New Evidence on Wealth Inequality in Canada

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Abstract

Measures of wealth inequality are important indicators, but only exist in a handful of countries. I am the first to estimate the distribution of wealth in Canada on an annual basis from 1990-2018. Using the income capitalization method of Saez & Zucman (2016), I find that while the top 1% wealth share rose from 15.3% in 1990 to 19.7% in 2008, the top 1% share has since fallen to 17.5% in 2018. I compare these results to those in the United States and France and find that Canada has much less wealth inequality compared to the US and is in line with France. Using linear decomposition methods, I show that this gap is driven by greater concentration across every asset class and is not driven by a single asset or a different composition of assets held in each country. I investigate this further using the concept of "synthetic savings" to decompose whether the fluctuations in the top 1% share were driven by changes in asset prices or changes to savings behaviour. I find evidence that changes in savings behaviour by the top 1% was more influential in driving the rise and then stagnation of the top 1% share than capital gains. Indications that the decline in the top 1% share is driven by reduced savings behaviour could have important implications for investment, future economic growth and policy.

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1 Introduction

Wealth inequality is a topic of interest for both scholars and the broader public alike, particularly since wealth-to-income ratios in several countries have risen dramatically over the last several decades (Piketty & Zucman, 2014). Despite this interest, relatively little is known about the general trends in wealth inequality because reliable data on wealth at an individual level is hard to come by in the majority of countries. Without this data, it is difficult to determine what drives wealth inequality and what policies should be used to address it.

More recently though, new approaches of gathering data on wealth have been developed, allowing researchers to make progress on these key questions. The *capitalization method*, popularized by Saez & Zucman (2016) and applied to the United States context, is one such advancement that combines individual-level, administrative tax data with aggregate wealth data to determine the distribution of wealth. This is done by translating capital income flows to stocks using internally consistent rates of return by asset type. This new approach has inspired a growing international effort to measure wealth inequality in countries across the world (Garbinti et al., 2020; Martínez-Toledano, 2019).

Cross-country analysis of wealth inequality trends however, remains scarce. One effort on this front is by Blanchet & Martinez-Toledano (2022), who break new ground by creating a set of Distributional Wealth Accounts for countries in Europe. The measures of wealth are applied consistently across countries, which allows for international comparisons both in Europe and with the United States. Blanchet & Martinez-Toledano (2022) find that wealth inequality in the US rose much quicker than in Europe from the 1980s onward. They argue that this is driven primarily by differing labour income share and asset price dynamics across countries which push the European top wealth shares down relative to the US. Whether this holds in other countries more generally has not yet been explored.

This paper contributes to this literature by developing novel Distributional Wealth Accounts for a major, non-European G7 country: Canada. Canada is an interesting country to study in this context because its economy is extremely intertwined with that of the US. Canada and the US share a language, land border and are part of a free-trade zone (NAFTA), where three-quarters of Canadian trade now occurs with the US. As a result, one might expect that Canada's wealth inequality trends might converge to those in the US. This is a phenomenon that is documented when looking at *income* inequality by Saez & Veall (2005). Canada has also seen a massive increase in aggregate wealth over the last few decades, rising from $2.5 trillion in 1990 to $10.3 trillion in 2018.[1] Whether this huge increase in wealth has accrued to those at the top or bottom of the distribution is unclear.

To date, there are no annual measures of wealth inequality for Canada, nor are there estimates of wealth inequality using administrative data. The lack of high-frequency, reliable wealth inequality data stems mainly from the fact that the primary survey on wealth in Canada - the Survey of Financial Security (SFS) - has a small sample size and has only occurred three times from 1984-2018 (in 1999, 2012 and 2016). Research based on the SFS has generally found the level of wealth inequality in Canada to be below that in the United States, however the magnitude of wealth inequality across different approaches has varied widely and little can be gleaned about trends over time (Davies & Di Matteo, 2020; Brzozowski et al., 2010).

To fill this gap, in this paper I estimate the level of wealth inequality in Canada using the capitalization method. I use administrative tax data from the Longitudinal Administrative Databank (LAD) and the National Balance Sheet Accounts (NBSAs) for the years 1990-2018. The annual nature of this data gives unprecedented detail on the trends in wealth inequality over this period, while the LAD, which is a 20% sample of tax-filing Canadian census families, serves as a more reliable portrait of the overall population compared to surveys. Upon capitalizing income flows at an individual level, I then compute the top 1% wealth share in Canada presented in Figure 1.

The first key result is that the top 1% wealth share in Canada is in fact not large by international standards. The top 1% share of 16.3% in 2016 is less than half the top 1% share in the US (Saez & Zucman, 2016) and is slightly lower than in France (Garbinti et al., 2020), which was about 4 percentage points higher in 2014. These results are also closer in magnitude to the raw survey

[1] Adjusted for inflation in 2018 Canadian dollars (CAD); all dollars in this paper are Canadian dollars.

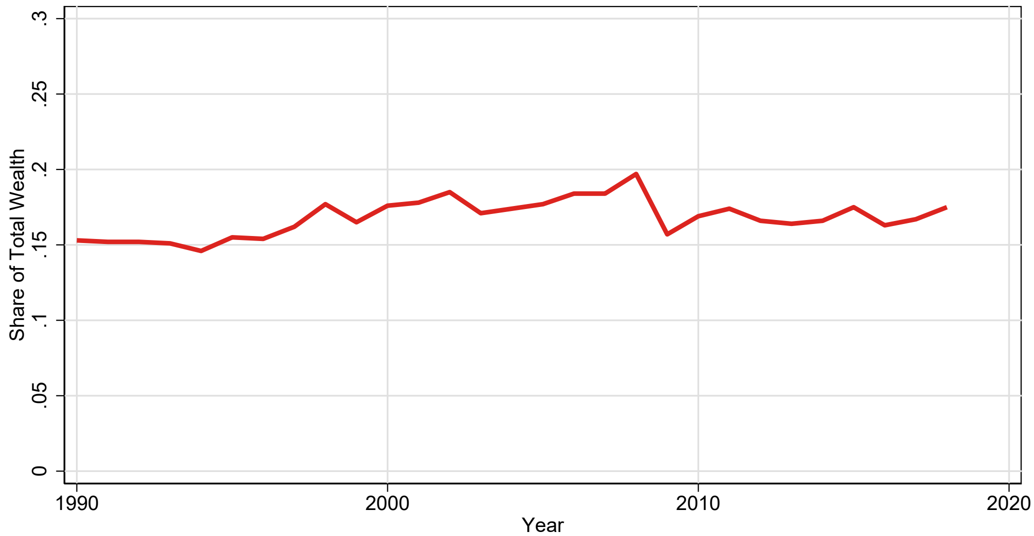

Figure 1: Top 1% Wealth Share in Canada

This figure plots the share of wealth owned by the wealthiest 1% in Canada from 1990-2018 using the capitalization approach from Saez & Zucman (2016). Wealth is inferred based on capital income flows in administrative tax data, the Longitudinal Administrative Databank (LAD), while aggregate wealth is measured in the National Balance Sheet Accounts (NBSAs). The unit of analysis is the census family and so the top 1% refers to the wealthiest 1% of families.

estimates in Canada (13.7%) than the estimates of Davies & Di Matteo (2020) (28.7%), which used a Pareto-interpolation approach. These estimates are robust to numerous alternative approaches in capitalizing different assets.

The second key result is that the massive increase of wealth in Canada has not solely accrued to those at the top of the distribution. The trend in the top 1% share has been modest, going from 15.3% in 1990 to 17.5% in 2018, an increase of 2.2 percentage points. The trend in the rest of the distribution has pointed towards greater equality with a falling Gini coefficient, a decreasing ratio between the wealth held by the 90th and 50th percentiles and median wealth increasing by over 330%. Groups below the 75th percentile have seen a rising wealth share at the expense of those between the 75th percentile and the top 1%.

While the overall increase in the top 1% wealth share is small over the full period, this masks the fact there were two distinct trends. Up until the 2008 recession, the top 1% share was rising at a similar rate to other countries going from 15.3% in 1990 to 19.7% in 2008, an increase of 4.4 percentage points. However, after 2008, the top 1% share declined over the following decade by 2.2 percentage points. This is in contrast to the US and France, who saw slight, continued increases.

In the rest of the paper, I decompose wealth into its various assets and compare the trends to those in other countries. For the differences in levels, one possibility is that the composition of Canadian assets skews towards more broadly held assets compared to the US, like pensions and housing, which could lead to a lower top 1% wealth share even if *within asset* inequality is equal across countries. For instance, in 2016, housing assets in Canada, which are more equally distributed, made up 40% of all assets in the national accounts and business assets, which are less equally distributed, made up 12.7%. In the US, these numbers were 24.6% and 25.8% respectively.

I test for this using linear decomposition methods to create counterfactual top 1% shares. I split each asset's contribution to the top 1% share into the aggregate asset share and the within asset share held by the top 1%. Then, I can create a counterfactual top 1% share using the values from the other country. That is, if Canada had the same aggregate asset mix as the US, I can estimate how much higher the top 1% share would be. I find that while differences in aggregate asset mix explain all the difference between Canada and France, it explains only 20% of the difference between Canada and the US. The remaining difference comes from within asset inequality across all asset types.

For the change in trend around 2008, I look into how much of this is driven by a change in the behaviour of the top 1% or by broader changes to the economy such as asset prices. I start by repeating the linear decomposition exercise from above, but instead I compare the top 1% share in 2008 and 2018 to the counterfactual that the asset mix was the same as in 1990. I find that the changing asset mix and changing within asset inequality contribute equally to the 4.4 p.p increase from 1990-2008, but 68% of the decrease from 2008-2018 is driven by falling within asset inequality. This points to the idea that the wealthiest in Canada were not increasing their share of the wealth on an asset-by-asset level like they were prior to 2008.

To explore this idea in greater detail, I break down the growth in wealth by asset into capital gains and investment. The top 1% wealth share will grow if the top 1% exhibit higher returns to capital or if they have higher savings rates. Using the concept of *synthetic savings* from Saez & Zucman (2016) and information in the national accounts, the change in wealth of different wealth groups can be separated into the portion that can be explained by increasing asset prices or by investment. I find that prior to 2008, the top 1% had a much larger savings rate than those outside the top 1%, but afterwards this gap narrowed considerably. This larger savings rate would serve to increase the top 1% share during this first period and the subsequent narrowing is consistent with the lack of growth in the second period. Capital gains on the other hand are only slightly higher for the top 1% than the rest of the distribution for the entire time. Higher capital gains for the top 1% after 2008 were matched by higher gains for the bottom 99%, mostly driven by high housing prices. Overall, these results suggest that changing investment rates by wealth group have played the most important role in explaining the trends in wealth inequality observed from 1990-2018.

The paper proceeds as follows. Section 2 offers a review of the literature and Section 3 provides an overview of the primary data sources used as well as trends in aggregate wealth and capital income in Canada. Section 4 covers the capitalization method in detail. Section 5 presents the main results, while Section 6 performs analysis on the key drivers of wealth inequality in the country.

2 Literature Review

The literature on wealth inequality has consistently grappled with a fundamental problem - little data on wealth itself. Surveys have typically been the most common and easily accessible source of information, but their reliability has often been called into question - particularly for measuring the wealthiest in the distribution. As a result, alternative methods have routinely been developed to try and gain more accurate insights. Kopczuk & Saez (2004) and Alvaredo et al. (2018) employed a method based on estate tax returns that tries to extrapolate the value of estates to the overall population. Vermeulen (2018) suggests a method that involves using a Pareto-interpolation between domestic wealth surveys and lists of billionaires. This approach is attractive because it can be used with public data, but is also highly sensitive to the estimated Pareto parameters. Some countries happen to have direct measurement of wealth as a result of past wealth taxes, such as in Denmark (Jakobsen et al., 2020; Fagereng et al., 2020; Bach et al., 2020), but this is confined to only a small subset of places.

The most promising recent methodological advancement is the approach of Saez & Zucman (2016). They estimate wealth using the income capitalization technique on administrative tax data in the United States, which allows them to cover a more representative share of the population compared to survey methods. This technique involves estimating an asset yield using economic aggregates and using this yield to infer the level of wealth that generated the observed capital income flow. Others have since followed, such as Garbinti et al. (2020) in France and Martínez-Toledano (2019) in Spain. These efforts have helped contribute to an international effort attempting to better document the level and trends of wealth inequality around the world. This paper serves as an effort to contribute to this effort by applying the capitalization method to a new country - Canada.

Wealth inequality measurement in Canada has been somewhat limited. The Survey of Financial Security (SFS) has only been conducted three times (reliably[2]) since 1984: 1999, 2012 and 2016. The top 1% wealth share based on the SFS is generally thought to be fairly low - around 13.7% in the 2016 public use microfile - causing researchers to look for alternative forms of measurement. Davies & Di Matteo (2020) employed the method from Vermeulen (2018) to those three years and find that wealth inequality is much worse than the raw SFS data would suggest - a top 1% share around 28.7%. This large discrepancy highlights the need for further research to try and reconcile this large gap. In addition, these estimates are not able to provide insight into trends over time since they are based on only three years since 1984. The capitalization method offers an opportunity to address both of these issues and to improve the understanding of wealth inequality in Canada.

