis has focused on the *quantity* of deposits being held by households, without considering the role of deposit rates. This is motivated by our theoretical framework, which does not rely on changes to deposit rates for its empirical predictions. However, a deposit insurance limit increase may also affect the rates banks offer on both insured and uninsured deposits. Changes in deposit rates may enhance or reduce the shift in deposits that we empirically observe. For example, the increase in the deposit insurance limit may have reduced rates on insured deposits, because for banks the higher limit increases the attractiveness of deposits. Or banks may have reacted to the outflow of deposits by increasing rates on uninsured deposits. In the CFM data, no information on deposit rates is available and we are thus forced to turn to a different data set.

We use detailed monthly data on term deposit rates and their various features that are collected from CANNEX.[16] Since we know that accounts with a maximum balance below \$60,000 are fully insured, the rate on such accounts captures the return on insured deposits. We identify 1,445 unique fully insured accounts with a maturity of one to five years being offered by 19 financial institutions in Canada (if an institution only offers accounts that do not feature maximum balance requirements, we drop them from our sample). We then subtract the yield of a maturity-matched Government of Canada (GoC) debt instrument from the respective deposit rate to remove the effects of macroeconomic factors such as inflation, monetary policy and macroeconomic outlook.

We observe that the mean spread between the insured deposit rates and the maturity-matched GoC debt yield fell by 5 basis points between the pre- and post-limit increase periods. While this decline in the insured deposit rate may have contributed to the withdrawal of deposits after the deposit insurance increase, the magnitude of converting 10.3% of deposits to risky assets due to a 5 basis point decrease seems unreasonable. Furthermore, if households indeed respond to the change in the rate on insured deposits, we should expect all households to withdraw funds, not just those that we classify as affected, and the DID specification would not have yielded any significant results.

While we are able to directly observe the rate on insured deposits in the data, the return on uninsured deposits is not directly observable. The reason is the uniqueness of the asset we are calling "uninsured deposits": to hold any uninsured deposits, a household first has

[16] CANNEX is a privately-held company whose Canadian operation provides automated application processing services and administers term deposits for participant financial institutions and dealer organizations. Therefore, CANNEX maintains a comprehensive database of term deposit account information covering most depository institutions in Canada (banks, trust companies, credit unions and cooperative credit institutions). For all the institutions in our sample, we observe interest rates for multiple accounts that are differentiated by maturity and/or other account features (such as the frequency of interest payments and compounding).

to invest in insured deposits up to the insurance limit. Banks do not quote rates on the uninsured portion of an account by itself, but rather post a single rate for the entire account, which is part insured and part uninsured. Hence, in order to measure the rate on uninsured deposits, we use the rate offered by banks on "partially insured" deposits. Before the limit increase, these are all accounts with a *minimum* balance of above \$100,000. We drop the accounts with minimum balances between \$60,000 and \$100,000, since these accounts could switch from being partially to fully insured after the limit increase. As before, we subtract the maturity-matched GoC debt instrument yield from the deposit rate.

We identify from CANNEX 457 unique partially insured accounts offered by 14 financial institutions, including the six largest banks. We first confirm in Table 6 that all else equal, the average yield on fully insured deposits is lower than the average yield on partially insured deposits by about 8-10 basis points over time and across all maturities. Next, in order to examine the spread between partially and fully insured accounts more closely and to obtain meaningful comparisons over time, we calculate the spread *between* two identical accounts, one partially insured and the other fully insured, offered by the same bank (i.e., both term deposits have the same maturity, taxability, redeemability, compounding frequency and timing of interest payments). We observe that the average spread across the 14 banks that offered both fully and partially insured accounts was 12.4 basis points before the limit change, and about 7.3 basis points during the post-period. Some of this decrease is likely due to the fact that with a higher limit, a greater portion of the balance becomes insured. Assuming that the rate offered on a partially insured account is a weighted average of insured and uninsured deposits, this greater weight on insured deposits implies a lower account rate. Nevertheless, as a decrease of this magnitude is unlikely to be large enough to prompt significant withdrawals from deposit accounts, we conclude that the quantity constraint in our theoretical framework has played a role in observed withdrawals.

## 4.5 Heterogeneity in Mutual Fund Returns

In addition to the *across time* variation in deposit rates considered above, it is also possible that *cross-sectional* differences in mutual fund returns can explain our main findings. Specifically, if the affected households in our sample happen to hold mutual funds with higher returns, then the value of their mutual fund holdings will rise faster, compared to the unaffected households with lower yielding funds. As affected households' mutual fund holdings rise in value throughout our sample period, their financial wealth will increase and their portfolio share of deposits will automatically fall. However, this decrease in the portfolio share of deposits obviously would not represent a conscious re-balancing of the portfolio away from deposits, in the manner implied by our theoretical framework. Therefore, it is necessary to rule out any significant differences in the returns on mutual funds held by the two groups of households in our sample.

We achieve this goal by combining mutual fund holding-specific information from the CFM survey with quarterly mutual fund return data from Morningstar, an investment research company that provides comprehensive coverage on various types of open-end mutual funds. During our sample period, CFM respondents specify a "type" for each of their mutual fund holdings by choosing an appropriate fund category from a list. This list includes choices such as Canadian-Equity, International/Global-Balanced, US Equity, etc.[17] We combine this list with the Morningstar data in order to create annual average returns for each mutual fund category. We weigh the return of each fund within a category using fund size, in order to make sure that returns of smaller funds are not disproportionately affecting the group averages.