[2] The 2005 edition is ignored due to a low sample size (Davies & Di Matteo, 2020)

The improvements made to measuring wealth have also helped improve our understanding of why wealth inequality occurs and changes over time. Empirically, the recent studies have all tried providing explanations for the observed trends. Saez & Zucman (2016) argue that earnings heterogeneity and differential savings rates can account for the differences. Garbinti et al. (2020), Martínez-Toledano (2019) and Kuhn et al. (2020) all point to the role played by asset price fluctuations and portfolio heterogeneity. Fagereng et al. (2020) and Bach et al. (2020) use direct wealth records to highlight the fact that portfolios differ fundamentally across the wealth distribution, with those at the top holding riskier assets with higher returns. Hubmer et al. (2020) uses data from Saez & Zucman (2016) to test various theories and argues that the decline in tax progressivity in the United States led to larger gaps in savings rates between the rich and the poor and increased wealth inequality. This paper contributes further to this growing literature by highlighting the role played by different assets as well as capital gains and differential savings rates in the Canadian context.

3 Wealth in Canada

3.1 Defining Wealth

Before going further, it is necessary to define the concept of wealth. Marketable wealth is the current market value of all assets owned by households minus their debts. The international standards of the System of National Accounts (SNA) limits assets to those "which are subject to ownership rights and from which economic benefits may be derived by their owners by holding them or using them in an economic activity" (United Nations, 2010). This definition of assets omits things such as promises of future government spending (such as government pensions), unfunded pensions, consumer durables and human capital. Using these criteria, in this paper, the following assets make up marketable wealth: public and private equity, currency and deposits, bonds and short-term paper, unincorporated business assets, pension assets, principal residences and other real estate properties, while debts include mortgages and non-mortgage loans.

3.2 Aggregate Wealth in Canada

Data on aggregate wealth in Canada from 1990-2018[3] comes from the National Balance Sheet Accounts (NBSAs), which record the stock of assets and debts in the economy for a variety of sectors. In particular, the focus will be on the household and non-profit institutions serving households sector, which aligns with the definition of wealth above. Within each sector, the NBSAs break wealth down further into different instrument types such as residential structures, debt securities and listed shares, which is instrumental for the capitalization approach. Because the NBSAs follow the "System of National Accounts" (United Nations, 2010) framework, these estimates of aggregate wealth are also comparable to other countries such as the United States, Great Britain and France.

This period provides an interesting backdrop for the study of wealth inequality since aggregate wealth has exploded over this time. Table 1 shows that aggregate wealth in Canada increased by a factor of four in real terms between 1990 and 2018, when it surpassed $10 trillion dollars. The growth in aggregate wealth has remained steady for most of the period, with average growth rates above 4% for each of the seven year periods. The growth in wealth has also been disproportionate to income. The capital to income ratio in Canada has grown from almost 300% to over 700% of national income. Naturally, the average family net worth has also risen over this period, with the average currently at $608,849 per family. All of this is happening while the aggregate household savings rate, measured in the Current and Capital Account for households, has been declining. This suggests that rising savings in the household sector as a whole cannot explain the increase in aggregate wealth and that other factors, such as capital gains, may be important.

To better understand where this upward trend in aggregate wealth is coming from, it is useful to look at its component parts. Figure 2 plots aggregate wealth over time, broken up into six assets groupings. Net housing wealth is measured as the value of residential structures and land minus mortgages. According to the Survey of Financial Security (SFS), around 80% of net housing wealth

[3] This period is chosen because in 2012, revised estimates of the NBSAs were published going back only to 1990 and in this way, the series can only remain consistent up until then.

	Years				
	1990	1997	2004	2011	2018
Total Net Worth (in Millions)	2,518,539	3,827,947	5,018,988	7,265,858	10,296,541
Average Growth Rate (%)	.	6.21	4.03	5.56	5.14
Capital to Income Ratio	298%	435%	472%	575%	716%
Average Net Worth	219,029	296,278	362,285	474,579	608,848
Average Savings Rate (%)	13.10	10.21	4.29	3.57	3.30
Number Of Families	11,498,655	12,920,130	13,853,690	15,310,115	16,911,505

Dollar variables expressed in 2018 CAD $

Table 1: Net Worth Summary Statistics

This table presents summary statistics of household net worth for five individual years. Aggregate net worth is computed using data from the National Balance Sheet Accounts (NBSAs). Aggregate net worth, expressed in millions, totalled $10.3 trillion CAD in 2018. The average in the growth and savings rate refers to the average over the preceding seven years. The savings rate is presented from the household's current and capital account, which also is part of the system of national accounts. The capital to income ratio (K/Y) is the ratio of total net worth to income. Average net worth is with respect to the family unit.

is attributable to principal residences, with the remainder categorized as other or secondary real estate. Pensions include trusteed pension plans and registered retirement savings plans (RRSPs) and do not include unfunded pension plans.[4] Unincorporated business assets are defined narrowly in this exercise because the NBSAs do not separate non-corporate business activity from the household sector. As a result, this category considers capital assets owned by households for the purposes of operating a business. This includes machinery, non-residential structures and intellectual property and subtracts non-mortgage loans, but does not include assets such as bank deposits, land or equities since these are just attributed to the household itself. The last two

[4] This pension breakdown does not actually appear in the NBSAs themselves, but rather in a supplement called the Pension Satellite Account. While consistent with the NBSAs, this does have a couple implications. First, the aggregate net worth total in the data is slightly different from the one seen in the NBSAs due to the omission of certain pension related assets such as life insurance (as well as the inclusion of consumer durables in the NBSAs). Second, RRSPs are counted in the NBSAs not as a unique instrument, but instead in its component parts, which are mainly equities, bonds and cash. To assign these as a pension asset, I subtract the value of RRSPs from the NBSAs assuming that RRSPs have a similar portfolio structure to the NBSAs as a whole - an assumption that is supported by a recent survey of RRSP portfolios (Link Here)

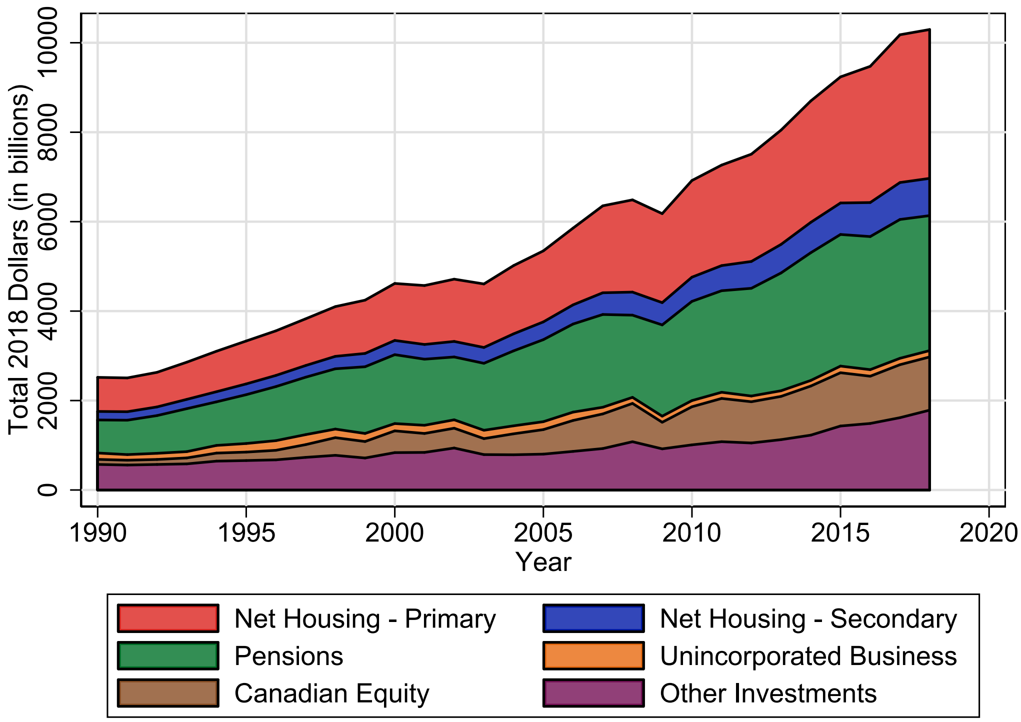

Figure 2: Aggregate Household Wealth in Canada - 1990-2018

This figure depicts the level and composition of household wealth in Canada from 1990-2018 in 2018 CAD. Net housing is the value of the land and residential structures minus mortgages and split into primary residences and secondary residences (all other real estate). Pensions includes employer-pension plans and registered savings plans (eg. RRSPs). Unincorporated business wealth are assets owned by households and used for non-corporate business (this includes machinery, non-residential structures, intellectual property and receivables) net of non-mortgage loans. Canadian equity refers to listed and unlisted shares of Canadian corporations. Other investments captures currency, deposits, debt securities (eg. bonds) and foreign equity. The later two categories refer to assets held both directly and through mutual funds, but not through RRSPs.

categories are Canadian equity and other investments. Canadian equity is comprised of listed and unlisted shares while other investments captures currency, deposits and debt securities (eg. bonds). Both these assets include directly held assets and those held through mutual funds, but do not include assets held in RRSPs.[5]

A major takeaway from Figure 2 is the key role played by housing. Net housing wealth has increased from \$950 billion in 1990 to over \$4 trillion in 2018 CAD, which is consistent with the rise of Canadian home values - the Canadian home price index shows that the price of a home has tripled since 2000. However, housing alone is not driving the trend in aggregate wealth. Both

[5]Mutual funds held by the household are assigned to the various instruments (eg. listed shares) using the breakdown of assets held by mutual funds as recorded in the mutual fund sector account.

housing and pensions have been growing at a similar rate and have maintained a consistent share of aggregate wealth over the period. Housing has remained between 34-40% of aggregate wealth, while pensions have hovered around 30%.

That is not to say that there has not been any change to the aggregate wealth portfolio, as Canadian equities have increased dramatically during this period. In 1990, Canadian equities directly held by households were worth only $112 billion, while in 2018, this number was $1.2 trillion - ten times the amount from almost thirty years prior. This change boosted the equity share of aggregate wealth from 4.4% to 11.6%. Most of this came at the expense of unincorporated business assets, which fell from 5.6% to 1.4%, and other investments, which fell from 22.7% to 17.3% of aggregate wealth. The decline in unincorporated business wealth reflects a growing trend towards incorporation among sole proprietors.

The important takeaway from this section is the remarkable increase in wealth from 1990 to 2018, but this aggregate data says nothing about how this wealth was distributed. It is on this front that information is fairly limited. There have been a couple Surveys of Financial Security (SFSs) in 1999, 2012 and 2016, but these surveys can be unreliable in capturing the wealthiest families and the sparse nature of the data - only capturing three years - makes drawing conclusions on trends in the distribution of wealth challenging. It is here, where this paper tries to fill an important gap in better understanding how equally this explosion of aggregate wealth in Canada was distributed.

3.3 Capital Income in Canada

While capital income is a flow and not a stock like wealth, the two are related and data on the distribution of capital income is much more reliable because it is reported on tax forms. In Canada, this capital income data comes from the Longitudinal Administrative Databank (LAD). The LAD is a 20% sample of the annual T1 Family File (T1FF) of Canadian taxpayers, which amounts to over 5.6 million individual observations in 2018. The T1 Family File covers all taxpayers who have a social insurance number (SIN) and creates Census families that link together parents and

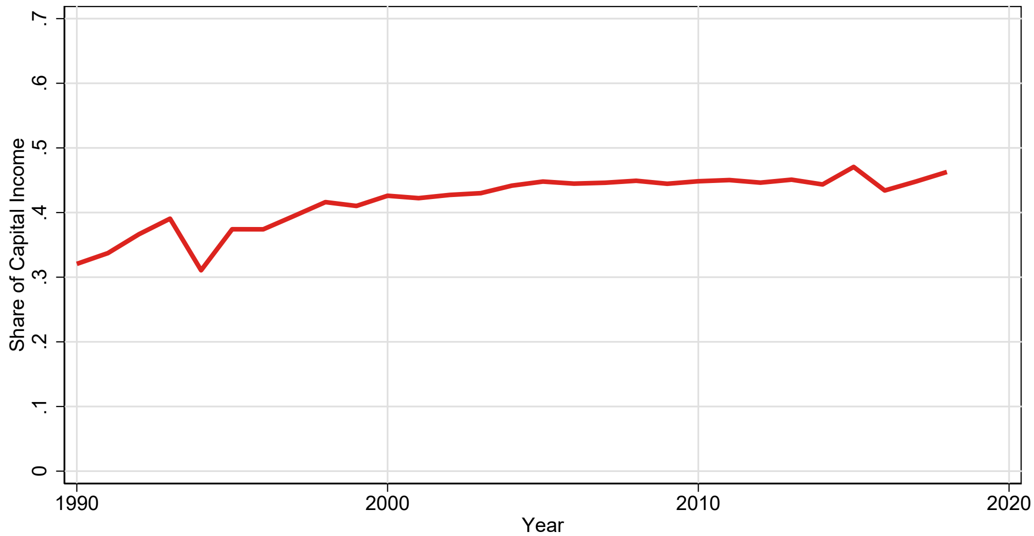

Figure 3: Top 1% Share of Capital Income

This figure depicts the share of capital income earned by the top 1% of capital earners. Capital income is made up of self-employment income, dividends, capital gains, net rental income and interest and other investment income. Data comes from the Longitudinal Administrative Databank (LAD) for the years 1990-2018.

children through information provided on the tax form.[6] Census families are comprised of either unattached individuals or a married couple, both including their unmarried children if any.[7] I will use the Census family as the unit of analysis because some forms of wealth, like housing, are difficult to allocate to just one individual in a household.