Once the average returns for different CFM fund categories are constructed, we then

[17] The full list is: Asia and Pacific Rim, Canadian-Balanced, Canadian-Bond, Canadian-Dividend, Canadian-Equity, Canadian-Mortgage, Canadian-Sector Equity, Canadian-Small-Mid Cap, Canadian-All Other Types, European Equity, International/Global-Balanced, International/Global-Bond, International/Global-Equity, Latin America and Emerging Markets, US Equity, US Balanced and All Other.

calculate an "annual average mutual fund portfolio return" for each household using amounts of funds held in each category. For each household, we perform two such calculations: once for the pre- and once for the post-change period. If affected households are, on average, more likely to hold high-yield funds, then we expect this to show up as a significantly higher "annual average mutual fund portfolio return" in one or both periods. However, we find that the average returns enjoyed by the two groups of households are very similar in both periods (with statistically insignificant differences). During the pre-change period, the annual average returns for affected vs. unaffected households' mutual fund holdings are 8.96% and 8.93%, respectively. During the post-change period of 2006, these returns are 11.26% for affected and 11.59% for unaffected households. Therefore, we dismiss the possibility of our main empirical findings being the outcome of an increase in the financial wealth due to higher mutual fund returns diluting the share of deposits in affected households' portfolios.

# 5 Robustness and Extensions

## 5.1 Parallel Trends Test

Our empirical specification is based on the assumption that the portfolio allocations of affected and unaffected households follow parallel trends prior to the increase in the deposit insurance limit. To validate this assumption, we estimate placebo regressions for Equations 4 and 5 where the pre-change period is 2000-2002 and the post-change period is 2003-2004, while affected vs. unaffected households are defined as of 2003-2004. Although our primary focus is on the portfolio weights of deposits and risky assets, we also include the portfolio weight of non-deposit safe assets in our analysis. Given that the CFM is a repeated cross-section and not a panel, we do not observe all households throughout time. In total, 445 households (out of 883) have also completed the CFM survey between 2000 and 2002, with 238 affected and 207 unaffected (compared to 491 and 391 in the baseline sample). The placebo results in Table 7 rule out the presence of any pre-existing trends, validating the parallel trends assumption and our choice of the DID framework.

## 5.2 Pre-Change Differences in Household Characteristics

As discussed above and shown in Table 1, the pre-change differences between the affected and unaffected households can raise concerns about the validity of a DID approach. Specifically, affected households appear to be older and wealthier; perhaps related to these differences, their portfolios include fewer risky assets before the limit increase. In order to rule out the possibility of these differences driving the post-limit increase evolution of the two groups' portfolios, we utilize two additional empirical specifications.

First, we fix depositor characteristics at the pre-change period and interact them with the post-change indicator ($Post_t$). As discussed in Barrot (2016), this ensures that the results are not driven by pre-period differences between affected and unaffected households. It also alleviates the concern that the estimation is biased due to the heterogenous distribution of depositor characteristics such as age and wealth. The equation for this specification is:

$$Y_{i,t} = \alpha_1 + \alpha_2 Affected_i \cdot Post_t + \alpha_3 Post + \alpha_4 Post \cdot X_i + \delta_i + \epsilon_{i,t}, \tag{6}$$

where most variables are as defined above, except $X_i$ is now the vector of depositor characteristics measured at the pre-change period and $\delta_i$ is a household-level fixed effect. Note that $X_i$ is absent from this specification, as it is absorbed by $\delta_i$. However, since our panel only contains two observations per household, we also estimate an alternate version of Equation 6 with $X_i$ and without household fixed effects:

$$Y_{i,t} = \alpha_1 + \alpha_2 Affected_i \cdot Post_t + \alpha_3 Post + \alpha_4 Post \cdot X_i + \alpha_5 X_i + \epsilon_{i,t}. \tag{7}$$

While estimating both equations, we use the portfolio weights of deposits, non-deposit safe assets and risky assets as separate independent variables. The results given in Table 8 are very similar to our empirical findings from above, suggesting that the pre-change differences in household characteristics are not driving our results.

Our second empirical specification uses the "synthetic control" method introduced by Abadie and Gardeazabal (2003) and used recently in studies such as Cetorelli and Traina (2018). The idea is to reweigh the pool of unaffected households to construct a composite (or "synthetic") unaffected household for each affected household, where the synthetic unaffected household matches (or is closer to) the pre-change characteristics of the affected household. Using the synthetic control approach alleviates any concerns related to the differences in household characteristics (such as financial wealth) discussed above.

As we have a pool of 392 potential unaffected households, we consider a $(392 \times 1)$ vector of non-negative weights that sum to 1, where each element of the vector represents the weight of a particular unaffected household in the synthetic unaffected household. As described in Abadie and Gardeazabal (2003), the weights are calculated so that the pre-change characteristics of the synthetic unaffected household are as similar as possible to those of the affected household. This process is repeated for each affected household (491 times), which then allows us to compare the post-change portfolios of the affected household and the synthetic control household to determine the impact of the deposit insurance limit increase.

The choice of the pre-change household characteristics (i.e., the covariates) plays an important role in the synthetic control approach, as discussed in Abadie and Gardeazabal (2003) and Cetorelli and Traina (2018). Given that there is no single way of choosing these covariates, we opt to include the same household controls as in our DID specification (with the exception of *Age Squared*). In addition, we include the pre-change portfolio weight of risky assets as an additional covariate, as it differs between the groups.

Table 9 shows the results of the synthetic control method. The average differences in the post-change portfolio weights between the affected and synthetic unaffected households (i.e., the impact of the limit increase) are quite similar to the DID estimates, validating our main conclusions. Meanwhile, Table 10 compares the pre-change characteristics of affected vs. synthetic unaffected households, with characteristics of all unaffected households also provided as a benchmark. The synthetic control approach creates an unaffected household sample that is closer to affected households: differences in the share of risky assets, financial wealth and home equity are either eliminated or greatly reduced, while the balance of other characteristics (such as age) remains unchanged. As discussed by Cetorelli and Traina (2018), if a particular covariate is not key in explaining pre-change differences in the outcome variable, then it receives a low weight in the procedure and will not change while going from the pool of all unaffected households to the sample of synthetic unaffected households. The results from the synthetic control approach reinforce our assertion that pre-change period differences among the two groups of households are not driving our results.

## 5.3 Housing and the Financial Portfolio

Housing can play an important role in the portfolio allocation of households. Specifically, Chetty et al. (2017) find that higher home equity can lead to a lower risk aversion and to a higher share of risky assets in the household's portfolio. Meanwhile, for a given level of home equity, an increase in the home value translates into higher mortgage debt, which is associated with higher risk aversion and a lower share of risky assets. Therefore, if affected households experienced disproportionately faster increases in their home equity, or if unaffected households saw an increase in their mortgage debt, these could also explain the observed portfolio re-balancing. To confirm that the results are not driven by housing-related factors, we revise the baseline specification such that:

$$\begin{aligned} Y_{i,t} &= \alpha_1 + \alpha_2 Affected_i \cdot Post_t + \alpha_3 Post_t + \alpha_4 Affected_i \\ &+ \alpha_5 HomeValue_{i,t} + \alpha_6 HomeEquity_{i,t} + \alpha_7 X_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{8}$$

where $HomeValue_{i,t}$ and $HomeEquity_{i,t}$ capture the impact of these respective components on the portfolio share of different types of assets.[18] The results in Table 11 suggest that the inclusion of the two housing variables does not change our main empirical findings. The share of bank deposits in the affected households' portfolios declines, while the share of risky assets increases. Meanwhile, the signs (but not the significance) of the coefficients for $HomeValue_{i,t}$ and $HomeEquity_{i,t}$ are in line with the literature (higher home values are associated with more safe and less risky assets, while higher home equity is associated with fewer safe and more risky assets in the portfolio).

## 5.4 Re-balancing and Financial Advice

It could be that the effect we capture is due to financial advice, rather than coming directly from the policy change. Consider a situation where affected households were unaware of their portfolio holdings. The deposit insurance limit increase may have acted as a "wake-up call" prompting households to seek financial advice that encourages re-balancing towards riskier positions (Gennaioli et al. 2015).

We test this possibility using specific CFM questions that gauge households' reliance on financial advice. The CFM asks "Over the last 12 months, did anyone in your household receive any professional advice (free or for a fee) from any of the following?", with the

[18] As discussed by Chetty et al. (2017), OLS estimates for $\alpha_5$ and $\alpha_6$ could be biased due to the presence of an omitted variable (such as unobserved labor income) that affects both home values and portfolio shares. However, we are primarily interested in whether the sign and significance of $\alpha_2$ is robust to the presence of these housing-related variables; estimating Equation 8 via OLS should be sufficient to satisfy this goal.

household indicating the number of times it received advice from different types of financial firms.[19] Thus we calculate the number of times a household received professional advice both in total, and also from deposit-taking institutions during the previous 12 months.

Using the "frequency of professional advice" as a dependent variable in our regressions (while replacing the fractional logit specification with a negative binomial regression), in Table 12 we find no differences in financial advice reliance between the two groups of households. Therefore, it is unlikely that the policy change acted as a catalyst for affected households to seek financial advice and subsequently change portfolio allocations.

## 5.5 Another Contemporaneous Policy Change

The MFDA introduced in 2005 a protection scheme that covers financial losses for investors (outside of Québec) in the event that their mutual fund dealer becomes insolvent. The policy clearly states that coverage only applies if the dealer fails to return or account for the client's property, and that it does not cover losses from changing market values of securities, unsuitable investments or the default of an issuer of securities.[20] While this contemporaneous policy change could account for the mutual funds inflows, we argue it is unlikely. First, the MFDA coverage differs from deposit insurance because the latter guarantees principal and interest repayment up to the limit. Further, our DID approach should address this issue because if re-balancing towards mutual funds is due to their enhanced protection, then we should observe all households engaging in this activity (not just the affected ones).

Nevertheless, we show that the MFDA guarantee cannot explain the observed decrease in deposits by limiting the sample to 144 households who reside in Québec, given that the MFDA coverage does not apply in that province. Table 13 confirms that households in

[19]These different types of firms are "Banks/Trusts/Credit Unions," "Brokers," "Insurance Companies," "Independent Advisers" and "All Other." The household chooses between the options "Not Used," "1," "2," "3-4," "5-6" and "7+." We consider "3-4," "5-6" and "7+" to be 3, 5 and 7 visits, respectively.

[20]Please see `http://www.mfda.ca/wp-content/uploads/IPC_AR07.pdf` accessed December 2017.

Québec also responded to the deposit insurance limit increase by reducing their deposit holdings. Although the coefficients of interest are not statistically significant for the risky assets category, they have the correct sign and magnitude; we assert this lack of significance is primarily because the Québec sub-sample contains only 17% of the original observations.

# 6 Conclusion

This paper sheds light on the household finance implications of a change to the deposit insurance limit policy. We examine how households respond to an exogenous change that alters the amount of safe assets in their portfolios. In 2005, the deposit insurance limit in Canada was raised from $60,000 to $100,000, converting some previously uninsured deposits in the households' portfolios into fully insured ones. This corresponds to a quantity constraint change on the amount of insured vs. uninsured deposits held.

Using detailed household survey data we document that following the limit change, households re-balanced their financial portfolios, withdrawing deposits while increasing exposure to mutual funds and stocks, thereby changing the risk composition of their portfolios. These results are consistent with our theoretical predictions where the household maximizes its utility across a three asset portfolio, subject to the constraint imposed by the limited nature of deposit insurance. We confirm that neither deposit yields nor mutual fund returns are likely to explain this re-balancing behavior. Our findings are also not driven by the households' age or wealth profiles, housing dynamics, inattention or financial advice, or due to a different policy change that could have made mutual funds more attractive.