While the the concentration of capital income has remained fairly stable in recent years, the nature of capital income has changed dramatically between 1990 and 2018. Figure 3 plots the share of capital income going to the top 1% of capital income earners. Capital income concentration rose in the 1990s, from 32.0% in 1990 to 42.6% in 2000, but it has remained around 45% since then. This relatively stable trend masks substantial changes to the overall composition of capital income. In 1990, in an era when the prime lending rate was over 14% (Bank of Canada, 2021), interest and other investment income (which includes deposits and bonds) made up 42% of all capital income. By 2017, with the prime rate down to 2.7%, investment income made up only

[6]This means that under the family variable for each individual in the LAD, the family's total income is pulled from the T1FF.

[7]This definition includes unmarried, adult children who continue to reside at the same residence as their parents regardless of age.

6.5% of all capital income. Dividends (from 10.7% to 35%) and capital gains (from 13.6% to 31.9%) have made up the difference.

These large changes to the aggregate composition of capital income mean that we should not take the concentration of capital income shown here as representative of the top 1% wealth share. That is because each type of capital income reflects a different level of asset wealth. For example, a bond that generates $10 in income at a 1% interest rate is worth $1,000, while a stock that provides a $10 dividend at a 5% rate of return might be worth only $200. That means that even though the top capital income earners' share of capital income is rising, it may not reflect a larger share of assets if that income is generated from higher return assets like stocks. This is the key principle of income capitalization - if one knows the rate of return on different asset classes, they can infer the level of wealth based on the capital income flow. This process will be described in detail in the next section.

4 Method

4.1 Capitalization Method

The income capitalization method is an approach to convert capital income flows into the stock value of an asset - and a form of marketable wealth. Suppose we have an asset j and a distribution of agents $i \in \{1, ..., k\}$. The stock of asset j, held by individual i is W_j^i. This is connected to the capital income flow from asset j received by individual i, I_j^i, through the annual return of that individual's asset, r_j^i. This can be written in the following way:

$$r_j^i W_j^i = I_j^i \implies W_j^i = \frac{1}{r_j^i} I_j^i = \beta_j^i I_j^i$$

Here, β_j^i is called the *capitalization factor*, which is the inverse of the annual return for that asset. An individual's total wealth, W^i, is the sum of the holdings of each asset type.

$$W^i = \sum_j \beta_j^i I_j^i$$

This equation tells us that we can infer the wealth of an individual based on their capital income if we can estimate these annual returns for different assets. However, the primary challenge when using this method is that it is impossible to know the exact annual return received by each individual and each asset. To deal with this, I follow Saez & Zucman (2016) in making a simplifying assumption: the annual return for each asset is constant across all individuals, $r_j^i = r_j$.

Annual returns by asset, r_j, are computed using aggregate wealth data from the NBSAs and aggregate capital income flows from the LAD. To do this, capital income flows from the LAD are matched with categories of assets in the NBSAs - a process presented in Table 2. As an example, for Canadian equity, the relevant NBSA variables are listed and unlisted shares, while the two sources of capital income from owning shares are dividends and capital gains, which are reported in the LAD. Then, to get the rate of return by asset, the aggregate capital income flow is divided by the aggregate of the corresponding stock in the NBSA. In the case of Canadian equity, in 2018, the combined rate of return of dividends and capital gains on listed and unlisted shares is 13.8%. The capitalization factor, which is the inverse, is then 7.2. On the other hand, for the other investments category that comprises mostly of bonds and deposits, the rate of return is only 1% in 2018, down from 9.7% in 1990, which coincides with the secular decline in interest rates over the period. This approach for estimating returns is useful for two main reasons. First, it allows for a consistent approach across assets in estimating returns. That is, rather than relying on asset-specific estimates from a collection of sources that use different methods, here it is consistent across all assets. Second, using this approach, the total wealth is going to be consistent with the total wealth in the NBSAs. This is because the constant used to scale income to wealth is exactly the ratio of aggregate wealth from the NBSAs to aggregate income.

Categories	NBSA Variables	LAD Variables
Canadian Equity	Listed Shares Unlisted Shares	Eligible Canadian Dividends Non-Eligible Canadian Dividends Capital Gains
Other Investments	Currency and Deposits Debt Securities (Bonds) Foreign Equity	Interest and Other Investment Income
Unincorporated Business	Non-Residential Property Machinery Inventories Intellectual Property Other Receivables (Minus) Non-Mortgage Loans	Self-Employment Income
Pensions	Registered Pension Plans Registered Retirement Savings Plans	No Direct Capital Income Flow
Primary Residences	Residential Structures Land	No Direct Capital Income Flow
Other Real Estate	(Minus) Mortgages	Net Rental Income

Table 2: Categorization of Assets

4.2 Limitations of the Capitalization Method

While the capitalization method works well for a number of assets, there are a couple situations that require further attention. The first is that some assets do not generate capital income flows, such as principal residences or pensions. This means that there is nothing on the tax form to capitalize into wealth and so the capitalization method cannot be applied. The second limitation to address is the issue of heterogeneous returns. The standard approach operates under the assumption of homogeneous returns for a given asset class, which can be computed using aggregate data. In many cases this is a reasonable assumption, such as a particular stock that pays out the same dividend to all shareholders, but sometimes it is not, especially when a category of wealth comprises many different kinds of assets. These next sections will address these issues and the solutions implemented for them.

4.2.1 Assets With No Capital Income Flows

When there are no capital income flows for an asset, the values can be imputed based on existing survey data. However, the objective of this imputation differs from a standard prediction problem because the objective is to replicate the *distribution* of assets rather than to minimize the squared error at the individual level. As a result, a simple linear regression approach is not suitable here. Instead, I estimate the conditional distribution of housing and pensions using distribution regression techniques on the SFS and then impute the value of assets in the LAD by drawing from a family's predicted conditional distribution.

The following serves as a brief overview of distribution regression; for a more complete explanation see Chernozhukov et al. (2020). Distribution regression allows for the generalization from a univariate cumulative distribution function (CDF) to a conditional CDF. We can write the conditional distribution of Y as a function of covariates X as follows:

$$F_{Y|X}(y \mid x) = E[\mathbb{1}(Y \leq y) \mid X = x]$$

The distribution regression model can then be written as:

$$F_{Y|X}(y \mid x) = \Lambda\left(x'\beta(y)\right)$$

where $\Lambda(\cdot)$ is a link function - in the case of this paper, the logit transformation, x is a vector of covariates, and $\beta(y)$ is an unknown vector of coefficients that depends on the value of y.[8] If we think in terms of a single threshold y, then this is just a binary regression of whether one is above or below that threshold. Doing so for many thresholds yields the distribution regression model.

This object is useful because it can be inverted to yield the conditional quantile function.[9] With the conditional quantile function, I can then predict the value of the asset at each percentile $p \in \{0, 0.01, ...0.99, 1\}$ for each family. It is then straightforward to draw from a uniform distribution, $p \sim U[0, 1]$, for each family and assign the value of the asset that corresponds to that percentile drawn. This way, the resulting distribution of the asset will be preserved.

[8] In the context of this paper, because y is a continuous variable (eg. housing value), it will be approximated using a series of 100 grid points at each percentile of y

[9] This approach is theoretically equivalent to estimating a quantile regression directly in large enough samples. However, the distribution regression is faster to run computationally and more flexible (Chernozhukov et al., 2020).

The distribution regression model can be estimated by maximum likelihood using the SFS. The SFS is appropriate in this case because, unlike dividends and capital gains, pensions and principal housing wealth are fairly uniformly distributed across the population and there is less reason to believe that these assets are being under-counted at the top. In this case, registered pensions have contribution limits that restrict the level of pension wealth and principal residences have easily verifiable values. I model net housing prices (value of principal residence - mortgage) as a linear function of market income, age, age-squared, family indicators and city fixed-effects for the 15 largest cities in Canada. For pensions, I compute the family pension value per person and model it as a quadratic function of average age, and a linear function of income, pension contributions and pension income (both employer pensions and RRSPs). Using the estimates from the SFS, I then predict the conditional quantiles in the LAD using the common covariates.[10]

This method does a good job replicating the distribution of housing in the LAD that is found in the SFS, especially compared to some more rudimentary alternatives. Table 3 reports the share of housing wealth going to the top 1% by total wealth across two different imputation methods and compares the results to the share observed in the SFS. In the first column, housing values are assigned based on the average housing value in the census tract of residence obtained from the Canadian Census Profiles. In Canada, a census tract comprises 2,500 to 8,000 people and there are around 5,000 of them across the country. To deal with the fact that not everyone in a census tract owns a home, the share of home ownership is measured for each census tract and families are sorted based on wealth within a census tract. Then, the share of home ownership is used as the percentile cutoff for assigning the average home value. That is, if the census tract home ownership rate is 65%, then those above the 35th percentile of non-housing wealth in the census tract are assigned the average census tract value and those below are assigned a value of zero. While this approach can get geographically specific values, the data itself does not capture mortgages (which are larger at the bottom of the distribution) and the method of assigning ownership as well as the

[10] I use SFS estimates from the nearest year to the LAD year in question. That is, I use the 1999 SFS estimates for all LAD years prior to 2006. I then re-scale housing and pension values so that they add up to the aggregate wealth value in the NBSAs for that year, which functions as a quasi-inflation adjustment.

	Variations		
	Census Profiles	SFS Imputation	SFS Values
1999	2.90	4.80	5.59
2012	2.80	4.50	5.63
2016	3.20	4.80	6.66

Table 3: Comparing Top 1% Share of Housing Across Imputation Approaches

This table compares tow different approaches to imputing housing wealth to the Survey of Financial Security (SFS) true values (column 3) by comparing the share of total housing wealth owned by the wealthiest 1%. The first method involves assigning the average housing value of a census tract to those that live there (column 1). The second employs the distribution regression approach described in Section 4.2.1 (column 2). The distribution regression approach generates housing estimates at the top much closer to what is observed in the actual SFS.

lack of variation in imputed values likely leads to an underestimate of top share housing wealth.

The second column, the distribution regression approach described above, does a much better job of matching the true SFS values for housing (reported in column 3). There are a couple reasons this approach is useful compared to more non-parametric approaches such as in column 1 or as employed by Garbinti et al. (2020).[11] First, the method does a good job dealing with zero values, which is often a challenge in a linear regression model or even tobit and hurdle models. This is because the conditional quantile function can yield many predicted quantiles of 0 for families, giving a high likelihood of drawing a zero value for some families. Second, in non-parametric approaches that use bins, there is a concern of no within-group variation. This will reduce the level of variation and inequality generated. Last, the model provides the opportunity to include several covariates to increase predictive power - including city fixed-effects. Better prediction may not necessarily change the overall distribution, but does raise confidence in the approach. In addition, the parametric assumptions made for housing values are fairly reasonable: housing wealth is linear market income and quadratic in age.

[11] In Garbinti et al. (2020), they employ a non-parametric approach where people are assigned to around 200 bins based on income and age. Then using the share of people holding an asset in each bin, they randomly draw to see if the average value should be assigned. In their refined method, they do allow values in the bin to vary according to the observed distribution as well.

4.2.2 Heterogeneous Returns

The assumption of homogeneous returns for the capitalization method is a strong one that does not always hold for certain asset classes. Heterogeneous returns arise within an asset class because it is infeasible to measure each unique asset, and its corresponding return, and therefore assets are lumped together into broader categories. For example, in the Canadian context, interest and investment income - the line item on the tax form - includes all of the following: Canada Savings Bonds, corporate bonds, trusts, bank or other deposits, mortgages, notes, foreign interest, foreign dividend income and other property. It is clear that not all these assets generate the same rates of return. This in and of itself is not a problem, provided that the rates of return generated on average are constant across the distribution of wealth. Where it becomes an issue is if they are; for example, if the rich own more corporate bonds relative to deposits, which is surely the case. This is a problem because the amount of wealth inferred from the capital income stream, based on a single rate of return will then be incorrect and lead to bias in the overall wealth shares. Suppose a wealthy individual holds a corporate bond worth \$100 and receives \$5 of interest income at a 5% rate of return. Then suppose a middle-class individual holds \$500 in a savings account that generates 1% interest, which is a \$5 capital income flow. The aggregate rate of return, r_j, if assuming homogeneous returns would be 1.67% and the inferred wealth of each individual would be \$300 each. This example illustrates that if average returns are positively correlated with wealth, the homogeneous returns assumption would overstate wealth inequality. That said, there are approaches to handle this issue.

There has been some debate in the literature on how exactly to address this issue though. Smith et al. (2020) first raised this issue in the context of the United States, where they showed that correcting for it significantly lowered the top 1% share of wealth when compared to the estimates from Saez & Zucman (2016). Their correction involved taking a stance on what the rate of return was for the rich in the fixed income claims asset category (which is similar to the interest and other investment income category in Canada). They argued that the rate of return on the Moody's AAA corporate bond, which averaged 6.0% in the 2000s and 4.2% from 2010-2016, is a good proxy for the top 0.1% and the 10-year US treasury bond for the next 0.9%. They then capitalize the income of these groups according to those returns and then compute the residual rate of return for the remaining population, which is close to 0.