Thus, our results highlight an overlooked financial stability implication. Specifically, generous coverage may lead to deposit outflows from the banking system, by altering the risk characteristics of households' portfolios, exposing them to market risk. We also highlight the importance of partially insured deposits for households and how they adjust investment decisions in response to such a government policy change. Finally, the deposit outflows could have altered bank lending decisions, but this remains a topic for future research.

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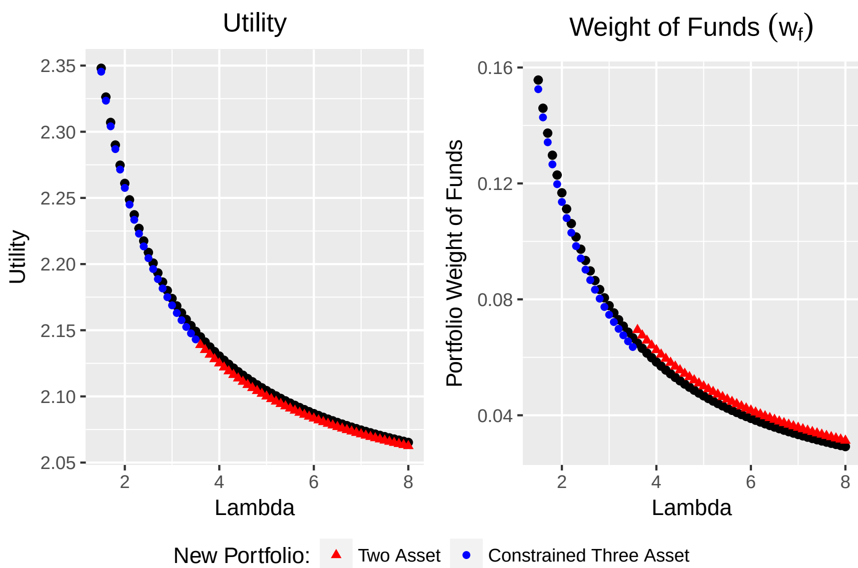
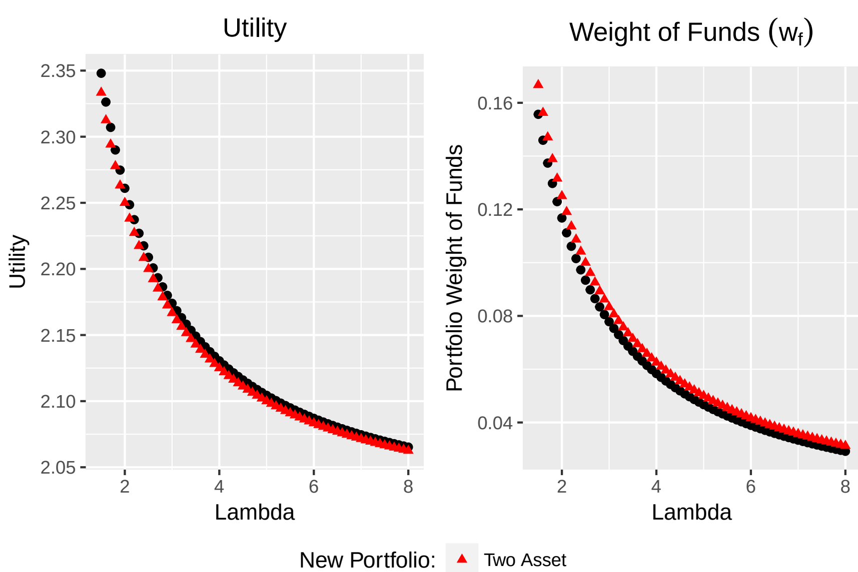
Figure 1: Numerical exercise showing household reaction to the deposit insurance limit increase, according to our theoretical framework and different levels of absolute risk aversion ($1.5 \leq \lambda \leq 8$). The magnitude of the increase in the weight of insured deposits due to the higher limit ($l$) is set at 3% in panel (a) and at 10% in panel (b). The graphs on the left compare pre- and post-limit increase utility, while the graphs on the right show the change in portfolio weight of funds between the pre- and post-limit increase. The graphs also show whether the household prefers the two asset or the constrained three asset portfolio following the limit increase.




(a) When $w_i' = w_i^* + 3\%$




(b) When $w_i' = w_i^* + 10\%$

Table 1: Summary statistics for households with at least \$60,000 in deposits in 2004, prior to the increase in the deposit insurance limit in 2005. Affected households own at least one account with a balance above the insurance limit of \$60,000. Unaffected households own only fully insured deposits. A bundle combines all deposit accounts for which the deposit insurance limit applies, as described in section 3.1. Liquid deposits are demandable checking and saving accounts. Risky assets are stocks, mutual funds and non-government bonds; safe financial assets are all deposits plus government bonds plus money-market mutual funds; Portfolio shares are calculated relative to total financial wealth, defined as safe plus risky financial assets. ***, ** and * represent significance at the 1%, 5% and 10% level, respectively.

| | Affected HHs (N: 491) | | Unaffected HHs (N: 392) | | |
|---|---|---|---|---|---|
| | Mean | Std. Dev. | Mean | Std. Dev. | Mean Diff. |
| *Panel A: Bundles' Characteristics* | | | | | |
| Total Deposits (\$1000s) | 272.1 | 230.9 | 119.8 | 76.7 | 152.3*** |
| No. of Bundles | 3.739 | 2.179 | 4.132 | 2.024 | -0.393*** |
| of which: Demand | 0.479 | 0.861 | 0.439 | 0.899 | 0.04 |
| Maturity of Term Deposits (in months) | 24.972 | 24.131 | 26.906 | 23.988 | -1.994 |
| Liquid Deposit Share | 0.284 | 0.331 | 0.307 | 0.317 | -0.023 |
| Deposits in Registered Accounts (\$1000s) | 85.5 | 129.1 | 44.9 | 51.9 | 40.5*** |
| Uninsured Deposits (\$1000s) | 117.4 | 162.2 | | | |
| No. of Bundles with Uninsured Deposits | 1.384 | 0.708 | | | |
| Maturity of Uninsured Deposits (in months) | 21.709 | 24.352 | | | |
| *Panel B: Household Portfolio Composition* | | | | | |
| Risky Asset Share | 0.223 | 0.267 | 0.266 | 0.298 | -0.043** |
| Safe Asset Share | 0.777 | 0.267 | 0.733 | 0.298 | 0.043** |
| of which: Deposit Share | 0.731 | 0.282 | 0.694 | 0.304 | 0.037* |
| *Panel C: Households' Characteristics* | | | | | |
| Income (\$1000s) | 74.7 | 42.7 | 71.1 | 41.1 | 3.6 |
| Financial Wealth (\$1000s) | 454.2 | 436.8 | 246.2 | 252.2 | 208*** |
| Home Owner? | 0.935 | 0.247 | 0.962 | 0.192 | -0.027* |
| Home Equity/Financial Wealth | 0.779 | 0.925 | 1.276 | 1.371 | -0.497*** |
| Household Size | 2.033 | 0.807 | 2.199 | 1.081 | -0.166*** |
| Married? | 0.739 | 0.439 | 0.729 | 0.445 | 0.009 |
| Age | 66.429 | 11.441 | 63.533 | 11.993 | 2.897*** |
| Education (High School) | 0.289 | 0.454 | 0.293 | 0.456 | -0.004 |
| Education (Some College) | 0.189 | 0.392 | 0.196 | 0.398 | -0.007 |
| Education (College and Higher) | 0.360 | 0.481 | 0.385 | 0.487 | -0.025 |
| Big City? | 0.468 | 0.499 | 0.406 | 0.492 | 0.063* |

Table 2: Impact of the 2005 deposit insurance limit increase on the portfolio shares of households with at least \$60,000 in deposits in 2004. Affected households own at least one account where the balance is greater than the pre-change insurance limit of \$60,000. Unaffected households own only insured deposits. The post-period is 2006. *Risky assets* are stocks, mutual funds, and non-government bonds; *Safe assets* are all deposits, government bonds and money-market mutual funds. Portfolio shares are calculated relative to total financial wealth (safe plus risky assets). Therefore *Safe Asset Share + Risky Asset Share = 1*. All specifications include province-level fixed effects (not reported). For the "fractional logit" specifications (columns (ii)), marginal effects are reported. Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% level, respectively.

| | *Safe Assets* | | *Risky Assets* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.063*** | -0.061*** | 0.063*** | 0.061*** |
| | (0.016) | (0.016) | (0.016) | (0.016) |
| Affected | 0.129*** | 0.139*** | -0.129*** | -0.139*** |
| | (0.016) | (0.016) | (0.016) | (0.016) |
| Post | -0.073*** | -0.054*** | 0.073*** | 0.054*** |
| | (0.012) | (0.012) | (0.012) | (0.012) |
| ln(Income) | -0.037*** | -0.029** | 0.037*** | 0.029** |
| | (0.138) | (0.014) | (0.138) | (0.014) |
| ln(Financial Wealth) | -0.153*** | -0.159*** | 0.153*** | 0.159*** |
| | (0.009) | (0.008) | (0.009) | (0.008) |
| Home Owner? | -0.012 | -0.026 | 0.012 | 0.026 |
| | (0.029) | (0.034) | (0.029) | (0.034) |
| Home Equity/Financial Wealth | -0.004*** | -0.002 | 0.004*** | 0.002 |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Household Size | 0.011 | 0.011 | -0.011 | -0.011 |
| | (0.011) | (0.009) | (0.011) | (0.009) |
| Married? | 0.015 | 0.016 | -0.015 | -0.016 |
| | (0.019) | (0.019) | (0.019) | (0.019) |
| Age | -0.004 | -0.004 | 0.004 | 0.004 |
| | (0.006) | (0.005) | (0.006) | (0.005) |
| Age-squared | 0.001 | 0.001 | -0.001 | -0.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Education (High School) | 0.089*** | 0.084*** | -0.089*** | -0.084*** |
| | (0.026) | (0.024) | (0.026) | (0.024) |
| Education (Some College) | 0.040 | 0.026 | -0.040 | -0.026 |
| | (0.031) | (0.027) | (0.031) | (0.027) |
| Education (College and Higher) | 0.041* | 0.325 | -0.041* | -0.325 |
| | (0.025) | (0.021) | (0.025) | (0.021) |
| Big City? | -0.036** | -0.038** | 0.036** | 0.038** |
| | (0.017) | (0.001) | (0.017) | (0.001) |
| R-squared | 0.333 | 0.161 | 0.333 | 0.161 |
| N | 1766 | 1766 | 1766 | 1766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit |

Table 3: Impact of the higher deposit insurance limit on individual portfolio components. All definitions and specifications are based on those in Table 2. The fractional logit columns (labelled (ii)) report marginal effects. All specifications include household controls and province-level fixed effects (not reported). Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% levels, respectively.