Saez & Zucman (2020) argue that this correction is excessive and does not line up with the data. They argue that there is no evidence that suggests an interest rate premium for the wealthiest that is close to the Moody's AAA corporate bond rate. At most, they find that the interest rate of the top 1% wealthiest households is 1.4 times higher than the average after 2008, which is far below the Moody's rate. In 2016, for example, the Moody's rate was 4% and Saez & Zucman (2020) estimate the top 1% rate to be 2.0% in the Survey of Consumer Finances compared to an average rate of 1.5%. One reason for the disagreement is that Smith et al. (2020) apply the Moody's rate to the top 1% of *interest* income earners rather than the wealthiest 1%. However, this approach is flawed. As discussed above, what matters for wealth shares is that rates of return not be correlated by wealth, not interest income. Saez & Zucman (2020) show that the Smith et al. (2020) method leads to a downward bias in top wealth shares.

As a result, in this paper I follow the correction proposed in Saez & Zucman (2020) for my preferred estimate of other investments. However, because I cannot perform the same analysis of rates of return by wealth in the SFS as was done in the SCF, I will assume the same interest rate premium for the wealthy, 1.4 times, as was found in the United States. This assumption is reasonable for a couple reasons. First, interest rates have followed a similar path in Canada and the United States since the Great Recession. Second, with global capital markets, the wealthiest Canadians have access to many of the same corporate bonds and financial instruments as their American counterparts and likely share similar portfolio strategies.

5 Wealth Inequality in Canada

5.1 Top Wealth Shares

Using the capitalization method and the adjustments described above, I estimate the share of wealth for a number of wealth groups in the population. The results are presented in Figure 4. There are a few important observations. First, top wealth shares have not increased substantially over this period. The top 1% share rose only from 15.3% to 17.5% from 1990 to 2018, a very slight increase. While the top 1% do own a large share of overall household wealth, these results suggest that concerns over dramatically *worsening* wealth inequality in Canada may be overblown. Second, most of the movement observed in the top 1% over this period, as seen in Figure 1, is driven by the top 0.1%. The top 0.1% saw an increase in wealth from 4.5% of total wealth in 1990 to 7.8% in 2011 before dropping to 6.4% in 2018. The next 0.9% on the other hand was fairly steady for most of this period, hovering between 10.1% and 11.9%. This suggests that while the top 1% is a popular subgroup, most of the movement is actually happening amongst the very wealthy. The top 0.1% in 2018 was comprised of just under 17,000 families, with a threshold wealth level of $16,779,000 and average wealth of $39 million. Finally, when the top 0.1% share was rising dramatically up to 2011, most of these gains came at the expense of those near the top rather than those at the bottom. The 95th-99th percentile group fell from 21.3% to 19.8% during this period, while the 90-95 group fell from 15.7% to 14.4%. The bottom 75% actually rose during this period from 21.3% to 23.1%.

These results are not overly sensitive to choices around how to compute wealth. Figure 5 plots a number of alternative measures of the top 1% wealth share. The first alternative is where returns in the interest and other investment category are assumed to be homogeneous. Since the correction proposed by Saez & Zucman (2020) only applies after the Great Recession, the difference only emerges in more recent years. As expected, the top 1% wealth share is higher when all returns are treated equally, but never by more than 2 percentage points and the trend is preserved. On the other side is the correction proposed by Smith et al. (2020), where the Moody's AAA corporate

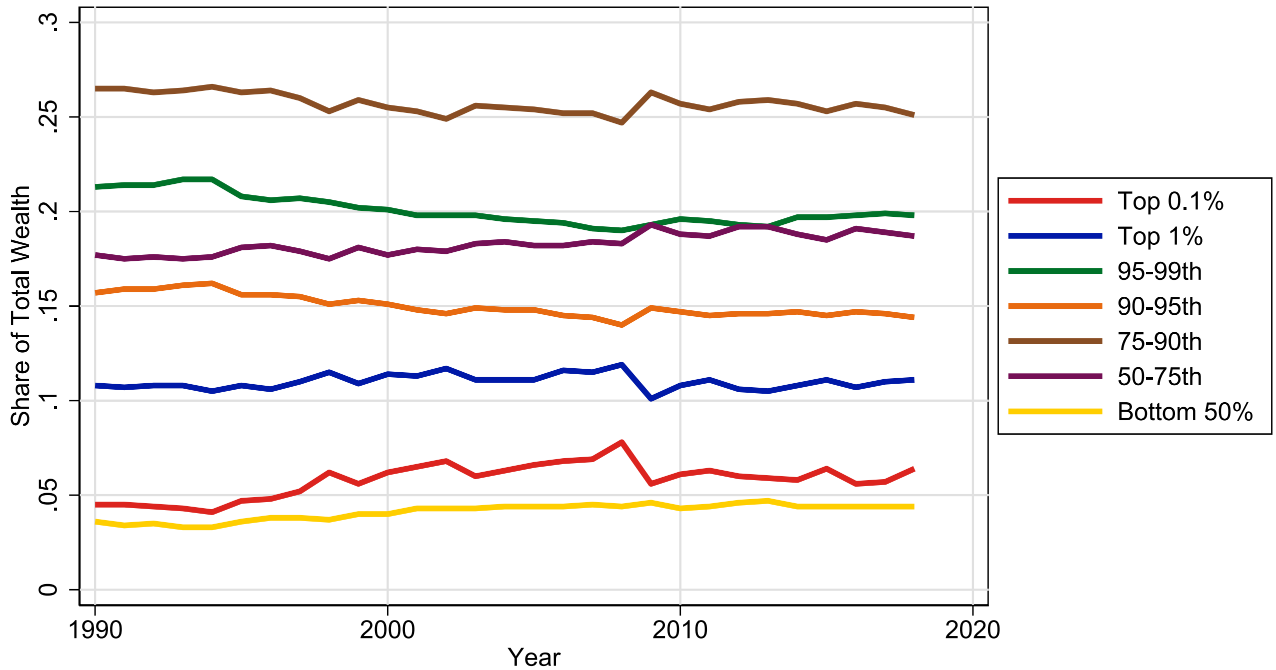

Figure 4: Share of Wealth Held By Various Wealth Groups

This figure presents the share of wealth held by a variety of wealth groupings in Canada from 1990-2018 using the capitalization method from Saez & Zucman (2016). Wealth is inferred based on capital income flows in administrative tax data, the Longitudinal Administrative Databank (LAD), while aggregate wealth is measured in the National Balance Sheet Accounts (NBSAs). The unit of analysis is the census family and so the top 0.1% refers to the wealthiest 0.1% of families.

bond rate is used to capitalize the top 0.1% share and the 10-year Canadian government bond rate is used for the next 0.9%. This leads to a lower top 1% share in every year, but again is never more than 3 p.p. below the preferred estimate and the trend the same. While these adjustments do impact the share of other investments going to the wealthiest 1%, one reason it does not have a large impact on the share of wealth is because these assets only make up around one-fifth of all assets.

Two other alternatives generate very similar estimates to the preferred estimate. The first involves capitalizing dividends only, which yields very similar results except for in 1994, which was a big year for capital gains due to a policy change. The other is the estimate of wealth that uses census tract housing values as a proxy for housing wealth as described in Section 4.2.1. Since housing wealth is not very prominent in the portfolio of the top 1%, the difference in housing

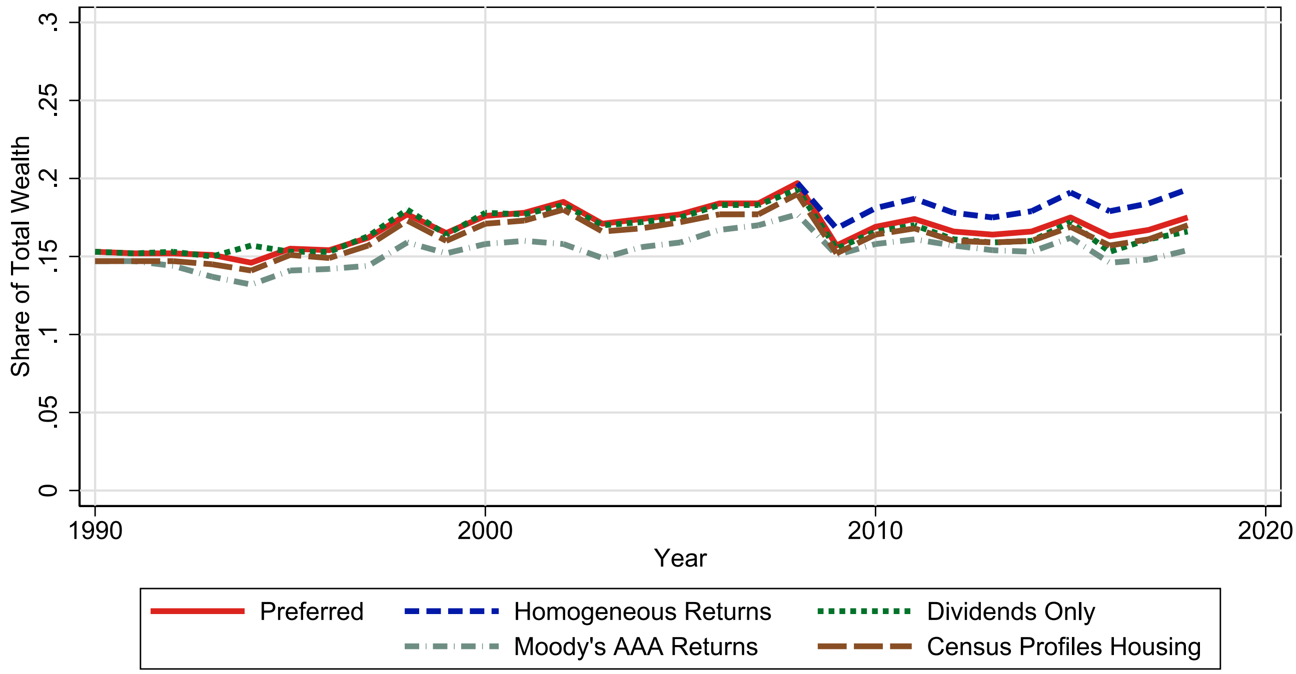

Figure 5: Alternative Estimates of the Top 1% Share

This figure presents the share of wealth held by the wealthiest 1% in Canada from 1990-2018 using different assumptions when capitalizing income. The homogeneous returns variation refers to when the interest and other investments category is capitalized using a single capitalization factor - rather than apply the correction proposed by Saez & Zucman (2020). The Moody's AAA variation refers to the method done by Smith et al. (2020) to correct for heterogeneous returns to fixed income claims. Dividends only means that Canadian equity is inferred from dividends only and not capital gains. Census Profiles Housing is the approach outlined in Section 4.2.1, where housing is assigned based on the average of the census tract of residence.

wealth assigned across methods has a minimal effect on the total wealth share. All together, these results suggest that the preferred estimate is fairly robust to alternative specifications.

These results also indicate that perhaps the raw survey estimates from the SFS do not underestimate the top 1% wealth share as much as is speculated. Figure 6 plots the top 1% wealth share in Canada from a variety of existing estimates. The first set of estimates come from the Survey of Financial Security (SFS). There is the public SFS microdata file (PUMF) and the restricted access version, where values are not top-coded and greater detail is provided. The second set of estimates are based off the method outlined by Vermeulen (2018), where lists of the richest individuals - Forbes in the United States and the Canadian Business Magazine in Canada - are spliced together with wealth surveys, fitted with a Pareto-interpolation and then used to compute

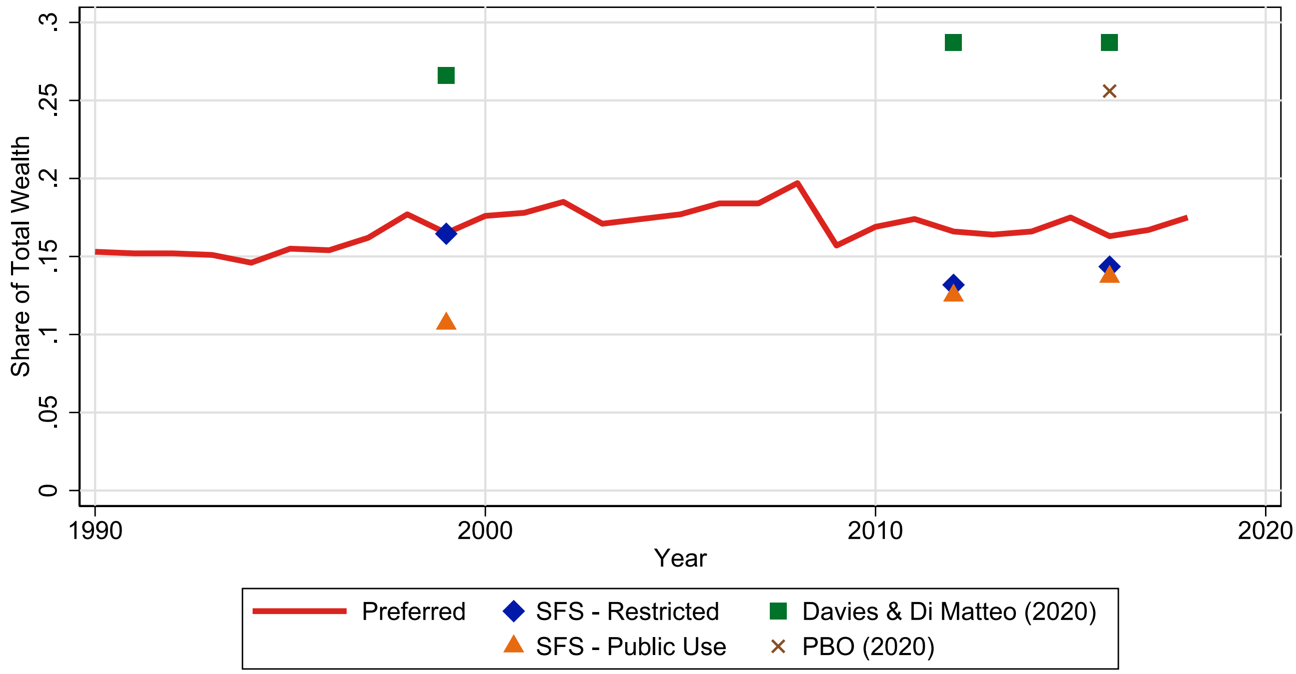

Figure 6: Comparing Canadian Estimates of the Top 1% Wealth Share

This figure presents the share of wealth held by the wealthiest 1% in Canada from 1990-2018 from different sources. The preferred estimate comes from using the capitalization method on administrative tax data. The Survey of Financial Security (SFS) data is available publicly, but values are top-coded so there is also a restricted version that is not top-coded plotted here. Davies & Di Matteo (2020) use Pareto-interpolation methods between the SFS and the billionaire "rich lists" from the Canadian Business Magazine, while the Parliamentary Budget Officer (PBO) (Wodrich & Worswick, 2020) did a similar exercise that includes employer pensions.

wealth shares. Davies & Di Matteo (2020) do this for Canada, although because they compare over a long time horizon, they omit employer pension plans, which were not available earlier in the data. The Parliamentary Budget Officer (Wodrich & Worswick, 2020) used a similar strategy that does include pensions and provide a public dataset that is replicated here.