*Panel A: Safe Asset Portfolio Components*

| | *Deposits* | | *Other Safe Assets* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.074*** | -0.071*** | 0.011 | 0.011 |
| | (0.016) | (0.017) | (0.009) | (0.009) |
| Affected | 0.130*** | 0.140*** | -0.001 | -0.001 |
| | (0.016) | (0.016) | (0.007) | (0.007) |
| Post | -0.069*** | -0.053*** | -0.005 | -0.005 |
| | (0.012) | (0.011) | (0.006) | (0.006) |
| R-squared | 0.348 | 0.153 | 0.031 | 0.026 |
| N | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit |

*Panel B: Risky Asset Portfolio Components*

| | *Stocks* | | *Risky Bonds* | | *Risky Mutual Funds* | |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) | (i) | (ii) |
| Affected·Post | 0.026** | 0.023** | 0.005 | 0.005 | 0.032** | 0.036** |
| | (0.011) | (0.011) | (0.005) | (0.005) | (0.016) | (0.016) |
| Affected | -0.038*** | -0.043*** | -0.008* | -0.009* | -0.084*** | -0.089*** |
| | (0.012) | (0.013) | (0.004) | (0.005) | (0.015) | (0.016) |
| Post | 0.023*** | 0.010 | 0.002 | 0.001 | 0.049*** | 0.039*** |
| | (0.008) | (0.009) | (0.003) | (0.003) | (0.013) | (0.012) |
| R-squared | 0.187 | 0.149 | 0.033 | 0.091 | 0.159 | 0.089 |
| N | 1,766 | 1,766 | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit | OLS | Fractional Logit |

*Panel C: Select Mutual Fund Portfolio Components*

| | *Segregated Funds* | | *Index Funds* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.007 | -0.006 | 0.006 | 0.006 |
| | (0.007) | (0.007) | (0.008) | (0.008) |
| Affected | -0.001 | -0.001 | -0.011** | -0.011** |
| | (0.005) | (0.006) | (0.005) | (0.005) |
| Post | 0.015 | 0.014** | -0.001 | -0.001 |
| | (0.006) | (0.006) | (0.007) | (0.005) |
| R-squared | 0.019 | 0.062 | 0.033 | 0.116 |
| N | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit |

Table 4: Impact of the higher deposit insurance limit on the portfolio shares of "transaction deposits" (kept in checking accounts) and "investment deposits" (held in savings accounts and term deposits). All definitions and specifications are identical to those in Table 2. The fractional logit columns (labelled (ii)) report marginal effects. All specifications include household controls and province-level fixed effects (not reported). Standard errors are clustered at the postal code-based region level. *** is significant at the 1% level.

| | *Transaction Deposits* | | *Investment Deposits* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.021 | -0.021 | -0.052*** | -0.053*** |
| | (0.015) | (0.014) | (0.023) | (0.023) |
| Affected | 0.048*** | 0.038*** | 0.081*** | 0.084*** |
| | (0.013) | (0.014) | (0.022) | (0.022) |
| Post | 0.011 | 0.001 | -0.082*** | -0.078*** |
| | (0.011) | (0.009) | (0.017) | (0.017) |
| R-squared | 0.246 | 0.115 | 0.169 | 0.059 |
| N | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit |

Table 5: Impact of the 2005 deposit insurance limit increase on portfolio shares based on affected households' ability to move funds between deposit accounts. All definitions and specifications other than *Slack* are identical to those in Table 2. The fractional logit columns (labelled (ii)) report marginal effects. All specifications include household controls and province-level fixed effects (not reported). Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% level, respectively.

| | *Safe Assets* | | *Risky Assets* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Slack·Affected·Post | 0.051* | 0.048* | -0.051* | -0.048* |
| | (0.027) | (0.026) | (0.027) | (0.026) |
| Affected·Post | -0.079*** | -0.078*** | 0.079*** | 0.078*** |
| | (0.017) | (0.017) | (0.017) | (0.017) |
| Affected | 0.107*** | 0.116*** | -0.107*** | -0.116*** |
| | (0.015) | (0.015) | (0.015) | (0.015) |
| Slack | 0.101*** | 0.095*** | -0.101*** | -0.095*** |
| | (0.022) | (0.021) | (0.022) | (0.021) |
| Post | -0.074*** | -0.053*** | 0.074*** | 0.053*** |
| | (0.012) | (0.021) | (0.019) | (0.021) |
| R-squared | 0.349 | 0.169 | 0.349 | 0.169 |
| N | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit |

Table 6: Summary statistics on monthly time deposit rates from CANNEX between January 2003 and December 2006. Partially insured deposits have a minimum deposit balance greater than $100,000, whereas fully insured deposits are with a maximum deposit balance of $60,000.

| | Mean | Std.Dev | Min | Max |
|---|---|---|---|---|
| 1-year Maturity | | | | |
| Partially insured | 2.064 | 0.808 | 0.670 | 4.600 |
| Fully insured | 1.967 | 0.783 | 0.550 | 4.525 |
| | | | | |
| 3-year Maturity | | | | |
| Partially insured | 2.730 | 0.658 | 1.470 | 4.450 |
| Fully insured | 2.647 | 0.630 | 1.350 | 4.400 |
| | | | | |
| 5-year Maturity | | | | |
| Partially insured | 3.262 | 0.662 | 1.950 | 5.850 |
| Fully insured | 3.188 | 0.627 | 2.000 | 5.100 |

Table 7: Parallel trends test via placebo regressions. The placebo pre-change period is 2000-2002 and the placebo post-change period is 2003-2004. $Affected$ is defined as of 2003-2004. All definitions and specifications are identical to those in Table 2. The fractional logit columns (labelled (ii)) report marginal effects. All specifications include household controls and province-level fixed effects (not reported). Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% levels, respectively.

| | *Deposits* | | *Other Safe Assets* | | *Risky Assets* | |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) | (i) | (ii) |
| Affected·Post | 0.023 | 0.015 | -0.004 | -0.002 | -0.019 | -0.009 |
| | (0.029) | (0.029) | (0.017) | (0.016) | (0.025) | (0.025) |
| Affected | 0.042 | 0.056* | -0.001 | -0.002 | -0.042 | -0.096** |
| | (0.032) | (0.029) | (0.015) | (0.013) | (0.029) | (0.027) |
| Post | 0.061*** | 0.063*** | -0.019 | -0.021 | -0.041** | -0.045** |
| | (0.021) | (0.021) | (0.013) | (0.013) | (0.018) | (0.017) |
| | | | | | | |
| R-squared | 0.283 | 0.122 | 0.045 | 0.031 | 0.294 | 0.137 |
| N | 890 | 890 | 890 | 890 | 890 | 890 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit | OLS | Fractional Logit |

Table 8: Impact of the higher deposit insurance limit on individual portfolio components after accounting for pre-limit increase differences in household characteristics. All specifications include the interaction of pre-change household characteristics with the post-change indicator (similar to Barrot 2016). Specification (i) includes household-level fixed effects, while in specification (ii) the household-level fixed effects are dropped in favor of time-varying household characteristics. Coefficients of household characteristics are not reported for brevity. All specifications include province-level fixed effects (not reported). Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% levels, respectively.

| | *Deposits* | | *Other Safe Assets* | | *Risky Assets* | |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.098*** | -0.071*** | 0.018 | 0.018* | 0.079*** | 0.053*** |
| | (0.029) | (0.019) | (0.014) | (0.011) | (0.027) | (0.019) |
| Affected | | 0.133*** | | -0.003 | | -0.131*** |
| | | (0.016) | | (0.007) | | (0.016) |
| Post | -0.373 | -0.099 | -0.110 | -0.088 | 0.483 | 0.187 |
| | (0.411) | (0.371) | (0.228) | (0.162) | (0.408) | (0.351) |
| R-squared | 0.624 | 0.356 | 0.242 | 0.634 | 0.817 | 0.343 |
| N | 1,766 | 1,766 | 1,766 | 1,766 | 1,766 | 1,766 |

Table 9: Average impact of the higher deposit insurance limit on individual portfolio components calculated via the synthetic control method. A synthetic unaffected household is created for each affected household. Means across the affected and synthetic unaffected control groups are reported. For the "Difference" column, p-values are calculated by a two-sample paired t-test. *** is significant at the 1% level.

| | Affected | Synthetic Unaffected | Difference |
|---|---|---|---|
| Deposits Pre-Change | 0.731 | 0.732 | -0.001 |
| Deposits Post-Change | 0.645 | 0.714 | -0.069*** |
| Difference | -0.086 | -0.018 | -0.068*** |
| | | | |
| Other Safe Assets Pre-Change | 0.046 | 0.052 | -0.006 |
| Other Safe Assets Post-Change | 0.049 | 0.029 | 0.021*** |
| Difference | 0.004 | -0.022 | 0.026*** |
| | | | |
| Risky Assets Pre-Change | 0.223 | 0.223 | 0.000 |
| Risky Assets Post-Change | 0.306 | 0.258 | 0.047*** |
| Difference | 0.082 | 0.035 | 0.047*** |

Table 10: Pre-change (2004) characteristics of affected vs. synthetic unaffected vs. all unaffected households. All reported characteristics are used as covariates in the synthetic control approach.

| | Affected | Synthetic Unaffected | Unaffected |
|---|---|---|---|
| Risky Asset Share | 0.223 | 0.224 | 0.266 |
| ln(Income) | 11.056 | 11.064 | 10.993 |
| ln(Financial Wealth) | 12.685 | 12.635 | 11.871 |
| Home Owner? | 0.935 | 0.966 | 0.962 |
| Home Equity/Financial Wealth | 0.779 | 0.872 | 1.276 |
| Household Size | 2.033 | 2.149 | 2.199 |
| Married? | 0.739 | 0.743 | 0.729 |
| Age | 66.429 | 63.588 | 63.533 |
| Education (High School) | 0.289 | 0.305 | 0.293 |
| Education (Some College) | 0.189 | 0.212 | 0.196 |
| Education (College and Higher) | 0.360 | 0.362 | 0.385 |
| Big City? | 0.468 | 0.349 | 0.406 |
| | | | |
| N | 491 | 491 | 392 |

Table 11: Baseline estimation with home value and home equity (in $100,000) included as explanatory variables. All other definitions are identical to those in Table 2. All specifications include time-varying household characteristics. Standard errors are clustered at the postal code-based region level. ***, is significant at the 1% level.

| | Deposits | Other Safe Assets | Risky Assets |
|---|---|---|---|
| Affected·Post | -0.071*** | 0.011 | 0.059*** |
| | (0.016) | (0.009) | (0.016) |
| Affected | 0.128*** | -0.001 | -0.127*** |
| | (0.016) | (0.007) | (0.016) |
| Post | -0.067*** | -0.004 | 0.071*** |
| | (0.012) | (0.006) | (0.012) |
| Home Value | 0.009 | 0.001 | -0.009 |
| | (0.013) | (0.005) | (0.012) |
| Home Equity | -0.015 | 0.001 | 0.016 |
| | (0.012) | (0.004) | (0.012) |
| | | | |
| R-squared | 0.351 | 0.031 | 0.335 |
| N | 1,766 | 1,766 | 1,766 |

Table 12: Financial advice regressions. The dependent variable is either the total number of times the household sought financial advice in the last 12 months (Panel A) or the total number of times the households sought advice from a depository institution (Panel B). All definitions and specifications are identical to those in Table 2, except a negative binomial specification is used in columns labelled (ii).

| | *Total Advice* | | *Advice from Financial Institutions* | |
|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) |
| Affected·Post | 0.148 | 0.068 | 0.021 | 0.047 |
| | (0.177) | (0.094) | (0.114) | (0.138) |
| Affected | -0.251 | -0.074 | 0.028 | 0.052 |
| | (0.184) | (0.095) | (0.114) | (0.137) |
| Post | -0.122 | -0.055 | -0.043 | -0.059 |
| | (0.137) | (0.079) | (0.089) | (0.112) |
| R-squared | 0.117 | 0.031 | 0.022 | 0.009 |
| N | 1,766 | 1,766 | 1,766 | 1,766 |
| Estimation Method | OLS | Negative Binomial | OLS | Negative Binomial |