There are a few important takeaways from this graph. First, there is obvious value to having an annual wealth trend. Since the survey data are only available for three years between 1990-2018, it is difficult to deduce any trend in the survey-based estimates. With the capitalization method, a more complete picture can be formed. Second, the estimates using the capitalization method are much closer in magnitude to the raw survey estimates than the Pareto-interpolated ones. One reason for this is that pensions and principal residences, which make up 70% of aggregate wealth are imputed based off the SFS data. However, these results suggest that perhaps the SFS does not do that poorly at approximating the wealth of the top 1% either. While top-coding appears to have played a role in 1999, as evidenced by the gap between the public use SFS and the restricted access one[12], there appears to be less of a difference in 2012 and 2016. When applying the capitalization method, which theoretically does a better job of capturing large wealth values, the top 1% wealth share only increases slightly compared to the SFS estimates.

On the other side are the Pareto-interpolated estimates, which seem to over-estimate the level of wealth inequality relative to the capitalization method. One reason for this could be the definition of wealth used in both cases. The definition of wealth used by Davies & Di Matteo (2020) omits employer pension plans, which are a substantial portion of total wealth - 19% in the NBSA in 2016. The PBO estimate, which does not omit pensions, is 3 p.p. lower. In addition, the billionaire lists seem to use a broader concept of wealth than the one employed in this paper. Forbes says that they include "art, yachts, planes, ranches, vineyards, jewelry, car collections and more" in their definition of wealth for billionaires. However, this paper does not count consumer durables or vehicles in its definition of wealth, nor expensive art or jewelry.[13]

Overall, the capitalization method results fall somewhat in between the two sets of estimates, but follow the raw SFS estimates more closely. This suggests that top wealth shares are on the lower end of previous estimates and that there is little evidence of runaway wealth inequality in recent years. It also means that the raw SFS estimates of top wealth shares do not underestimate the level of wealth inequality as much as previously thought.

5.2 Other Measures

Wealth shares represent one measure of wealth inequality, but there are others. Table 4 presents some important alternative measures of wealth inequality over this period. The Gini coefficient, which ranges from 0 to 1, with 0 being completely equal and 1 meaning one person holds all

[12] This gap is discussed in detail by Brzozowski et al. (2010)

[13] While this closes some of the difference between the approaches, there would still be a gap. Some of this remaining discrepancy could be attributable to differences in how the value of equities held by billionaires is calculated. Another plausible explanation is that the assumption of a constant Pareto coefficient across the top of the wealth distribution does not hold perfectly.

	Years				
	1990	1997	2004	2011	2018
On Aggregate					
Gini Coefficient	0.711	0.710	0.701	0.698	0.699
90/50 Ratio	7.9	7.3	6.5	6.3	6.1
Median Wealth	72,117	104,012	137,692	183,351	239,000
N	11,498,655	12,920,130	13,853,690	15,310,120	16,911,500
Top 0.1%					
Wealth %	4.5	5.2	6.3	6.3	6.4
Threshold	5,216,488	7,396,588	9,995,430	13,486,392	16,779,000
Mean	9,855,151	15,400,636	22,821,816	29,898,698	38,958,240

Dollar variables expressed in 2018 CAD $

Table 4: Wealth Inequality Measures

This table presents some key measures of wealth inequality in Canada for five years from 1990-2018 using the wealth estimates from this paper. The Gini coefficient is measured on a scale of 0 to 1, with higher numbers meaning more inequality. The 90-50 ratio is the ratio between the threshold for the 90th percentile and the median. N represents the number of families.

the wealth, is a more general indicator of inequality that is not solely focused on the very top. According to this Gini coefficient, wealth inequality has been steadily falling over the course of the period. Another measure that can be informative about wealth inequality is the ratio of the 90th percentile threshold to the median. This measure, like the Gini coefficient, also has been declining over time, which suggests there is compression of the wealth distribution over this period.

These results are not necessarily contradicting the trends in wealth shares from Figure 4. The Gini coefficient is capturing the fact that, although the top 0.1% share rose over this period, it rose at the expense of the next 9.9% of the distribution, while the wealth of those in the bottom 75% saw a relative increase over this period. Similarly, the 90-50 ratio is capturing this compression between the family with the median level of wealth and the 90th percentile. Another way to see this is to look at the growth rates of mean wealth by wealth group. The bottom 50% and the 50-

75th percentile group saw their average wealth increase 3.40 and 2.94 times between 1990 and 2018 respectively. The 75-90, 90-95, 95-99th percentile groups all had growth in average wealth between only 2.55 and 2.65 times for the period. Lastly, the top 0.1% and the next 0.9% group saw a 3.95 and 2.85 times increase respectively. So, while all groups saw their wealth increase significantly over this period, growth rates were somewhat u-shaped across the wealth distribution, with those at either end growing fastest.

Overall, the results of this exercise suggest that while wealth inequality remains an issue, the top 1% own 17.5% of all wealth, the trends do not suggest that things are getting significantly worse over time. These results are robust to alternative specifications and generally corroborate the estimates of top wealth shares found in the raw survey data more than the Pareto-interpolated estimates. These trends also hold whether looking at wealth shares or at other measures such as the Gini coefficient.

6 Analysis

The results of the previous section leave some pressing questions. The first question is why wealth inequality, despite rampant discussion of its increased prevalence, does not appear to be increasing in Canada. In fact, the level of wealth inequality as measured by the top 1% share appears to be no higher than it was 20 years ago. The second question is why the level and trend are so different from other countries like the United States. The results from Saez & Zucman (2020) suggest that the top 1% share in the US is over 35%, double that of Canada. In this section, I will explore these questions under two lenses: portfolio composition and savings versus capital gains.

The portfolio composition lens looks at the trends in the portfolio holdings of different wealth groups over time. Recent research, from Kuhn et al. (2020) and others, has discussed the role that relative asset prices can play in shaping the distribution of wealth. For example, a large relative increase in the value of housing will lead to increased wealth for the middle class and a decline in the top 1% share of wealth. Looking at whether changes in the wealth distribution are driven by changing asset portfolios or within-asset concentration can provide clues about how the wealth distribution is changing over time.

The savings versus capital gains lens focuses more on the role played by differential savings rates across the distribution and capital gains. Saez & Zucman (2016) use a concept of *synthetic savings rates* to approximate the savings rate of different wealth groups given their income in a given year and aggregate measures of capital gains for an asset class. Breaking this down highlights whether changes to the wealth distribution are being driven by capital gains on existing assets or changing savings or borrowing rates by different groups or into different assets.

6.1 Portfolio Composition

To better understand the dynamics of top wealth shares requires understanding the role played by the composition of assets both within a wealth group's portfolio and across the entire economy. Figure 7 plots each asset's share of wealth within the portfolio of different wealth groups over time. There are a few interesting observations. First, the importance of pensions and principal residences for the wealth of those not in the top 1% cannot be overstated. For the bottom 75%, principal residences and pensions make up 84% of their wealth in 2018, while it is just 16% of the portfolio of the top 1%. The reverse is apparent for Canadian equities. For the bottom 75% and 75th-90th percentiles, equities make up only 3% and 5% of their portfolios in 2018 respectively, compared to 33% for the top 1%.

This portfolio heterogeneity provides an opportunity to discuss top wealth shares by looking at the evolution of different assets in the economy over time. This is because changes to these different assets, such as prices or their availability, can affect wealth groups - and top wealth shares - as a result of the fact that each wealth group has a different portfolio. This can be seen concretely from the fact that a wealth group's wealth share can be written in terms of the aggregate share of each asset and the share of the asset held by that group.

Suppose the wealth of a given wealth fractile, f, is the sum of the individual wealth of each

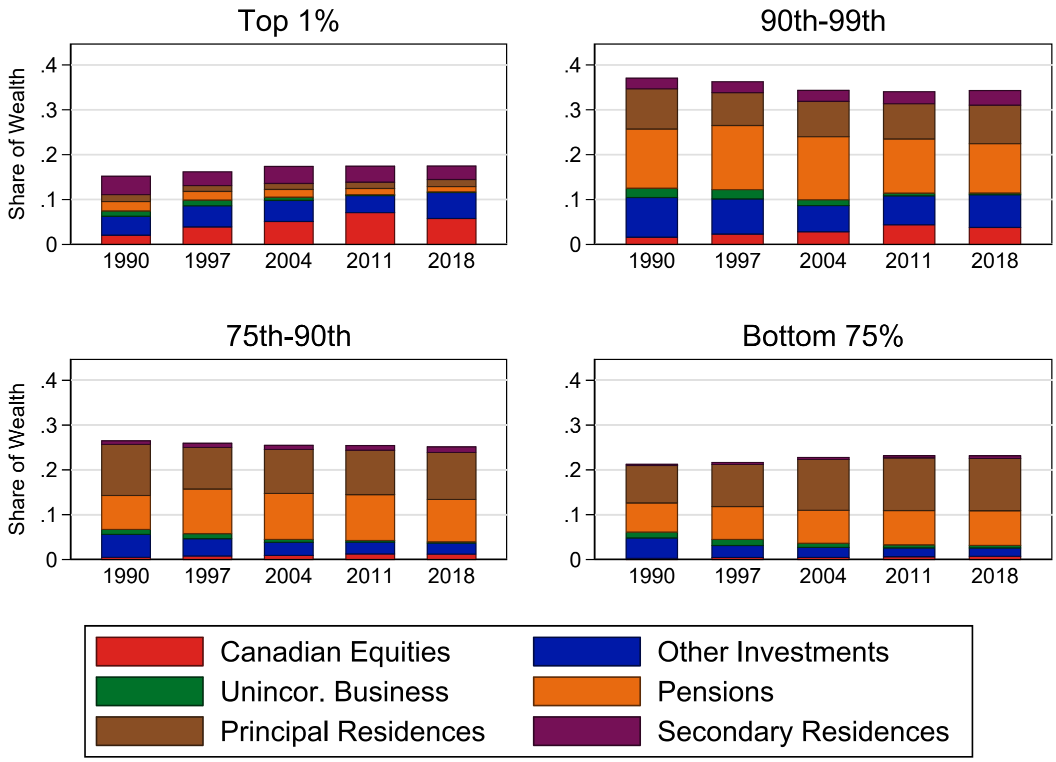

Figure 7: Portfolios of Wealth Groups Over Time

This figure presents the portfolios of different wealth groups over time using wealth calculated with the capitalization method. Each bar's height corresponds to the share of overall wealth held by that wealth group in a given year. Each bar is divided into the components of wealth for each wealth group.

member of the fractile, which is the sum of assets held by each individual.

$$\hat{W}^f = \sum_i W^i = \sum_i \sum_j \frac{W_j}{I_j} I_j^i$$

The share of wealth going to wealth fractile sh_w^f, is just $\frac{W^f}{W}$, into which we can substitute the expression above. This expression can be simplified into the following expression:

$$sh_w^f = \sum_j \sum_i \frac{W_j}{W} \frac{I_j^i}{I_j} = \sum_j \frac{W_j}{W} \frac{I_j^f}{I_j} = \sum_j \omega_j \psi_j^f \tag{1}$$

where ω_j is the aggregate share of the given asset and ψ_j^f is the share of asset j going to fractile f. This says that the share of wealth going to a given fractile, f, is equal to a weighted average of asset specific wealth shares where the weights are the aggregate share of that asset in the overall economy.

This expression provides a useful framework for thinking about how wealth shares change over time. When within-asset concentration, ψ_j^f rises, the share of wealth going to a given group, f, rises as well. For aggregate wealth shares, ω_j, the interpretation is somewhat more nuanced since $\sum_j \omega_j = 1$. In this case, an increase in the aggregate share of an asset that is more concentrated than wealth overall for that group will lead to an increase in the wealth share of the group. However, if the asset is less concentrated than wealth overall, an increase in the aggregate share will lead to a decrease in the overall wealth share.