Table 13: Re-estimation of baseline specifications with a sub-sample comprising of households that reside in Québec (which is not covered by the MFDA guarantee). All definitions and specifications are identical to those in Table 2. The fractional logit columns (labelled (ii)) report marginal effects. All specifications include household controls (not reported). Standard errors are clustered at the postal code-based region level. ***, ** and * are significant at the 1%, 5% and 10% levels, respectively.

| | *Deposits* | | *Other Safe Assets* | | *Risky Assets* | |
|---|---|---|---|---|---|---|
| | (i) | (ii) | (i) | (ii) | (i) | (ii) |
| Affected·Post | -0.083* | -0.086* | 0.019 | 0.022 | 0.064 | 0.071 |
| | (0.043) | (0.045) | (0.026) | (0.029) | (0.048) | (0.046) |
| Affected | 0.122*** | 0.127*** | 0.004 | 0.003 | -0.127*** | -0.133*** |
| | (0.043) | (0.041) | (0.016) | (0.017) | (0.039) | (0.041) |
| Post | -0.077* | -0.055 | -0.007 | -0.012 | 0.084** | 0.061* |
| | (0.045) | (0.043) | (0.015) | (0.021) | (0.036) | (0.034) |
| R-squared | 0.331 | 0.164 | 0.072 | 0.076 | 0.289 | 0.153 |
| N | 288 | 288 | 288 | 288 | 288 | 288 |
| Estimation Method | OLS | Fractional Logit | OLS | Fractional Logit | OLS | Fractional Logit |

# A Appendix: Unconstrained Three Asset Portfolio

As discussed in Section two, the fact that a household is required to hold a certain amount of insured deposits (i.e., the safe asset) in order to have any uninsured deposits (i.e., the semi-risky asset) can be interpreted as a quantity constraint on the portfolio weight of the safe asset. However, if this quantity constraint is not binding, perhaps due to a low deposit insurance limit, then the household's problem reverts to the standard portfolio problem with two risky assets and one safe asset. The expected return and variance of this portfolio are, respectively, given by $E[R_p] = w_f\mu_f + w_u\mu_u + w_i\mu_i$ and $\sigma_p^2 = [w_f^2\sigma_f^2 + w_u^2\sigma_u^2 + 2w_f w_u \sigma_{u,f}]$.

Such a portfolio can also be written as having one safe and one risky asset, where the single risky asset is a "portfolio" consisting of funds and uninsured deposits. In this case, the expected return becomes $E[R_p] = w_r E[R_r] + (1 - w_r)\mu_i$, where $E[R_r]$ is the expected return on the risky asset portion, $w_r = w_f + w_u$ and $w_i = (1 - w_r)$. The variance is $\sigma_p^2 = w_r^2\sigma_r^2$, which implies $w_r = \sigma_p/\sigma_r$. Substituting $\sigma_p/\sigma_r$ for $w_r$ in $E[R_p]$ yields $E[R_p] = \mu_i + \frac{(E[R_r]-\mu_i)}{\sigma_r}\sigma_p$ and the (standard) result that the efficient portfolio lies somewhere along a capital allocation line (CAL) with intercept $\mu_i$ and slope $(E[R_r] - \mu_i)/\sigma_r$ (i.e., the "Sharpe ratio"). Simplifying the three asset problem in (1) to one with a non-binding constraint:

$$\underset{w_r}{max} \;\; w_r E[R_r] + (1 - w_r)\mu_i - 0.5\lambda w_r^2 \sigma_r^2,$$

and taking its first order condition yields the optimal weight for the risky portion of the portfolio $w_r^* = \frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$. Once $w_r^*$, and hence the location of the portfolio along the CAL, is determined, the optimal allocation between funds and uninsured deposits within the risky portion of the portfolio is found by combining the slope of the CAL with the efficient mean-variance frontier for these two assets.

As seen in Figure A1, the optimal portfolio lies on the steepest possible CAL, which is tangent to both the mean-variance frontier (at point $\boldsymbol{T}$) and the highest possible indifference curve (at a point between $\mu_i$ and $T$, if short-selling is not allowed, such as point $\boldsymbol{O}$).*

The weights of the two risky assets that yield the tangency portfolio along the steepest CAL are found by maximizing the Sharpe ratio:

$$\max_{x_f} \ \frac{x_f\mu_f + (1-x_f)\mu_u - \mu_i}{(x_f^2\sigma_f^2 + (1-x_f)^2\sigma_u^2 + 2x_f(1-x_f)\sigma_{u,f})^{0.5}},$$

where $x_f$ is the weight of funds in the risky portion of the portfolio, implying that $x_f = w_f/w_r$ and $(1-x_f) = w_u/w_r$. The solution to this problem is:

$$x_f^* = \frac{(\mu_f-\mu_i)\sigma_u^2 - (\mu_u-\mu_i)\sigma_{u,f}}{(\mu_f-\mu_i)\sigma_u^2 + (\mu_u-\mu_i)\sigma_f^2 - (\mu_f-\mu_i+\mu_u-\mu_i)\sigma_{u,f}}.$$

Therefore, if the insurance limit is such that the constraint is not binding, the optimal portfolio weights are $w_i^* = 1 - \frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$, $w_f^* = x_f^*\frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$ and $w_u^* = (1-x_f^*)\frac{E[R_r]-\mu_i}{\lambda\sigma_r^2}$.

*Given the nature of mutual funds and uninsured deposits, the generic efficient mean-variance frontier in Figure A1 is drawn according to the plausible assumption that $\rho_{u,f} \neq \pm 1$.

Figure A1: The household's optimal three asset portfolio decision when the "quantity constraint" is not binding