Based on this framework, Figure 8 plots aggregate asset shares, ω_j (left-panel), and the share of each asset going to the top 1%, ψ_j^f (right-panel), over time. This figure helps illustrate part of why the top 1% wealth share is not overly large and has only risen modestly over this period. First, Canadian equity, the most unequally distributed asset, has remained fairly stable for most of the period. The only exception was from 1990 to 2008, when the aggregate share of Canadian equity rose significantly. This coincided unsurprisingly with the fastest increase in the top 1% wealth share during this time. However, the amount of Canadian equity in the economy as a whole severely limits the magnitude of the top 1% share. To see this, note that in 2018, the top 1% owned half of all Canadian equity, but if we were to assign them all Canadian equity, the top 1% share would only rise by 6%. This is because Canadian equity only makes up 12% of aggregate wealth. The second reason is because housing has been increasing as a share of aggregate wealth since 2000, but the concentration of housing wealth has remained fairly stable. As a result, this has put downward pressure on the top 1% wealth share.

Of course, there are a number of trends happening at once and some present opposing implications for the top 1%. In order to decipher the overall impacts, an Oaxaca-Blinder decomposition can be used according to Equation 1. The difference in wealth shares for a given group over time can be written as:

$$sh_w^{18} - sh_w^{90} = \sum_a \omega_a^{18}\psi_a^{18} - \sum_a \omega_a^{90}\psi_a^{90}$$

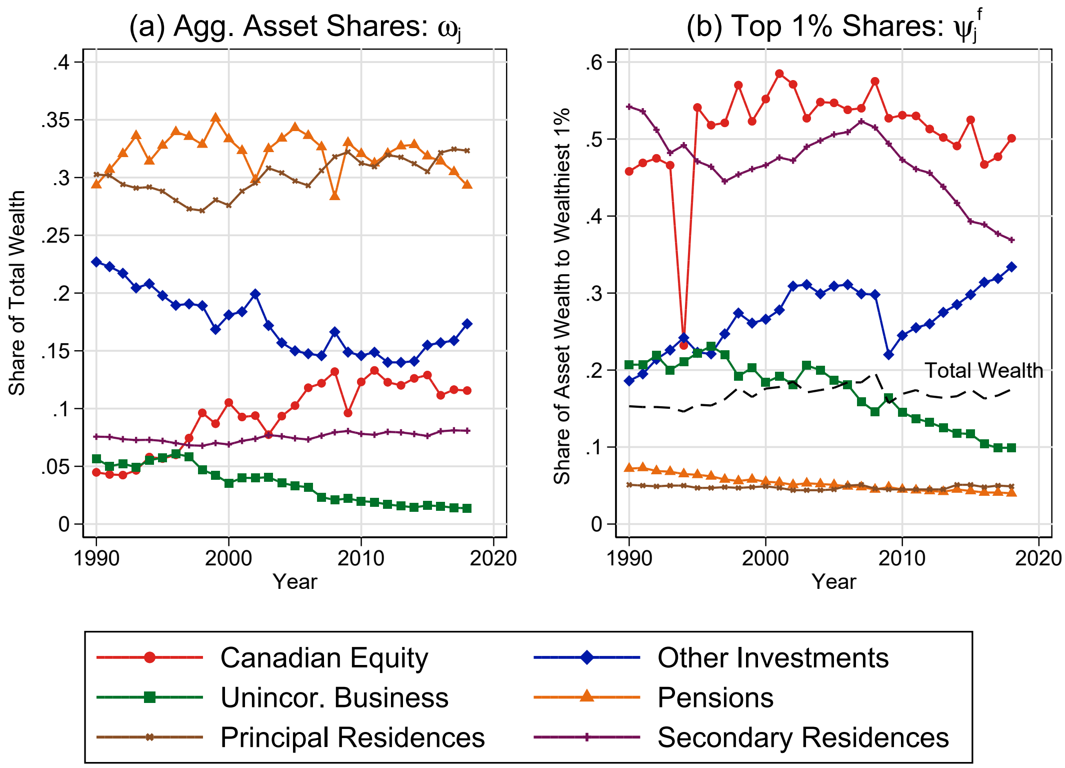

Figure 8: Breaking Down Wealth by Asset

This figure plots the breakdown of the top 1% wealth share by the aggregate asset share (left-panel) and the share of each asset held by the top 1% (right-panel). Wealth is estimated using the capitalization method and the unit is the census family. The top 1% wealth share is also indicated with the dotted line.

Adding and subtracting $\sum_a \omega_a^{18}\psi_a^{90}$, means the above expression can be re-written in terms of the component that is explained by changing aggregate wealth shares and the component that is explained by changing within-asset concentration.

$$sh_w^{18} - sh_w^{90} = \sum_a \underbrace{\psi_a^{90}(\omega_a^{18} - \omega_a^{90})}_{\text{agg. asset shares}} + \sum_a \underbrace{\omega_a^{18}(\psi_a^{18} - \psi_a^{90})}_{\text{within-asset concentration}} \tag{2}$$

The results of this decomposition are presented in Table 5. This shows that the change to the aggregate composition of assets contributed more on net to the change in total wealth than changes to within-asset concentration on net. That is, the change in the total wealth share was 2.26 percentage points between 1990 and 2018 and the change explained by different aggregate wealth shares was 1.74 percentage points, while within-asset concentration was only 0.51 p.p. This

	1990 to 2018
Change in Total Wealth Share	2.26
Changes in Aggregate Wealth Shares, ω_j	1.74
Changes in Share of Asset to Top 1%, ψ_j	0.51
Equity	0.50
Other Investments	2.57
Unincor. Business	-0.15
Pensions	-0.94
Principal Residences	-0.06
Secondary Residences	-1.40

Table 5: Oaxaca-Blinder Decomposition of Change in Top 1% Share

This table presents the results of the Oaxaca-Blinder decomposition shown in Equation 2. It tells us the change in top 1% wealth share between 1990 and 2018 that can be explained by changing the aggregate wealth composition and the shares of each asset going to the top 1%. The change in the share of each asset going to the top 1% is further broken down into the role each asset played.

means the increase in aggregate equity share did still play a role in increasing wealth concentration, just a fairly modest one.

This top-level result though masks the fact that there was a lot of variation across assets. The change in concentration of the other investments category would have increased the top 1% share by 2.57 p.p., but this was offset by would be decreases from secondary residences and pensions. Overall, neither the most prominent assets by aggregate share nor the most unequally distributed assets moved in directions that would increase the top wealth share for much of this period. This helps to explain why the top 1% share overall has remained fairly constant over time.

6.2 Wealth Shares In Context

A second approach to better understanding the trends in the top wealth shares is to put it in the context of other estimates of wealth, both existing Canadian estimates and internationally.

While the previous paragraphs looked at how the capitalization method compared to other Canadian estimates, it is also helpful to see how they compare to other international estimates that employed the capitalization method. Figure 9 plots the top 1% wealth share for Canada alongside the United States (Saez & Zucman, 2016) and France (Garbinti et al., 2020). What this figure shows is that the top 1% share in Canada is lower than in some other countries even when

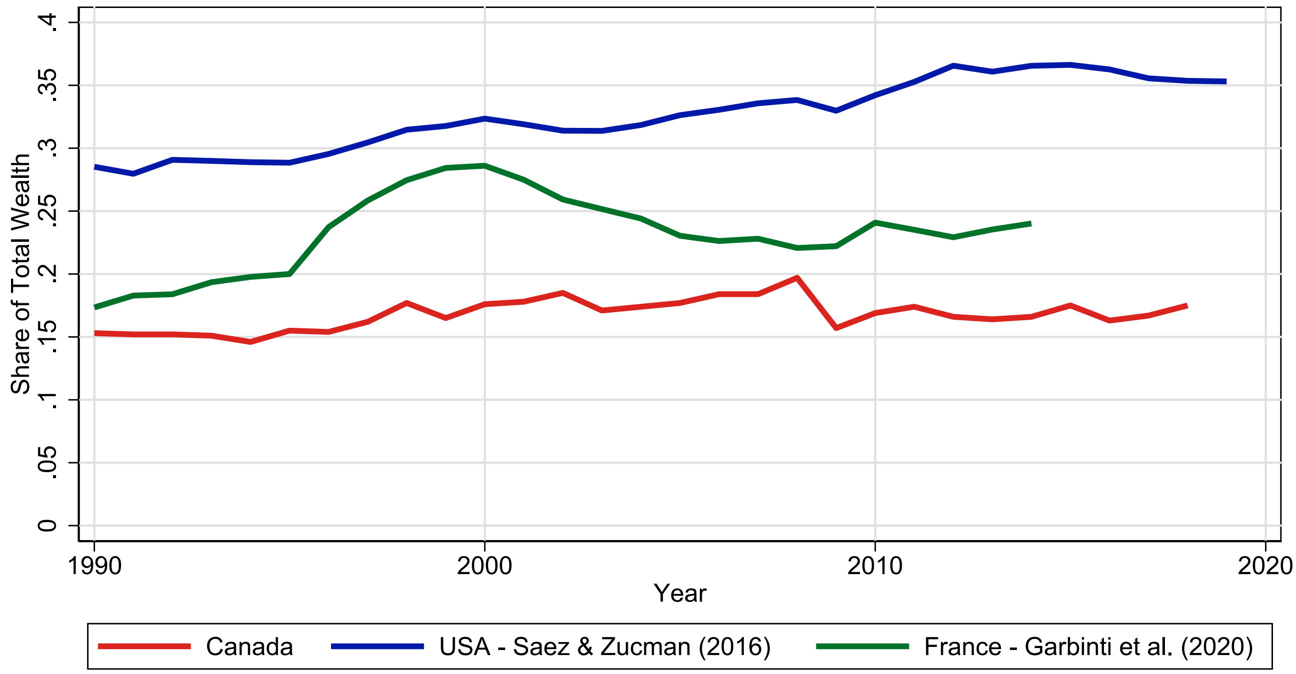

Figure 9: International Estimates of the Top 1% Wealth Share

This figure presents the share of wealth held by the wealthiest 1% for Canada, the USA and France between 1990 and 2019. The United States estimates come from Saez & Zucman (2016) and the distributional national accounts they update. The French estimates come from Garbinti et al. (2020). Both these estimates use the capitalization method as well.

using the same approach. In 1990, the top 1% share was 28.5% in the US, 15.3% in Canada and 17.3% in France. By 2014, the US sat at 36.6%, Canada at 16.6% and France at 24%.

To gain a better understanding of why Canada has a significantly lower wealth share than these two countries, it helps to again look at the asset breakdown in each country. Figure 10 plots the aggregate share of different assets in Canada, France and the United States. Canada and the United States have a similar overall composition of assets except that Canada has a larger share of housing on aggregate and a lower share of business assets (equities and non-corporate businesses). This composition of assets would indicate that the United States would have a higher top 1% wealth share given that business assets are more unequally distributed. France has a lower share of pensions[14], but a higher share of business assets and housing, which also points to a higher

[14]France having a low share of pensions may seem surprising on the surface, but when considering the definition of wealth used in these papers makes more sense. France has a much higher pension replacement rate - the government pension entitlement received by someone with average pre-retirement income net of taxes as a share

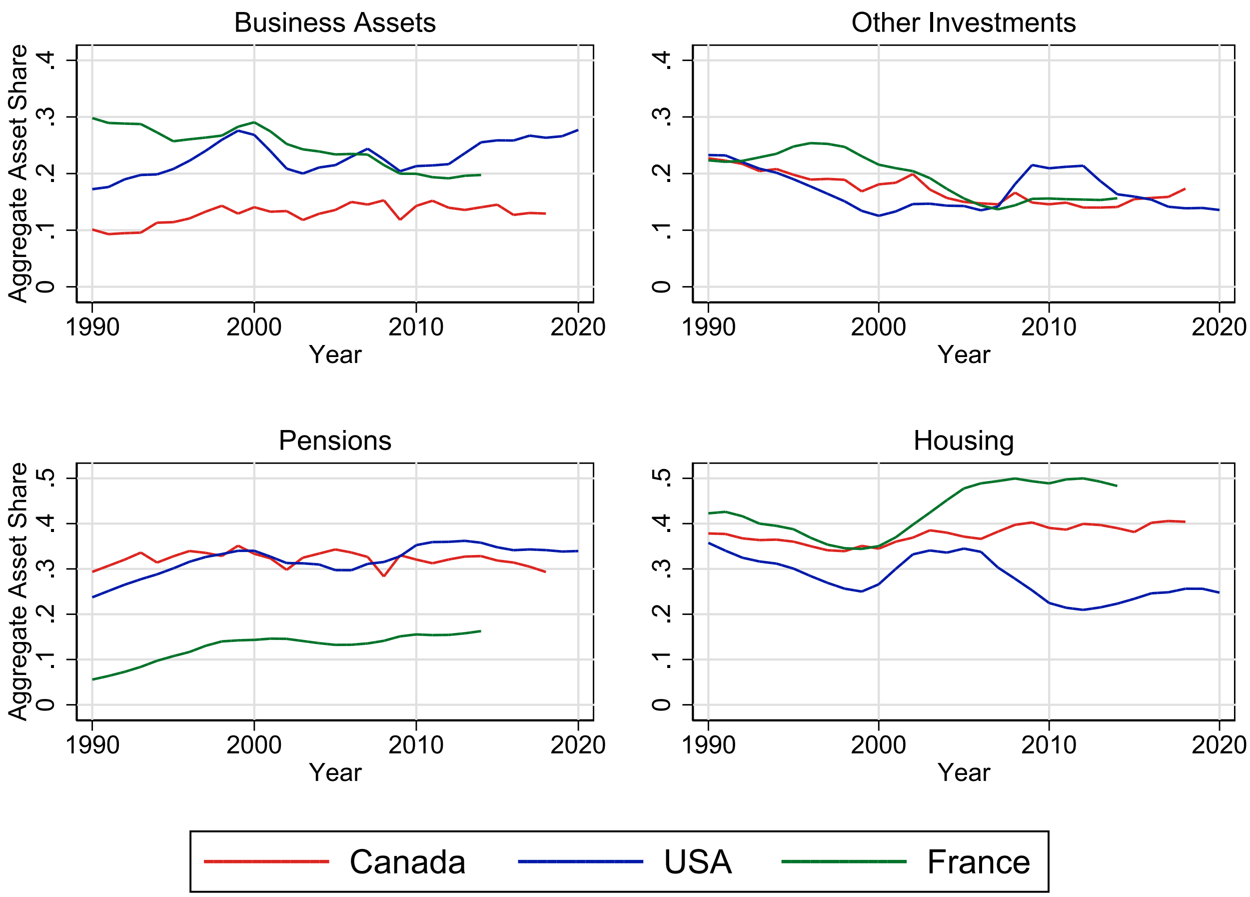

Figure 10: Comparing Aggregate Shares By Asset Across Countries

This figure plots the aggregate wealth share of each asset in Canada, the United States (Saez & Zucman, 2016) and France (Garbinti et al., 2020) between 1990 and 2020. Business assets includes equities and unincorporated business wealth.

top 1% wealth share. Figure 11 plots the within-asset concentration in the three countries across assets. Canada has less concentration is every asset class compared to the United States, but has more concentration than France in terms of equities and other investments.

In order to properly disentangle which effects dominate, Table 6 shows the results of the Oaxaca-Blinder decomposition done in Section 6.1. This yields some interesting results. First, the aggregate wealth composition in Canada reduces the top 1% wealth share by between 3-4 p.p. compared to France and the USA holding the Canadian within-asset concentration constant.

of pre-retirement income - than Canada. France has a 70% replacement rate, while Canada only has a 50% replacement rate. (OECD, 2019). This could result in less pension saving through employer-pension plans or individual retirement vehicles like an RRSP.

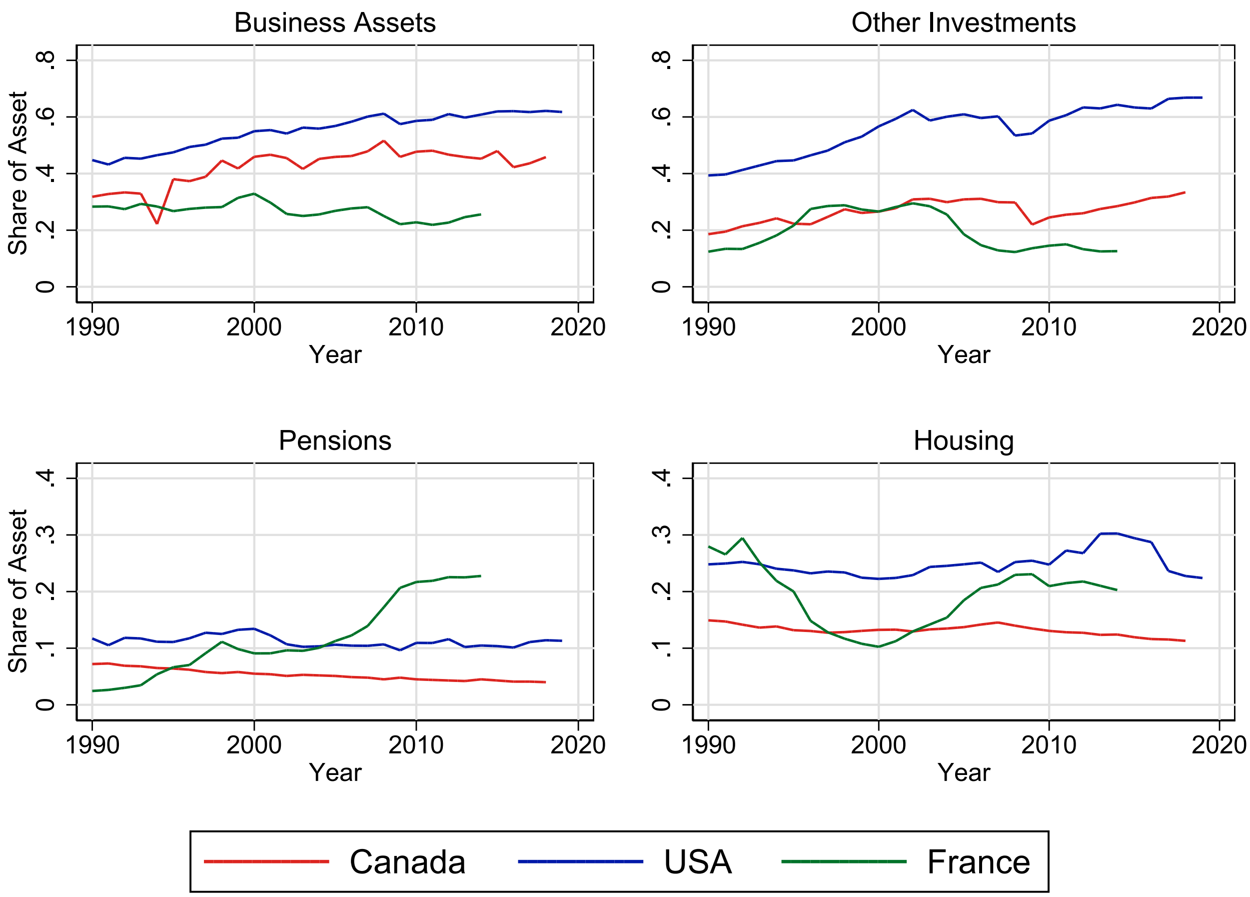

Figure 11: Comparing Within-Asset Shares By Asset Across Countries

This figure plots the within-asset concentration of each asset in Canada, the United States (Saez & Zucman, 2016) and France (Garbinti et al., 2020) between 1990 and 2020. Business assets includes equities and unincorporated business wealth.

While compared to France, this closes virtually the entire gap between the countries in 2014, but it hardly puts a dent in the gap with the United States. This suggests that the difference between Canada and France is somewhat superficial. If the more generous French government pensions were counted as part of wealth, their top 1% share would likely look more like Canada's. However, the difference with the United States is much more fundamental. The United States just has a lot more concentration at the top with every asset class.

By putting the top 1% wealth shares in the context of other estimates, it becomes clear that what is stopping the Canadian share from being much higher is that within-asset concentration is

	Countries	
	France	USA
Difference in Total Wealth Share	3.82	19.85
Difference in Aggregate Wealth Shares, ω_j	3.43	3.90
Difference in Share of Asset to Top 1%, ψ_j	0.39	15.95
Business Equity	-3.89	3.98
Other Investments	-2.49	5.85
Pensions	2.97	2.14
Housing	3.79	3.98

Table 6: Oaxaca-Blinder Decomposition of Change in Top 1% Share Between Countries, 2014

This table presents the results of the Oaxaca-Blinder decomposition shown in Equation 2. It tells us the change in top 1% wealth share between Canada, the United States and France that can be explained by changing the aggregate wealth composition and the shares of each asset going to the top 1%. The change in the share of each asset going to the top 1% is further broken down into the role each asset played.

somewhat small relative to the United States or the Pareto-interpolation method. However, the composition of assets, in particular the level of housing wealth making up the Canadian aggregate portfolio, also serves to reduce the share of wealth held by those at the top because these assets are more widely held.

6.3 Synthetic Savings and Capital Gains

While the section above provides some interesting insights on a high level about how different assets shape the top 1% share of wealth, the objects are highly endogenous. The change in an asset's aggregate share or within-asset concentration is driven by both changes in prices and transactions by agents across the distribution. This section will explore this issue in some detail.

To dig into this question first requires data that can help distinguish whether the change in the NBSAs from year to year is due to changing prices or transactions. This data is available from the Financial Flow Accounts, transactions, and the Other Changes in Assets Accounts, capital gains. Together the two add up to the difference in the NBSAs from one year to the next. Figure 12 plots the cumulative increase in wealth by capital gains and financial flows. While financial flows dominated on aggregate for the first half of the period, capital gains have taken over as the primary source of wealth increases in recent years.

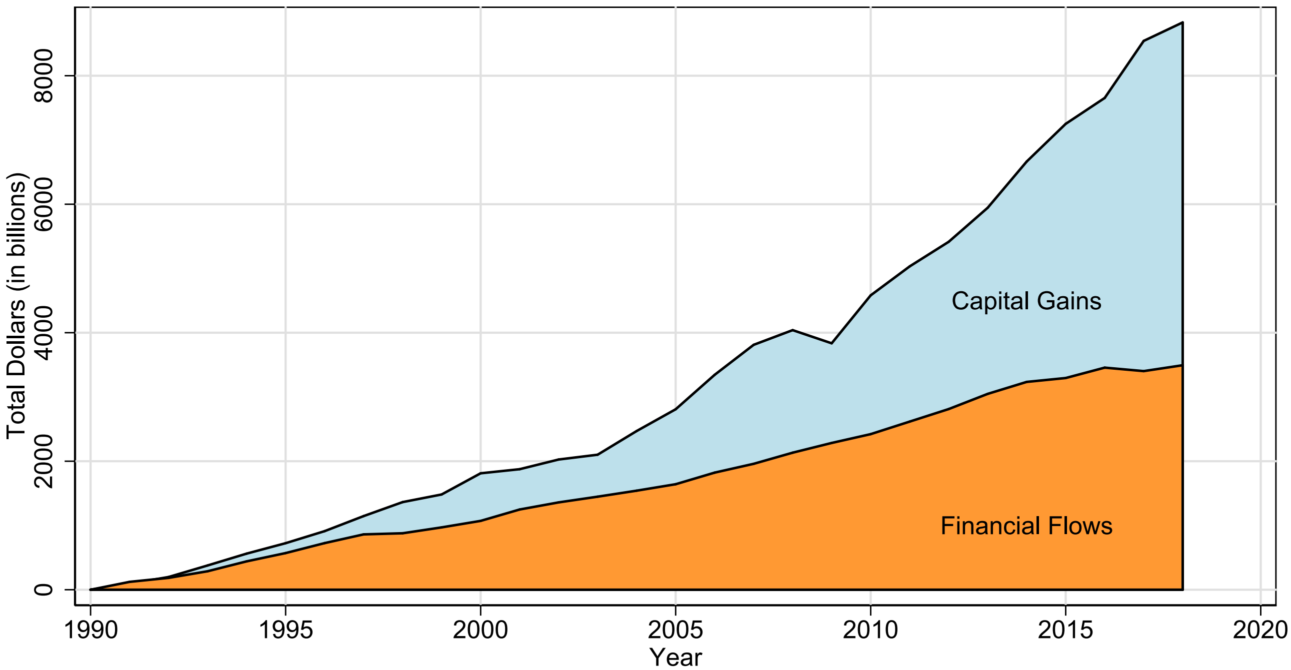

Figure 12: Cumulative Increase in Wealth By Type of Gain

Some adjustments are made in order to properly match the financial flows to the categories used in the capitalization method. First, housing investment is reverse-engineered using the Federal Reserve Bank of Dallas's international housing price index. The change in price is calculated using the index and the remaining change in the asset value in the NBSAs is attributed to housing investment. This serves to increase the level of household savings above that registered in the Current and Capital Account. Second, investment in equities is negative for many years in the national accounts. To deal with this, I follow Saez & Zucman (2016), who correct for this by assigning retained earnings (undistributed corporate profits) in the corporate sector to household investment in equities. This makes sense because had these retained earnings been otherwise distributed to shareholders and then used to buy new shares in the company to finance new investment, it would have been recorded as investment by the household sector. The capital gains and flows shown in this section, reflect these adjustments.

By mapping these investments to the categories used in the capitalization method, Figure 14 shows how the capital gains and financial flows differ across different asset categories. Here, it is

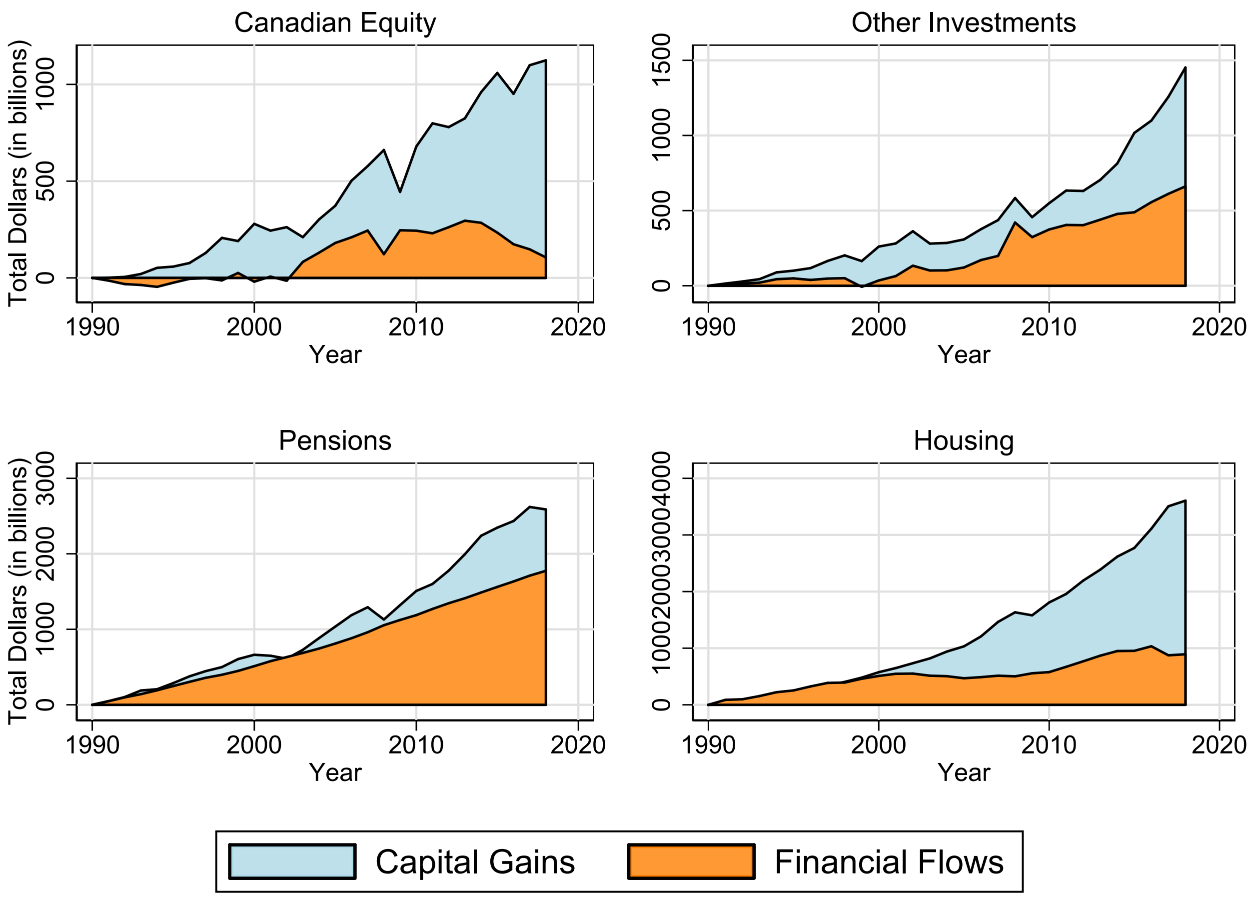

Figure 13: Breaking Down Cumulative Increase in Wealth by Asset

clear that even after correcting for corporate investment, the growth of Canadian equity has been primarily driven by capital gains rather than investment. For housing, investment dominated gains in the 1990s, but has since slowed down with capital gains accounting for most of the increase since 2000. Pensions on the other hand have been driven mainly by contributions.

These figures show how capital gains and financial flows are broken down at the aggregate asset level, but do not say anything about how these effects vary across the wealth distribution. To look into this, note that a change in the stock of an asset held by an individual can be decomposed into the gain and amount of savings invested in it.

$$W_{t+1}^{i} = \left(1 + q_t^i\right) \cdot \left(W_t^i + S_t^i\right) \tag{3}$$

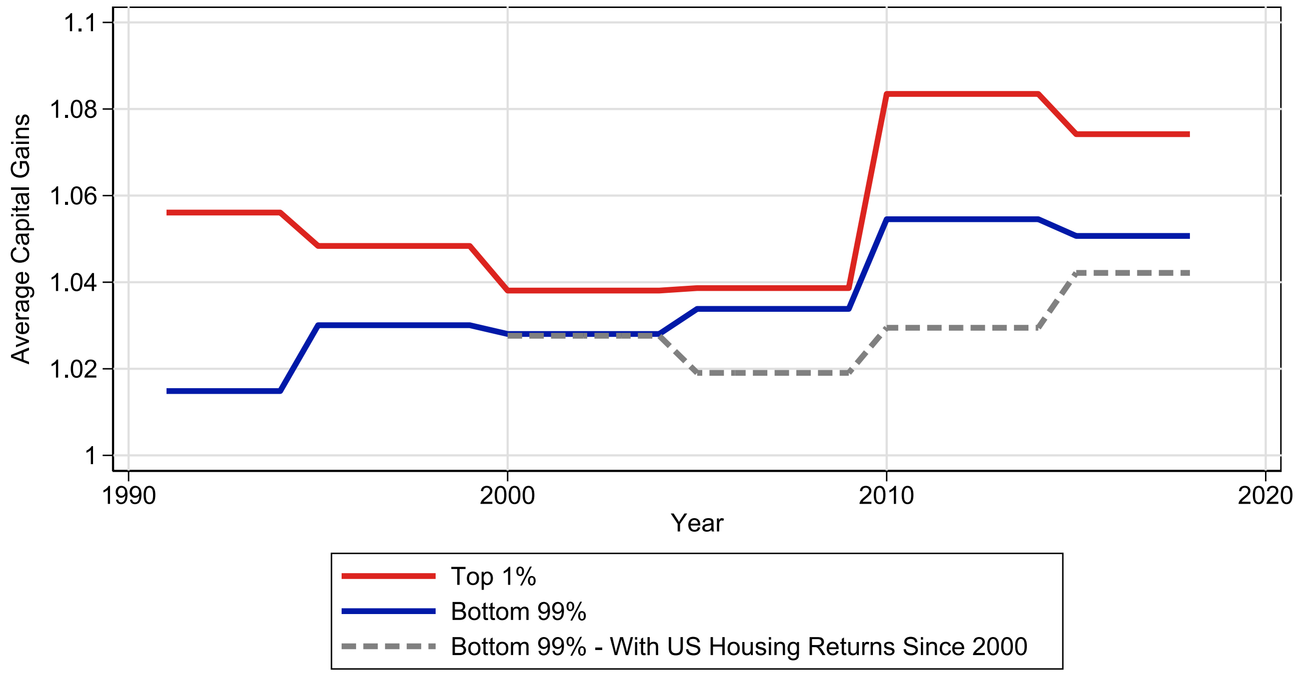

Figure 14: Average Capital Gains by Wealth Group

This figure plots the average capital gain across five year periods for the top 1% and the remaining 99%. Capital gains are estimated using the Financial Flow Accounts and the Federal Reserve Bank of Dallas's international housing price index and weighted using portfolio shares based on wealth estimates using the capitalization method.

The *synthetic savings* (Saez & Zucman, 2016) of a group, can be then defined as:

$$W_{t+1}^{p} = (1 + q_t^p) \cdot (W_t^p + S_t^p) \tag{4}$$

where p represents a wealth group, q_t^p represents the weighted average (by portfolio composition) of capital gains for each asset, W_t^p is the stock of wealth held by each group and S_t^p is the level of savings. This is called "synthetic" because the people comprising the actual group (eg. the top 1%) may change from year to year.

The key idea is that, if you can observed the stock of wealth held by each wealth group and the capital gains for each asset class, then you can infer the level of savings for each wealth group. Using the capital gains inferred from the Financial Flow Accounts and the distribution of wealth estimated using the capitalization method, one can back out the savings rate and capital gains for

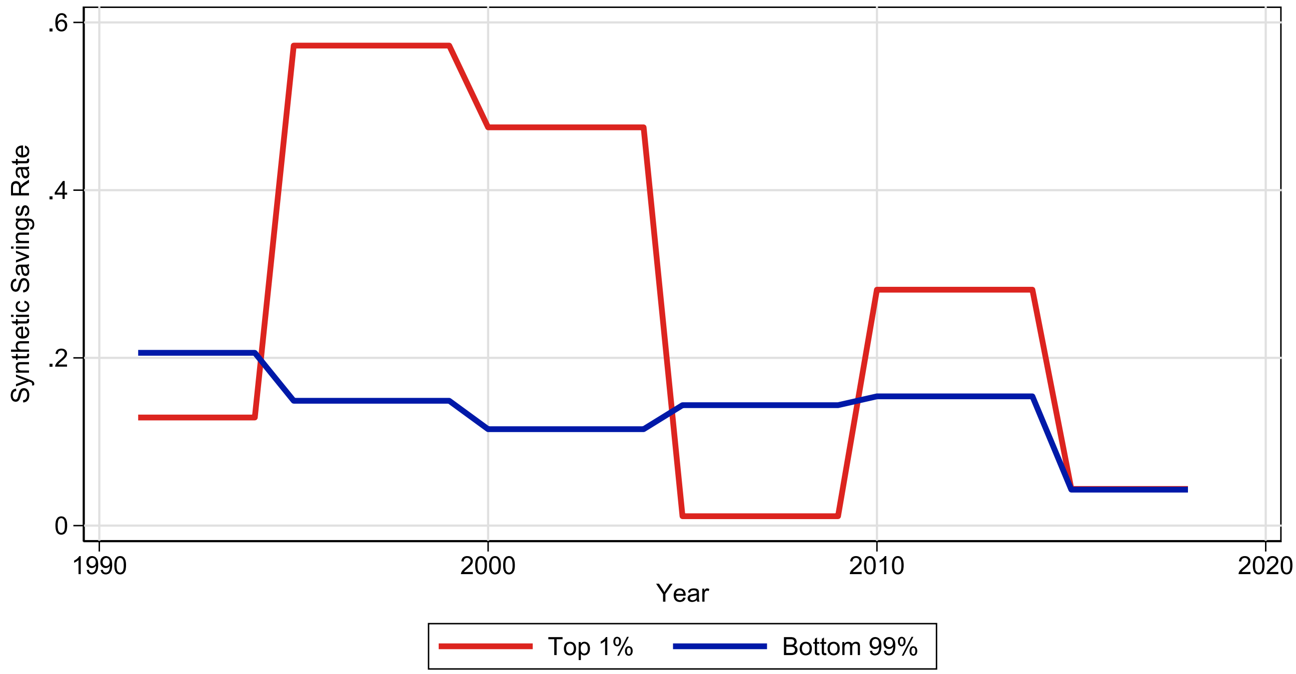

Figure 15: Synthetic Savings by Wealth Group

each wealth group.

The results for the rate of capital gains are presented in Figure 14. This figure shows the capital gain, $1 + q_t^p$, averaged over five year periods[15] from 1990 to 2018, by wealth group. While the top 1% earned larger capital gains than the rest of the population for the entire period, the gap narrowed and then expanded again only recently. This suggests that when wealth inequality was growing between 1995 and 2008, it was likely not because of significantly larger capital gains. The role of strong returns on housing is also apparent in maintaining a smaller gap in capital gains between groups. The bottom 99%'s average capital gain is plotted under the case where housing prices followed those in the United States since 2000. The trend, especially around 2008 suggest much lower rates of return for the bottom 99% than actually occurred. The steady rise in capital gains for the bottom 99% likely played a key role in preventing greater wealth inequality.

Alternatively, Figure 15 plots the synthetic savings rate as a share of income. The synthetic savings rate appears to correlate much more strongly with the periods of increasing wealth inequal-

[15] The measure was too noisy when plotted annually

ity in the Canadian data. The synthetic savings rate for the top 1% was over 40% between 1995 and 2005, a period that saw the largest increase in wealth inequality in Canada. In addition, the gap between the groups closed in recent years, a period when wealth inequality has held relatively stable. As a result, changes to the savings rate of the top 1% in Canada seems to explain much more clearly the observed trends.

This result is relevant to the ongoing debate surrounding the causes of wealth inequality (Hubmer et al., 2020). Some of the primary explanations for trends in wealth inequality surround differential savings rates as well as changes in asset prices. These results provide some evidence that differential savings rates - and changes in them - are better explanations in the Canadian context, than different capital gains alone.

7 Conclusion

This paper provides novel, annual estimates of wealth inequality in Canada using the capitalization method of Saez & Zucman (2016). I find that wealth inequality in Canada is low by international standards, the top 1% share of wealth was only 17.5% in 2018 compared to 35% in the United States. While somewhat low, these results are corroborated the values seen in the wealth surveys. The major differences between Canada and the United States stem from lower levels of within-asset concentration across all assets - the rich in Canada just are not as rich as their American counterparts.

These estimates also allow for the study of trends in wealth inequality over time. By estimating the "synthetic savings" of different wealth groups, these estimates also help shed light on the role of differential savings rates in affecting top wealth shares. When the top 1%'s synthetic savings rate was high relative to the rest of the population, such as in the late 1990s and early 2000s, the top 1% wealth share was increasing as well. When the difference between the two dropped after 2008, the top 1% share stopped increasing. While this is simply circumstantial, it provides some cursory evidence of the importance and existence of differential savings rates.

There are some limitations to be aware of as well. This approach relies upon the fact that the rich are receiving dividends and capital gains on their equity assets at the same rate as the rest of the population. However, there is a possibility that they are keeping some of these capital flows inside a corporate structure where they are not reported on the personal income tax form. This could lead these estimates to be an underestimate of overall wealth inequality. Future research that can link corporations to personal income taxes could held shed light on this phenomenon.

Lastly, these results carry some important implications for the discussion surrounding wealth taxes. Recent wealth tax proposals of a 1% wealth tax on fortunes above $20 million were reported to bring in $5.6 billion in revenue. However, these estimates suggest that revenue might in fact be lower. Using the top 0.1% threshold of $16.7 million in 2018, a 1% wealth tax would generate $3.2 billion. This is also before considering that housing and pensions, which make up around a third of the portfolio of the top 1%, are either tax-exempt or tax-deferred assets at the moment. That is to say, a more lucrative route towards raising revenue while taxing wealth is to eliminate the capital gains exemption for primary residences or reconsidering the tax treatment of individual retirement savings vehicles like the RRSP. Otherwise, there is just not enough wealth at the top end of the distribution to have much of an impact.

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